

Faculty of Engineering & Technology

Department of Civil Engineering



2-Year Full-Time Program

Master of Technology in Civil Engineering (Structural Engineering/ Transportation Engineering/ Remote Sensing and GIS)

With Effect from Year 2025



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1. NATURE AND EXTENT OF THE PROGRAM

A Master of Technology in Civil Engineering is a postgraduate program that focuses on advanced studies and research in various aspects of civil engineering. The program is designed to provide students with a deeper understanding of theoretical concepts, practical applications, and research methodologies in the field of civil engineering.

Master of Technology in Civil Engineering offers specializations in areas such as Structural Engineering, Geotechnical Engineering, Transportation Engineering, Environmental Engineering, Water Resources Engineering, and Construction Management.

The curriculum typically includes a mix of core courses, elective courses, and a research-based thesis or project. Core courses cover fundamental principles of civil engineering, while elective courses allow students to develop into specific areas of interest. The nature of Master of Technology in Civil Engineering is characterized by its focus on advanced education, research orientation, practical application, and a commitment to preparing graduates for successful careers in civil engineering. The program is designed to provide a well-rounded and in-depth understanding of the chosen specialization while fostering critical thinking and research skills.

A significant component of Master of Technology in Civil Engineering is the research work and the completion of a thesis. Students are required to identify a research topic, conduct a literature review, and undertake original research under the guidance of a faculty advisor. The thesis work provides an opportunity for students to contribute to the existing knowledge in their chosen specialization.

The Master of Technology in Civil Engineering program is typically delivered through a combination of classroom lectures, student's interactive sessions, industry expert lectures, seminars, hands-on workshops, live projects, laboratory sessions, Thesis writing and practical training.

Upon completion of the program, Graduates with an Master of Technology in Civil Engineering can pursue careers in various sectors, including construction and infrastructure development, consulting firms, research and development organizations, government agencies, and academia. Job roles may include structural engineer, geotechnical engineer, transportation planner, environmental consultant, and project manager.

In conclusion, Master of Technology in Civil Engineering provides students with the knowledge, skills, and research capabilities needed to excel in the field and contribute to advancements in civil engineering practices. The extent of Master of Technology in Civil Engineering program is dynamic and ensure graduates are well-prepared for the challenges and opportunities in the field of civil engineering.



2. PROGRAM EDUCATION OBJECTIVES (PEOs)

After completing Master of Technology in Civil Engineering, students will be able to:

PEO No.	Education Objective
PEO1	Graduates of the program will have in-depth knowledge to identify and formulate challenging problems of Civil Engineering, apply appropriate research methodologies, use modern engineering tools and provide economical and sustainable solutions.
PEO2	To develop the design capability among students so that have the ability to innovate, develop and implement it in various interdisciplinary fields of civil engineering.
PEO3	To promote quality research and undertake research projects related to experimental investigation and use of software techniques, keeping in view the present and future needs of the civil industry.
PEO4	To develop the post-graduate civil engineers to undertake safe, economical and sustainable design of civil and other structures.
PEO5	To inculcate in the students the sense of ethics, morality, professionalism, creativity, leadership, independent thinking and self-confidence.



3. GRADUATE ATTRIBUTES

Sl. No.	Attributes	Description
1	Pool of knowledge	Apply knowledge of civil engineering
		fundamentals and an engineering specialization
		to the solution of challenging civil engineering
		problems.
2	Critical thinking	Real-world experience through internships and
		practical training including Problem
		Identification, Analysis of Data, Risk Assessment and Analyze complex engineering
		problems contributes significantly to the
		development of critical thinking abilities in civil
		engineering professionals.
3	Problem solving	Conduct investigations of civil engineering
		complex problems using research-based
		knowledge and research methods including
		design of experiments, analysis and
		interpretation of data and synthesis of
		information to provide valid conclusions.
4	Research skill	Develop the ability to search for, locate, extract,
		organize, evaluate and use or present
	26.1	information that is relevant to a particular topic.
5	Modern tool usage	Integration of modern tools in civil engineering
		enhances efficiency, accuracy, and
		collaboration throughout the entire lifecycle of a construction project—from planning and
		design to construction and maintenance.
6	Collaborative and	Embracing diverse perspectives and expertise
	multidisciplinary work	enhances the industry's ability to address
	mundiscipinary work	complex challenges and contribute to
		sustainable, resilient, and efficient infrastructure
		development.
7	Project management	Demonstrate knowledge and understanding of
		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.



8	Communication	Ensures that all stakeholders are well-informed, promotes collaboration, and helps manage challenges effectively, ultimately contributing to the successful planning, design, and implementation of infrastructure projects.
9	Life-long learning	Recognize the need to have a natural drive to explore, learn and grow to improve self-quality of life and sense of self-worth by paying attention to the ideas and goals in the field of Civil Engineering.
10	Ethical practices and social responsibility	Understand the impact of professional engineering solutions in societal and ethical contexts and apply ethical principles and commit to professional ethics responsibilities and norms of engineering practice.
11	Independent and reflective learning	Recognize the need for and have the preparation and ability to Engage in independent and reflective learning in the broadest context of technological Change.



4. QUALIFICATION DESCRIPTORS:

The Master of Technology in Civil Engineering program is designed to provide students with advance education in the principles and practices of civil engineering. The qualification descriptor of the Master of Technology in Civil Engineering program includes:

1. Knowledge & Understanding:

- Demonstrate a dedicated understanding in field of civil engineering, its different learning areas and applications, and its linkages with related disciplinary areas/subjects.
- Demonstrate procedural knowledge that creates different types of professionals related to the specialized domain of civil engineering, including research and development, teaching and academics and also the industrial sector.
- Aware about eco-friendly construction materials, energy-efficient design, and sustainable urban development to address environmental concerns with emphasis on sustainable practices in civil engineering.

2. Technology & Skill:

- Exposes students to cutting-edge technologies and innovations in civil engineering. This may include advancements in materials, construction techniques, smart infrastructure, and the integration of digital tools like Building Information Modeling (BIM) and simulation software.
- Acquire knowledge of project management principles, including planning, scheduling, budgeting, and resource allocation. This prepares them for leadership roles in managing complex engineering projects.
- Acquire understanding of national and international codes and standards relevant to civil engineering practices. Adherence to these codes ensures that projects meet regulatory requirements and industry benchmarks.



3. Communication and Competence:

- Development of effective communication and presentation skills. Students learn to convey complex engineering concepts to diverse audiences, including technical and non-technical stakeholders.
- Aware students to global challenges and international best practices in civil engineering. This includes exposure to case studies and projects from around the world, allowing students to apply a global perspective to their work.

Overall, Master of Technology in Civil Engineering program aims to produce graduates who possess a deep understanding of their chosen specialization, are capable of conducting independent research, and can apply their knowledge to address real-world civil engineering challenges. The curriculum is designed to balance theoretical knowledge with practical application, ensuring that graduates are well-prepared for leadership roles in academia, research, and industry.



5. PROGRAM OUTCOMES

PO No.	Attribute	Competency
PO1	Engineering knowledge	Student will be able to apply the knowledge of engineering to understand and analyse individual components related to the relevant specialization of Civil Engineering.
PO2	Research knowledge	Student will be able to carry out systematic research, design appropriate experiments and tools, and interpret experimental and analytical data for development of technological knowledge in civil engineering
PO3	Conduct research-based investigations of Complex Problems	Student will be able to design and conduct experiments, interpret, critically analyze data and carry out independent research on complex problems of civil engineering
PO4	Implementation of Advance Tools	Student will be able to create, adopt, and apply modern computational tools to analyze Civil engineering problems with understanding of limitations.
PO5	Engineer and Society	Student will comprehend their ethical and professional responsibilities while operating in inter-disciplinary engineering teams, with view on social responsibilities.
PO6	Life Long Learning	Students will be able to engage themselves in higher studies or life-long learning and keep on updating themselves with technological advance.



6. PROGRAM SPECIFIC OUTCOMES

PSO No.	Competency
	Graduates of the program will have in-depth knowledge to identify and formulate
PSO1	challenging problems in Structural/ Transportation/ Remote Sensing and GIS
1301	Engineering, apply appropriate research methodologies, use modern engineering
	tools and provide technically sound, economical and sustainable solutions.
PSO2	Graduates will have ability for higher studies and undertake high value research.
	Graduate of program will actively engage in a professional career as a Civil
PSO3	Engineer with sound analytical and lateral thinking ability to engage in lifelong
1303	learning for professional advancement to cope up with multidisciplinary and
	changing technologies in Civil Engineering.
	Graduates of the program will have sense of social responsibility, will
PSO4	demonstrate ability to communicate and work effectively as an individual or in a
P304	team having acquired leadership skills and manage projects in multidisciplinary
	environments.



7. COURSE STRUCTURE

SEMESTER - I

Course Code	Course Title		istri	edit buti s/We		Di	Marks istribut	
		L	T	P	C	IAE	ESE	Total
13160138	Research Methodology & IPR	3	0	0	3	40	60	100
13160107	Seminar	0	0	2	1	20	30	50
	hoose these subjects for specialization in I							
13160132	Pavement Materials	3	0	0	3	40	60	100
13160133	Urban Transportation System Planning	3	0	0	3	40	60	100
13160134	Geometric Design of Transportation Facilities	3	0	0	3	40	60	100
13160135	Ground Improvement	3	0	0	3	40	60	100
13160136	Pavement Materials Lab	0	0	2	1	20	30	50
13160137	Geometric Design Lab	0	0	2	1	20	30	50
	Choose these subjects for specialization i	n Stı	ruct	ural	Engi	ineerin	ıg	
13160114	Advance Pre-Stressed Concrete Design	3	0	0	3	40	60	100
13160115	Structural Dynamics	3	0	0	3	40	60	100
13160116	Matrix Methods of Structural Analysis	3	0	0	3	40	60	100
13160117	Design of Concrete Structural Systems	3	0	0	3	40	60	100
13160118	Matrix Methods of Structural Analysis Lab (STAAD PRO)	0	0	2	1	20	30	50
13160119	Design of Concrete and Structural Systems Lab (STAAD PRO)	0	0	2	1	20	30	50
	Choose these subjects for specialization in	Rer	note	Sen	sing	and G	IS	
13160143	Principles of Remote Sensing	3	0	0	3	40	60	100
13160108	Geographical Information Systems	3	0	0	3	40	60	100
13160139	Photogrammetry	3	0	0	3	40	60	100
13160140	Application of Remote Sensing	3	0	0	3	40	60	100
13160141	Geographical Information Systems Lab	0	0	2	1	20	30	50
13160142	Photogrammetry Lab	0	0	2	1	20	30	50
	Total	15	0	6	18	260	390	650

Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, C: Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

SEMESTER - II

Course Code	Course Title		istri	edit butions/We		Di	Marks stribut	
		L	T	P	C	IAE	ESE	Total
13160238	Minor Project	0	0	6	3	20	30	50

T	ransportation Engineering (Choose these	subj	ects	for	spec	ializat	ion)	
13160232	Analysis and Design of Pavement	3	1	0	4	40	60	100
13160233	Transport Economics	3	0	0	3	40	60	100
13160234	Traffic Engineering and Management	3	0	0	3	40	60	100
12160225	Airport Infrastructure, Planning and					40	60	100
13160235	Design	3	0	0	3			
13160236	Pavement Design Lab	0	0	2	1	20	30	50
13160237	Traffic Lab	0	0	2	1	20	30	50

	Structural Engineering (Choose these su	ıbjec	ts fo	r sp	ecial	izatior	1)	
13160214	Finite Element Analysis	3	0	0	3	40	60	100
13160215	Theory of Elasticity and Plasticity	3	0	0	3	40	60	100
13160216	Limit State Design of Steel Structures	3	1	0	4	40	60	100
13160217	Earthquake Resistant Design	3	0	0	3	40	60	100
13160218	Structural Engineering lab (CASTING)	0	0	2	1	20	30	50
13160239	Finite Element Analysis Lab	0	0	2	1	20	30	50

	Remote Sensing and GIS (Choose these s	ubje	cts f	or s	oecia	lizatio	n)	
13160240	Geospatial Data Processing and					40	60	100
13100240	Modelling	3	1	0	4	40	UU	100
13160241	Satellite Image Processing	3	0	0	3	40	60	100
13160242	Advanced GIS	3	0	0	3	40	60	100
13160243	GPS & Surveying	3	0	0	3	40	60	100
13160244	Advanced GIS Lab	0	0	2	1	20	30	50
13160245	Satellite Image Processing Lab	0	0	2	1	20	30	50

Total Credits for the semester 12 1 10 18 220 330 550
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Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, C: Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

SEMESTER – III

Course Code	Course Title		istri	edit butions/We		Di	Marks stribut	
		L	T	P	C	IAE	ESE	Total
13160367	Dissertation Phase-I	0	0	12	6	20	30	50

Transportation Engineering (Choose these subjects for specialization)								
13160357 Intelligent Transportation Systems 3 1 0 4 40		40	60	100				
Program Ele	Program Elective-I Pool (Choose One from the pool)							
13160355	Construction Project Management & BOT							
13160368 Traffic Management and Road safety 3 0 0 3 40 60		60	100					
13160359	Highway Construction Practices							
Program Ele	ective-II Pool (Choose One from the pool)							
12160260	Pavement Evaluation, Rehabilitation &							
Maintenance		2	^	0	2	40	(0	100
13160363	60363 Environment Impact Assessment 3 0 0 3 40 60		OU	100				
13160365	Bridge Engineering							

Structural Engineering (Choose these subjects for specialization)								
13160305 Theory & Design of Plate and Shell 3 1 0 4 40 60					60	100		
Program Elective-I Pool (Choose One from the pool)								
13160325	Pre-Fabricated Structures							
13160327 Design of Industrial Structures 3 0 0 3 40 60		60	100					
13160329	Maintenance & Rehabilitation of Structures							
Program Ele	ective-II Pool (Choose One from the pool)							
13160331	Design of Bridges							
13160333	Composite Structures	3	0	0	3	40	60	100
13160335	Design of Tall Buildings							

Remote Sensing and GIS (Choose these subjects for specialization)								
13160370 Digital Image Processing 3 1 0 4 40		60	100					
Program Elective-I Pool (Choose One from the pool)								
13160371	Web and Mobile GIS							
13160372	Argo Remote Sensing	3	0	0	3	40	60	100
13160373	Remote Sensing Geology							
Program Ele	ective-II Pool (Choose One from the pool)							
13160374	Global Navigation Satellite System							
13160375	Advanced Surveying and Cartography	3	0	0	3	40	60	100
13160376	Pattern Recognition and Machine Learning							

Total Credits for the semester	9	1	12	16	140	210	350	

Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, C: Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

SEMESTER – IV

Course Code	Course Title	Credit Distribution (Hours/Week)			Di	Mark istribut		
		L	T	P	C	IAE	ESE	Total
13160432	Dissertation Phase-II	0	0	16 Week	16	80	120	200
Total Credits for the semester		0	0	16 Week	16	80	120	200

Note – L: Lecture Hour/week, T: Tutorial Hour/week, P: Practical Hour/week, C: Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.

OVERALL CREDIT DISTRIBUTION TABLE

SEMESTER	HOURS	S PER W	EEK	Total Credit	Mark	s Distrib	oution
	L	T	P	TC	IAE	ESE	Total
SEMESTER – I	15	0	6	18	260	390	650
SEMESTER – II	12	1	10	18	220	330	550
SEMESTER – III	9	1	12	16	140	210	350
SEMESTER – IV	-	-	-	16	80	120	200
Total	36	2	28	68	700	1050	1750

Note – L: Lecture Hour, T: Tutorial Hour, P: Practical Hour, TC: Total Credits, IAE: Internal Assessment Examination, ESE: End Semester Examination.



8. SEMESTER-WISE COURSE DETAILS SEMESTER - I

Course Code	Course Title						
13160138	Research Methodology & IPR						
13160107	Seminar						
Choose these subjects for specialization in Transportation Engineering							
13160132	Pavement Materials						
13160133	Urban Transportation System Planning						
13160134	Geometric Design of Transportation Facilities						
13160135	Ground Improvement						
13160136	Pavement Materials Lab						
13160137	Geometric Design Lab						
Choose these subjects for specialization in Structural Engineering							
13160114	Advance Pre-Stressed Concrete Design						
13160115	Structural Dynamics						
13160116	Matrix Methods of Structural Analysis						
13160117	Design of Concrete Structural Systems						
13160118	Matrix methods of Structural Analysis Lab (STAAD PRO)						
13160119	Design of Concrete and Structural Systems Lab (STAAD PRO)						
Choose	these subjects for specialization in Remote Sensing and GIS						
13160143	Principles of Remote Sensing						
13160108	Geographical Information Systems						
13160139	Photogrammetry						
13160140	Application Of Remote Sensing						
13160141	Geographical Information Systems Lab						
13160142	Photogrammetry Lab						

Name of the Department Civil Engineering & Technology Name of the Program Master of Technology in Civil Engineering Engineering Engineering							
Name of the Program Master of Technology in Civil Engineeri							
	Master of Technology in Civil Engineering (Structural						
	1.8 (2 11 0.7 0.1 1.11						
Course Code 13160138							
Course Title Research Methodology & IPR							
Academic Year I							
Semester I							
Number of Credits 3							
Course Prerequisite							
Course Synopsis The aim of the course is to make studer	nts understand the						
importance of Research Paper Writing.	Also it covers all						
the concepts which involved in writing							
	ing the Research						
Paper.							
Course Outcomes:							
At the end of the course students will be able to:	_						
CO1 Recognize the various steps involved in research.							
CO2 Collect data from samples, Examine and analyze the data.							
CO3 Develop models for problems.							
Explain the entire process in the form of a report.							
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Pro Outcomes:	gram Specific						
COs PO1 PO2 PO3 PO4 PO5 PO6 PSO1 PSO2 PSO5 PS	O3 PSO4						
CO1 3 3 3 3 -	-						
CO2 3 3 3 3 -	-						
CO3 3 3 3 3 -	-						
CO4 3 3 3 3 -	-						
Average 3 3 3 3 -	-						
Course Content:							
	otal Hour/Week						
3 0 0	3						
Unit Content							
Define Research (C1, Remember), Classify resea	rch, and discuss						
Research process and steps (C2, Understand), Exp	plain Hypothesis,						
Research Proposal and aspects (C2, Understand)							
Describe Research Design- Need, Problem Definition, Variables							
Research Design concepts (C2, Understand), Use of Literature							
and review (C3, Apply), Explain Research design process, Errors							
and review (C3, Apply), Explain Research design r	oroccos, Errors in						

	models, model building and stages, Data consideration (C4, Analyze)
2	Discuss Sampling and data collection (C2, Understand)- Compare the
	Techniques of sampling, Random, Stratified, Systematic, Multistage-
	sampling, Primary and secondary sources of data (C4, Analyze), Design
	of questionnaire (C6, Create)
3	Design of Experiments- Objectives, strategies (C6, Create), Examine
	Factorial experimental design, designing engineering experiments, basic
	principles-replication, randomization, blocking, guidelines for the
	design of experiments (C4, Analyze)
4.	Discuss and explain Single factor experiment- Hypothesis testing,
	analysis of Variance component (ANOVA) for fixed effect model;
	Total, treatment and error of squares, Degrees of freedom, Confidence
	interval; ANOVA for random effect model, estimation of variance
	components, Model adequacy checking (C2, Understand)
	Examine the Structure and components of Scientific Reports (C4,
	Analyze), compare the Types of Report, Technical Reports and Thesis
	(C4, Analyze); Distinguish Different steps in the preparation – Layout,
	structure and Language of typical reports; Illustrations and tables,
	Bibliography, Referencing and foot notes (C4, Analyze)

Teaching - Learning Strategies	Contact Hours
Lecture	25
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	8
Case/Project Based Learning (CBL)	12
Revision	6
Others If any:	
Total Number of Contact Hours	45

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce



Objective Structured Practical Examination

Mapping of Assessment with COs

Nature of Assess	ment	CO1	CO2	CO3	CO4				
Quiz									
VIVA									
Assignment / Pres	sentation	✓	✓	✓	✓				
Unit test		✓	✓	✓	✓				
Practical Log Boo	ok/ Record Book								
Mid Semester Exa	amination 1	✓	✓	✓	✓				
Mid Semester Exa	amination 2	✓	✓	✓	✓				
University Exami	nation	✓	✓	✓	✓				
Feedback Proces	S	1.	1. Student's Feedback						
 Regular fe 	k is taken through variousedback through Mentor between the semester thr	Mentee sy		S					
References:									
	Text Books 1. Research Methodology – Methods and Techniques – C.R. Kothari, New Age International, New Delhi, 2004.								
	Reference Books								
	1. Design and Analys Wiley India, 8th Edition	-	eriments -	- Dougla	s C. Montg	gomery,			
	2. Practical Research:	Planning !	Design –	Paul D. 1	Leddy, Lond	don, 1980.			



Master of Technology in Civil Engineering (Transportation Engineering) 1st Semester

			For	mlty o	f Fngi	noorir	a & Toohn	ology			
Nama of th	artma			ty of Engineering & Technology Civil Engineering							
Name of the Department Name of the Program					Master of Technology in Civil Engineering (Transportation						
Name of th	16 1 10	grain			asici o igineei		nology in C	ivii Eiigiii	ecring (11a	nsportation	
Course Co	da				16013						
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Number of				3	11 3 5						
Course Pro							and concre				
Course Sy	nopsis					_			perties and	test on road	
				ag	gregat	e, Bitu	men materi	als.			
Course Ou											
At the end											
CO1			lifferen								
CO2							ze pavemer				
CO3							for differen			ocedures.	
CO4			velop suitable performance tests and material specifications.								
Mapping of	f Cou	rse Ou	tcomes	(COs)) to Pr	ogran	Outcomes	(POs) &	Program S _l	pecific	
Outcomes:											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	3	3	2	2	1	1	2	2	3	3	
CO2	3	3	2	2	1	1	2	2	3	3	
CO3	3	3	2	2	1	1	2	2	3	3	
CO4	3	3	2	2	1	1	2	2	3	3	
Average	3	3	2	2	1	1	2	2	3	3	
11, e1 uge			1 –	_	_	_					
Course C	ontei	nt:									
L (1	Hours/\	Week)		T (I	Hours/V	Veek)	P (Hour	·s/Week)	Total H	lour/Week	
	3				0		1)		3	
Uni							Conten	nt	·L	_	
1	_	D	efine s	oil co	mposit	ion ar			member).	Explain soil	
					-			*		scuss Origin,	
					_	-	nts (C2, Un	•	120011-0), 21.	97.000	
2									1. Remem	ber). Explain	
_	Define properties and tests on road aggregates (C1, Remember), Explain aggregate classification (C2, Understand), Discuss volumetric analysis of										
aggregate (C2, Understand).											
3				_			and) Discu	ss nrenar	ation (C2	Understand)	
Define origin (C1, Understand), Discuss preparation (C2, Understand), Classify properties and tests (C2, Understand), Classify constituent of											
	bituminous (road binders) (C2, Understand), Bituminous Emulsions and Cutbacks: Demonstrate preparation, characteristics, uses and tests (C3,										
					omon a	proj	, and a 1011, CII		co, asco an	ia 10515 (C5,	
Apply).											

4	State Mechanical properties (C1, Remember) –Define Resilient modulus,
	dynamic modulus and fatigue characteristics of bituminous mixes (C1,
	Remember). Demonstrate Weathering and Durability of Bituminous
	Materials and Mixes (C3, Apply) –Differentiate Performance based
	Bitumen Specifications (C4, Analyze) – Develop Super pave mix design
	method (C6, Create)

Teaching - Learning Strategies	Contact Hours	
Lecture	35	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)	2	
Self-directed learning (SDL) / Tutorial	2	
Problem Based Learning (PBL)	4	
Case/Project Based Learning (CBL)	2	
Revision		
Others If any:		
Total Number of Contact Hours	45	

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessn	nent	CO1	CO2	CO3	CO4					
Quiz		✓	✓	✓	✓					
VIVA										
Assignment / Prese	entation	✓	✓	✓	✓					
Unit test		✓	✓	✓	✓					
Practical Log Book	x/ Record Book									
Mid Semester Exam	mination 1	✓	✓	✓	✓					
Mid Semester Exam	mination 2	✓	✓	✓	✓					
University Examin	ation	✓	✓	✓	✓					
		ı								
Feedback Process		1. Student's Feedback								
Students Feedback	_	<u> </u>								
_	dback through M		•							
	etween the semes	ster through	Google to	rms						
References:										
	Text Books									
	1. S.K. Khanna			vay Engine	ering, Name					
	chand & Bros. p			3.6	1 1					
	2. S.K. Khanna			•						
	Pavement Testing, Name chand & Bros. publication.									
	Reference Books 1. Martin Rogers and Bernard Enright, Highway Engineering,									
	Wiley publication. 2. IRC, "Steel Fiber Reinforced Concrete for Pavements", IRC:									
					cincins , inc.					
	SP – 46, 1997, Indian Road Congress.									

			F	aculty	of En	gineer	ing & Tecl	hnology			
Name of the	e of the Department Civil Engineering										
Name of the								il Engineer	ing	(Transr	ortation
		9- **			neering		87		8	(r	
Course Co	ourse Code 13160133										
Course Title Urban Transportation System Planning											
Academic	ı v 8										
Semester	1 car			I							
Number o	f Cradi	ite		3							
Course Pr					ev Hic	thway	Engineerin	σ			
Course Sy		5116						•	on 1	icarc T	rip analysis and
Course sy	nopsis										ss transit system
							ut selection.		ssity	or mas	ss transit system
Course Or	ıtaama	.e. •		III uf	van art	.as, 101	ut Sciection.	•			
At the end			ctudos	te 33/11	ha ahl	a to:					
CO1											
CO2		ify urba					ıvel demand	1			
CO2		iop data				101 112	ivei demand	i illodeis.			
CO4		urban tr				1	1		•	1	
CO5				•			orepare urba				
Outcomes	:						1 Outcome	, ,	,		_
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	-	PSO3	PSO4
CO1	3		2	2	3		2	2	3		3
CO2	3		2	3	3		2	2	3		3
CO3	3		2	3	2		2	2	3		3
CO4	3		2	2	2		2	2	3		3
CO5	3		2	3	2		2	2	3		3
Average	3		2	2.6	2.4		2	2	3		3
Course C				Tar	NX.		D or	AST IN		Tatal	Howw/W/ook
L (H	ours/W	еек)		T (Hou		K)	P (Hours			1 otal	Hour/Week
T T •4	3	1			0		0				3
Unit		D 6	3.6			Conten		1) 7	<u> </u>		ompetencies
Define Mass transit systems (C1,Remember), Discuss Elements / components of transit systems (C2, Understand); Describe Urban Mass Transit systems (C2, Understand)-Explain the types, characteristics, suitability and adaptability of these systems (C2, Understand); Demonstrate the evolution of urban transportation (C3, Apply).											
Discuss planning needs (C2, Understand); Explain Short-term and long-term planning (C2, Understand); Demonstrate Planning procedures and methodology,											

	Data collection (C3, Apply); Describe Medium performance transit systems and high performance transit systems (C2, Understand); Investigate trends in transit planning (C6, Create).
3	Design transit demand forecasting (C6, Create); Discuss transit mode evaluation (C2, Understand); Examine the comparison and selection of most suitable transit mode (C4, Analyze).
4	Define Basic operational elements (C1, Remember); Discuss transit travel characteristics (C2, Understand); Define transit scheduling (C1, Remember); Discuss transit line analysis (C2, Understand) – Explain planning objectives, geometry, types and their characteristics, capacity of transit lines, system procedures for improving transit line capacity (C2, Understand).

Teaching - Learning Strategies	Contact Hours				
Lecture	33				
Practical					
Seminar/Journal Club	2				
Small group discussion (SGD)	2				
Self-directed learning (SDL) / Tutorial					
Problem Based Learning (PBL)	4				
Case/Project Based Learning (CBL)	4				
Revision					
Others If any:					
Total Number of Contact Hours	45				

Formative	Summative
Objective Structured Practical Examination	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)



Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4	CO5				
Quiz	✓	✓	✓	✓	✓				
VIVA									
Assignment / Presentation	✓	✓	✓	✓	✓				
Unit test	✓	✓	✓	√	✓				
Practical Log Book/ Record Book									
Mid Semester Examination 1	✓	✓	✓	✓	✓				
Mid Semester Examination 2	✓	✓	✓	✓	✓				
University Examination	√	✓	✓	√	✓				
	- U	-	'	-					
Feedback Process	1. Student's Feedback								
Students Feedback is taken through 1. Regular feedback through N 2. Feedback between the seme	Mentor M	entee sys							
References:		<u> </u>	,						
Text Books 1. C A O'Flaherty, 'Transport Planning and Traffic Engineering', Butter worth Heinemann, Burlington. 2. John W. Dickey and others, "Metropolitan Transportation Planning", Tata McGraw-Hill Book Company Ltd., New Delhi Reference Books 1. C Jotin Khisty and B Kent Lall, "Transportation Engineering" Prentice Hall of India Pvt. Ltd., New Delhi.									

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Name of the	ho Don	autma			y of Engineering & Technology Civil Engineering						
Name of the Department					Master of Technology in Civil Engineering (Transportation						
Name of the Program							ology in Ci	vii Engine	ering (1 ran	sportation	
Common Co	d a				gineeri						
Course Co					60134		C.T.	4 4•	E 11.4.		
Course Ti				Ge	ometri	ic Desi	gn of Tran	sportation	1 Facilities		
Academic	Year			<u> </u>							
Semester		•		I							
Number o				3							
Course Pr							way Engine				
Course Sy	nopsis			Ro	ad clas	sificat	ion, Unders	tanding th	e various g	overnment	
				gui	delines	for	geometric (design of	road, imp	ortance of	
				cro	ss-sect	ional e	elements, si	ght distanc	es and curv	es, design	
				of i	nterse	ction.					
Convers	-4										
Course Ou			. 1 .	'11 1	11 4						
At the end								. 01	• 1	1	
CO1			•				d design ele			nd streets	
CO2							signalized	intersection	ns.		
CO3				parking							
CO4				hting sy							
		rse Ou	tcomes	(COs)	to Pro	gram	Outcomes	(POs) & P	rogram Sp	ecific	
Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	2	3	2	2	2	1	2	2	3	3	
CO2	1	3	3	3	3	3	2	2	3	3	
CO3	2	3	3	3	2	3	2	2	3	3	
CO4	1	3	3	3	3	1	2	2	3	3	
Average	1.5	3	2.75	2.75	2.5	2	2	2	3	3	
11,010,90	1 200			1			_	<u> </u>	1 -	1 -	
Course C	onte	nt•									
	Hours/\			T (F	Iours/W	/eek)	P (Hour	rs/Week)	Total Ho	ur/Week	
	3	.,			0		((ŕ		3	
Unit					C	ontent			Comp	etencies	
1.		St	ate Pa	vement			haracteristic	es (C1.]			
							nts (cambe		,		
							barriers a		•		
					_	-	oss-section		/ /	/ /	
2.							ce (C1, Re		, ,		
۷.					_		Define ov	, .		0 0	
							sight dista	_	_	·	
				ngle (C2		_	-	(С1, 1		, Describe	
3.								and) Dec	cribe cupe	r-elevation	
3. Explain Horizontal curve (C2, Understand), Describe super-elevation											

	(C2, Understand), Define transition curve (C1, Remember), Discuss back-
	sight distance vertical curves (summit & valley curve) (C2, Understand).
4.	Describe the Types of un-signalized intersection (C1, Remember),
	Demonstrate sight distance consideration, channelization(C3, Apply),
	Define mini roundabouts (C1, Remember), Design the layout of
	roundabouts (C6, Create), Discuss Inter-changes: major and minor
	interchanges, entrance and exit ramps, acceleration and deceleration lanes
	(C2, Understand)

Teaching Dearting Strategies and Contact Hours							
Teaching - Learning Strategies	Contact Hours						
Lecture	38						
Practical							
Seminar/Journal Club							
Small group discussion (SGD)							
Self-directed learning (SDL) / Tutorial							
Problem Based Learning (PBL)	3						
Case/Project Based Learning (CBL)	4						
Revision							
Others If any:							
Total Number of Contact Hours	45						

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)



Mapping of Assessment with COs

Nature of Assessme	ent	CO1	CO2	CO3	CO4		
Quiz		✓	✓	✓	✓		
VIVA							
Assignment / Presen	ntation	✓	✓	✓	✓		
Unit test		✓	✓	✓	✓		
Practical Log Book/	Record Book						
Mid Semester Exam	ination 1	✓	✓	✓	✓		
Mid Semester Exam	ination 2	✓	✓	✓	✓		
University Examina	University Examination		✓	✓	✓		
					1		
Feedback Process		1. Student's Feedback					
Students Feedback i 1. Regular feed 2. Feedback be	back through M	entor M	entee sys				
References:		ster timot	ign doog	1011113			
	Text Books 1. S.K. Khanna & C.E.G. Justo, Highway Engineering, Name chand & Bros. publication. 2. AASHO, A policy on Geometric Design of Rural Highway, American Association of State highway Officials; Washington. Reference Books 1. Relevant IS and IRC codes 2. AASHTO Green Book, 2001						

Faculty of Engineering & Technology											
Name of the	nartmen			Civil Engineering							
Name of the			10		Master of Technology in Civil Engineering						
T value of the	10 110	grain					Engineering		cering		
Course Co	de .				60135		Diiginicornig	<i>)</i>			
Course Tit							vement				
Academic				I	ouna 1	шрго	rement				
Semester	1 cai			Ī							
Number of	f Cred	lite		3							
Course Pr					1 Mech	anics					
Course Sy							nroperties	Soil dra	inage charac	eteristics	
Course Sy	nobsis	•					methods a			iciistics,	
Course Ou	ıtcom	P6.		501	1 Stabii	1241101	i iliculous ai	id deep e	Apioration.		
At the end			student	s will be	e able t	0.					
CO1							by using var	ious tests	<u> </u>		
CO2							techniques.	Tous testi	J.		
CO2		earn gro					comiques.				
CO4							oad bearing	canacity			
									<u>.</u> Program Sp	ocific	
Outcomes		iise Out	comes	(COs)	10 110	grain	Outcomes (1 Os) &	r rogram sp	cenic	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	2	3	3	3	2	1	2	2	3	3	
CO2	2	3	3	3	3	3	2	2	3	3	
CO3	2	3	3	3	2	3	2	2	3	3	
CO4	2	3	3	3	3	1	2	2	3	3	
Average	2	3	3	3	2.5	2	2	2	3	3	
				· ·	II.			•			
Course C	Conte	nt:									
	Hours/			Тан	ours/Wo	eek)	P (Hours/	Week)	Total Hou	r/Week	
	3	,, ceri,		_ (==	0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0	,,,,,,	3		
Un						ntent			Compet	encies	
1.		Co	mpare	the Eng			perties of so	ft (C4, A	nalyze), Des		
			-	_				*	ssociated w		
				-		-	-				
deposit (C2, Understand), Investigate the Requirements of ground								_			
improvements (C6, Create) – explain and identify the differen engineering ground modification, need and objectives (C2, Understand)											
										-	
2.						,	-	, ·	npare and in	_	
								_	ues i.e. me		
				•					g systems, (
	modification, Modification by admixtures like lime, Cement, Bitumen										
		etc	etc. (C4, Analyze, C6, Create), Describe Grouting and Deep jet mixing								

	1 1/60 1/1 1 1
	method (C2, Understand).
3.	Explain and Compare the recent Ground improvement techniques-
	stabilization using industrial waste (C2, Understand; C4, Analyze),
	Examine the modification by inclusion and confinement – soil nailing –
	stone column – compaction piles – dynamic compaction – prefabricated
	vertical drains – preloading – electro – osmosis – soil freezing vacuum
	consolidation – deep explosion – dry powdered polymers – enzymes
	(C4, Analyze)
4.	Describe the concept of reinforced earth and Mechanisms (C2,
	Understand), Differentiate the various types of reinforcements – Soil –
	Reinforcement - Interaction studies (C4, Analyze), Investigate the
	Internal & External stability criteria - Design Principles of steep
	reinforced soil slops – pavements – Embankments on soft soils (C2,
	Understand; C6, Create)

Teaching - Learning Strategies	Contact Hours	
Lecture	35	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	3	
Problem Based Learning (PBL)	3	
Case/Project Based Learning (CBL)	4	
Revision		
Others If any:		
Total Number of Contact Hours	45	_

1 155 C 55 III C I VI C III C II S C	
Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)



Mapping of Assessment with COs

Nature of Assessm	nent	CO1	CO2	CO3	CO4		
Quiz	✓	✓	✓	✓			
VIVA	VIVA						
Assignment / Prese	entation	✓	✓	✓	✓		
Unit test		✓	✓	✓	✓		
Practical Log Book	/ Record Book						
Mid Semester Exar	nination 1	✓	✓	✓	✓		
Mid Semester Exar	nination 2	✓	✓	✓	✓		
University Examin	ation	✓	√	✓	✓		
					1		
Feedback Process		1. Stu	ident's Fe	edback			
2. Feedback b	dback through Metween the semes	lentor M	entee sys				
References:	(List of books)						
	Modification, N 2. Purushotham Publications, N Reference Book 1. Jones C. J. F. Butterworths, L 2. PCA, Soil-ce association, Chi	ooks J. F. P, Earth Reinforcement and Soil Structures, s, London. l-cement Laboratory Hand Book, Portland cement					

			Fac	ulty of l	Fngin	paring l	7 Tachnolog	TV/		
Name of th	artmer			y of Engineering & Technology Civil Engineering						
Name of the Program					Master of Technology in Civil Engineering (Transportation					
Traine of the							logy in civi	Liigiiie	ering (Transi	ortation
Course Co	de				gineerii 60136					
Course Tit							ials Lab			
Academic				I	CIIICII	t Wiater				
Semester	1 cai			I						
Number of	Crad	ite		1						
Course Pro					hway	Enginee	ring lab			
Course Sy								na maah	anical prope	rtion Tost
Course Syl	nobsis								iamcai prope	illes Test
				on	omaing	g materi	al and test of	n som.		
Course Ou	tcome	es:								
At the end			tudent	s will be	able t	o:				
CO1				paveme						
CO2							ent and pave	ement m	aterials.	
CO3							istics of in-s			
CO4							stics of in-se			
									rogram Spe	cific
Outcomes:		ise out	comes	(003)	.0110	gruin O	accomes (1	05) & 1	rogram spe	CITIC
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	3	2	2	2	3	3
CO2	2	1	2	2	3	3	2	2	3	3
CO3	3	2	1	3	2	1	2	2	3	3
CO4	3	2	2	3	2	1	2	2	3	3
Average	2.75	1.75	2	2.5	2.5	1.75	2	2	3	3
		•		•	•	•	•		•	•
Course C	Conte	nt:								
	Hours/V			T (H	lours/W	/eek)	P (Hours/	Week)	Total Hou	r/Week
	0			_ (0		2		2	
Experime).	I				Content		<u> </u>	
1.			AC det	erminati	ion of s	soil (C1		C2.Und	lerstand; C4,	Analyze)
2.							Remember;			
		1	Analy				,	-2,5110		
3.					mine t	he load-	bearing cana	acity of s	sub grade ma	terial
]		CBR test to determine the load-bearing capacity of sub grade material (C1,Remember; C2,Understand; C3,Apply; C4,Analyze)								
4.									ned Index (C3	3.Apply:
			Analy,		-0	.,	mach w	20111011		
5.					t value	test (C3	3,Apply;C4,	Analyze	e)	
6.							(C4,Analyz			
7.							C4, Analyze		•	
8.							; C5,Evaluat			
0.		511	171115 V	4140 103	ι (\smile \lnot , ι	IIIui y Z.C.	, ~, _ varuat	·-)		

9.	Ductility test (C4,Analyze; C5,Evaluate)
10.	Penetration test (C4,Analyze; C5,Evaluate)
11.	Viscosity test (C4,Analyze; C5,Evaluate)

Teaching Dearing Strategies and Contact Hours							
Teaching - Learning Strategies	Contact Hours						
Lecture							
Practical	24						
Seminar/Journal Club							
Small group discussion (SGD)	2						
Self-directed learning (SDL) / Tutorial							
Problem Based Learning (PBL)							
Case/Project Based Learning (CBL)	4						
Revision							
Others If any:							
Total Number of Contact Hours	30						

110000011111111111111111111111111111111					
Formative	Summative				
Viva-voce	Practical Examination & Viva-voce				
Objective Structured Practical Examination	Objective Structured Practical Examination				



Mapping of Assessment with COs

CO1	CO2	CO3	CO4	
✓	✓	✓	✓	
		+		
✓	✓	✓	✓	
✓	✓	✓	✓	
		1		
✓	✓	✓	✓	
1. Student's Feedback				
	✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms

			Faci	ulty of F	Engine	ering	& Technol	nσv			
Name of th	ıe Den	artme			il Eng			ogy			
Name of the Program					Master of Technology in Civil Engineering						
a contract of the contract of							Engineering		8		
Course Code					60137		6	<i>5)</i>			
							T 1				
Course Title					ometri	c Desi	gn Lab				
Academic Year				I							
Semester				I							
Number of	f Cred	its		1							
Course Pr	erequi	site		NII	_						
Course Sy	nopsis			Civ	il 3D	/Open	Roads	software	for road h	ighway	
				geo	metric	design	1.				
C 0	-4										
Course Ou At the end			ctudont	c will b	ahla 4	0.					
CO1				ous design			n tools				
CO2							ile format				
CO3							on to align	the profi	le		
CO4							plicable st				
Mapping of									Program Spe	cific	
Outcomes								` ,			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSC	PSO3	PSO4	
CO1	3	2	3	2	3	2	2	2	3	3	
CO2	2	1	2	2	3	3	2	2	3	3	
CO3	3	2	1	3	2	1	2	2	3	3	
CO4	3	2	2	3	2	1	2	2	3	3	
Average	2.75	1.75	2	2.5	2.5	1.75	2	2	3	3	
Course C	Conte	nt:									
<u>L (</u>	Hours/\	Week)		Т (Не	T (Hours/Week)		P (Hours/Week)		Total Hour/Week		
	0				0 2			2			
Experiment No.					Content pts and view control (C1,Remember; C2,Understand)						
1.									/		
2 1					t and validation (C3,Apply; C4,Analyze)						
					and drawing style (C3,Apply; C4,Analyze)						
4 Surface checker, string creation and edition (C5, Evaluate) 5 Surface analysis and earth work calculation (C5, Evaluate)											
6							l and vertic				
7							ate; C6,Cr		<i>!</i>		
8				design (, 00,010				
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Teaching - Learning Strategies	Contact Hours			
Lecture				
Practical	22			
Seminar/Journal Club				
Small group discussion (SGD)				
Self-directed learning (SDL) / Tutorial				
Problem Based Learning (PBL)	4			
Case/Project Based Learning (CBL)	4			
Revision				
Others If any:				
Total Number of Contact Hours	30			

Assessment Methods:

Formative	Summative		
Viva-voce	Practical Examination & Viva-voce		
Objective Structured Practical Examination	Objective Structured Practical Examination		
Problem Based Learning (PBL)			

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book	✓	✓	✓	✓
Demonstration	✓	✓	✓	✓
Mid Semester Examination 1				
Mid Semester Examination 2				
University Examination(External Practical)	✓	✓	✓	✓
				.I
Feedback Process	1. Student's Feedback			

Students Feedback is taken through various steps

- 1 Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms



Master of Technology in Civil Engineering (Structural Engineering) 1st Semester

]	Facul	ty of Er	ngineerii	ng & T	echnolog	EY		
Name of the Department Civil Engineering										
Name of the	Progra	ım		Mast	er of Teo	chnolog	y in Civi	1 Engine	eering (Structural
	C				neering)		•	C		
Course Code)			1316	0114					
Course Title				Adva	anced Pi	e-stres	sed Con	crete St	ructur	es
Academic Yo	ear			Ι						
Semester				I						
Number of C	redits			3						
Course Prer	equisite	e		Desig	gn of cor	ncrete si	tructure			
Course Syno	_			,				11 10000	about	Dra strassad
·	-									Pre-stressed
							•			nods and its
				1					sses in	pre-stressed
				conc	rete struc	cture an	d design.	•		
Course Outc	omes:									
At the end of	the cou	ırse stud	dents	will be a	able to:					
CO1	Knov	v the co	ncept	s, metho	ods and r	naterial	s of pre-	stressing	g systen	ns.
CO2	Desig	gn the p	re-stre	essed co	ncrete m	nembers	S.			
CO3							oncrete n	nembers	S.	
CO4	Desig	gn anch	orage	zones a	nd comp	osite pi	re-stresse	d concr	ete men	nbers.
Mapping of Outcomes:	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	-	-	3	3	3	3	3	3	3	3
CO2	-	-	3	3	3	3	-	-	_	-
CO2			2	12	2	12	2	2	2	2
CO3	-	-	3	3	3	3	3	3	3	3
CO4	-	-	3	3	3	3	3	3	3	3
Average	-	-	3	3	3	3	3	3	3	3
Course Content: L (Hours/Week) T (Hours/Week) P (Hours/Week) Total Hour/Week										
3					0 0 3					3
Unit							ntent			
1.							and systems of pre-stressed			
		1			\ , , -					

	and High strength steel, Stress-strain diagram (C2, Understand),
	Examine Losses in pre-stress (C4, Analyze)
2.	Describe Section Modulus and pre stressing force (C2, Understand),
	Design of prismatic pre-stressed concrete members for bending at
	service load (C6, Create), Design recommendation, Design of pre
	tensioned and post tensioned flexural members (C6, Create)
3.	Identify the Factors affecting deflection (C2, Understand), Compare
	Short term and long term deflection of Cracked and Un-cracked
	member (C4, Analyze), Demonstrate the Simple cable profiles and
	Calculation of deflections (C3, Apply), Design of beams for shear and
	torsion at working and ultimate loads (C6, Create)
4.	Stress distribution, Anchorage zone stress, Anchorage zone
	reinforcement, Design of Anchorage zone by Guyon's method -
	Concept of Magnel's method – IS: 1343 recommendations.

Teaching Learning Strategies and Contact I		
Teaching - Learning Strategies	Contact Hours	
Lecture	20	
Practical		
Seminar/Journal Club	3	
Small group discussion (SGD)	3	
Self-directed learning (SDL) / Tutorial	12	
Problem Based Learning (PBL)	3	
Case/Project Based Learning (CBL)		
Revision	4	
Others If any:		
Total Number of Contact Hours	45	

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	

Quiz							
VIVA							
Assignment / Prese	nment / Presentation						
Unit test		✓	✓	✓	✓		
Practical Log Bool	x/ Record Book						
Mid Semester Exa	mination 1	✓	✓	✓	✓		
Mid Semester Exa	mination 2	✓	✓	✓	✓		
University Examin	ation	✓ ✓ ✓					
Feedback Process		1. S	tudent's F	Feedback			
1. Regular fee	is taken through various edback through Mentor Metween the semester thro	Ientee s	•	s			
References:		68	8				
	Text Books 1. Krishna Raju.N, (20 Second Edition, CBS P Reference Books 1. Dayarathnam P, Edition, Oxford & 2. Sinha N. C and R Third Edition, S.C.	(1996) (IBH – Roy S. 1	rs, ISBN- , Pre-stre Pubs Cor K., Funda	13: 9788 essed Co npany, Is amentals	12390715 oncrete S SBN-13: 9 of Pre-str	tructure 788120 ressed C	s, Fifth 400450.

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Name of the	Denart		acuit		Engin			ology		
Name of the								Tivil Engi	neering	(Structural
Traine of the	iiogia	111		Master of Technology in Civil Engineering (Structural Engineering)					(Structurar	
Course Code				1316		5/				
Course Title	•				ctural	Dyna	mics			
Academic Ye	ar			I	ctui ai	Бупа	iiics			
Semester 1	aı			I						
Number of C	'radite			3						
Course Prere					nology	,				
Course Syno	_	,					dogra	of from	odom s	ystem (SDOF
Course Syno	hara					_	_			aic and Impulse
					/ /	•				nulti degree of
								ysis, Siuc Continuou		
Course Outc	omes.			necu	om sys	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1,11001	Jonanaou	5 5 y stel	110 /.
At the end of		rse stud	lents w	/ill be a	able to	•				
CO1	1						edom sys	stem.		_
CO2									ling and	related analysis.
CO3				•				dom systen		Telacea allaly sis:
CO4							structur			
Mapping of C	l .								. Висан	am Cnasifia
Outcomes:	course	Outco	iics (C	os) to	riogi	am	outcome	s (1 Os) G	, i i ugi	аш эрсене
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	_	-	3	3	3	3	3	3	3	3
CO2	_	-	3	3	3	3	_	-	-	-
CO3	_	-	3	3	3	3	3	3	3	3
CO4	_	-	3	3	3	3	3	3	3	3
Average	_	_	3	3	3	3	3	3	3	3
								_		_
Course Con	ntent:									
	urs/Wee	k)		T (Hou	rs/Wee	k)	Р (Нош	rs/Week)	Tota	l Hour/Week
E (Ho	3	к)			0	K)		0	100	3
Unit	<u> </u>					onten		U		
1		Defin	e Sinc	ole De				vstem an	d free	vibration (C1,
1			_	-	_			•		, ,
		Remember), State Alembert's principle (C1, Remember), Derive Mathematical models for SDOF system (Analyze), Differentiate								
			Damped and un-damped, Critical damping (C4, Analyze)							
2										Loading (C3,
4				perrode	<i>,</i> w ii		Lvav	uug anu l	mpuisc	Louding (CJ,
		Apply), Analysis of un-damped system - damped system - general								
					of un-	-damp	ed syste			
3		dynan	nic loa	ding (C	of un- C4, An	-damp alyze)	ed syste	em - dam	ped sys	

	Create), Define Shear building concept (C1, Remember), Discuss and examine free vibration of un-damped multi-degree-of- freedom systems - Natural frequencies and mode shapes, Orthogonality of modes (C2, Understand, C4, Analyze), Differentiate Vibration Analysis - Rayleigh's method - Approximate Analysis - Improved Rayleigh method C4, Analyze)
4	Investigate the Response of Shear buildings for harmonic loading without damping using normal mode approach (C6, Create), Investigate the Response of Shear buildings for forced vibration for harmonic loading with damping using normal mode approach (C6, Create)

Teaching - Learning Strategies	Contact Hours
Lecture	18
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	14
Problem Based Learning (PBL)	8
Case/Project Based Learning (CBL)	
Revision	05
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					

Assignment / Prese	entation	✓	✓	✓	✓					
Unit test		✓	✓	✓	✓					
Practical Log Book	x/ Record Book									
Mid Semester Exam	mination 1	✓	✓	✓	✓					
Mid Semester Exa	mination 2	✓	✓	✓	✓					
University Examin	ation	✓	✓	✓	✓					
		I			l	1	1			
Feedback Process		2. Student's Feedback								
1. Regular feed	is taken through various dback through Mentor Mo etween the semester throu	entee sy		s						
References:										
	Text Books 1. Mario Paz, (2004), Structural Dynamics - Theory and Computation, Second Edition, CBS Publishers, ISBN-13: 9788123909783.									
	Reference Books									
	1. J. Humar, (2012), Dynamics of Structures, Third Edition, CRC Press, ISBN- 13: 9780415620864.									
	2. Anil K. Chopra, (200	3), Dyı	namics of	Structur	es - Theor	y and				
	Applications to Earthqu ISBN-13: 97881317132		Engineerir	ng, Third	Edition, l	Pearson 1	India,			

Faculty of Engineering & Technology										
Name of the l	Civil Engineering									
Name of the l	Master of Technology in Civil Engineering (Structural									
				Engine		1111010	6) III ()	21161	ineering (o di
Course Code	13160									
Course Title				nds of	f Struct	ural An	alveie			
Academic Ye	I	A IVICUII	ous or	Struct	urar And	a1y 515				
Semester Semester		I								
Number of C		3						_		
					1 A	.1:-				
Course Prere		<u> </u>			ıral Ana		1 1	1 1.1	. •	1 : 0
Course Synop	OSIS						•			analysis of
				structu	res. It b	egins	with a	review o	f the basi	ic concepts of
				structu	ıral anal	lysis a	ınd matı	rix algeb	ra, and sl	nows how the
				latter 1	provide	s an e	excellen	t mather	natical fi	ramework for
				-						criptions, and
								-		f how matrix
							_	-	_	
									•	sis of skeletal
				structures (plane and space trusses; beams and grids; plane						
				and space frames) by the stiffness method, and also the						
				flexibility method.						
Course Outco	omes:			,						
At the end of t		rse stuc	lents w	ill be ab	ole to:					
CO1						/ matri	ix metho	d and stif	fness matı	rix method.
CO2				space tr						
CO3				of settle						
Mapping of C								(POs) &	Progran	n Specific
Outcomes:	Jourse	Outcol	ines (C	Osj to I	iogiai	ıı Ou	tcomes	(1 05) &	riogiai	n speeme
Outcomes.										
COs	PO1	PO2	PO3	PO4	PO5	PO	PSO1	PSO2	PSO3	PSO4
203		_				6				
CO1	-	-	3	3	3	3	3	3	3	3
CO2	_		3	3	3	3		_	-	
CO3	-	-	3	3	3	3	3	3	3	3
Average	_	-	3	3	3	3	3	3	3	3
Course Cor	tent:									
	ırs/Wee			T (Hours	s/Week)	I	P (Hours	/Week)	Total	Hour/Week
2 (110)	3	,		0		-	0	, , , conj	1000	3
Unit				0			ontent		1	
1		Define	ctati	c inde	termina			nematic	indeterr	ninacy (C1,
Define static indeterminacy and kinematic indeterminacy (C1,										

	Remember), Differentiate between static indeterminacy and kinematic indeterminacy (C2, Understand; C4, Analyze), Compare flexibility matrix and stiffness matrix (C4, Analyze), Discuss the properties of matrices (C2, Understand), - explain coordinate system (C2, Understand), Analyze the beam (C4, Analyze), Formulate and derivation of stiffness matrix of beam element from strain energy (C6, Create)
2	Formulate Displacement transformation matrix (C6, Create), explain global stiffness matrix (C2, Understand), analysis of continuous beams (C4, Analyze), analysis of rigid frames and trusses (C4, Analyze).
3	Analysis of continuous beam (C4, Analyze), Compare and analyze the plane truss and plane frame by stiffness matrix method ((C2, Understand; C4, Analyze), Investigate the Internal forces due to thermal expansion and lack of fit (C6, Create), discuss the effect of settlement of supports (C2, Understand).
4	Use, analyze and investigate the bar, truss, beam, and frame structures of determinate and indeterminate ones using direct stiffness method (C3, Apply; C4, Analyze; C6, Create)

Teaching - Learning Strategies	Contact Hours
Lecture	18
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	15
Problem Based Learning (PBL)	8
Case/Project Based Learning (CBL)	-
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative				
Multiple Choice Questions (MCQ)	Mid Semester Examination 1				
Viva-voce	Mid Semester Examination 2				
Objective Structured Practical Examination	University Examination				
Quiz	Dissertation				
Seminars	Multiple Choice Questions (MCQ)				
Problem Based Learning (PBL)	Short Answer Questions (SAQ)				

Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessr	nent	CO1	CO2	CO3				
Quiz								
VIVA								
Assignment / Pres	entation	✓	✓	✓				
Unit test		✓	✓	✓				
Practical Log Boo	k/ Record Book							
Mid Semester Exa	mination 1	✓	✓	✓				
Mid Semester Exa	✓	✓	✓					
University Examir	✓	✓	✓					
Feedback Process	S	1. Student's Feedback						
1.Regular feedbac	t is taken through various through Mentor Ment en the semester through	ee system	rms					
References:	3	<u> </u>						
	Text Books 1. Pundit G.S. & Gup approach), Second Ed 9780070667358. Reference Books 1 J. S. Przemieniecki, Edition, Dover Public 2. Richard B. Nelson, John Wiley & Sons, I	(1985), TI eation, ISB Lewis P. I	McGraw neory of N N-13: 978 Felton, (19	Hill Educati Matrix Structo 804866494. 997), Matrix	on, ISBN-13: ural Analysis, Structural An	New		

			Facult				k Technolo	gy			
Name of the				_	Engin						
Name of the Program				l l			ology in Civ	il Engin	eering (Structural	
					neering	g)					
Course Code				1316	0117						
Course Title				Desig	gn of C	Concr	ete Structu	ıral Syst	tems		
Academic Year				I							
Semester				I							
Number of C	redits			3							
Course Prere	quisite	e		Desig	gn of c	oncre	te structure				
Course Syno	psis			Limi	t state	desigr	method, I	Deep Bea	ıms, Flat	Slab,	
				Colu	mns an	nd she	ar walls and	d framed	buildin	gs	
Course Outco	omes:									<u> </u>	
At the end of		ırse stud	lents v	vill be a	able to:						
CO1		Analysis of beam using limit state design									
CO2		yze and design the deep beams and flat slab									
CO3				P							
CO4		Yield line theory Design of slender columns. and stair case									
	•							DOa) P	Duagua	- Craife	
Mapping of Outcomes:	Jourse	Outcor	mes (v	cos) to	o i rugi	am C	outcomes (1 Os) &	Tiogra	in Specific	
COs	PO1	PO2	PO3	PO4	PO5	PO	6 PSO1	PSO2	PSO3	PSO4	
CO1	1	-	3	3	3	3	1	-	3	3	
CO2	1	-	3	3	3	3	1	-	3	3	
CO3	1	-	3	3	3	3	1	-	3	3	
CO4	1	-	3	3	3	3	1	-	3	3	
Average	1	-	3	3	3	3	1	_	3	3	
		•	ı	1		ı	·		•		
Course Con	ntent:										
	urs/Wee			T (Hou	rs/Wee	k)	P (Hours/	Week)	Total	Hour/Week	
	3	<u></u>)			0	/	0	.,, 5522)		3	
Unit					(Conte	nt				
1		Defin	e and	explair				nd desig	n of bea	ms in flexure	
				_			-	_			
, i					mber; C2, Understand), Demonstrate the Behavior of						
					concrete members in bending (C3, Apply), Discuss the e and Rotation capacity (C2, Understand), explain factors						
					otation capacity of a section and Plastic moment (C2,						
· · · · · · · · · · · · · · · · · · ·				, .						ent curvature	
	relationship and Redistribution of moments (C4, Analyze; C6, Create)							C6, Create)			
2		D	1	D .	C.	CD	D	10	15((0)	1, Remember;	

r	
	C6, Create), Investigate the Detailing of Deep Beams and Checking for
	Local Failures (C2, Understand; C6, Create)
	Direct design method -Discuss and investigate the distribution of
	moments in column strips and middle strip moment and shear transfer
	from slabs to columns using direct design method (C2, Understand; C6,
	Create), Design for Shear in Flat slabs-Check for one way and two way
	shears (C6, Create), Describe Equivalent frame method and Direct
	design method (C2, Understand), Compare the distribution of moments
	in column strips and middle strip sketch showing reinforcement details
	(C4, Analyze).
3	Describe yield line analysis for slabs (C2, Understand), Differentiate
	Virtual work and equilibrium methods of analysis – For square circular,
	Rectangular, Triangular and Hexagonal with simple and continuous end
	conditions along with Reinforcement details (C4, Analyze).
4	Describe column and Euler theory (C2, Understand), Differentiate the
	different methods of design of Slender Columns (C4, Analyze), Design
	of slender column subjected to combined bending moment & axial force
	using SP: 16 (C6, Create).
	Explain staircase (C2, Understand), Compare the different types of
	staircases (C4, Analyze), Design of staircase as per IS code (C6, Create)

Teaching - Learning Strategies	Contact Hours	
Lecture	25	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	10	
Problem Based Learning (PBL)	6	
Case/Project Based Learning (CBL)		
Revision	04	
Others If any:		
Total Number of Contact Hours	45	

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation

Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Mapping of Assessment with COs

Mapping of Asse	ssment with COs						
Nature of Assessi	ment	CO1	CO2	CO3	CO4		
Quiz							
VIVA							
Assignment / Pres	entation	✓	✓	✓	√		
Unit test		✓	✓	✓	✓		
Practical Log Boo	k/ Record Book						
Mid Semester Exa	mination 1	✓	✓	✓	✓		
Mid Semester Exa	mination 2	✓	✓	✓	✓		
University Examin	nation	✓	✓	✓	√		
				1	1	1	
Feedback Proces	s	2. Student's Feedback					
3. Regular fe	x is taken through various edback through Mentor Noetween the semester thro	Ientee sy					
	Text Books 1. Krishnaraju N., (Second Edition, CE					•	
	Reference Books						
	 P. C. Varghese, Second Edition, Ph M. L. Gambhir, (2) First Edition, Phi L P. Dayaratnam, (2) Fourth Edition, (2) 9788120414198. B. C. Punmia, As 	i Learnin 2009), Dearning F 011), De Oxford	g Pvt. Ltdesign of Pvt. Ltd., I esign of & IBH	I., ISBN- Reinford ISBN-13 Reinford – Pubs	ed Concrete: 978812033 ed Concrete: Company	0327870. e Structures, 31938. e Structures, y, ISBN-13:	

Designs, Laxmi Publication (P) Ltd., ISBN-13: 9788131809426.

		т	Za av l t	v of En		ein a	P- Tookno	lo ov			
Name of the	Donort		acuit				& Technol	logy			
Name of the					Civil Engineering Master of Technology in Civil Engineering (Structural						
Name of the	rrogra	III					ology in C	IVII EII§	gmeering (Structural	
Course Code					neering	3)					
Course Code				1316		411.	C C 4 4	1 A	l	1.	
Course Title				Matr	1x Me	tnoa	s of Struct	urai A	naiysis La	<u>ID</u>	
Academic Ye	ar			1							
Semester	10.			I							
Number of C				3	. 1 4		•				
Course Prere		2			tural A						
Course Syno	psis			This	cours	se m	nainly dea	als wit	h matrix	analysis of	
				struct	tures. I	t beg	ins with a	review	of the bas	ic concepts of	
				struct	tural a	nalys	is and mat	rix alge	bra, and s	hows how the	
						-		_		ramework for	
					-					scriptions, and	
								•		f how matrix	
							•	•			
									-	sis of skeletal	
					\ 1		-		-	nd grids; plane	
				and space frames) by the stiffness method, and also the							
				flexibility method.							
Course Outco	omes:										
At the end of	the cou	rse stuc	lents v								
CO1	Solve	differe	ent str	uctures by flexibility matrix method and stiffness matrix							
	metho	od.									
CO2	Visua	lize and	l analy	ze space trusses and space frames.							
CO3					ct of settlement of supports.						
Mapping of ((POs)	& Progra	m Specific	
Outcomes:	Jourse	Outcol	ines (C	303) (0	Tiogi		outcomes	(1 05)	a i i ogi u	ш эрсете	
COs	PO1	PO2	PO3	PO4	PO5	PO	6 PSO1	PSO2	PSO3	PSO4	
CO1	_	-	3	3	3	3	3	3	3	3	
CO2	_	-	3	3	3	3	-	-	-	_	
CO3	_	_	3	3	3	3	3	3	3	3	
Average	_	_	3	3	3	3	3	3	3	3	
	1	ı	<u> </u>	1	1	1	<u> </u>		I	1	
Course Con	ntent:										
L (Ho	urs/Wee	ek)		T (Hou	T (Hours/Week) P (Hours/Week)				Total	Hour/Week	
	0				0		2			2	
Experiment	No.						Content				
1.		Analy	sis of	proppe	d canti	lever	beam (C4	, Analy	ze)		
					two span continuous beams(C4, Analyze)						
		1 11101	010 01	···· o sp		illiuo	us ocams(v		ilyzc)		

4.	Analysis of statically indeterminate plane truss(C4, Analyze)
5.	Analysis of kinematically indeterminate plane truss(C4, Analyze)
6.	Analysis of one bay – one storey plane frame(C4, Analyze)
7.	Analysis of multi bay – multi storied plane frame(C4, Analyze)
8.	Analysis of space truss(C4, Analyze)
9.	Analysis of space frame(C4, Analyze)

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	13
Seminar/Journal Club	
Small group discussion (SGD)	04
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	13
Case/Project Based Learning (CBL)	
Revision	
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3		
Quiz					
VIVA	✓	✓	✓		
Assignment / Presentation					
Unit test					
Practical Log Book/ Record Book	✓	✓	√		
Mid Semester Examination 1					



Mid Semester Examination 2					
University Examination (External	✓	✓	✓		
Practical)					
	•	•	1	•	•
Feedback Process	2. S	tudent's F	Feedback		
Students Feedback is taken through various. Regular feedback through Mentor	Mentee sy				

2. Feedback between the semester through Google forms

]		v of En	gineer	ing	& Te	echnolog	v			
Name of the Department				Civil Engineering							
Name of the Progra							v in Civil	Engine	eering (S	Structural	
				neering		0.	,	8	8 (
Course Code			1316								
Course Title			+		onc	rete :	and Stru	ctural :	Systems	s Lab	
Course Title				AD P			una stra	cturur	oystem.		
Academic Year			Ì								
Semester			I								
Number of Credits			2								
Course Prerequisite	2		Desig	gn of C	onci	ete S	tructural	System	ıs		
Course Synopsis			Limi	t state o	desig	n me	ethod, Be	ams, Sl	ab, Colı	umns and	
						,				STAAD Pro.	
Course Outcomes:			1					•	, <u> </u>		
At the end of the cou	rse stud	dents w	ill be a	able to:							
CO1 Analy	ze and o	lesign t	he fram	ie.							
	ze and o										
	n shear				l slab	S.					
	n of sle										
Mapping of Course					ram	Outo	comes (P	Os) & 1	Progran	n Specific	
Outcomes:			,					,	0	•	
COs PO1	PO2	PO3	PO4	PO5	P	D6	PSO1	PSO2	PSO3	PSO4	
CO1 1	-	3	3	3		3	1	-	3	3	
CO2 1	-	3	3	3		3	1	-	3	3	
CO3 1	-	3	3	3		3	1	-	3	3	
CO4 1	-	3	3	3		3	1	-	3	3	
Average 1	-	3	3	3	,	3	1	-	3	3	
Course Content:											
L (Hours/Wee	ek)		T (Hou	rs/Weel	k)	P	(Hours/W	eek)	Total	Hour/Week	
0			-	0			4			2	
Experiment No.		,	Content								
1.	Desig	n of pr	opped	cantile	ver l	RCC	beam (C	6, Desig	gn)		
2.	Desig	n of tw	vo span continuous RCC beams (C6, Design)								
				d design one bay – one storey plane frame (C6, Design)							
3.	Analy	zis and	ı aesig	n one t	design of multi bay – multi storied plane frame (C6,						
3.											
		sis and									
	Analy Desig	/sis and gn)	d desig	n of m	ulti t	oay –		ried pla			

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	15
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	11
Revision	
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4		
Quiz						
VIVA	✓	✓	✓	✓		
Assignment / Presentation						
Unit test						
Practical Log Book/ Record Book	✓	✓	✓	✓		
Demonstration	✓	✓	✓	✓		
Mid Semester Examination 1						
Mid Semester Examination 2						
University Examination (External	✓	✓	✓	✓		
Practical)						
	L	1	1	1	I	



Feedback Process 2. Student's Feedback

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms



Master of Technology in Civil Engineering (Remote Sensing and GIS) 1st Semester

			Facu	lty of E	ngineer	ing & Te	chnology						
Name	of the De	partment		Civil	Civil Engineering								
Name	of the Pr	ogram		Mast and C		chnology	in Civil En	gineering	(Remote	Sensing			
Cours	se Code			1316	0143								
Cours	e Title			Prin	ciples of	Remote	Sensing						
Acade	mic Year	•		I									
Semes	ster			I									
Numb	er of Cre	dits		3									
Course Prerequisite						uld have b	asic knowl	edge of si	urveying	and			
Cours	se Synops	is					s with data	acquisitio	n, proces	sing and			
	J - I							-	-	8			
Cours	se Outcon	ies:			sensors, this can be used in their respective fields.								
		e course stu	dents wil	ll be abl	e to:								
CO1	Select th	e type of re	mote sen	sing da	ta for ma	apping ear	th surface	features					
CO2	Analyze	the energy	interaction	ons with	the atm	osphere a	nd earth su	ırface feat	ures				
CO3	Identify	the earth su	rface fea	tures fro	om satel	lite image	s						
CO4	Apply re	mote sensir	g techni	ques for	r natural	resources	evaluation	1					
Mapp Outco	_	urse Outco	mes (CC	Os) to P	rogram	Outcome	es (POs) &	Progran	1 Specific	2			
COs	PC	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4			
CO1	3	2	-	-	-	-	-	-	1	1			
CO2	3	2	-	-	-	-	-	-	1	1			
CO3	3	2	-	-	-	-	-	-	1	1			
CO4	3	1	-	-	-	-	-	-	1	1			
Avera	ge 3	1.75	-	-	-	-	-	-	1	1			

Course Co	ontent:										
L	T (Hours/Week)	otal Hour/Week									
(Hours/		(Hours	/Week)	(Hour	s/Week)						
Week)											
3	-	I	-	L			3				
Unit		Cont	ent and	Compete	ncy						
1	Sources of Energy (C2, Understand), Active and Passive Radiation. (C2, Understand),										
	Radiation - Reflectance	e, Transn	nission, A	bsorption	n (C3, App	lication),	Thermal E	Emissions,			
	Interaction with Atmo	sphere (C	C1, Reme	ember), A	tmospheri	c window	vs. (C1, Re	emember),			
	Spectral reflectance of	of Earth'	s surface	features	(C3, Ap)	plication)	, Multi c	oncept of			
	Remote Sensing. (C3,	Applicati	ion)								
2	1. Various types of p	latforms	C2 (Und	erstand),	different ty	ypes of a	ircraft, ma	anned and			
	unmanned spacecrafts	used for	data acqu	uisition (C6, Create	e), charac	eteristics of	f different			
	types of platforms (C	5, Evalua	ate), IRS	Satellite	Sensors, L	ANDSA	Γ, SPOT,	IKONOS,			
	Quickbird, Geoeye, R	Kompsat,	Worldvi	ew II &	III, Micro	owave, A	ALOS, Pla	net Data,			
	Sentinel, SMAP, MOI	DIS (C2, I	Understar	nd)							
3	Optical, thermal and	d micro	wave (C	2, Unde	erstand), I	Resolution	ns-spatial,	spectral,			
	radiometric and temp	oral (C1	, Remen	nber), sig	gnal to no	ise ratio	(C3, Ap)	plication),			
	LiDAR data acquisitio	n and pro	ocessing.	(C1, Rem	ember)						
4	Explain the application	ns of Rer	note sens	ing in va	rious Engir	neering ar	nd Science	domains.			
	C2 (Understand),	Explain	the Agri	culture,	Forest, So	il, Geolo	gy, LU/L	C, Water			
	Resources, Urban, Dis	aster Mai	nagement	, etc. (C2	, Understan	nd)					

Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2

Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assessi	ment	CO1	CO2	CO3	CO4			
Quiz	✓	✓	✓	✓				
Assignment / Pres	entation	✓	✓	✓	✓			
Unit test		✓	✓	✓	✓			
Mid Semester Exa	✓	✓	✓	✓				
Mid Semester Exa	✓	✓	✓	✓				
University Examin	✓	✓	✓	✓				
		1	T.					
Feedback Proces	S	2. Stud	ent's Feedb	ack				
		1						
References:	Textbooks:							
	1. Introduction to Remote Sensing, James B. Campbell & Randolph H.							
	Wynne., The Guilford Press, 2011.							
	2. Introduction to the physics and techniques of Remote Sensing, Charles							

Elach & Jakob van Zyl., John Wiley & Sons publications, 2006.
3. Remote Sensing and Image Interpretation, Lilles and T.M & Kiefer
R.W., John Wiley and Sons, 2015
References:
1. Thermal microwave radiation: Applications for remote sensing, Chritian
Matzler., The institution of Engineering and Technology, London, 2006
2. Remote Sensing: Models and Methods for Image Processing, Schowengerdt,
R. A., Academic Press, 2007.
3. Introduction to Remote Sensing, Cracknell, A.P., Second Edition, Tylor &
Francis, London, 1991.

	Faculty of Engineering & Technology										
Name	of the Depa	artment	Civil Engineering								
Name	of the Prog	gram	Ma	Master of Technology in Civil Engineering (Remote Sensing and							
			GIS	5)							
Cours	e Code		131	60108							
Cours	e Title		Geo	ographi	ical Infor	mation S	ystems				
Acade	emic Year		I								
Semes	ter		I								
Numb	er of Credi	ts	3								
Cours	e Prerequis	site	NII	_							
Cours	e Synopsis		Geo	ographic	e informa	ation syste	em (GIS)	is a da	ta mana	gement,	
			ana	lysis, a	nd mappi	ng system	. GIS inte	egrates lo	cation da	ata with	
			all t	forms o	f descript	ive inform	ation to c	reate a m	ap. This	lays the	
			gro	undwor	k for ma	apping and	d analysis	in rese	arch and	nearly	
			eve	ry secto	or.						
			Bas	sic In	troduction	n to F	Remote	Sensing,	Conce	ept of	
			Pho	togram	metry, Re	emote Sens	sing: App	lications	and Erro	rs.	
Cours	e Outcomes	s:									
At the	end of the c	ourse students	will be al	ble to:							
CO1	Analyze th	e basic compor	nents of C	GIS							
CO2	Classify th	e maps, coording	nate syste	ms and	projection	ons					
CO3	Process spa	atial and attribu	ite data ai	nd prepa	are thema	tic maps					
CO4	Identify an	d rectify mapp	ing inacc	uracies							
Mapp	ing of Cour	rse Outcomes ((COs) to	Progra	m Outco	mes (POs) & Progi	ram Spec	ific Out	comes:	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	1	1	1	1	-	-	-	-	1	1	
CO2	2	1	-	-	-	-	-	-	1	1	
				- - - - 1 1							



CO4	1	2	1	2	2	-	-	-	1	1	
Average	1	1.25	1	1	2	-	-		1	1	
Course Content:											
L	T (F	Hours/We	ek)		P		CL	П	Total Hou	r/Week	
(Hours/W				(Ho	ours/Week)	(Hou	rs/Week	()			
eek)											
3		-					-		3		
Unit				Co	ntent and (Competen	ıcy	•			
1	Mapping	concepts,	analysis	s with	paper base	ed maps,	limitatio	ns, Co	mputer A	utomated	
	Cartograp	hy. C2 (U	nderstan	ıd), His	story and D	evelopmei	nts, GIS-	Defini	ition, adva	ntages of	
	digital ma	aps. C2 (Underst	and), p	projections	and coor	dinate s	ystems.	. C1 (Rea	member),	
	Information	on System	s, Mode	lling R	eal World	Features D	Oata.C1 (Remen	nber), Dat	a Models	
	- Spatial	and Non-	-spatial,	Comp	onents, Da	ta Collect	tion and	Input,	Data Co	nversion,	
	Metadata. C4 (Analyze)										
2	Database Structures, Files; Standard Data Formats, Compression Techniques. C5										
	(Evaluate)	(Evaluate), Explain the concepts of Hardware and Software. C2 (Understand), Define									
	Types of	Errors, Ed	liting an	d Erro	r Rectificat	ion. C2 (U	Understa	nd), Aı	nalyze the	types of	
	Topology.	. C4 (Ar	nalyze),	Mode	lling topol	ogical Re	elationsh	ips an	d Tolera	nces. C4	
	(Analyze)										
3	Explain th	ne concept	s of Pro	ximity	Analysis, (Overlay A	nalysis,	Buffer	Analysis,	Network	
	Analysis.	C2 (Unde	erstand),	Recall	the purpos	e of the F	Route ali	gnment	t, Canal a	lignment;	
	Digital El	levation M	Models.	C1 (Re	emember),	Describe	Map con	mpositi	ion, Prepa	ration of	
	qualitative	e and quan	titative 1	maps. C	C2 (Underst	and)					
4	Explain th	ne principle	es of Un	derstan	ding the Re	equiremen	ts, Phase	s of Pla	anning. C2	2	
	(Understan	nd), Speci	fications	s, and P	rocedure fo	or analysis	projects	and de	sign proje	cts. C5	
	(Evaluate))									
	Topology. (Analyze) Explain the Analysis. Digital Elequalitative Explain the (Understand	ne concept C2 (Underlevation Me and quan ne principle nd), Speci	es of Procestand), Models. titative 1	Mode eximity Recall C1 (Remaps. C)	Analysis, on the purpose emember), C2 (Understanding the Real	Overlay A se of the F Describe and)	nalysis, Route ali Map con	Buffer gnment mpositions of Plan	Analysis, t, Canal a ion, Prepa	Network Networ	

Learning Strategies and Contact Hours

Learning Strategies Contact Hours	
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Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Clinical Examination	University Examination
(OSCE)	
Objective Structured Practical Examination	Dissertation
(OSPE)	
Quiz	Multiple Choice Questions (MCQ)
Seminars	Short Answer Questions (SAQ)
Problem Based Learning (PBL)	Long Answer Question (LAQ)
Journal Club	Practical Examination & Viva-voce
	Objective Structured Clinical Examination (OSCE)
	Objective Structured Practical Examination (OSPE)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓

Unit test		✓	✓	✓	✓				
Mid Semester Examination 1			✓	✓	✓				
Mid Semester Ex	amination 2	✓	✓	✓	✓				
University Exam	University Examination			✓	✓				
Feedback Proce	1. Stu	ident's Feedl	oack						
References:	Books								
	1. Geographic Information systems and Science, Paul Longley., John Wiley & Sons,								
	4th Edition,2015.								
	2. Introduction to Geogra	ographic Information Systems, 9th Edition, Kang Tsung							
	Chang., Tata Mc Graw H	aw Hill Publishing Company Ltd, New Delhi, 2018.							
	3. Concepts and Techniqu	ies of Ge	ographic Inf	ormation Sy	ystems, C.P.Lo & Albert				
	K. W.Yeung, second Edit	ion, Pren	tice Hall Ind	lia Pvt. Ltd,	2016.				
	References:								
	1. Principles of GIS for Land Resource Assessment, Burrough, P.A., Oxford								
	Publications, 2005.								
	2. The design and implem	2. The design and implementation of Geographic Information Systems, John E.							
	Harmon & Steven J. And	erson., Jo	ohn Wiley &	Sons, 2003	·				

				Faculty o	of Engineer	ing & Tec	hnology				
Name of the	he Depar	tment			Civil Engineering						
Name of the Program					Master of	Technolog	gy in Civi	l Engine	ering (Remote	Sensing	
Course Co	ode				13160139	1					
Course Ti	tle				Photogra	mmetry					
Academic	Year				I						
Semester					Ι						
Number o	f Credits				3						
Course Pr	erequisit	e			NIL						
Course Synopsis					Fundamental of aerial photography system, scale, Stereoscopes, Analytical Photogrammetry, aerial triangulation, digital Photogrammetry, unmanned air vehicle and its application.						
Course O	utcomes:										
At the end	of the co	urse, stu	dents	will be a	ble to:						
CO1	Acquire	e, meast	ire an	d analyze	aerial phot	ographs					
CO2	Interpre	et aerial	photo	graphs							
CO3		n orienta			to generate ortho photos and mosaics using aerial photographs						
CO4			int clo	oud data f	for documen	ntation and	archiving	g of featu	ires		
Mapping	_								Specific Outo	comes:	
COs	PO1	PO2	РО	3 PO4	PO5	PO6	PSO1	PSO	PSO3	PSO4	
CO1	3	1	2	-	3	1	-	-	1	2	
CO2	3	2	2	-	-	1	-	2	3	2	
CO3	3	2		-	-	-	-	1	3	2	
CO4	3	2	3	3	1	-	-	2	3	2	
Average	3.0	1.8	2.3	3	2	1	-	1.3	2.5	2.0	
Course Co	ontent:	1	<u> </u>	l	<u> </u>		1	I	1	1	
L	(Hours/W	eek)		T (Hou	ırs/Week)	Week) P (Hours/Week)			Total Hour/Week		
	3				0	0 3					

Unit	Content & Competencies
1	Historical development –classification, application–analogue and digital cameras–geometry of vertical photographs. C1 (Remember)
	Scale – coordinate transformations, relief displacement – tilted and oblique photographs, Flight Planning, Interpretation keys. C2 (Understand)
	Stereoscopes, stereoscopic view and its exaggeration – parallax equation – parallax measurement. C2 (Understand)
	Parallax bar-measurement of heights and determination of slopes- stereoscopic plotting instruments. C1 (Remember)
2	Concepts of orientation-interior, relative and absolute orientation of aerial photographs C1 (Remember)
	Aerial triangulation, Block adjustment, Ortho photos, Kinds of mosaics- controlled, semi-controlled, uncontrolled. C2 (Understand)
3	Automatic DTM acquisition from stereo pairs or image blocks. C1 (Remember) Colour balancing, Digital image enhancement, Feature extraction. C2 (Understand) DEM Applications in Civil Engineering. C2 (Understand)
4	History of unmanned air vehicle (UAV) development. C2 (Understand) Classifications and components of UAVs – Design standards and Regulatory aspects. C2 (Understand)
	Environment, Budget & Time, Airframe Design & Payload, Flight planning, Mosaicing, Ground control. C3 (Application)
	Feature detection and mapping, Point cloud, 3D Models, C3 (Application) DEM generation, Ortho photo generation, UAV Applications. C2 (Understand)

Teaching - Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	



Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1,2, End term
Viva-voce	
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	Multiple Choice Questions (MCQ)
Seminars	Multiple Choice Questions (MCQ)
Problem-Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce

Nature of Assess	ment		CO1	CO2	CO3	CO4
Assignment / Pres	sentation		✓	✓	✓	✓
Mid-Semester Ex	amination 1		✓	✓	✓	✓
Mid-Semester Ex	amination 2		✓	✓	√	✓
University Exami		✓	✓	✓	✓	
Feedback Proces	 Student's F Course Exit 					
References:						
	1. Digital Photogramme Springer 2013 2. Unmanned Aircraft S 3. Aerial Photography a John Wiley & Sons, Inc 4. Introductory Course i ITC, Netherlands, 1980	ystems, Reg Aus nd Image Interpr ., 2012. n Photogrammet	stin, Wile retation, F	y Public Paine D.	ations, 2 P., Kiser	010 J. D.,

BOOKS:

- 1. Elements of Photogrammetry with Application in GIS, Wolf P.R., Mc Graw Hill International Book Company, Fourth Edition, 2014.
- 2. Photogrammetry, Moffitt, Francis H. & Mikhail, Edward M., Harper and Row Publishers, 1980.
- 3.Fundamentals of Computational Photogrammetry, Sanjib K Ghosh., Concept Publishing Company, 2005
- 4.Introduction to UAV Systems, Paul Gerin F & Thomas James Gleason., Wiley Publications, 2012

İ	Faculty of Engineering & Technology										
Name of t	he Do	epart	ment			Civil E	ngineering				
Name of t	he Pr	ogra	m			Master	Master of Technology in Civil Engineering (Remote				
						Sensing	and GIS)				
Course C	Course Code						40				
Course Ti	itle					Applica	ation of Re	mote Sensing			
Academic	Year	r				I					
Semester						I					
Number o	of Cre	edits				3					
Course Pr	rereq	uisite				NIL					
Course Sy	Course Synopsis					technol city pla numero satellite numero	Satellites are crucial in the development of various technologies, including global mapping, GPS, and city planning. Remote sensing is only one of the numerous breakthroughs made possible by the satellites orbiting the globe. Remote sensing has numerous applications in land use mapping, weather forecasting, environmental study and study of natural hazards etc.				
Course O	utcon	nes:				•					
At the end	of th	e cou	rse, st	udents	will b	e able to:					
CO1					-		f remote Agriculture	sensing data e, Forestry	separately	and in	
CO2				ledge	about	t the vario	ous geolog	ical structure	es and Geon	norphic	
Landforms. CO3 Exposure to various Remote Sensing Applications to earth Sciences ,urban a											
COS		posui			5 ICCIII	iote Sensin	g Applicati	ons to earth	Sciences ,urb	oan and	
CO4	reg Ur	posui gional nderst	planr and t	ning the co	ncepts			ons to earth			
CO4	reg Un est	xposur gional nderst timati	plann and to on, cr	ning the co op dan	oncepts nage a	s involved ssessment.	in mapp		acreage and	l yield	
CO4 Mapping	reg Un est	iposungional gional nderst timati purse	plann and to on, cr	ning the coop dan omes (concepts nage a	s involved ssessment.	in mapp	ing of crop	acreage and	l yield	
CO4 Mapping Outcomes	reş Ur est of Co	kposur gional nderst timati purse	plann and ton, cr	ning the coop dan omes (oncepts nage a	s involved ssessment. to Progran	in mapp	ing of crop s (POs)& Pro	acreage and	l yield	



CO2	2	3	2	-	-	2	-	2	3	2
CO3	2	3	2	-	-	3	-	1	3	2
CO4	2	3	3	3	3	2	-	2	3	1
Average	2	3	2.5	0.8	1.5	2.5	-	2	3.0	1.5

Course Content:

L (Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total
			Hour/Week
3	0	0	3

	3	U	U	3
Sr. No.	Content & Co	ompetencies		
1	interpretation Remember), (characteristics Understand)	for delineation of Geological structures C1 (Remember),	and their field charact lithology (Rocks) and Folds, Faults and Joints Various important land	minerals (C1, and their field d forms (C2,
2	Field Applic Archeology, A Application in	Agriculture (C2, unders Disaster management	ing and management, tand) , wet land management (C2 ement (C2, Understand)	• •
3	Hyper spectra	l RS and its application Thermal RS and its a	on; Microwave RS and its pplication; Optical RS and	
4	(C2, Understa IDRISI, USO Observation (I ESA's Sentino	nd) GS Global Visualiza NEO), USGS Earth, Ex	T mips, ERDAS, ENVI, Cation Viewer (GloVis), Explorer C2 (Understand) JS Terra, LANCE, VITO Vand)	NASA Earth

Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2

Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	1	✓
University Examination	✓	✓	√	✓

Feedback Pr	Process 1. Student's Feedback	
		Course Exit Survey
References:		
1. Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.		
	2. Remote Sensing of the Environment by J.R. Jensen, Pearson Publication	

BOOKS:

- 1. Remote Sensing and Image interpretation: Thomas Lilles and & R. W. Keifer, John Wiley and Sons (3rdEd.).
- 2. Manual of Remote Sensing, Vol. 1, American Society of Photogrammetry.

				Facul	lty of E	Ingineerin	g & Techn	ology			
Name of the	he Dep	artmer	nt			Civil I	Civil Engineering				
Name of t	he Prog	gram				Master	Master of Technology in Civil Engineering (Remote				
							g and GIS)				
Course Code						13160					
Course Title						Geogr (GIS)		formation S	ystems		
Academic Year						Ī					
Semester						I					
Number o	f Credi	its				1					
Course Pr	erequi	site				NIL					
Course Outcomes: At the end of the course, students will be able to:					storing GIS co inform and ar Users their lo	A geographic information system (GIS) is a system for storing, analysing, and mapping data. To build a map, GIS combines location data with all types of descriptive information. This establishes the foundation for mapping and analysis in research and almost every other field. Users may use GIS to look at trends, correlations, and their location's surroundings.					
CO1	Recall and Prepare the different geospatial layers										
CO2	Comp	oute ge	ometric	measu	rement	s and perfo	orm spatial	analysis			
CO3	Creat	e high-	quality	maps a	and asso	ociated gra	phics				
CO4	Integr	rate dif	ferent g	geospati	ial laye	rs					
Mapping	of Cou	rse Out	tcomes	(COs)	to Pro	gram Out	comes (PO	s)& Progra	m Specific O	outcomes:	
COs	PO	PO	PO	PO	PO	PO6	PSO1	PSO2	PSO3	PSO4	
	1	2	3	4	5						
CO1	3	1	2	-	3	1	-	-	1	1	
CO2	3	2	2	-	-	1	-	2	3	-	
CO3	3	2		-	-	-	-	1	3	-	
CO4	3	2	3	3	1	-	-	2	3	1	
Average	3.0	1.8	2.3	0.8	1.0	0.5	-	1.3	2.5	0.5	
Course Co	ntent:	ı	ı	ı	ı	<u>I</u>	ı	1	<u>I</u>	<u>I</u>	

L (Ho	ours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week			
	0	0	2	2			
Sr. No.	Content & Com	petencies					
1	Importing maps	Importing maps and layers from various sources (C1, Knowledge)					
2	Geo referencing	Geo referencing and projection (C1, Knowledge)					
3	Digitization of P	Digitization of Points and Lines (C1, Knowledge)					
4	Editing Map Ele	Editing Map Elements (C1, Knowledge)					
5	Attribute Data En	Attribute Data Entry and Manipulation (C1, Knowledge)					
6	Cleaning, Buildin	Cleaning, Building and Transformation (C1, Knowledge)					
7	Buffer Analysis	Buffer Analysis (C1, Knowledge)					
8	Network Analysi	Network Analysis (C1, Knowledge)					
9	Data Analysis—	Overlay, Buffer (C1, K	nowledge)				
10	Importing maps	and layers from various	sources (C1, Knowledge)				

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	15
Seminar/Journal Club	
Small group discussion (SGD)	10
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	5
Case/Project Based Learning (CBL)	
Revision	
Others If any:	
Total Number of Contact Hours	30

Formative	Summative

Multiple Choice Questions (MCQ)	
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	
Seminars	
Problem Based Learning (PBL)	
Journal Club	-

Nature of Assessn		CO1	CO2	CO3	CO4	
VIVA	✓	✓	✓	✓		
Practical Log Book	✓	✓	✓	✓		
University Examin		✓	✓	✓	✓	
Feedback Process	 Student's Feedback Course Exit Survey 					
2. Feedback b	rious steps Mentor Mentee system. r through Google forms. e end of the semester.					
References:						
	New Delhi., Vol-1 2. Workshop Tech Publications; Four 3. Principles of M	nnology Vol. I & II - Hazra : ISBN-10: 8185099146, V nnology (Manufacturing Pr th Edition (2018), ISBN-1 anufacturing Materials and w Edition, ISBN-10: 0070	Vol-II: ISB rocess) –S .0: 813180 d Processes	N: 978818 K Garg, La 6979.	5099156 axmi	

				F	aculty	of Engineer	ing & Tech	nology				
Name of the Department						Civil Engi	Civil Engineering					
Name of the Program						Master of	Technology	in Civil Engin	eering (Remo	ote		
G						Sensing an		_				
Course Code						13160142						
Course Title						Photogra	mmetry La	ıb				
Academic Year						I						
Semester						I						
Number	of Cre	dits				1						
Course P	rerequ	isite				NIL						
Course S	ynops	is				Understan	d various co	omputer compo	nents.			
Course O	utcon	ies:										
At the end	l of the	e cour	se, stu	idents	will be	e able to:						
CO1	Understand about the Photogrammetry and its types											
CO2	Identify about the stereoscopy.											
CO3	Will able to learn about the analytical Photogrammetry											
					Jut the	anaryticai i n	otogramme	try				
Mapping		urse (Outco	mes (COs) 1	to Program (Outcomes (POs) & Progra	_			
Mapping	РО	urse (Outco PO	mes (COs) 1	to Program (am Specific (
Mapping		urse (Outco	mes (COs) 1	to Program (Outcomes (POs) & Progra	_			
Mapping COs	РО	urse (Outco PO	mes (COs) 1	to Program (Outcomes (POs) & Progra	_			
Mapping COs CO1	PO 1	PO 2	PO 3	mes (COs) 1 PO 5	PO 6	Outcomes (POs) & Progra	PSO3	PSO4		
Mapping COs CO1 CO2	PO 1 3	PO 2	PO 3	mes (COs) 1 PO 5	PO 6	Outcomes (POs) & Progra PSO2	PSO3	PSO4		
Mapping COs CO1 CO2 CO3	PO 1 3 3	PO 2 1 2	PO 3	PO 4	PO 5 3 -	PO 6	PSO1	POs) & Progra PSO2 - 2	PSO3	PSO4		
COs CO1 CO2 CO3 CO4	PO 1 3 3 3 3	PO 2 1 2 2	PO 3	PO 4	PO 5 3	PO 6	PSO1	PSO2	PSO3 1 3 3	PSO4		
COs CO1 CO2 CO3 CO4 Average	PO 1 3 3 3 3 3 3.0	PO 2 1 2 2 1.8	PO 3 2 2 3	PO 4 3	PO 5 3 - 1	PO 6 1 1	PSO1	PSO2	PSO3 1 3 3 3	PSO4		
COs CO1 CO2 CO3 CO4	PO 1 3 3 3 3 3 3.0	PO 2 1 2 2 1.8	PO 3 2 2 3	PO 4 3	PO 5 3 - 1	PO 6 1 1	PSO1	PSO2	PSO3 1 3 3 3	PSO4		
COs CO1 CO2 CO3 CO4 Average Course C	PO 1 3 3 3 3 3 3.0	PO 2 1 2 2 1.8	PO 3 2 2 2 3 2.3	PO 4 3	PO 5 3 - 1 1.0	PO 6 1 1	PSO1	PSO2	PSO3 1 3 3 2.5	PSO4		



Content & Competencies					
Sr. No.	Title				
1	Fundamentals of aerial photos and satellite image Interpretation (C3, Apply)				
2	Types of imaging (C3, Apply)				
3	Elements of interpretation (C3, Apply)				
4	Techniques of Visual interpretation (C3, Apply)				
5	Generations of Thematic maps (C3, Apply)				
6	Study of satellite image annotation (C3, Apply)				
7	Demarcation of contours & watershed (C3, Apply)				
8	Remote sensing applications (C3, Apply)				
9	Understanding of spectral response pattern of different landforms (C3, Apply)				
10	Image Interpretation and Analysis (C3, Apply)				

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	Contact Hours	
Lecture		
Practical	15	
Seminar/Journal Club		
Small group discussion (SGD)	10	
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	5	
Case/Project Based Learning (CBL)		
Revision		
Others If any:		
Total Number of Contact Hours	30	

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination (OSPE)	University Examination
Quiz	
Seminars	
Problem Based Learning (PBL)	
Journal Club	

Mapping of Assessment with COs

√ √	✓	✓	✓
√ √	√	✓	✓
√			
	✓	✓	✓
		_	

2. Feedback between the semester through google forms.



SEMESTER - II

Course Code	Course Title
	Course Title
13160238	Minor Project
Choose th	ese subjects for specialization in Transportation Engineering
13160232	Analysis and Design of Pavement
13160233	Transport Economics
13160234	Traffic Engineering and Management
13160235	Airport Infrastructure, Planning and Design
13160236	Pavement Design Lab
13160237	Traffic Lab
Choose	these subjects for specialization in Structural Engineering
13160214	Finite Element Analysis
13160215	Theory of Elasticity and Plasticity
13160216	Limit State Design of Steel Structures
13160217	Earthquake Resistant Design
13160218	Structural Engineering lab (CASTING)
13160239	Finite Element Analysis Lab
Choose	these subjects for specialization in Remote Sensing and GIS
13160240	Geospatial Data Processing and Modelling
13160241	Satellite Image Processing
13160242	Advanced GIS
13160243	GPS & Surveying
13160244	Advanced GIS Lab
13160245	Satellite Image Processing Lab

			Fa	culty of	Engine	ering &	k Technology	y			
Name of the	he Dep	artmen	t	Civ	il Engi	ineerin	g				
Name of the	he Pro	gram		Mas	Master of Technology in Civil Engineering						
				(Tra	anspor	tation I	Engineering))			
Course Co	ode			131	60238						
Course Ti	tle			Miı	nor Pr	oject					
Academic	Year			I							
Semester				II							
Number o	f Cred	its		3							
Course Pr	erequi	site		NII	1						
Course Sy	nopsis			base ado ana	Minor Project will include identification of the problem based on the literature review and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution						
Course Ou			4 14	:11 1	-1.1. 4						
At the end	of the	course s	tudent	s will be	able t	o:					
CO1	Id	entify c	ivil en	gineering	g probl	lems by	reviewing	availabl	e litera	iture.	
CO2		entify apgineering		iate tech	niques	to ana	lyze comple	x proble	ems re	lated to	civil
CO3	In	vestigat	e and o	levelopr	elopment of solution						
Mapping o		rse Out	comes	(COs)	to Pro	gram (Outcomes (1	POs) &	Progr	am Spe	cific
COs	PO 1	PO2	PO 3	PO4	PO 5	PO6	PSO1	PSO)2	PSO3	PSC 4
CO1	3	3	2	3	3	3	3	3	2		3
CO2	3	3	2	3	3	3	3	3	2		3
CO3	3	3	2	3	3	3	3	3	2		3
Average	3	3	2	3	3	3	3	3	2		3
Course Co	ontent:										
L (Hours/	Week)			T (Hou	ırs/Wo	eek)	P (Hours/V	Veek)	Total	Hour/\	

0	0		6	6
Unit	,		Content	
1.	suitable sol	ution (C3, App	Understand), Impoly), Experiments develop the solut	and tests (C4,

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	13
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	26
Problem Based Learning (PBL)	
Case/Project Based Learning (CBL)	13
Revision	
Others If any:	
Total Number of Contact Hours	52

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)



Practical Examination & Viva-voce
Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book/Drawing	✓	✓	✓	✓
Mid Semester Examination 1				
Mid Semester Examination 2				
University Examination (External Practical)	✓	✓	✓	✓

Feedback Process

1. Student's Feedback

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through google forms



Master of Technology in Civil Engineering (Transportation Engineering) 2nd Semester

			Faci	ulty of B	Engine	ering &	Technolog	v			
Name of th	e Dep	artmen				neering		, <u> </u>			
Name of th					Master of Technology in Civil Engineering						
	•	5			(Transportation Engineering)						
Course Co	de				13160232						
Course Tit						and Des	sign of Pave	ment			
Academic				I	<u>,</u> 515 (, , g				
Semester				II							
Number of	Cred	its		4							
Course Prerequisite					l Mech	anics at	nd concrete 1	technolog	ον		
Course Synopsis									environmental	factors	
course syl	торы					_			d calculation,		
							ible and rigid			8 ,	
Course Ou	tcome	es:		•							
At the end	of the	course s	student	s will be	able t	o:					
CO1	Stı	udents v	will lea	rn about	t the be	haviou	r of various	materials	under variou	ıs	
	en	vironm	ental co	ondition	S						
CO2	Design philosophy of flexible pavement										
CO3				hy of rig	-						
CO4				ble and			t				
Mapping o Outcomes:		rse Out	tcomes	(COs) 1	to Prog	gram O	Outcomes (P	Os) & P	rogram Spec	eific	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	2	1	3	3	3	1	2	2	3	3	
CO2	2	1	3	3	3	1	2	2	3	3	
CO3	2	1	3	3	3	1	2	2	3	3	
CO4	2	1	3	3	3	1	2	2	3	3	
Average	2	1	3	3	3	1	2	2	3	3	
					, -					1 - 1	
Course C	onter	nt:									
L (1	Hours/V	Week)		T (Ho	ours/We	eek)	P (Hours/W	eek)	Total Hour/	Week	
	3				1		0		4		
Uni	it				Content						
1.		Cla	assify t	he types	and co	ompone	nt of pavem	ents (C2	, Understand)),	
			•	• 1		•	•		· · · · · · · · · · · · · · · · · · ·	•	
					e factors affecting design and performance of C2, Understand), Explain the significance of Highway						
		_						_			
			_	_				Jenne un	e functions o	1	
				compo							
2.		Ex	plain	the con	cept o	f desig	n wheel lo	ad (C2,	Understand)),	
		Dis	scuss	the stre	ength	charact	teristics of	paveme	ent materials	5,	
		cli	matic	variatio	ne tr	affic -	load equ	ivalence	factors and	4	
2.		Dis	scuss	the str	ength	charact	teristics of	paveme	ent materials	5,	

	equivalent wheel loads (C2, Understand), Discuss aircraft loading,
	gear configuration and tyre pressure (C2, Understand). Explain
	the drainage – Estimation of flow, surface drainage, sub-surface
	drainage systems, design of sub-surface drainage structures (C2,
	Understand).
3	Discuss empirical, semi-empirical and theoretical approaches (C2,
	Understand), Explain the design of highway and airport pavements by
	IRC, AASHTO Methods (C2, Understand), Describe the applications of
	pavement design software (C2, Understand)
4.	Discuss the types of joints and their functions, joint spacing (C2,
	Understand); Explain the design of CC pavement for roads,
	highways and airports as per IRC, AASHTO, design of joints
	(C2, Understand). Explain the design of continuously reinforced
	concrete pavements (C2, Understand). Explain the reliability; Use
	of software for rigid pavement design (C2, Understand).

Teaching - Leafning Strategies and Contact Hou	1.5
Teaching - Learning Strategies	Contact Hours
Lecture	40
Practical	
Seminar/Journal Club	1
Small group discussion (SGD)	1
Self-directed learning (SDL) / Tutorial	6
Problem Based Learning (PBL)	8
Case/Project Based Learning (CBL)	3
Revision	3
Others If any:	-
Total Number of Contact Hours	60

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)



Nature of Assessn	nent	CO1	CO2	CO3	CO4			
Quiz		✓	✓	✓	✓			
VIVA								
Assignment / Prese	✓	✓	✓	✓				
Unit test		✓	✓	✓	✓			
Practical Log Book	x/ Record Book							
Mid Semester Exa	mination 1	✓	✓	✓	✓			
Mid Semester Exa	mination 2	✓	✓	✓	✓			
University Examin	ation	✓	✓	✓	✓			
Feedback Process	}	1. Student's Feedback						
_	is taken through edback through M etween the seme	Ientor M	entee sys					
References:								
	(ii) Yang. H. Hu Hall Inc. (iii) Rajib B. Ma and Practice, CR	ang, Pave llick and C Press (Hudson, R IcGraw H	ment Ana Tahar El-F Taylor and alph Haas	lysis and I Korchi, Pa I Francis (and Zeni	nt Design, John Wiley and Sons Design, Second Edition, Prentice avement Engineering – Principles Group) swki, Modern Pavement			

			Foor	ulty of I	Ingino	oring &	- Tachnalac	rw 7				
Name of th	no Don	artmar				ineering &	z Technolog	<u> </u>				
Name of the			ii.					1 Engin	eering			
Name of th	16 1 10	grain			Master of Technology in Civil Engineering (Transportation Engineering)							
Course Co	do				13160233							
Course Tit					Transport Economics							
Academic				I	шэрог	t Econe	Jilics					
Semester	1 Cai			II								
Number of	f Cred	ite		3								
Course Pr					hway	Enginee	rinσ					
Course Sy								and and	surplus, deterr	ninant of		
Course sy	порыз								lation and e			
						project						
Course Ou	itcome	es:		•		-						
At the end												
CO1	Stı	udents w	ill be a	ble to un	derstan	d the eco	onomics of ro	ad proje	ects			
CO2			ill learr	n about tl	he conc	ept of el	asticity and h	ow it af	fects the supply	y		
		mand										
CO3									f travel mode			
CO4									ghway project			
Mapping o Outcomes:		rse Out	tcomes	(COs)	to Pro	gram O	Outcomes (P	Os) &	Program Spe	ecific		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	PSO3	PSO4		
	PO1											
CO1	PO1 2	2	2	3	2	2	2	2	3	3		
CO1 CO2	PO1 2 2 2	2 2	2 2	3	2 2	2 2	2 2	2 2	3 3	3 3		
CO1 CO2 CO3	PO1 2 2 2 2	2 2 2	2 2 2	3 3 3	2 2 2	2 2 2	2 2 2	2 2 2	3 3 3	3 3 3		
CO1 CO2 CO3 CO4	PO1 2 2 2 2 2	2 2 2 2	2 2 2 2	3 3 3	2 2 2 2	2 2 2 2	2 2 2 2 2	2 2 2 2	3 3 3 3	3 3 3 3		
CO1 CO2 CO3	PO1 2 2 2 2	2 2 2	2 2 2	3 3 3	2 2 2	2 2 2	2 2 2	2 2 2	3 3 3	3 3 3		
CO1 CO2 CO3 CO4 Average	PO1 2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2	3 3 3	2 2 2 2	2 2 2 2	2 2 2 2 2	2 2 2 2	3 3 3 3	3 3 3 3		
CO1 CO2 CO3 CO4 Average Course C	PO1 2 2 2 2 2 2 2 Conte	2 2 2 2 2 2	2 2 2 2	3 3 3 3 3	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2	3 3 3 3 3	3 3 3 3 3		
CO1 CO2 CO3 CO4 Average Course C	PO1 2 2 2 2 2 2 Hours/N	2 2 2 2 2 2	2 2 2 2	3 3 3 3 3	2 2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2 2	2 2 2 2 2 2	3 3 3 3 3 3 Total Hour	3 3 3 3 3		
CO1 CO2 CO3 CO4 Average Course C	PO1 2 2 2 2 2 2 1 Contein Hours/N 3	2 2 2 2 2 2	2 2 2 2	3 3 3 3 3	2 2 2 2 2 2	2 2 2 2 2 2	2 2 2 2 2 2 2 P (Hours/W	2 2 2 2 2 2	3 3 3 3 3	3 3 3 3 3		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 2 week)	2 2 2 2 2 2	3 3 3 3 3	2 2 2 2 2 2 2 2 0	2 2 2 2 2 2 2	2 2 2 2 2 2 2 P (Hours/W 0	2 2 2 2 2 2 2	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3		
CO1 CO2 CO3 CO4 Average Course C	PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 2 Week)	2 2 2 2 2 2	3 3 3 3 3	2 2 2 2 2 2 2 2 0	2 2 2 2 2 2 2 eek)	2 2 2 2 2 2 2 P (Hours/W 0 Content nomics (C2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 Total Hour 3	3 3 3 3 7/Week		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 Week)	2 2 2 2 2 2 2 escribe	3 3 3 3 3 T (He	2 2 2 2 2 2 2 2 0 ortatio	2 2 2 2 2 2 2 2 (C2, Un	P (Hours/W O Content nomics (C2 derstand), D	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 Total Hour 3 derstand),	3 3 3 3 3 VWeek Explain iffication		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2	2 2 2 2 2 2 2 2 2 2 2, Uno	3 3 3 3 T (He transportion derstand	2 2 2 2 2 2 2 0 ortatio mand (2 2 2 2 2 2 2 eek)	P (Hours/W 0 Content nomics (C2 derstand), D eterminants	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 Contact Hour 3 Contact Hour 3 Contact Hour 4 Contact H	3 3 3 3 VWeek Explain iffication malyze),		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	T (Hotel)	2 2 2 2 2 2 2 0 ortatio mand (), Exa	2 2 2 2 2 2 2 ceek) n ecor (C2, Un mine denction continuo	P (Hours/W O Content nomics (C2 derstand), D eterminants curve (C2, U	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 Control Hour 3 Control Hour 3 Control Hour 3 Control Hour 4 Control H	3 3 3 3 3 VWeek Explain iffication nalyze), shift in		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 mt: Week) Detra (C. Didetal	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	T (He transportion derstand the demacurve (Control of the transportion derivative)	2 2 2 2 2 2 2 ortatio mand (), Exa and fur C2, Un	2 2 2 2 2 2 2 (C2, Un mine denction conderstand	P (Hours/W 0 Content nomics (C2 derstand), Determinants curve (C2, Ud), Compa	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 Control Hour 3 Control Hour 3 Control Hour 3 Control Hour 4 Control H	3 3 3 3 3 Week Explain ification nalyze), shift in ation of		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 2 2 Dit: Week) Details details details trained tra	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	T (Hotel transportion der derstand the demacurve (Contion derivation derivati	2 2 2 2 2 2 2 ours/We 0 ortatio mand (), Exa and fur C2, Un mand a	2 2 2 2 2 2 2 2 (C2, Un mine denction conderstand peak	P (Hours/W O Content nomics (C2 derstand), D eterminants curve (C2, U d), Compa k problem an	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 4 Total Hour 3 derstand), demand class mand (C4, A and), Discuss temporal vari sures to mitig	3 3 3 3 3 /Week Explain iffication nalyze), shift in ation of rate (C4,		
CO1 CO2 CO3 CO4 Average Course C L (PO1 2 2 2 2 2 2 2 Hours/V 3 it	2 2 2 2 2 2 2 2 Dit: Week) Details details details trained tra	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	T (Hotel transportion der derstand the demacurve (Contion derivation derivati	2 2 2 2 2 2 2 ours/We 0 ortatio mand (), Exa and fur C2, Un mand a	2 2 2 2 2 2 2 2 (C2, Un mine denction conderstand peak	P (Hours/W O Content nomics (C2 derstand), D eterminants curve (C2, U d), Compa k problem an	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 Control Hour 3 Control Hour 3 Control Hour 3 Control Hour 4 Control H	3 3 3 3 3 /Week Explain iffication nalyze), shift in ation of rate (C4,		

	model (C2, Understand), Distinguish direct and cross elasticity (C4,
	Analyze).
2.	Describe supply curve (C2, Understand), Explain the determinant of
	supply (C2, Understand), Explain the price elasticity of supply (C2,
	Understand), Implement determinant of price elasticity of supply (C3,
	Apply), Discuss constant elasticity supply function (C2, Understand),
	Contrast demand supply equilibrium and in-equilibrium (C4, Analyze).
3.	Explain consumer surplus (C2, Understand), Describe change in
	consumer surplus (C2, Understand), Explain latent demand (C2,
	Understand), Define producer surplus (C2, Understand), Classify
	change in producer surplus (C2, Understand), Explain Income elasticity
	(C2, Understand).
4.	Explain behavior analysis and its objective and application (C2,
	Understand). Organize Travel Behavior Analysis (TBA) (C4, Analyze),
	Explain Application of TBA (C2, Understand), Define Basic steps of
	TBA (C2, Understand), Design of survey instrument (C6, Create),
	Define Data types in behavior analysis (C2, Understand), Explain
	Preference elicitation techniques (C2, Understand), Develop Discrete
	choice experiment (C6, Create), Identification of attributes and its levels
	(C2, Understand), Conjecture of alternatives (C6, Create), Investigate
	Factorial design (C6, Create).

Teaching - Learning Strategies and Contact i	10015	
Teaching - Learning Strategies	Contact Hours	
Lecture	38	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	5	
Case/Project Based Learning (CBL)		
Revision	2	
Others If any:		
Total Number of Contact Hours	45	

Formative	Summative
Objective Structured Practical Examination	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)



Nature of Assessn	Nature of Assessment		CO2	CO3	CO4			
Quiz	Quiz		✓	✓	✓			
VIVA					✓			
Assignment / Prese	Assignment / Presentation		✓	✓	✓			
Unit test		✓	✓	✓	✓			
Practical Log Book	Practical Log Book/ Record Book							
Mid Semester Exam	mination 1	✓	✓	✓	✓			
Mid Semester Exam	Mid Semester Examination 2		✓	✓	✓			
University Examin	University Examination		✓	✓	✓			
		-1		_ L				
Feedback Process	Feedback Process		1. Student's Feedback					
_	is taken through dback through M etween the semes	lentor M	entee syst					
	Text Books 1. Winfrey, Economic analysis for Highways, International Textbook Company, Pennsylvania, 1969 2. CRRI, Road User Cost Study in India, New Delhi, 1982 3. IRC, Manual on Economic Evaluation of Highway Projects in India, SP30, 2007							

			Faci	ulty of I	Engine	ering d	& Technolog				
Name of the	ıe Den	artmen				ineerin) <i>J</i>			
	Name of the Program					Master of Technology in Civil Engineering					
8							Engineering)	8	8		
Course Code					60234						
Course Tit							ring and Ma	nagem	ent		
Academic				I	tine E	<u>ngmee</u>	ing una ma	magem			
Semester	Tear			II							
Number of	f Cred	its		3							
Course Pr					hway	Engine	ering				
Course Sy								erino	Road user fa	cilities	
Course by	порыз			l l			_	•	egulation & c	-	
				l l			intersection of		egulation & c	ontrois,	
Course Ou	itcome	16.		Git	ide sep	aratea	intersection (icsigii			
At the end			student	s will he	e able t	0.					
CO1							affic studie	s traf	fic forecasting	ng and	
CO1		terpreta		icarii (about	tile ti	arric stadic	.s, 11a1	ine forecastii	ig and	
CO2				ırn abou	t the sr	need str	ıdv				
CO3							and of traffic	contro	1 system		
CO4				ırn abou				Contro	1 System		
								(Os) &	Program Spe	cific	
Outcomes		rsc Out	comes	(COs)	10 1 10	grain	Jutcomes (1	Os) &	i rogram spc	CIIIC	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	PSO3	PSO4	
CO1	3	1	3	3	2	2	2	2	3	3	
CO2	3	1	3	3	2	2	2	2	3	3	
CO3	3	1	3	3	2	2	2	2	3	3	
CO4	3	1	3	3	2	2	2	2	3	3	
Average	3	1	3	3	2	2	2	2	3	3	
					1		1				
Course C	Conte	nt:									
L (Hours/V	Week)		Т (Н	ours/W	eek)	P (Hours/W	eek)	Total Hour/	Week	
	3	,		Ì	0		0	ĺ	3		
Un	it			l .			Content				
1.		De	fine R	Road us	er (C1	, Rem	ember), vehi	cle and	d road way.	Vehicle	
									nderstand) -		
					me. Highway capacity and levels of service (C6,Create) -						
					urban and rural roads –Examine PCU concept and its						
				ns (C4,A					•		
2.							(C1, Reme	mber)–	Demonstrate	Parking	
				(C3,			scuss Cycle			le-ways	
				•		*	-		raffic volume	•	
		`	-	, .	ation studies, speed studies, travel time and delay studies,						
			_			-	es (C4,Analy		J		

3.	Design of Alignment - Cross sectional elements (C6, Create), Use of Stopping
	and passing sight distance (C3, Apply). Design of Horizontal curves and
	Vertical curves (C6, Create). Design problems(C3, Apply)
4.	Understand Signs and markings in Traffic System Management (C2,
	Understand); Design of at-grade intersections (C6, Create), Principles of
	design - Channelization - Design of rotaries(C6, Create); design of Traffic
	signals - pre-timed and traffic actuated. Design of signal setting - phase
	diagrams, timing diagram, signal coordination (C6, Create);

Teaching Bearing Strategies and Contact	i di s	
Teaching - Learning Strategies	Contact Hours	
Lecture	35	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	4	
Case/Project Based Learning (CBL)	4	
Revision	2	
Others If any:		
Total Number of Contact Hours	45	

Assessment Methods:

Formative	Summative
Objective Structured Practical Examination	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
-	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
VIVA				
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Practical Log Book/ Record Book				
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination(External Practical)	✓	√	✓	✓



Feedback Process		1. Student's Feedback				
Students Feedback	pack is taken through various steps					
 Regular fee 	eedback through Mentor Mentee system					
2. Feedback b	eedback between the semester through Google forms					
References:						
	Text Books					
(i) ITE Hand Book, Highway Engineering Hand Book, McGraw - Hill						
(ii) R. J. Salter and N. B. Hounsel, Highway Traffic Analysis and Design,						
	Macmillan Press Ltd, 1996					
	(iii) AASHTO A Policy of	on Geometric Design of Highway and Streets				
	(iv) John Wiley & Sons I	nc., ITE Brian, Traffic Engineering handbook				

			E	_14 C T	7) Tll.				
	na Dan	autmar					& Technolog	<u> </u>			
	Name of the Department					Civil Engineering Master of Technology in Civil Engineering					
Name of the Program								i Engin	eering		
						tation E	Engineering)				
Course Code					60235	C ,	, DI	•			
Course Tit				Air	port I	ntrastr	ucture, Plai	nning a	nd Design		
Academic	Year			1							
Semester				1I 3							
Number of Credits											
Course Pro						ngineer					
Course Syr	nopsis								air traffic op		
									, Concept of		
					_		-	_	laws, Capac	•	
				traf	fic de	termina	tion, Runw	ay desi	gn, Taxiway	design,	
				Ma	rking &	& signa	l, Lighting				
Course Ou											
At the end	of the	course s	student	s will be	e able t	o:					
CO1	St	udents	will be	able to	undersi	tand the	e various air	ort con	nponents		
CO2	St	udents	will be	able to	underst	tand the	e different te	chnique	es used for air	traffic	
	ca	lculatio	n								
CO3	St	udents	will lea	rn abou	t the va	arious f	actors affect	ing the	runway orient	ation	
CO4	St	udents	will un	derstand	about	the the	ICAO stanc	lards &	regulations		
Mapping o Outcomes:		rse Ou	tcomes	(COs)	to Pro	gram (Outcomes (P	Os) &	Program Spe	cific	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	PSO3	PSO4	
	3	2	3	3	2				2		
CO1			1.3			1	2	12	3	3	
CO1 CO2						1	2	2	3	3	
CO2	2	3	2	3	2	1	2	2	3	3	
CO2 CO3	2	3	2 2	3	2 2	1	2 2	2 2	3	3	
CO2 CO3 CO4	2 2 2	3 3 3	2 2 3	3 3 3	2 2 2	1 1 1	2 2 2	2 2 2	3 3 3	3 3 3	
CO2 CO3	2	3	2 2	3	2 2	1	2 2	2 2	3	3	
CO2 CO3 CO4 Average	2 2 2 2.5	3 3 2.75	2 2 3	3 3 3	2 2 2	1 1 1	2 2 2	2 2 2	3 3 3	3 3 3	
CO2 CO3 CO4 Average	2 2 2 2.5	3 3 3 2.75	2 2 3	3 3 3 3	2 2 2 2	1 1 1 2	2 2 2 2	2 2 2 2 2	3 3 3 3	3 3 3 3	
CO2 CO3 CO4 Average	2 2 2 2.5 Contei	3 3 3 2.75	2 2 3	3 3 3 3	2 2 2 2 2	1 1 1 2	2 2 2 2 2 P (Hours/W	2 2 2 2 2	3 3 3 3 3 Total Hour.	3 3 3 3	
CO2 CO3 CO4 Average	2 2 2 2.5 Contei Hours/V	3 3 3 2.75	2 2 3	3 3 3 3	2 2 2 2	1 1 1 2	2 2 2 2	2 2 2 2 2	3 3 3 3	3 3 3 3	
CO2 CO3 CO4 Average Course C L (1	2 2 2 2.5 Contei	3 3 2.75 nt: Week)	2 2 3 2.5	3 3 3 3	2 2 2 2 2 2 0	1 1 1 2 eek)	2 2 2 2 2 P (Hours/W 0 Content	2 2 2 2 2	3 3 3 3 Total Hour	3 3 3 3 /Week	
CO2 CO3 CO4 Average Course C L (I	2 2 2 2.5 Contei	3 3 3 2.75 nt: Week)	2 2 3 2.5	3 3 3 3	2 2 2 2 2 2 0 CAO s	1 1 1 2 eek)	2 2 2 2 P (Hours/W 0 Content ds (C2, Unde	2 2 2 2 2 Veek)	3 3 3 3 Total Hour 3	3 3 3 3 /Week	
CO2 CO3 CO4 Average Course C L (I	2 2 2 2.5 Contei	3 3 2.75 nt: Week)	2 2 3 2.5	3 3 3 3 T (He	2 2 2 2 2 2 0 CAO s	1 1 1 2 eek)	2 2 2 2 P (Hours/W 0 Content ds (C2, Unde	2 2 2 2 2 Veek)	3 3 3 3 Total Hour	3 3 3 3 /Week	
CO2 CO3 CO4 Average Course C L (I	2 2 2 2.5 Contei	3 3 2.75 nt: Week)	2 2 3 2.5	T (Ho	2 2 2 2 2 2 0 CAO s	1 1 1 2 eek)	P (Hours/W 0 Content ds (C2, Underport compo	2 2 2 2 2 2 veek) erstand) nents, 2	3 3 3 3 Total Hour 3 . Planning for zoning laws e	3 3 3 3 /Week airport tc. (C2,	
CO2 CO3 CO4 Average Course C L (1	2 2 2 2.5 Contei	3 3 2.75 nt: Week)	2 2 3 2.5 2.5 2.6 2.6	3 3 3 3 T (He	2 2 2 2 2 2 Ours/We 0	1 1 2 eek) tandard	2 2 2 2 P (Hours/W 0 Content ds (C2, Underport compo	2 2 2 2 2 Veek) erstand) nents, z	3 3 3 3 Total Hour 3	3 3 3 3 /Week airport tc. (C2,	
CO2 CO3 CO4 Average Course C L (1	2 2 2 2.5 Contei	3 3 2.75 nt: Week)	2 2 3 2.5 2.5 2.6 2.6 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7	T (Ho	2 2 2 2 2 2 CAO s Underst	1 1 1 2 eek) tandard and air	P (Hours/W O Content ds (C2, Underport compo	2 2 2 2 2 veek) erstand) nents, 2 corecast ze)	3 3 3 3 Total Hour 3 . Planning for zoning laws e	3 3 3 3 /Week rairport tc. (C2,	

	radius exit taxiways (C6, Create)
4.	Design principles of critical, semi-critical, non-critical airport
	pavements and FAA and PCA methods (C6, Create). Airport hangars,
	their planning and design criteria (C5, Evaluate
	C6, Create)

Teaching - Learning Strategies	Contact Hours				
Lecture	32				
Practical					
Seminar/Journal Club					
Small group discussion (SGD)					
Self-directed learning (SDL) / Tutorial					
Problem Based Learning (PBL)	5				
Case/Project Based Learning (CBL)	5				
Revision	3				
Others If any:					
Total Number of Contact Hours	45				

Assessment Methods:

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
VIVA				
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Practical Log Book/ Record Book				
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓
Feedback Process	1. Stu	ıdent's F	eedback	

Students Feedback is taken through various steps							
1. Regular feed	1. Regular feedback through Mentor Mentee system						
2. Feedback be	tween the semester through Google forms						
References:							
	Text Books						
	(i) Airport Engineering, N.J. Ashford, P.H. Wright, John Wiley						
	(ii) Planning and Design of Airports, R.M. Horonjeff, F.X. McKelvey,						
	W.J Sproule, Seth Young						
	(iii) Airport Planning & Management, Wells, Alexander; Young, Seth,						
	McGraw Hill						
	(iv) TMH International Publishers						
	(v) Airport Engineering (Planning and Design), S.C Saxena, CBS						
	Publisher						

			Faci	ulty of I	Engine	ering	& T	Technolog	v			
Name of th	ie Den	artmen				ineerin			1.0			
Name of the Program					Master of Technology in Civil Engineering							
								gineering)			8	
Course Co	de				60236			<u>,</u>				
Course Tit							on I	ah				
	ourse Title Pavement Design Lab cademic Year I											
Semester	1 Cui			II								
Number of	f Cred	ite		1								
Course Pro					hway	Engine	eriı	ng lah				
Course Syl		3100							arious	env	ironmental	factors
Course sy	порыз					_					load calcu	
											id pavemen	
						nd IITP			ore arra	i iig.	ia pavemen	it using
Course Ou	ıtcoma	· C •		12-10	uyor ar	14 1111	11 V	<u> </u>				
At the end			student	s will he	e ahle t	.O.						
CO1							mei	ntal factor	s for th	ne na	avement des	gion
CO2				luation a				iliai lacioi	5 101 ti	ic pa	avenient des	oigii
CO2				tion in 1				acian				
CO4								ement syst	om.			
Mapping of										Dvc	ogram Snac	vific
Outcomes:		ise Out	Comes	(COs)	10 1 10	gram	Ou	tcomes (1	Os) &	110	ogram spec	cilic
	PO1	DO3	DO2	DO4	DO5							
		PO	POS		PO4 PO5 PO6 PSO1 PSO2 PSO3 P				PSO3	PSO4		
COs	POI	PO2	PO3	PO4	POS	PO	6	PSOI	PSU	02	PSO3	PSO4
COs CO1	3	2	3	2	3	PO6	5	2	2)2	PSO3	PSO4
							6)2 		
CO1	3	2	3	2	3	2	6	2	2	02	3	3
CO1 CO2	3 2	2	3 2	2 2	3	2 3	6	2 2	2 2)2 	3	3
CO1 CO2 CO3 CO4	3 2 3 3	2 1 2	3 2 1	2 2 3 3	3 3 2	2 3 1	6	2 2 2	2 2 2		3 3 3	3 3 3
CO1 CO2 CO3	3 2 3	2 1 2 2	3 2 1 2	2 2 3	3 3 2 2	2 3 1 1	6	2 2 2 2	2 2 2 2		3 3 3 3	3 3 3 3
CO1 CO2 CO3 CO4 Average	3 2 3 3 2.75	2 1 2 2 2 1.75	3 2 1 2	2 2 3 3	3 3 2 2	2 3 1 1	6	2 2 2 2	2 2 2 2		3 3 3 3	3 3 3 3
CO1 CO2 CO3 CO4 Average Course C	3 2 3 3 2.75	2 1 2 2 1.75	3 2 1 2	2 2 3 3 2.5	3 3 2 2 2 2.5	2 3 1 1 1.75		2 2 2 2 2 2	2 2 2 2 2 2		3 3 3 3 3	3 3 3 3 3 3
CO1 CO2 CO3 CO4 Average Course C	3 2 3 3 2.75	2 1 2 2 1.75	3 2 1 2	2 2 3 3 2.5	3 3 2 2	2 3 1 1 1.75		2 2 2 2	2 2 2 2 2 2		3 3 3 3	3 3 3 3 3 3
CO1 CO2 CO3 CO4 Average Course C	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75	3 2 1 2	2 2 3 3 2.5	3 3 2 2 2 2.5	2 3 1 1 1.75	F	2 2 2 2 2 2	2 2 2 2 2 2		3 3 3 3 3	3 3 3 3 3 3
CO1 CO2 CO3 CO4 Average Course C	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75	3 2 1 2 2	2 2 3 3 2.5	3 3 2 2 2 2.5	2 3 1 1 1.75	F	2 2 2 2 2 2 2 (Hours/W 2 ontent	2 2 2 2 2 2 2	Т	3 3 3 3 3 3	3 3 3 3 3
CO1 CO2 CO3 CO4 Average Course C L (3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Week)	3 2 1 2 2	2 2 3 3 2.5 T (Ho	3 3 2 2 2 2.5	2 3 1 1 1.75	F	2 2 2 2 2 2 2 (Hours/W 2 ontent	2 2 2 2 2 2 2	Т	3 3 3 3 3	3 3 3 3 3
CO1 CO2 CO3 CO4 Average Course C L (1) Experime	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 nt: Veek)	3 2 1 2 2 2 allysis allyze)	2 2 3 3 2.5 T (He	3 3 2 2 2.5 ours/W	2 3 1 1 1.75	F C Cdata	2 2 2 2 2 2 (Hours/W 2 content	2 2 2 2 2 2 2	T and;	3 3 3 3 3 Cotal Hour/ 2	3 3 3 3 3 Week
CO1 CO2 CO3 CO4 Average Course C L (3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Week)	3 2 1 2 2 2 allysis halyze) roduct	2 2 3 3 2.5 T (Ho	3 3 2 2 2 2.5 0 ours/W 0	2 3 1 1 1.75 eek)	F Cdata	2 2 2 2 2 2 2 (Hours/W 2 content a (C2, Use	2 2 2 2 2 2 2 2 mdersta	T mnd;	3 3 3 3 3 Cotal Hour/ 2 C3, Appl Understand	3 3 3 3 3 3 Week
CO1 CO2 CO3 CO4 Average Course C L (Experime 1. 2. 3.	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Veek)	3 2 1 2 2 2 allysis alyze) roductingle lay	2 2 3 3 2.5 T (He do not be before analyzed)	3 3 2 2 2 2.5 ours/W 0 effic su -layer sysis us:	2 3 1 1 1.75 eek)	For Cartain Ca	2 2 2 2 2 2 2 Content a (C2, Use C1, Remeer software	2 2 2 2 2 2 2 2 mdersta	T C2,	3 3 3 3 3 Cotal Hour/ 2 C3, Appl Understand lyze, C6, Cr	3 3 3 3 3 Week
CO1 CO2 CO3 CO4 Average Course C L (Experime 1. 2. 3. 4.	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Veek)	3 2 1 2 2 2 allysis halyze) roductingle layultilaye	2 2 3 3 2.5 T (Hotologie analyser analyser)	3 3 2 2 2 2.5 ours/W 0 ffic su -layer s ysis usis	2 3 1 1 1.75 eek) softwaring E-lag E-lag	F Cdata	2 2 2 2 2 2 2 Content a (C2, Use of tware of tware (content)	2 2 2 2 2 2 2 2 (eek) mber, (c4, ArC4, ArC4, ArC4, Arc4)	Tund;	3 3 3 3 3 3 Cotal Hour/ 2 C3, Appl Understand Lyze, C6, Cre ze, C6, Cre	3 3 3 3 3 Week
CO1 CO2 CO3 CO4 Average Course C L (Experime 1. 2. 3. 4. 5.	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Week)	alysis alyze) roductingle layultilayerroduct	2 2 3 3 2.5 T (Hotological to Experiments) of trafficient to Experiments analysis ion to II	3 3 2 2 2 2.5 ours/W 0 ffic su layer: ysis usin TPAV	2 3 1 1 1.75 eek) rvey of softwaring E-lang	F Cdata re ((ayer ware	2 2 2 2 2 2 2 Content (C2, United Software (se interface)	2 2 2 2 2 2 2 2 2 (eek) mber, (cek) (C4, And (C2, U)	T C2, Analy Jndd	3 3 3 3 3 3 Cotal Hour/ 2 C3, Appl Understand Lyze, C6, Cre Lerstand)	3 3 3 3 3 3 Week y; C4,
CO1 CO2 CO3 CO4 Average Course C L (Experime 1. 2. 3. 4.	3 2 3 3 2.75 Conter Hours/V	2 1 2 2 1.75 1t: Veek) An An Int Sir Mu Int De	alysis alyze) roductingle layultilayeroductissign ar	2 2 3 3 2.5 T (He of trafficion to Experience analysmin to II analysmin to II analysmin to analysmin to analysmin to analysmin to II analysmi	3 3 2 2 2 2.5 ours/W 0 ffic su -layer s ysis usin TPAV rsis of s	2 3 1 1 1.75 eek) softwa ing E-lag E-lag E-softwa single l	F Cdata rre ((ayer ware)	2 2 2 2 2 2 2 Content a (C2, Use C1, Reme er software (e interface er flexible	2 2 2 2 2 2 2 2 mber, (c4, A (C2, U pavem	T C2, Anal naly Jndoent	3 3 3 3 3 3 Cotal Hour/ 2 C3, Appl Understand Lyze, C6, Cre ze, C6, Cre	3 3 3 3 3 3 Week y; C4, peate) ate)

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	22
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	
Case/Project Based Learning (CBL)	8
Revision	
Others If any:	
Total Number of Contact Hours	30

Assessment Methods:

Formative	Summative
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination	Objective Structured Practical Examination

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz				
VIVA	✓	✓	✓	✓
Assignment / Presentation				
Unit test				
Practical Log Book/ Record Book/Drawing	✓	✓	✓	✓
Mid Semester Examination 1				
Mid Semester Examination 2				
University Examination(External Practical)	✓	✓	✓	✓
	•		•	
Feedback Process	2. Stu	ident's Fe	edback	
Students Feedback is taken through various s	teps			

Regular feedback through Mentor Mentee system
 Feedback between the semester through Google forms

			Facı	ulty of I	Engine	ering &	Technolo	gy				
Name of th	ne Dej	partmen	ıt	Civ	Civil Engineering							
Name of the Program					ster of	Techno	logy in Civ	il Engineer	ring			
				(Tr	anspor	tation E	ngineering))				
Course Co	de			131	60237	1						
Course Tit	tle			Tra	affic L	ab						
Academic	Year			I								
Semester				II								
Number of	f Cred	lits		1								
Course Pr	erequ	isite		Hig	ghway	Enginee	ering					
Course Sy	nopsi	\$		Vehicle speed and volume survey, Traffic volume calculation and forecasting of (ADT, AADT, etc.), Axle load study, Drivers reaction time and road accidents investigation, Parking study								
Course Ou	ıtcom	es:										
At the end	of the	course s	student	s will be	e able t	to:						
CO1	fo					-	ce of traffic proper effic		d traffic ny transpor	t		
CO2	S	tudents a	able to	understa	and tha	at how to	o determine	the speed	criteria			
CO3	A	ccidents	analys	sis and r	nitigat	ion						
CO4	P	arking st	tudies									
Mapping of Outcomes		irse Out	tcomes	(COs)	to Pro	gram O	Outcomes (1	POs) & Pr	ogram Spe	cific		
COs	PO	PO2	PO	PO4	PO	PO6	PSO1	PSO2	PSO3	PSO		
CO1	3	2	3	2	3	2	2	2	3	3		
CO2	2	2	2	2	3	3	2	2	3	3		
CO3	3	2	2	3	2	2	2	2	3	3		
~ ~ ~		+	+			-		+				
CO4	3	2	2	3	2 1 2 2 3 3 5 2.5 2 2 2 3 3							

L (Hours/Week)		T (Hours/Week)	P (Hours/Week)	Total Hour/Week				
0		0	2	2				
Experiment No.	Content							
1.	Examine the Traffic volume study using videography technique (C4, Analyze).							
2.	Examine the Traffic speed study using videography technique (C4, Analyze).							
3.	Investigate the Speed study by radar gun & endoscope (C6, Create)							
4.	Determination of reaction time of driver (C4, Analyze)							
5.	Examine the Parking study (C4, Analyze)							
6.	Investigate the Accident investigation study (C6, Create)							
7.	Examine the Study for improvement of an accident prone location (C4, Analyze)							

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	22
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	
Case/Project Based Learning (CBL)	8
Revision	
Others If any:	
Total Number of Contact Hours	30

Formative	Summative
Viva-voce	Practical Examination & Viva-voce
Objective Structured Practical Examination	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4			
Quiz							
VIVA	✓	✓	✓	✓			
Assignment / Presentation							
Unit test							
Practical Log Book/ Record Book/Drawing	V	✓	✓	✓			
Mid Semester Examination 1							
Mid Semester Examination 2							
University Examination(External Practical)	√	✓	✓	✓			
Feedback Process	Student's Feedback						

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through google forms



Master of Technology in Civil Engineering (Structural Engineering) 2nd Semester

1		1	Facult	v of Er	ıginee	ring &	Techno	logy		
Name of the	Denari		ucuit			eering		105.		
Name of the				Master of Technology in Civil Engineering (Structural						
					Engineering)					
Course Code	<u> </u>				0214	5/				
Course Title						nent A	nalysis			
Academic Ye	ar			I			21001) 212			
Semester				II						
Number of C	redits			4						
Course Prere	equisite	2		Struc	ture ar	nalysis				
Course Syno							element	analysis	. study c	of different
								•	-	l, study by
							-			ch as frame
						•		n anaiysis	, basic st	udy of Iso-
				parar	netric	elemen	its.			
Course Outco			_							
At the end of	_									
CO1	<u> </u>			•				strain mat	rıx.	
CO2							atrix ope	erations.		
CO3	Know	the con	cepts o	of isoper	rimetric	elemei	nts.			
Mapping of Outcomes:	Course	Outco	mes (C	COs) to) Prog	ram O	utcomes	(POs) &	Program	Specific
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	1	-	3	3	3	3	1	-	3	3
CO2	1	-	3	3	3	3	1	-	3	3
CO3	1	-	3	3	3	_				5
				_	3	3	1	-	3	3
Average	1	-	3	3	3	3	1 1	-	3	
Average	1	-	3					-		3
Average Course Course		-	3					-		3
Course Con	ntent:		3	3	3	3	1	- - rs/Week)	3	3 3
Course Con			3	T (Hou	3	3	P (Hour	rs/Week)	3	3
Course Cou	ntent:		3	T (Hou	3 urs/Wee	k)	P (Hour	0	3	3 3 Iour/Week
Course Con	ntent:	ek)		T (Hou	3 urs/Wee 0	k)	P (Hour	0	Total H	3 3 Iour/Week 3
Course Con L (Ho	ntent:	Defin	e Fini	T (Hou	3 urs/Wee 0 nent me	k) ethod (P (Hour	nember) -	Total H Explain tl	3 3 Iour/Week 3
Course Con L (Ho	ntent:	Defin FEM	e Fini	T (Hou	3 urs/Wee 0 nent motand) -	k) ethod (P (Hour Content (C1, Ren ass stiffn	nember) -	Total H Explain tl d (C2, Ur	Jour/Week 3 ne steps for nderstand) -
Course Con L (Ho	ntent:	Defin FEM Demo	e Fini (C2, lonstrat	T (Hou	ars/Wee 0 nent metand) -	k) ethod (Discustrain	P (Hour Content C1, Ren vectors	nember) - ess metho (C3, Ap	Total H Explain tl d (C2, Ur ply), Des	Jour/Week 3 ne steps for nderstand) - cribe Stain
Course Con L (Ho	ntent:	Defin FEM Demo	e Fini (C2, lonstrat	T (House te elem Underste Stress	ars/Wee 0 nent motand) ss and tions (k) ethod (Discustrain (C2, U	P (Hour Content CC1, Ren vectors Inderstan	nember) - ess metho (C3, Ap d), Explai	Explain the d (C2, Ur ply), Des n Linear	Jour/Week 3 ne steps for nderstand) - cribe Stain constitutive
Course Con L (Ho	ntent:	Defin FEM Demo	e Fini (C2, I) onstrat acemei	T (Hourste element of the element of	nent metand) ss and tions (ndersta	k) ethod (Discustrain (C2, U and) –	P (Hour Content C1, Ren vectors Inderstan Define	nember) - ess metho (C3, Ap d), Explai overall s	Explain the d (C2, Uraply), Des n Linear estiffness r	lour/Week 3 ne steps for nderstand) - cribe Stain constitutive matrix (C1,
Course Con L (Ho	ntent:	Defin FEM Demo	e Fini (C2, lonstrat acemen ions (ember)	te elem Underste e Stres at equa C2, U	nent motand) ss and tions (ndersta	k) ethod (Discustrain (C2, U and) –	P (Hour Content C1, Ren vectors Inderstan Define	nember) - ess metho (C3, Ap d), Explai overall s	Explain the d (C2, Uraply), Des n Linear estiffness r	Jour/Week 3 ne steps for nderstand) - cribe Stain constitutive
Course Con L (Ho	ntent:	Defin FEM Demo displa equati Reme of bea	e Fini (C2, lonstrat acemen ions (cmber) mms (C	T (House te element Understand Equation 1997) The second of the control of the c	nent motand) ss and ations (anderstateribe of lyze).	k) ethod (Discustrain (C2, U and) — verall	P (Hour Content C1, Ren vectors Inderstan Define load mat	nember) - ess metho (C3, Ap d), Explai overall s rix (C2, U	Explain the d (C2, Uraply), Des n Linear estiffness randerstand	Jour/Week 3 ne steps for derstand) - cribe Stain constitutive matrix (C1,

	an element (C2, Understand) - Identify various elements shapes (C2,
	Understand) - Define displacement polynomials (C1, Remember) -
	Discuss convergence requirements (C2, Understand) - Classify shape
	functions (C2, Understand) - Examine element strains and stresses (C4,
	Analyze) - Explain direct formulation of element stiffness matrix for
	beam element and plane truss element (C3, Understand)
3.	Examine the discretization of a body or structure (C4, Analyze) -
	Discuss the minimization of band width (C2, Understand) - State the
	steps for construction of stiffness matrix and loads for the assemblage
	(C1, Remember) - Classify the boundary conditions (C2, Understand)-
	Contrast analysis of plane truss, space truss, plane frame (C4, Analyze).
4.	Describe plane stress (C2, Understand) - Describe Plane strain (C2,
	Understand) - Identify CST, LST & QST elements (C2, Understand)

Towering Edwining Strategies where Sometimes	Teaching Ecarting Strategies and Contact Hours						
Teaching - Learning Strategies	Contact Hours						
Lecture	26						
Practical							
Seminar/Journal Club							
Small group discussion (SGD)							
Self-directed learning (SDL) / Tutorial	9						
Problem Based Learning (PBL)	6						
Case/Project Based Learning (CBL)							
Revision	4						
Others If any:							
Total Number of Contact Hours	45						

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3				
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Quiz							
_							_
VIVA							
Assignment / Pre	esentation	✓	✓	✓			
Unit test		1	✓	✓			
Practical Log Bo	ok/ Record Book						
Mid Semester Ex	camination 1	✓	✓	✓			
Mid Semester Ex	xamination 2	✓	✓	✓			
University Exam	ination	✓	✓	✓			
Feedback Proce	SS	2. S	tudent's F	Feedback			
2. Feedba	r feedback through Menton tick between the semester the		•	rms			
References:			<u> </u>				
	Text Books						
	1. C. S. Krishnamoo	orthy, ((2008), F	inite El	ement A	Analysis,	Second
	Edition, Tata McGraw	Hill Ed	ucation P	vt. Ltd.,	ISBN-13	: 978007	7462100.
	Reference Books						
	1. Cook R. D., Malk				•	•	-
	applications of Finite I		•	, Fourth	Edition,	Wiley I	ndia Pvt.
	Ltd., ISBN-13: 9788126						
	2. Reddy, (2005), An						
	Edition, Tata McG 9780070607415.	iraw	Hill Ed	ucation	Pvt.	Ltd.,	I <i>SBN</i> -13:
	3. Singiresu S. Rao, (2	2010), 7	Γhe Finite	Elemen	t Metho	d in Eng	gineering,
1	Fifth Edition, Elsevier	Science	, ISBN-13	3: 97800	8095204	8.	

Faculty of Engineering & Technology												
Name of the	Denari		ucui	-				iologj				
Name of the				Civil Engineering Master of Technology in Civil Engineering (Structural								
1 (unite of the	riogra			l l	Engineering)							
Course Code	<u> </u>			1316		<i>)</i>						
Course Title						Elastic	rity and	l Plasticit	v			
Academic Yo	-ar			I	<i>n</i> y 01 1	motic	ity and	i i iasticit	J			
Semester	.ai			II								
Number of C	radite			3								
Course Prer		Δ		_	ture M	echani	ice					
Course PrerequisiteStructure MechanicsCourse SynopsisStructural analysis is the determination of the effect						the effects of						
Course Syno	psis			l l		•				components.		
				l l						nclude all that		
										dges, vehicles,		
										rostheses and		
				l l	gical ti		, at	, 5011	buata, p	rosmeses and		
Course Outc	omes.			1 01010	51001 11	bbuc.						
At the end of		irse stud	lents v	will be s	able to							
CO1						for t	two din	nensional	and three	e dimensional		
	eleme		se the stresses and strains for two dimensional and three dimensional									
CO2			:	1:1			1:4	1:4:				
CO2		rstand th				•						
CO3							erent sh	aped bars	•			
CO4	•	rstand t			-							
Mapping of Outcomes:	Course	Outco	mes (COs) to) Progr	am O	utcomo	es (POs) &	& Progra	m Specific		
COs	PO1	PO2	PO3	PO4	PO5	PO6	6 PS 01	PSO2	PSO3	PSO4		
CO1	1	-	3	3	3	3	1	-	3	3		
CO2	1	-	3	3	3	3	1	-	3	3		
CO3	1	-	3	3	3	3	1	-	3	3		
CO4	1	-	3	3	3	3	1	-	3	3		
Average	1	-	3	3	3	3	1	-	3	3		
Course Co	ntent:											
	urs/Wee			T (Hou	rs/Week	()	P (Hou	ırs/Week)	Total	Hour/Week		
	3			,	0			0		3		
Unit			ı			1	Conter	nt	1			
1.		Exam	ine th	e analv	sis of S				Analvze) -	- Describe the		
	Elasticity approach (C2, Understand) – Definition and notation of stress (C1, Remember) – Components of stress and strain (C2, Understand) –											
		Define Generalized Hooke's law (C1, Remember) - Examine Two										

	dimensional Problems in Cartesian Coordinates (C4, Analysis) - Examine Plane stress and plain strain problems with practical examples (C4, Analysis) - Discuss Equations of equilibrium and compatibility conditions in Cartesian coordinates (C2, Understand) – Define Airy's stress function (C1, Remember) - Design Bending of simply supported beams (C6, Create).
2	Examine Two dimensional Problems in Polar Coordinates (C4, Analysis) - Explain Equations of equilibrium and compatibility conditions in polar coordinates (C2, Understand) - Investigate Axisymmetrical problems (C6, create) - Discuss Thick cylinder under uniform pressure (C2, Understand) - Examine Circular arc beams subjected to pure bending (C4, Analysis).
3	Examine Torsion of circular shafts (C4, Analysis), Explain St. Venant's Approach (C2, Understand), Discuss torsion of non-circular sections (C2, Understand), Define membrane analogy (C1, Remember), Design narrow rectangular cross-section (C6, Create).
4	Discuss Introduction to plasticity (C2, Understand) – Explain Stress – Strain diagram (C2, Understand) – Discuss Plastic analysis (C2, Understand) – State Yield criteria (C1, Remember) – Define St. Venant's theory (C1, Remember) – State Von Mises criterion (C1, Remember) – Define Plastic work (C1, Remember) – Describe Strain hardening (C2, Understand).

Teaching - Learning Strategies	Contact Hours	
Lecture	28	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	4	
Problem Based Learning (PBL)	9	
Case/Project Based Learning (CBL)		
Revision	4	
Others If any:		
Total Number of Contact Hours	45	

Assessment Methods:

Formative	Summative				
Multiple Choice Questions (MCQ)	Mid Semester Examination 1				
Viva-voce	Mid Semester Examination 2				
Objective Structured Practical Examination	University Examination				
Quiz	Dissertation				
Seminars	Multiple Choice Questions (MCQ)				
Problem Based Learning (PBL)	Short Answer Questions (SAQ)				
Journal Club	Long Answer Question (LAQ)				
	Practical Examination & Viva-voce				
	Objective Structured Practical Examination				

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4		
Quiz						
VIVA						
Assignment / Presentation	✓	✓	✓	✓		
Unit test	✓	✓	✓	✓		
Practical Log Book/ Record Book						
Mid Semester Examination 1	✓	✓	✓	✓		
Mid Semester Examination 2	✓	✓	✓	✓		
University Examination	✓	✓	✓	✓		
Feedback Process	2. Student's Feedback					

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through google forms

References: **Text Books** 1. Timoshenko and Goodier, (1970), Theory of Elasticity, Third Edition, McGraw Hill Professional, ISBN-13: 9780070858053. **Reference Books** 1. Srinath, (2002), Advanced Mechanics of Solids, Third Edition, Tata McGraw Hill Pvt. Ltd., ISBN-13: 9780070139886. 2. D. Peric, E. A. de Souza Neto & D. R. J. Owen, (2011), Computational Methods for Plasticity, Wiley, ISBN-13: 9781119964544.

Faculty of Engineering & Technology											
Name of the Department				Civil Engineering							
Name of the Program				Master of Technology in Civil Engineering (Structural							
				Engineering)							
Course Code				13160216							
Course Title				Limit State Design of Steel Structures							
Academic Year				I							
Semester Semester				II							
Number of Credits				4							
Course Prerequisite				Design of Steel Structure							
Course Synopsis				Many civil engineering structures are made up of steel.							
				Knowledge of designing and detailing of steel structures is							
				very important for civil engineers in order to make							
				structures safe and serviceable during its life span. Limit							
				State design philosophy is currently used worldwide for							
				design of steel structures and its various components. Also							
	precise and correct detailing of structural drawing is										
				necessary in order to get the correct behavior of structures							
				and leads to smooth construction of structures. This course							
				will provide detailed knowledge of design and detailing of							
				steel structures as per Indian standards.							
Course Outcomes:											
	the course students will be able to:										
CO1	Design tension and compression members.										
CO2	Design of steel structure using plastic design method										
CO3	Design light gauge steel structures.										
CO4	Design of chimney and roof truss										
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific											
Outcomes:											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	1	_	3	3	3	3	1	-	3	3	
CO2	1	_	3	3	3	3	1	 	3	3	
CO3	1	 	3	3	3	3	1	† _	3	3	
CO4	1	_	3	3	3	3	1	† <u> </u>	3	3	
Average	1	_	3	3	3	3	1	-	3	3	
Tiverage	1			1 5		<u> </u>	1	1 -	1 5	15	
Course Content:											
L (Hours/Week)			T (Hours	/Week))	P (Hours/Week)			Total Hour/Week		
3				0 0						3	
Unit		Content									
Cint	Content										

1	Describe Tension member, net and effective area (C2, Understand), design of tension members (C6, Create), Define Compression member
	(C1, Remember), Design of compression members (C6, Create), Discuss
	built up compression member (C2, Understand), Design of lacing and
	batten (C6, Create), Describe column base (C2, Understand), Examine
	the types of column base (C4, Analyze), Design of base slab (C6,
	Create).
2	Introduction, Explain Shape factors (C2, Understand), Define load factor
	(C1, Remember), Discuss Plastic hinge (C2, Understand), Define length
	of plastic hinge (C1, Remember), Examine Mechanisms and types of
	mechanism (C4, Analyze), Define Theorem of plastic analysis (C1,
	Remember), Examine the Analysis of beams and portal frames (C4,
	Analyze).
3	Design of Light Gauge Steel Structures (C6, Create) - Differentiate the
	Types of cross sections (C4, Analyze) - Define Local buckling and
	lateral buckling (C1, Remember) - Design of compression and tension
	members (C6, Create) – Discuss Beams (C2, Understand) - Explain
	Deflection of beams (C2, Understand).
4	Discuss General consideration (C2, Understand), Describe Flexural
	strength (C2, Understand), Explain shear strength of web (C2,
	Understand), Explain stiffeners and their types (C2, Understand), design
	of plate girder with and without stiffeners (C6, Create).
	Introduction, Differentiate the types of roof truss (C4, Analyze),
	Describe spacing of truss (C2, Understand), Discuss loads on roof truss
	(C2, Understand), Examine the analysis of roof truss (C4, Analyze).

Teaching Dearting Strategies and Contact Hours				
Teaching - Learning Strategies	Contact Hours			
Lecture	30			
Practical				
Seminar/Journal Club				
Small group discussion (SGD)				
Self-directed learning (SDL) / Tutorial	12			
Problem Based Learning (PBL)	15			
Case/Project Based Learning (CBL)				
Revision	3			
Others If any:				
Total Number of Contact Hours	60			

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1

Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA	✓	✓			
Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	
Practical Log Book/ Record Book					
Mid Semester Examination 1	✓	✓	✓	✓	
Mid Semester Examination 2	✓	√	✓	✓	
University Examination	✓	✓	✓	✓	

Feedback Process	2. Student's Feedback

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through google forms

References:

Text Books

1. Dayarathnam. P., (1996), Design of Steel Structures, Second Edition, S. Chand and Publishers, ISBN-13: 0788121923200.

Reference Books

- 1. Duggal S. K., (2014), Limit State Design of Steel Structures, Second Edition, McGraw Hill, ISBN-13: 9789351343509.
- 2. Ramchandra, Virendra Gehlot, (2010), Limit State Design of Steel Structures: Based on IS: 800-2007 IN S. I. Units, Scientific Publishers, ISBN-13: 9788172336141.

Name of the D					. ~	19 A. I (echnolog	v		
)epart	ment		-	Engine		cennolog).J		
Name of the P							gy (Civil	Engine	eering)	with
Twine or one in ognome					ctural E			_		
Course Code										
Course Title				Earth	iquake R	esistant	t Design			
Academic Yea	ır			I	•					
Semester				II						
Number of Cr	edits			3						
Course Prerequisite				Struc	tural Dy	namics				
Course Synop	sis			The	course a	ime to	nrecent	to the	etudente	fundamental
							nt seisi			nd technical
					-					
					••					or the seismic
				_		uctures	and the	evalua	tion of	their seismic
				respo	onse.					
Course Outco										
At the end of the										
CO1	Evalu	ate the	e the behaviour of structures under dynamic loadings.							
CO2			nethodology for earthquake-resistant design of structures							
CO3							ductile de	etailing		
CO4	Seism	nic eval	uation	and re	trofitting	technic	ques			
Mapping of C Outcomes:	ourse	Outco	mes (C	COs) to) Progra	m Outo	comes (P	Os) & 1	Prograi	m Specific
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	1	-	3	3	3	3	3	3	3	3
CO2	1	-	3	3	3	3	-	-	-	-
CO3	1	-	3	3	3	3	3	3	3	3
CO4	1	-	3	3	3	3	3	3	3	3
Average	1	-	3	3	3	3	3	3	3	3
Course Con		I _z)		ТДои	ırs/Week)	, D	(Hours/V	(Vools)	Total	Hour/Week
,	<u>rs/wee</u> 3	K)			ors/week)	<u> </u>	(Hours/v	veck)	1 Otal	3
Unit	<u> </u>				U	Co	ntent		<u> </u>	<u> </u>
2.						ents of	Seismolo	· .		mber), e general
			es of trstand		es of seis	mic reg	ions and	Seismo	graphs ((C2,

	Describe Philosophy of earthquake resistant design (C2, Understand), Differentiate between earthquake proof v/s earthquake resistant design (C4, Analyze), Compare the four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration) (C4, Analyze), Investigate the different seismic structural configuration (C6, Create)
2.	Define seismic load (C1, Remember), Describe Seismic Coefficient Method (C2, Understand), and evaluation of base shear and its distribution along height (C5, Evaluate). Explain Response spectrum (C2, Understand), value of IS code provisions during the design of structures (C5, Evaluate) Capacity Based design- an approach for earthquake resistant design of soft storey RC Building (C6, Create), Design of Earthquake resistant structure (C6, Create), Seismic analysis of RC building as per IS:1893 code (C4, Analyze)
3.	Describe the concepts of Ductile Detailing of various structural components as per IS: 13920 provisions in earthquake resistant structure (C2, Understand), Investigate the strong Column weak beam concept (C6, Create)
4.	Describe irregularity (C2, Understand), Differentiate the types of irregularity (C4, Analyze), compare effect of structural irregularities on the performance of structure (C4, Analyze), Investigate the seismic evaluation and retrofitting, techniques used for the retrofitting of RC and masonry structures (C6, Create)

Teaching - Dearning Strategies and Contact	Teaching Dearming Strategies and Contact Hours				
Teaching - Learning Strategies	Contact Hours				
Lecture	20				
Practical					
Seminar/Journal Club	3				
Small group discussion (SGD)	3				
Self-directed learning (SDL) / Tutorial	12				
Problem Based Learning (PBL)	3				
Case/Project Based Learning (CBL)					
Revision	4				
Others If any:					
Total Number of Contact Hours	45				

Assessment Methods:

Formative	Summative			
Multiple Choice Questions (MCQ)	Mid Semester Examination 1			
Viva-voce	Mid Semester Examination 2			
Objective Structured Practical Examination	University Examination			

Quiz	Dissertation			
Seminars	Multiple Choice Questions (MCQ)			
Problem Based Learning (PBL)	Short Answer Questions (SAQ)			
Journal Club	Long Answer Question (LAQ)			
	Practical Examination & Viva-voce			
	Objective Structured Practical Examination			

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	
Practical Log Book/ Record Book					
Mid Semester Examination 1	✓	✓	✓	✓	
Mid Semester Examination 2	✓	✓	✓	✓	
University Examination	✓	✓	✓	✓	

Feedback Process	3. Student's Feedback

Students Feedback is taken through various steps

- 3. Regular feedback through Mentor Mentee system
- **4.** Feedback between the semester through google forms

References:	(List of books)
	TEXT BOOKS
	1. Anil K. Chopra, (2011), Dynamics of Structures - Theory and
	Applications to Earthquake Engineering, Second Edition, Ingram
	International Inc., ISBN-13: 9780132858038.
	REFERENCE BOOKS
	1. Pankaj Agarwal and Manish Shrikhande, (2007), Earthquake
	Resistant Design of Structures, First Edition, Prentice-Hall India
	Pvt Ltd, ISBN-13: 9788120328921.
	2. Gupta B. L., (2010), Principles of Earthquake Resistant Design of
	Structures & Tsunami, Standard Publishers & Distributors, ISBN-
	13: 9788180141485.

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		I	acu	lty of En	ginee	ring &	Techno	logy					
Name of the l	Depai	rtment			Civil Engineering								
Name of the	Progr	am		Maste	Master of Technology in Civil Engineering (Structural								
					Engineering)								
Course Code					13160239								
Course Title				Finit	Finite Element Analysis Lab								
Academic Ye	ar			I									
Semester				II									
Number of C	redit	S		3									
Course Prere	quisi	te		Struc	tural <i>A</i>	Analys	is						
Course Synor	osis			Basic	s of	finite	element	analysi	s, stud	y of different			
				metho	ods li	near e	quations	and mat	trix me	thod, study by			
							_			such as frame			
				_				-		e study of Iso-			
						elemer		it unuijoi	, D	study of 180			
Course Outco	mee	•		Paran	icuic		110.						
At the end of			lanta	will be o	hla ta								
CO1							stress-strai	n matriy					
CO2							natrix ope						
			-	-			-	rations.					
CO3		w the con						1 .					
CO4							element		D	C • 60			
Mapping of (cours	e Outcoi	mes ((COs) to	Prog	ram U	outcomes	(POs) &	Progra	am Specific			
Outcomes:	PO	PO2	PO3	B PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4			
COs	1	102	103	104	103	100	1301	1302	1303	1504			
CO1	1	-	3	3	3	3	1	-	3	3			
CO2	1	-	3	3	3	3	1	-	3	3			
CO3	1	-	3	3	3	3	1	-	3	3			
CO4	1	-	3	3	3	3	1	-	3	3			
Average	1	-	3	3	3	3	1	-	3	3			
Course Cor	itent	:											
L (Hor	ırs/W	eek)		T (Hou	rs/Wee	k)	P (Hours	s/Week)	Tota	l Hour/Week			
	0				Λ.				2				
Experiment	0				0		2			4			
Experiment	0				<u>U</u>	Co	ontent 2			<u> </u>			
No.	0				<u>U</u>	Co				2			
-	An			e-span co	ntinuc	ous bea	ontent ams (C4, A	Analyze)		2			
No.	An			e-span co	ntinuc	ous bea	ontent	Analyze)		2			
No. 1	An	alysis of	prop	-span co	ntinuo ilever	ous bea beam (ontent ams (C4, A	Analyze) yze)		2			
No. 1 2	An An An	alysis of alysis of alysis of	prop static	e-span co ped canti cally dete	ntinuo ilever ermina etermin	ous bea beam (te plar nate pl	ontent oms (C4, A	Analyze) yze) C4, Analy (C4, Ana	yze) alyze)	2			

Teaching - Learning Strategies	Contact Hours	
Lecture		
Practical	18	
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	12	
Case/Project Based Learning (CBL)		
Revision		
Others If any:		
Total Number of Contact Hours	30	

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4		
Quiz						
VIVA	✓	✓	✓	✓		
Unit test						
Practical Log Book/ Record Book	✓	✓	✓	✓		
Demonstration	✓	✓	✓	✓		
Mid Semester Examination 1						
Mid Semester Examination 2						
University Examination(External Practical)	✓	✓	✓	√	√	
Feedback Process	2. Stu	dent's Fe	edback			

Students Feedback is taken through various steps

1. Regular feedback through Mentor Mentee system

2. Feedback between the semester through google forms

		1	Facult	y of Er	ıginee	ring &	k Techno	logy				
Name of the	Depart	ment		Civil	Engin	neering	7					
Name of the	Progra	m		Mast	Master of Technology in Civil Engineering (Structural							
					Engineering)							
Course Code					0218	<u></u>						
Course Title				_		Engir	neering L	aborate	orv			
Academic Y				I								
Semester				II								
Number of (Credits			2								
Course Prer		<u> </u>		_	erete T	echno	logv					
Course Syno		-						is to r	resent t	o the students		
	- I									nic codes and		
										cal skills for the		
										luation of their		
						ponse.						
Course Outo	comes:			· ·								
At the end of		rse stuc	dents v	will be a	able to	:						
CO1							de of con	crete				
CO2	Test	concrete	e bean	ns for v	arious	loadin	ng conditi	ons				
CO3	_	rm non-										
N/ · ·												
Mapping of	Course	Outco	mes (0	COs) to) Prog	ram (Dutcomes	(POs)	& Progr	am Specific		
Mapping of Outcomes:	Course	Outco	mes (C	COs) to) Prog	ram (Outcomes	(POs)	& Progr	am Specific		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	& Progr PSO3	am Specific PSO4		
Outcomes:												
Outcomes: COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4		
Outcomes: COs	PO1 1	PO2	PO3	PO4 3	PO5 3	PO6	PSO1	PSO2	PSO3	PSO4		
Outcomes: COs CO1 CO2 CO3	PO1 1 1	PO2 1 1	PO3 3 3	PO4 3 3	PO5 3 3	PO6 3 3	PSO1 1 1	PSO2 1 1 1	PSO3 3 3	PSO4 3 3		
Outcomes: COs CO1 CO2	PO1 1 1 1	PO2 1 1 1	PO3 3 3 3	PO4 3 3 3	PO5 3 3 3	PO6 3 3 3	PSO1 1 1 1	PSO2 1 1 1	PSO3 3 3 3	PSO4 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average	PO1 1 1 1 1 1	PO2 1 1 1	PO3 3 3 3	PO4 3 3 3	PO5 3 3 3	PO6 3 3 3	PSO1 1 1 1	PSO2 1 1 1	PSO3 3 3 3	PSO4 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average Course Co	PO1 1 1 1 1 1 ontent:	PO2 1 1 1 1	PO3 3 3 3	PO4 3 3 3 3	PO5 3 3 3 3 3	PO6 3 3 3 3	PSO1 1 1 1 1	PSO2 1 1 1 1	PSO3 3 3 3 3	PSO4 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average Course Co	PO1 1 1 1 1 1	PO2 1 1 1 1	PO3 3 3 3	PO4 3 3 3 3 T (Hou	PO5 3 3 3 3 3	PO6 3 3 3 3	PSO1 1 1 1	PSO2 1 1 1 1 1 (s/Week)	PSO3 3 3 3 3	PSO4 3 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average Course Co	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1	PO3 3 3 3	PO4 3 3 3 3 T (Hou	PO5 3 3 3 3 3 3	PO6 3 3 3 3	PSO1 1 1 1 1 1 P (Hours	PSO2 1 1 1 1 1 1 s/Week)	PSO3 3 3 3 3	PSO4 3 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 1	PO3 3 3 3 3	PO4 3 3 3 3 T (Hou	PO5 3 3 3 3 3 3	PO6 3 3 3 3 3	PSO1 1 1 1 1 1 P (Hourse	PSO2 1 1 1 1 1 s/Week)	PSO3 3 3 3 3 Tota	PSO4 3 3 3 3 3 1 Hour/Week 2		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 To tes	PO3 3 3 3 3 3	PO4 3 3 3 3 T (Hou	PO5 3 3 3 3 3 3 ssive s	P06 3 3 3 3 3 ek)	PSO1 1 1 1 1 1 P (Hourse	PSO2 1 1 1 1 1 s/Week)	PSO3 3 3 3 3 Tota	PSO4 3 3 3 3		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 To test cube s	PO3 3 3 3 3 st the ospecin	PO4 3 3 3 3 T (House empression of Compression of	PO5 3 3 3 3 3 ars/Wee 0 ssive s 4, Ana	PO6 3 3 3 3 ek)	PSO1 1 1 1 1 P (Hourseld to be fibre)	PSO2 1 1 1 1 1 reinforce	PSO3 3 3 3 3 Total	PSO4 3 3 3 3 3 1 Hour/Week 2		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho Experimen	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 To test cube see Castin	PO3 3 3 3 3 st the ospecin	PO4 3 3 3 3 T (House testing	PO5 3 3 3 3 3 ars/Wee 0 ssive s 4, Ana	PO6 3 3 3 3 ek)	PSO1 1 1 1 1 P (Hourseld to be fibre)	PSO2 1 1 1 1 1 reinforce	PSO3 3 3 3 3 Total	PSO4 3 3 3 3 3 H Hour/Week 2 rete by testing		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho Experimen	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 Ck) To test cube service (C4, A	PO3 3 3 3 3 Analyz	PO4 3 3 3 3 T (House testing ze)	PO5 3 3 3 3 3 ssive s 4, Ana g of sin	PO6 3 3 3 3 strengthalyze) mply su	PSO1 1 1 1 1 1 P (Hours Content h of fibre	PSO2 1 1 1 1 1 reinford	PSO3 3 3 3 3 Tota ced concr	PSO4 3 3 3 3 3 H Hour/Week 2 rete by testing		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho Experiment 1.	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 Ck) To test cube service (C4, A	PO3 3 3 3 3 3 Analyzang and	PO4 3 3 3 3 T (House testing	PO5 3 3 3 3 3 ssive s 4, Ana g of sin	PO6 3 3 3 3 strengthalyze) mply su	PSO1 1 1 1 1 1 P (Hours Content h of fibre	PSO2 1 1 1 1 1 reinford	PSO3 3 3 3 3 Tota ced concr	PSO4 3 3 3 3 3 al Hour/Week 2 rete by testing flexural failure		
Outcomes: COs CO1 CO2 CO3 Average Course Co L (Ho Experiment 1.	PO1 1 1 1 1 ontent: ours/Wee	PO2 1 1 1 1 1 1 Ck) To test cube structure (C4, A Castin	PO3 3 3 3 3 3 St the ospecimal and Analyzing and Analyzin	PO4 3 3 3 3 T (House testing ze) testing ze)	PO5 3 3 3 3 3 3 ssive s 4, Ana g of sin	PO6 3 3 3 3 strengthalyze) mply strengthalyze) mply strengthalyze)	PSO1 1 1 1 1 1 P (Hours Content h of fibre	PSO2 1 1 1 1 1 reinforce RCC be	PSO3 3 3 3 3 Total	PSO4 3 3 3 3 3 3 al Hour/Week 2 rete by testing flexural failure shear failure		

6.	To test bending test of I-section steel beam (C4, Analyze)
7.	To conduct bending test of steel channel section (C4, Analyze)
8.	To test rebound hammer test on concrete blocks (C4, Analyze)
9.	To test ultrasonic pulse velocity test (C4, Analyze)

Teaching - Learning Strategies	Contact Hours	
Lecture		
Practical	11	
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	8	
Case/Project Based Learning (CBL)	11	
Revision		
Others If any:		
Total Number of Contact Hours	30	

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3		
Quiz					
VIVA	✓	✓	✓		
Assignment / Presentation					
Unit test					
Practical Log Book/ Record Book/Drawing	✓	✓	√		
Mid Semester Examination 1					
Mid Semester Examination 2					

University Examination (External	✓	✓	✓						
Practical)									
Feedback Process 1. Student's Feedback									
Students Feedback is taken through various steps									
1. Regular feedback through Mentor Mentee system									
2. Feedback between the semester through go	oogle for	ms							



Master of Technology in Civil Engineering (Remote Sensing and GIS) 2nd Semester

			Fac	ulty of	Engine	eering &	Technolo	ogy					
Name	of the De	partment		Civil	Engine	eering							
Name	of the Pr	ogram		Mast	Master of Technology in Civil Engineering (Remote Sensing and								
				GIS)	GIS)								
Cours	se Code			13160240									
Cours	se Title			Geos	Geospatial Data Processing and Modelling								
Acade	emic Year	•		I									
Semes	ster			II									
Numb	er of Cre	dits		4	4								
Cours	se Prerequ	uisite		NIL									
Cours	se Synops	is		Inter	polation	ı, Geo-	statistical	Method,	DTM app	plication, GIS			
				mode	models, programming tools								
	se Outcon												
At the	end of the	e course stud	lents wil	ll be abl	le to:								
CO1	Apply ac	Apply advanced GIS tools											
CO2	Prepare	GIS data for	various	elevati	on mod	els							
CO3	Solve ge	ospatial prol	olems us	sing pro	gramm	ing tools							
CO4	Analyze	GIS data usi	ng com	plex ge	ospatia	models							
Mapp	ing of Co	urse Outcoi	nes (CC	Os) to P	rogran	n Outcor	nes (POs)) & Progra	m Specifi	c Outcomes:			
COs	PO	1 PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4			
CO1	3	2	1	2	-	-	-	-	1	1			
CO2	3	3	1	2	-	-	-	-	1	1			
CO3	3	3	1	2	-	-	-	-	1	1			
CO4	3	2	1	2	-	-	-	-	1	1			
Avera	ige 3	1.75	1	2	-	-	-	-	1	1			
Cours	se Conten	t:											
L		T (Hours	/Week)		P			CL	Total	Hour/Week			
(Hou	ırs/				(Hour	:s/Week)	(Hou	rs/Week)					
Wee	ek)												

3	-	-	3	3
Unit		Content	and Competency	1
1	Local and Global method Explain method of undo (Understand)	•	· · · · · · · · · · · · · · · · · · ·	variation of parameters. C2
2	Slope and aspect and si view shed and watershe Working with Open So	ed analysis. C1 (Ro	emember)	
3	Modelling Process. C2 Classification; Model b Python, R programming	ouilder tools. C6 (C	•	ocessing tools. C6 (Create)
4	Components, Data Sour Free and open source G		pplications	

Learning Strategies	Contact Hours	
Lecture	32	
Practical		
Seminar/Journal Club	2	
Small group discussion (SGD)	2	
Self-directed learning (SDL) / Tutorial	16	
Problem Based Learning (PBL)	2	
Case/Project Based Learning (CBL)	2	
Revision	4	
Others If any:		
Total Number of Contact Hours	60	

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assess	sment	CO1	CO2	CO3	CO4				
Quiz		✓	✓	✓	✓				
Assignment / Pre	esentation	✓	✓	✓	✓				
Unit test		✓	✓	✓	✓				
Mid Semester Ex	amination 1	✓	✓	✓	✓				
Mid Semester Ex	amination 2	✓	✓	✓	✓				
University Exam	ination	✓	✓	✓	✓				
Feedback Proce	SS	1. Student's Feedback							
References:	Textbooks:								
References.	1. Principles of GIS for Land Resource Assessment, Burrough, P.A., Oxford Pub., 2005.								
	2. Concepts and Techniques of Geographic Information Systems, C.P .Lo &								
	Albert K.W. Yeung, second Edition, Prentice Hall India Pvt. Ltd,2016.								
	3. Remote Sensing and Image Interpretation, Lilles T. Mand Kiefer R.W., John Wiley, 2015								
	Reference Books:								
	1. Remote Sensing Imagery, Florence Tupin, Jordi Inglada and Jean-Marie								
	Nicolas, ISTE and W	Nicolas, ISTE and Wiley, 2014							
	2. Principles of GIS	for Land Resour	ce Assessme	nt, Burroug	h, P.A., Oxford				
	Publications, 2005.								

				Facult	y of Eng	gineering	g & Tech	nology						
Name o	f the De	partm	ent	Civ	Civil Engineering									
Name o	f the Pr	ogram			Master of Technology in Civil Engineering (Remote Sensing and GIS)									
Course	Code				60241									
Course	Title			Sat	Satellite Image Processing									
Academ	ic Year	•		I										
Semeste	er			I										
Number	of Cre	dits		3	3									
Course	Prerequ	uisite		NII										
Course Synopsis					•		_	formation, enlage classifica		•				
Course At the en			e studer	nts will	be able	to:								
CO1	Anal	Analyze remote sensing data using image processing techniques.												
CO2	Class	Classify the remote sensing data												
CO3	Evalı	uate the	accura	cy of in	nage cla	ssificatio	on							
CO4	Appl	y advar	nced pro	ocessing	g metho	ds to maj	p geograpl	hical features						
	_	urse O	utcome	es (COs	s) to Pro	gram O	utcomes ((POs) & Pro	gram Sp	pecific				
Outcom COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4				
CO1	3	1	-	-	1	-	-	-	-	2				
CO2	3	1	-	-	1	-	-	-	-	2				
CO3	3	1	-	-	1	-	-	-	-	2				
CO4	1	-	1	-	-	-	-	-	-	2				
Average	1.75	-	0.25	-	0.75	0.75	-	-	-	2				
Course	Conten	t:	•		•	·		,	,	,				
L		T (Hours/Week)				P		CL		Total				
L		/eek)							Hour/Week					
L (Hours/						(Hour	rs/Week)	(Hours/V	Veek)	Hour/Week				

		Competency						
1	Explain Data Products and Their Characteristics C2 (Understand)							
	Digital image formation, digital image display mechanism, image histograms and							
	look up table data. C1 (Remember)							
	Pre-processing – Atmospheric, Radiometric,							
	Implement Geometric Corrections - Basic Principles of Visual Interpre	etation,						
	Ground Truth, Ortho rectification, Applications. C2 (Understand)							
2	Explain Linear and non-linear Contrast enhancement techniques, dens	sity slicing,						
	pseudo colour images, spatial enhancement techniques (convolution fi	iltering). C2						
	(Understand)							
	Describe spectral enhancement techniques.C2 (Understand)							
	Implement Image algebra, PCA, data fusion techniques. C6 (Create)							
	Explain Segmentation - Methods, MDL, Watershed, Mean-shift, Edge detection. C2							
	(Understand)							
	Explain Spectral indices - Vegetation indices, water related indices, indices related							
	to cloud properties. C2 (Understand)							
	Describe Google Earth Engine platform for satellite data processing. C2							
	(Understand)							
3	Explain Supervised Classification.C2 (Understand)							
	Training set - Statistical computation, understanding feature space & s	scatter plots,						
	signature purity & separability.C2 (Understand)							
	Signature Baye's decision rule. C2 (Understand)							
	Implement Parallelepiped algorithm, maximum like-hood method, unsupervised and							
	hybrid classification techniques, classification analysis. C6 (Create)							
	Describe confusion matrix, error analysis & kappa coefficient. C2 (Ur	nderstand)						
	Analysis of Multi-Temporal series and change detection. C2 (Understa	and)						
4	Explain Object based Fuzzy, ANN and SVM classification techniques	s. C2						
	(Understand)							
	Implement sub-pixel mixture analysis. C6 (Create)							
	Define Object Oriented Image Classification. C1 (Remember)							

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Proce	ess 2. Student's Feedback							
	·							
References:	TEXTBOOKS:							
	1. Digital Image Processing, John R J, Introductory Prentice Hall, New Jersey, 2016.							
	2. Remote Sensing Imagery, Florence Tupin, Jordi Inglada and Jean-							
	Marie Nicolas, ISTE and Wiley, 2014.							
	3. Remote Sensing and Digital Image Processing, Jarocińska, Anna,							
	vander Meer, Freek D., Springer, 2016							
	REFERENCE BOOKS:							
	1. An Introduction to Support Vector Machines, Nello Cristiani and							
	John Shawe Taylor., Cambridge University Press, 2013							
	2. Remote Sensing and Image Interpretation, Lilles and, T.M., Kiefer,							
	R.W. and Chapman, J.W., Fifth Edition, John Wiley &Sons,2007.							
	3. Digital Image Processing, Gonzalez, Rafael C. and Richard E.							
	Woods, Third Edition, Pearson Education, London.							

				Facult	ty of Engineering o	& Tech	nology					
Name of t	he Dep	artmen	t		Civil Eng	gineerin	g					
Name of t	he Prog	gram			Master of	Master of Technology in Civil Engineering (Remote						
						Sensing and GIS)						
Course C	ode				13160242	2						
Course Ti	itle				Advance	d GIS						
Academic	Year				I							
Semester					II							
Number o	of Cred	its			1							
Course Pr	rerequi	site			NIL							
Course Sy	ynopsis					ping, a	application	on of inte	e, project evrnet service			
Course O	utcome	es:										
At the end	of the	course,	student	s will b	e able to:							
CO1	Cond	uct adva	anced s	patial a	analyses using GIS	tools						
CO2	Study	GIS da	ıta with	compl	ex geospatial mode	ls.						
CO3	Solve	the geo	spatial	error u	ising GIS tools.							
CO4	Deve	lop moc	lels in (GIS usi	ng Open source and	d Web (GIS.					
	1	1	T		to Program Outco	,	,					
COs	PO	PO	PO	PO	PO5	PO6	PSO1	PSO2	PSO3	PSO4		
CO1	1	2	3	4			_		3			
	2	-	1	0	3	-	_	-	_	2		
CO2	2	1	1	1	3	-	-	-	3	2		
CO ₃	2	1	1	1	3	-	-	-	3	2		
CO4	2	1	1	1	3	-	-	-	3	2		
Average	2	0.75	1	0.75	3	_	-	-	3.0	2.0		
Course C	ontent:	<u>I</u>	<u>I</u>	<u> </u>	<u> </u>	<u>I</u>	l	I	l	1		
Course Content: L (Hours/Week) T (Hours/												

	1	0	0	1			
Unit	Content & Com	petencies					
1	Discuss the nature of geographic data (C2, Understand), Explain sources of errors in						
		GIS database (C2, Understand), Describe the data quality parameters (C2, Understand), Define Handling error in GIS (C1, Remember), Demonstrate the Error					
	/ :	<u> </u>					
			ne Human and Organization				
			nalyze), Justifying the invition of GIS (C4, Analy				
		_	Discuss GIS project design	_			
	_), designing a data model				
		•	er), Identify Implementa	•			
		estigate Project evaluat	, ·	1 ()			
2	Define the Princ	Define the Principles of computer network (C1, Remember), Discuss Network type					
	`	•	erver computing concept				
			rnet services to GIS sof				
		Describe the Issues in GIS and trends (C2, Understand): Discuss the Development of					
	computer method for handling spatial data (C2, Understand), Define Web Page Basics						
	(C1, Remember), Discuss Web Mapping (C2, Understand), Describe Geospatial Web						
	Services (C2, Understand), Demonstrate the Application of Internet services to GIS (C3, Apply), Examine Internet GIS software (C4, Analyze).						
3			and other raster analysis (~ Annly) Examine			
	_	_	Define TIN (C1, Rememb				
	_	• •	n (C3, Apply). Demons				
	_	oplication (C3, Apply)					
4			(C2, Understand), Discu	uss Node and turn			
	• `	, , , , , , , , , , , , , , , , , , ,	Overpass and underpass				
			(C3, Apply): Examine S				
			y allocation (C4, Analyze)), Examine Location			
	allocation (C4, A	nalyze).					

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2

Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓
Assignment / Presentation	✓	✓	✓	✓
Unit test	✓	✓	✓	✓
Mid Semester Examination 1	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓
University Examination	✓	✓	✓	✓

Feedback Process		1. Student's Feedback		
		2. Course Exit Survey		
Students Feedback is taken through various steps 1. Regular feedback through the Mentor Mentee system.				
2. Feedback b	2. Feedback between the semester through Google forms.			
3. Course Exit	Survey will be taken at the	he end of the semester.		
References:				
	1. Principles of GIS: P.A. Burrough and Rachel A.M. McDonnel, Oxford.			
	2. Concepts and Techniques of GIS by C.P. Lo and A.K.W. Yeung Prentice Hall.			

- 3. An Introduction to GIS by Heywood, Cornelius and Carver, Pearson Education
- 4. Pinde Fu and Jiulin Sun, Web GIS: "Principles and Applications", ISBN:9781589482456,ESRI, 2010.

				racul	ity of El	ngineering							
Name of t	ame of the Department						Civil Engineering						
Name of t	he Pro	gram				Master	of Techno	logy in Civil	Engineering	(Remote			
							g and GIS)						
Course C	ode					131602	43						
Course Ti	itle					GPS &	Surveyin	g					
Academic	Year					1							
Semester						П							
Number o	of Cred	lits				3							
Course P	rerequi	isite				Survey	ing, Remot	te Sensing					
Course Sy	nopsis	}						students wil		-			
Course O	utcom	es:											
At the end	of the	course,	studen	ts will b	e able to	o:							
CO1	Stud	ents wil	ll learn	how to	take obs	servation as	nd collect o	lata from GP	S.				
CO2	Stud	ents wil	ll be ab	le to und	derstand	the applic	ation of Gl	PS					
CO3	Stuc	lents wi	ill be at	ole to un	derstand	d different	types of G	PS and its tec	hnical descr	ription.			
CO4	Unde	erstand	the con	cept of	MS Acc	ess.							
Mapping	of Cou	rse Ou	tcomes	(COs)	to Prog	ram Outc	omes (POs	s) & Progran	n Specific C	Outcomes:			
COs	PO	PO	PO	PO	PO	PO	PSO1	PSO2	PSO3	PSO4			
	1	2	3	4	5	6							
CO1	2	1	1	0	3	-	-	2	3	1			
CO2	2	1	1	1	3	-	-	2	3	1			
CO3	2	1	1	1	3	-	-	2	3	1			
CO4	2	1	1	1	3	-	-	2	3	1			
Average	2	1	1	0.75	3	-	-	2	3	3 1			
	1			1	1			1		1			
Course C	ontent	3											
		s/Weel				rs/Week)	P (I						

	Content & Competencies					
Unit	Content					
1	Discuss Maps & their numbering (C2, Understand), Describe Ma	p projection and co-				
	ordinate system (C2, Understand), Define Geo referencing and da	ata (C1, Remember),				
	Define Basic concepts of GPS (C1, Remember): History and timeli	ne, overview. pseudo				
	range and carrier phase measurements (C2, Understand); Describe	Signal structure (C2,				
	Understand); Explain GPS coordinate systems (C2, Understand): WGS-84, GPS time;					
	GPS Errors and biases; GPS orbital Geometry and Navigat	tional solution (C2,				
	Understand).					
2	Explain System Segmentation - Space segment (C2, Understan	d); Describe control				
	segment (C2, Understand), Discuss user segment (C2, Understand	nd)- Differentiate the				
	types of receivers (C4, Analyze); Discuss GPS satellite signal	s (C2, Understand),				
	Define GPS data, position and time from GPS (C1, Remember),	Explain code phase				
	tracking, pseudo range navigation, receiver position, time and ve	elocity, carrier phase				
	tracking (C2, Understand), Demonstrate GPS positioning types –	absolute positioning,				
	differential positioning (C3, Apply); Define Navigation signals -GPS frequencies (C1,					
	Remember); Calculating positions using C/A code using P(Y) of	eode, code phase v/s				
	carrier phase, augmented GPS, local augmentation (C6, Create); De	escribe Accuracy and				
	error sources - atmospheric effects, multipath effects, ephemer	is and clock errors;				
	selective availability, relativity, sagnac distortion (C2, Understand)					
3	Explain the factors that affect GPS (C2, Understand) - Discuss the	number of satellites,				
	multipath, ionosphere, troposphere, satellite geometry, satellite he	ealth, signal strength,				
	distance from the reference receiver, RF interference, loss of rad	io transmission (C2,				
	Understand); Demonstrate other satellite based navigational s	ystems: GLONASS,				
	GALILEO (C3, Apply). Explain GPS interference and jammin	g – natural sources,				
	artificial sources (C2, Understand); Discuss the techniques to improve accuracy -					
	augmentation, precise monitoring, GPS time and data, GPS	modernization (C2,				
	Understand).					
4	Define Military – airborne, marine and land based navigation (C1, Remember), and				
	Discuss civilian – surveying and mapping (C2, Understand), Exp	lain control surveys,				

cadastral surveying (C2, Understand), navigation, RS, GIS and Photogrammetry (C4, Analyze), geodesy, location, navigation, tracking, mapping and timing, Engineering and Monitoring (C4, Analyze); Special applications of GPS, etc. (C3, Apply).

Teaching Learning Strategies and Contact Hours

Learning Strategies	Contact Hours
Lecture	32
Practical	
Seminar/Journal Club	2
Small group discussion (SGD)	2
Self-directed learning (SDL) / Tutorial	1
Problem Based Learning (PBL)	2
Case/Project Based Learning (CBL)	2
Revision	4
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Quiz	Mid Semester Examination 2
Seminars	University Examination
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz	✓	✓	✓	✓

Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	
Mid Semester Examination 1	✓	✓	✓	✓	
Mid Semester Examination 2	✓	✓	✓	✓	
University Examination	✓	✓	✓	✓	

Feedback Process	1. Student's Feedback	
	2. Course Exit Survey	
References:	 Understanding GPS: Principles and Applications Elliott Kan Christopher Hearty Introduction to GPS: The Global Positioning System Ahmed Rabbany 	-

				Facu	lty of E	Ingineerin	ıg & Techn	ology				
Name of t	ame of the Department						Civil Engineering					
Name of t	Name of the Program					Maste	Master of Technology in Civil Engineering (Remote					
					Sensir	ng and GIS)						
Course C	ode					13160	244					
Course Ti	itle					Adva	nced GIS L	ab				
Academic	Year					I						
Semester						II						
Number o	of Cred	its				2						
Course P	rerequi	site				NIL						
	urse Synopsis					know excita instrui	To design electrical systems. To analyze a given network by applying various network theorems. To know the response of electrical circuits for different excitations. To study various electrical measuring instruments and transducers. To summarize the performance characteristics of electrical machines					
Course O At the end			studen	ts will 1	be able	to:						
CO1	Unde	rstand	the basi	ic conc	epts and	d terminol	terminology of electrical quantities					
CO2	Anal	yze the	DC cir	cuit usi	ing vari	ous netwo	us network theorems					
CO3	Unde	rstand	the resp	onse o	f differ	ent types o	nt types of electrical circuits to different excitations					
CO4	Unde	rstand	the mea	asurem	ent, cal	culation ar	nd relation b	etween the l	pasic electrica	l parameter.		
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes (POs) PO PO PO PO PO PSO1 PSO2 PSO3							Outcomes: PSO4					
	1	2	3	4	5	6						
CO1	2	-	1	-	3	-	-	2	3	1		
CO2	2	1	1	1	3	-	-	2	3	1		
CO3	2	1	1	1	3	-	-	2	3	1		
	2	1	1	1	3	-	-	2	3	1		
CO4												



Course Con	tent:						
L (I	Hours/Week)	T (Hours/Week)	P (Hours/Week)	Total Hour/Week			
	0	0	4	4			
		Content & Compe	tencies				
Unit	Title						
1		of electrical Elements, so cal circuits. C1 (Remem	ources, measuring device ber)	s and transducers			
2	Verification of k	XVL and KCL. C6 (Crea	te)				
3	Verification of T	Thevenin's and Norton's	theorems. C6 (Create)				
4	Verification of s	Verification of superposition theorem. C6 (Create)					
5	Verification of n	Verification of maximum power transfer theorem. C6 (Create)					
6		Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits. C6 (Create)					
7		Verification of relation between phase and line quantities in a 3-phase balanced star and delta connected systems. C6 (Create)					
8	Measurement of (Create)	Measurement of Active and Reactive Power in a balanced Three-phase circuit. C6 (Create)					
9	Torque-Speed C Motor. C1 (Rem	-	ntely/Self Excited DC Sh	nunt/Compound			
10	Load test on sing	gle phase transformer. C	l (Remember)	_			
11	Demonstration of (Create)	f measurement of electric	cal quantities in DC and	AC systems. C6			

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	30
Seminar/Journal Club	
Small group discussion (SGD)	20
Self-directed learning (SDL) / Tutorial	

Problem Based Learning (PBL)	10
Case/Project Based Learning (CBL)	
Revision	
Others If any:	
Total Number of Contact Hours	60

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1,2, End term
Viva-voce	
Objective Structured Practical Examination	University Examination
(OSPE) Quiz	Multiple Choice Questions (MCQ)
Seminars	Multiple Choice Questions (MCQ)
Problem-Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination
	(OSPE)

Nature of Assessn	ient	CO1	CO2	CO3	CO4	
VIVA	✓	✓	✓	✓		
Practical Log Book		✓	✓	✓	✓	
University Examin		✓	✓	✓	✓	
Feedback Process 1. Student's Fe				•		,
	2. Course Exit Su	ırvey				
References: Spatial Analysis Methods and Practice:			escribe –	Explore	– Expla	in
through GIS, Cambridge University Pres				2020).		



Faculty of Engineering & Technology										
Name of the Department					Civil Engineering					
Name of the	•				Master of Technology in Civil Engineering (Remote					
- ···					Sensing and GIS) Structural Engineering					
Course Code					_		<i>)</i>	-	, <u>8</u>	
Course Title				Sate	llite In	nage P	rocessing	Lab		
Academic Ye	ar			I			100000111	5 200		
Semester				II						
Number of C	redits			1						
Course Prere		<u> </u>		Imag	ge pro	cessing	z lab			
Course Synor	_							vith data	a products	s, digital image
							•		-	segmentation,
							n techniq	-		
Course Outco	omes.			111108	C CIGOS		ccoming			
At the end of		rse stud	lents	will be	able to	•				
CO1							e processi	ng techr	igues.	
CO2				note sens			- Г	0	1	
CO3				racy of in			ation			
CO4							map geog	ranhical	features	
										m Specific
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific										
i Ourcomes:										
Outcomes: COs	PO1	PO2	PO3	3 PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
COs	PO1	PO2								
COs CO1	PO1	PO2	3	3	3	3	3	3	3	3
COs CO1 CO2	PO1		3	3 3	3	3	3 3	3	3	3
COs CO1 CO2 CO3	PO1		3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 1 3	3 3 2
COs CO1 CO2 CO3 CO4	-	-	3 3 3	3 3 3	3 3 3	3 3 3 3	3 3 3 3	3 3 3	3 1 3 3	3 3 2 2
COs CO1 CO2 CO3	- - -	- -	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 1 3	3 3 2
COs CO1 CO2 CO3 CO4 Average	- - - -	- - -	3 3 3	3 3 3	3 3 3	3 3 3 3	3 3 3 3	3 3 3	3 1 3 3	3 3 2 2
COs CO1 CO2 CO3 CO4	- - - -	- - -	3 3 3	3 3 3	3 3 3	3 3 3 3	3 3 3 3	3 3 3	3 1 3 3	3 3 2 2
COs CO1 CO2 CO3 CO4 Average Course Con	- - - - - - ntent:	- - - -	3 3 3	3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3	3 3 3 3 3 3 P (Hours	3 3 3 3 3	3 1 3 3 2.5	3 3 2 2 2 2.5
COs CO1 CO2 CO3 CO4 Average Course Con L (Hou	- - - - - - ntent: urs/Wee	- - - -	3 3 3	3 3 3 3 3	3 3 3 3 3	3 3 3 3 3	3 3 3 3 3 P (Hours 2	3 3 3 3 3	3 1 3 3 2.5	3 3 2 2 2 2.5
COs CO1 CO2 CO3 CO4 Average Course Con	- - - - - - ntent: urs/Wee	- - - - -	3 3 3 3 3	3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3	3 3 3 3 3 3 P (Hours 2 Content	3 3 3 3 3 3	3 1 3 2.5	3 3 2 2 2 2.5
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon	- - - - - - ntent: urs/Wee	- - - - - - Image	3 3 3 3 3	3 3 3 3 3 3 T (Hou	3 3 3 3 3 3 Color T	3 3 3 3 3 2k)	3 3 3 3 3 3 P (Hours 2 Content (C1, Known)	3 3 3 3 3 3 www.eek)	3 1 3 2.5	3 3 2 2 2 2.5 Hour/Week 2
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon	- - - - - - ntent: urs/Wee	- - - - - - k)	3 3 3 3 3	3 3 3 3 3 3 3 3 4 3 5 C 4 5 C	3 3 3 3 3 3 Color T	3 3 3 3 3 2k)	3 3 3 3 3 3 P (Hours 2 Content (C1, Known)	3 3 3 3 3 3 www.eek)	3 1 3 2.5	3 3 2 2 2 2.5
COs CO1 CO2 CO3 CO4 Average Course Con L (Hone) Experiment 1. 2.	- - - - - - ntent: urs/Wee	- - - - - - Maly Know	3 3 3 3 3 see Discovers I viedge	3 3 3 3 3 T (Hou play & CandSat I	3 3 3 3 3 3 Color T	3 3 3 3 3 Sk) Cheory and Marketine M	3 3 3 3 3 P (Hours 2 Content (C1, Knowake Maps	3 3 3 3 3 3 www.eek)	3 1 3 2.5	3 3 2 2 2 2.5 Hour/Week 2
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon Experiment 1. 2.	- - - - - - ntent: urs/Wee		3 3 3 3 3 3 vie Dis	3 3 3 3 3 T (House play & CandSat line)	3 3 3 3 3 3 Color Timage	3 3 3 3 3 2 2 3 (C4, A	3 3 3 3 3 P (Hours 2 Content (C1, Knowake Maps Analysis)	3 3 3 3 3 3 www.eek)	3 1 3 2.5	3 3 2 2 2 2.5 Hour/Week 2
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon Experiment 1. 2. 3. 4.	- - - - - - ntent: urs/Wee		3 3 3 3 3 3 vsis I	3 3 3 3 3 T (House play & Contact line) all Rectification granger.	3 3 3 3 3 3 Color Timage	3 3 3 3 3 Sk) Cheory and Market (C4, Apply)	3 3 3 3 3 P (Hours 2 Content (C1, Knowake Maps Analysis)	3 3 3 3 3 S/Week)	3 1 3 2.5 Total atellite In	3 3 2 2 2 2.5 Hour/Week 2
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon Experiment 1. 2. 3. 4. 5.	- - - - - - ntent: urs/Wee		3 3 3 3 3 See Discrete Including the second	3 3 3 3 3 T (Hou play & C and Sat I ge) al Rectific Imager; n: multi-	3 3 3 3 3 3 Color Timage Cotton y (C3, sensor	3 3 3 3 3 Sek) Cheory and M (C4, A Apply) sharpe	3 3 3 3 3 3 P (Hours 2 Content (C1, Knowake Maps Analysis) ening (C4)	3 3 3 3 3 3 s/Week)	3 1 3 2.5 Total atellite In	3 3 2 2 2 2.5 Hour/Week 2
COs CO1 CO2 CO3 CO4 Average Course Con L (Hon Experiment 1. 2. 3. 4.	- - - - - - ntent: urs/Wee		3 3 3 3 3 3 vie Disviss Ivledge omiancing fusion ificat	January State Stat	3 3 3 3 3 3 Color Timage Cotation y (C3, -sensor	Theory and Market Sharper (C4, A Apply) sharper (C2, U;	3 3 3 3 3 P (Hours 2 Content (C1, Knotake Maps Analysis)) ening (C4 nderstand	3 3 3 3 3 3 S/Week) wledge from S	3 1 3 2.5 Total atellite In	3 3 2 2 2 2.5 Hour/Week 2

Teaching - Learning Strategies	Contact Hours	
Lecture		
Practical	13	
Seminar/Journal Club		
Small group discussion (SGD)	04	
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	13	
Case/Project Based Learning (CBL)		
Revision		
Others If any:		
Total Number of Contact Hours	30	

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

CO1	CO2	CO3			
✓	✓	✓			
✓	✓	√			
✓	✓	√			
3. Student's Feedback					
	✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓			

- 3. Regular feedback through Mentor Mentee system
- **4.** Feedback between the semester through google forms



SEMESTER - III

Course Code	Course Title			
13160367	Dissertation Phase-I			
Transportation Engineering (Choose these subjects for specialization)				
13160357	Intelligent Transportation Systems			
Program Elective-I Po	ol (Choose One from the pool)			
13160355	Construction Project Management & BOT			
13160368	Traffic Management and Road Safety			
13160359	Highway Construction Practices			
Program Elective-II P	ool (Choose One from the pool)			
13160369	Pavement evaluation, Rehabilitation & Maintenance			
13160363	Environment Impact Assessment			
13160365	Bridge Engineering			
Structural Engineer	ing (Choose these subjects for specialization)			
13160305	Theory & Design of Plate and Shell			
Program Elective-I Po	ool (Choose One from the pool)			
13160325	Pre-Fabricated Structures			
13160327	Design of Industrial Structures			
13160329	Maintenance & Rehabilitation of Structures			
Program Elective-II P	ool (Choose One from the pool)			
13160331	Design of Bridges			
13160333	Composite Structures			
13160335	Design of Tall Buildings			
Remote Sensing and	GIS (Choose these subjects for specialization)			
13160370	Digital Image Processing			
Program Elective-I Po	ool (Choose One from the pool)			
13160371	Web and Mobile GIS			
13160372	Argo Remote Sensing			
13160373	Remote Sensing Geology			
	ool (Choose One from the pool)			
13160374	Global Navigation Satellite System			
13160375	Advanced Surveying and Cartography			
13160376	Pattern Recognition and Machine Learning			

			Facu	lty of E	ngine	ering	& Tech	nology			
Name of the Department				Civil Engineering							
Name of the Program			_		_		Civil En	gineer	ring (Structural		
				Engineering)							
Course Code					13160367						
Course Title				Disse	Dissertation Phase-I						
Academic Year				II							
Semester				III							
Number of Credits			6								
Course Prerequisite			Rese	Research methodology							
Course Synopsis			In th	is cou	rse, st	tudent v	vill final	ize th	e research problem		
			l l	and will complete the literature review for Thesis.							
Course Outo	comes:			•		•					
At the end of	the co	urse stu	dents	will be	able to	o:					
CO1	Ident	entify civil engineering problems by reviewing available literature.									
CO2	Ident	ify appropriate techniques to analyze complex problems related to civil									
		eering	1		1			1 1			
CO3			igate and development of solution								
								ies (POs) & P	rogram Specific	
Outcomes:	Course	Cutte	Jiiics	(COs) t	UIIU	51 4111	Outcon	165 (1 05	<i>,</i> a 1	rogram specific	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSC	PSO4	
CO1	3	3	3	3	3	3	3	3	3	3	
CO2	3	3	3	3	3	3	3	3	3	3	
CO3	3	3	3	3	3	3	3	3	3	3	
Average	3	3	3	3	3	3	3	3	3	3	
	•	•	,	,	•		•	•	•	•	
Course Co	ntent	:									
L (Hours/Week)			T (Hou	T (Hours/Week)			ours/Week	(x)	Total Hour/Week		
0			0 12 12				12				
Experiment No.				Content							
1				e problem (C2, Understand), Implement the suitable solution							
				(C3, Apply), Experiments and tests (C4, Analyze), Investigate and							
	develop the solution (C6, Create)										

Teaching - Learning Strategies	Contact Hours
Lecture	
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	90

Case/Project Based Learning (CBL)	90
Revision	
Others If any:	
Total Number of Contact Hours	180

Formative	Summative			
Multiple Choice Questions (MCQ)	Mid Semester Examination 1			
Viva-voce	Mid Semester Examination 2			
Objective Structured Practical Examination	University Examination			
Quiz	Dissertation			
Seminars	Multiple Choice Questions (MCQ)			
Problem Based Learning (PBL)	Short Answer Questions (SAQ)			
Journal Club	Long Answer Question (LAQ)			
	Practical Examination & Viva-voce			
	Objective Structured Practical Examination			

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3		
Quiz					
VIVA	✓	✓	✓		
Assignment / Presentation	✓	✓	✓		
Unit test					
Practical Log Book/ Record Book	✓	✓	✓		
Demonstration	✓	✓	✓		
Mid Semester Examination 1					
Mid Semester Examination 2					
University Examination (External	✓	✓	✓		
Practical)					

Feedback Process 1. Student's Feedback

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms



Master of Technology in Civil Engineering (Transportation Engineering) 3rd Semester

			Fac	ulty of	Fngine	ering d	7 Technolog	TV/					
Name of th	Name of the Department					y of Engineering & Technology Civil Engineering							
Name of the			10		Master of Technology in Civil Engineering (Transportation								
Name of th	i vame of the frogram					g)	logy in Civii	Liigiik	Cillig	, (Transpo	'i tation		
Course Co	Course Code					5/							
Course Tit					60357	Trans	portation S	vetame					
Academic Year					emgent	11 ans	portation S	ystems					
Semester	1 cai			III									
Number of	f Cuad	ita		4									
					hyvory E								
Course Pro					hway E			I4	1: 4	.: I	T: _1		
Course Sy	nopsis						and overvier affic manage						
							applications,						
Course Ou	ıtcome			1000	giiitioii	and its	applications,	113 (011)	poner	its and stan	idards		
At the end			student	s will be	e able to	•							
CO1							ices and thei	r comp	onent	S			
CO2							solve real-li						
											lvanced		
CO3	Estimate traffic congestion by the acquisition of big data using advanced devices.							rvaneca					
CO4	Design and implement suitable ITS and services for effective transportation.												
CO5							mplementati			шъроган	J11.		
Mapping of Outcomes:		rse Out	tcomes	(COs)	to Prog	ram O	outcomes (P	Os) & 1	Progr	am Speci	fic		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSC)2	PSO3	PSO4		
CO1	2	2	2	2	2	1	2	2		3	3		
CO2	3	3	2	2	1	1	2	2		3	3		
CO3	3	3	2	2	1	2	2	2		3	3		
CO4	3	2	2	2	2	1	2	2		3	3		
CO5	3	2	2	2	1	1	2	2		3	3		
Average	2.8	2.4	2	2	1.4	1.2	2	2		3	3		
		-	l	ı			l	I					
Course C	Conte	nt:											
	Hours/\			Тл	lours/We	ek)	P (Hours/V	Veek)	To	tal Hour/	Week		
<u> </u>	3	vv cck)			T (Hours/Week) 1		P (Hours/Week)		10	4	VVCCIX		
Uni							Content						
1.	11	Ox	erview	z and hi	istory o	f ITS		nher) I	TC A	nnlication	nc (C3		
1.		Ap			ad history of ITS (C1, Remember), ITS Applications (C3, eral ITS Programs, Improving Highway Safety with ITS (C4,								
2.		Ad DC Tel	vanced OT A lecomm	active nunication	Traffic ns Techr	Man nologie	ystems A Ca agement C s Connected - ons (C3, App	Concept Vehicle	(C4	4, Analy	yze);ITS		

3.	Understand Interactive Voice Recognition (IVR) Technologies (C2,
	Understand); ITS Mobile Applications (C3, Apply)
4.	Understand analyze Economics of ITS Congestion and Pricing Revenue
	Generation Models (C2, Understand, C4, Analyze)

Teaching - Learning Strategies	Contact Hours
Lecture	35
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	15
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	4
Revision	2
Others If any:	
Total Number of Contact Hours	60

Assessment Methods:

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)

Mapping of Assessment with COs

Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Quiz	✓	✓	✓	✓	✓
VIVA					
Assignment / Presentation	✓	✓	✓	✓	✓
Unit test	✓	✓	✓	✓	✓
Practical Log Book/ Record Book					
Mid Semester Examination 1	✓	✓	✓	✓	✓
Mid Semester Examination 2	✓	✓	✓	✓	✓
University Examination	✓	✓	✓	✓	✓

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- **2.** Feedback between the semester through google forms

References:

Feedback Process

1. Student's Feedback

Text Books

1. Rangawala , Building Construction (2010) ISBN No. 978-93-80358-15-4, Charotar Publications Pvt. Ltd. 28th Edition

Referance books

- 1. P.C.Varghese, Engineering Materials, 1st edition, PHI Learning.
- 2. S.K.Duggal, Building Materials, 3rd Edition, New Age International Publishers.
- 3. Sushil Kumar, Building Construction, Standard Publishers Distributors.
- 4. M.S.Shetty, Concrete Technology: Theory and Practice, S. Chand Publishers.
- 5. A.R.Santhakumar, Concrete Technology, Oxford University Press.



Master of Technology in Civil Engineering (Transportation Engineering)

Departmental Electives

			Faci	ulty of F	Ingina	oring d	R Tachnolog	TX/					
Name of th	Name of the Department					of Engineering & Technology Civil Engineering							
Name of the			10		Master of Technology in Civil Engineering								
Traine of the	Titume of the Frogram						Engineering)	_	iccing				
Course Co	da				60355	tation i	ingineering)						
Course Tit						tion Dr	oject Mana	gomoni	· & ROT				
Academic				II	isti uc	uon 1 1	oject Mana	gemen	а вот				
	rear			III									
Semester Number of	f Crad	:40		3									
					DT d	CDM							
Course Pro					RT and		<u> </u>		-£				
Course Sy	nopsis								of project, E				
							-		t, Project s				
				Net	work	schedul	ling, Use of	f Projec	ct Planning S	oftware,			
				Pro	ject bio	d, Proje	ect operation						
Course Outcomes:													
At the end of the course students will be able to:													
CO1							managemen	t for any	y infrastructur	e			
		oject		1	1	J	8	•	,				
CO2		- J	evelopi	ment of	studen	ts in ho	w to deal wi	ith diffe	rent – differei	nt			
				in the p									
CO3						softwa	re in flow les	ss execu	ition of any				
		frastruct											
CO4				-	ilure tl	neories	for design o	f structi	ures				
									Program Spo	ecific			
Outcomes	:												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	2 PSO3	PSO4			
COs	roi	FO2	103	FU4	103	100	rsoi	130	2 1803	1304			
CO1	3	2	3	3	2	1	2	2	3	3			
CO2	2	3	2	3	2	1	2	2	3	3			
CO3	2	3	2	3	2	1	2	2	3	3			
CO4	2	3	3	3	2	1	2	2	3	3			
Average	2.5	2.75	2.5	3	2	2	2	2	3	3			
Course C	Conte	nt:											
L (Hours/\	Week)		Т (Но	ours/We	eek)	P (Hours/V	Veek)	Total Hour	/Week			
	3	•			0		0		3				
Un	it						Content						
1.									Remember), Ur				
									ion methodolo				
					roject	Proposa	ıl (C3, Apply), Proje	ct Scope under	rstanding			
1		1/('	ı Keme	mperl									
(C1,Remember 2) Understand t					11	C1) 1	\ NI				
2.		Ùn	dersta	nd the B					er). Network C4, Analyze),				

	Program Evaluation & Review Technique (C5, Evaluate), Planning and Scheduling of Activity Networks (C2, Understand), Assumptions in PERT (C1, Remember)
3.	Modeling - Time-cost Trade-offs, Linear Programming and Network Flow Formulations (C6, Create), PERT/COST Accounting (C5,
	Evaluate)
4.	Scheduling with limited resources (C3, Apply), Resource Planning and
	Resource Allocation (C3, Apply), Project Schedule Compression (C2,
	Understand), Project Scheduling Software, Precedence Diagrams,
	Decision CPM, Generalized Activity Networks, GERT (C6, Create)

Teaching - Learning Strategies	Contact Hours
Lecture	36
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	3
Revision	2
Others If any:	
Total Number of Contact Hours	45

Formative	Summative
Quiz	Mid Semester Examination 1
Seminars	Mid Semester Examination 2
Problem Based Learning (PBL)	University Examination
	Short Answer Questions (SAQ)
	Long Answer Question (LAQ)

Nature of Assessm	ient	CO1	CO2	CO3	CO4		
Quiz		✓	✓	✓	✓		
VIVA							
Assignment / Prese	entation	✓	✓	√	✓		
Unit test		✓	✓	✓	✓		
Practical Log Book	/ Record Book						
Mid Semester Exar	nination 1	✓	✓	✓	✓		
Mid Semester Exar	mination 2	✓	✓	✓	✓		
University Examin	ation	✓	✓	✓	✓		
Feedback Process		1. Student's Feedback					
_	is taken through dback through M etween the seme	Ientor M	entee sys				
References:							
	 Text Books: Projects: Planning, Analysis, Selection, Implementation & Review, Prasanna Chandra, 5th Ed., 2002. Project Management: A systems approach to planning and controlling, Harold Kerzner, CBS Publisher, New Delhi, 2nd Ed., 2000. Reference Books: Lock, D., 2003, Project Management, 8th edition, Gower Publishing Limited. AMS REALTIME projects 						
	http://www.	amsrealt	ime.com/	products	/project.htm		

			Fac	ulty of F	of Engineering & Technology								
Name of the Department					Civil Engineering								
Name of th	Name of the Program					Master of Technology in Civil Engineering							
							ingineering)						
Course Co	de				60368								
Course Title					affic M	[anage r	nent and Ro	oad Sa	fety				
Academic Year													
Semester													
Number of Credits													
Course Pro	erequi	isite											
Course Sy	nopsis				hway	safety,		behavi		safety			
	_			mar	nageme	nt systei	n, Crash stati	stics an	d road safety aud	lit			
Course Ou													
At the end													
CO1								safety	concepts, cove	ring the			
COA		range from traffic planning, operations, and design Gain an understanding of safety management systems.						1: cc	C .				
CO ₂	Gain an understanding countermeasures, statistic				•	-	_	•	ems, different	safety			
					ii issue	s with c	oumermeasur	es and	meir effectiven	ess, and			
CO3		crash investigation Hotspot" identification and remediation											
CO4							evaluating co	unter m	neasures				
			_						Program Spec	rific			
Outcomes:		130 040	comes	(003)		grain (outcomes (1	Os) α	Trogram Spec				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	PSO3	PSO4			
CO1	3	2	2	3	2	2	2	2	3	3			
CO2	3	2	2	3	2	2	2	2	3	3			
CO3	3	2	2	3	2	2	2	2	3	3			
CO4	3	2	2	3	2	2	2	2	3	3			
Average	3	2	2	3	2	2	2	2	3	3			
Course C	Conte	nt:											
	Hours/\			Т (Н	T (Hours/Week)		P (Hours/Week)		Total Hour/Week				
	3			_ (==	0		0		3	.,			
Uni	it					I	Content						
1.		De	fine R	oad use	d user, vehicle, and roadway (C1,Remember);Understand								
					aracteristics(C2,Understand); IRC standards for Design								
					raffic volume(C3,Apply);Understand Highway capacity and								
					ervice determination for capacity of urban and rural								
roads(C2,Uno								-		nd its			
					, ,		Analyzed).		1				
2.				_ `				facilit	ies, Cycle trac	ks and			
									ber); Understa				
design Road user facilities like Parking facilities, Cycle tracks and													

	cycle-ways and Pedestrian facilities(C2, Understand, C6,Create);							
	Explain Road inventory(C2,Understand); Discuss Accident							
	studies(C2,Understand);							
3.	Define Cross-sectional elements(C1,Remember); Define Stopping and							
	passing sight distance(C1,Remember);Design of Horizontal and							
	Vertical curves(C6,Create). Construction of Hill Roads(C6,Create);							
4.	Differentiate between Signs and markings(C4,Analyzed); Describe							
	Traffic System Management(C2,Understand); Define at-grade							
	intersections and its type(C1,Remember); Understand Channelization of							
	traffic(C2,Understand); Design of rotaries(C6,Create);Understand the							
	function of Traffic signals - pre-timed and traffic							
	actuated(C2,Understand); Design of signal setting - phase diagrams,							
	timing diagram(C6,Create);developing Signal co-ordination(C6,Create);							

Teaching - Learning Strategies	Contact Hours	
Lecture	35	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	4	
Case/Project Based Learning (CBL)	4	
Revision	2	
Others If any:		
Total Number of Contact Hours	45	_

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessn	nent	CO1	CO2	CO3	CO4			
Quiz								
VIVA			✓		✓			
Assignment / Prese	entation	✓	✓	✓	✓			
Unit test		✓	✓	✓	✓			
Practical Log Book	X/ Record Book							
Mid Semester Exam	mination 1	✓	✓	✓	✓			
Mid Semester Exam	Mid Semester Examination 2			✓	✓			
University Examin	✓	✓	✓	✓				
Feedback Process		1. Student's Feedback						
Students Feedback	is taken through	various	steps					
 Regular fee 	dback through M	Ientor M	entee sys					
	etween the seme	ster throu	ıgh googl	e forms				
References:								
	 Text Books KW Ogden, Safer Roads: A Guide to Road Safety Engineering, Averbury Technical Press, Ash gate Publishers, 1996. Rune Elvik and TrulsVaa, the Handbook of Road Safety Measures, Elsevier, 2004. Reference books Leonard Evans, Traffic Safety, Science Serving Society, 2004. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002). Highway Safety Manual (HSM). 							

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Name of the	he Dens	rtmen				ineerin		<u>5.y</u>		
Name of the			11				ology in Civi	1 Engir	neering	
Traine of the Frogram							Engineering)	n Engn	icering	
Course Co	nde				60359		<u> </u>			
Course Ti							ruction Prac	tices		
Academic Year				II	<u>şii way</u>	Const	i uction i rac	iics		
Semester	1 Cai			III						
Number of	f Cradii	te		3						
Course Pr										
Course Sy								my lean		
Course sy	nopsis						· ·		·	•
									oase, Concret	
				con	structi	on, Ro	ad constructi	on in m	nountainous re	gion
Course Ou										
At the end										
CO1	Develop construction procedures for subgrade, unbound, and bound granu						granular			
	lay									
CO2			te strategies to produce optimal bituminous mixes.							
CO3		pose appropriate construction procedures for bituminous and concrete								
	lay									
CO4				iate pav	ement	qualit	y control tes	st, and	quantify cons	truction
		iability								
		se Out	comes	(COs)	to Pro	gram (Outcomes (F	Os) &	Program Spe	ecific
Outcomes	:									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	2 PSO3	PSO4
CO1		1	2	3	1	2	2	2	3	3
CO2		1	2	3	1	2	2	2	3	3
CO3		1	2	3	1	2	2	2	3	3
CO4		1	2	3	1	2	2	2	3	3
Average		1	2	3	1	2	2	2	3	3
Course C	Conten	t:								
L (Hours/W	/eek)		T (He	ours/W	eek)	P (Hours/W	/eek)	Total Hour	/Week
				0 0 3						
	3				0		0		3	
Un					0		0 Content		3	
Un 1.	it				nation	_	Content in Soil and		rock (C2, Und	
	it	Inv	estigat	e the p	nation reparat	ion of	Content in Soil and Sub-grade (C6, C1	rock (C2, Und reate), Explain	ground
1.	it	Inv imj	estigat provem	e the p ent, Reta	nation reparati	ion of nd Brea	Content in Soil and Sub-grade (ast walls on hi	C6, C1	rock (C2, Und reate), Explain (C2, Understan	ground d)
	it	Inv imj De	vestigate provem scribe	e the p ent, Reta the Sub	nation reparationing a	ion of nd Brea / base (Content in Soil and Sub-grade (ast walls on hi (C2, Understa	C6, C1 ll roads nd), cor	rock (C2, Und reate), Explain (C2, Understan npare the Wate	ground d) er Bound
1.	it	Inv imj De Ma	restigate provem scribe to cadam	e the pent, Retathe Sub (WBM)	nation reparationing a base Wet	ion of nd Brea / base (Mix Market)	Content in Soil and Sub-grade (ast walls on hi (C2, Understa acadam (WM	C6, C1 ll roads nd), cor	rock (C2, Und reate), Explain (C2, Understan	ground d) er Bound
1.	it	Inv imj De Ma	restigate provem scribe to cadam	e the p ent, Reta the Sub	nation reparationing a base Wet	ion of nd Brea / base (Mix Market)	Content in Soil and Sub-grade (ast walls on hi (C2, Understa acadam (WM	C6, C1 ll roads nd), cor	rock (C2, Und reate), Explain (C2, Understan npare the Wate	ground d) er Bound

3.	Differentiate the different types of Bituminous Constructions (C4, Analyze), Interface Treatments, Examine the Bituminous Surfacing and wearing Courses for roads and bridge deck slabs (C4, Analyze), Selection of wearing Course under different Climatic and Traffic conditions as per IRC specifications (C5, Evaluate), Compare the different construction techniques and Quality Control (C4, Analyze)
4.	Test on Concrete mixes (C4, Analyze), Classify the construction equipment (C2, Understand), Compare the different methods of construction of joints in concrete pavements (C4, Analyze), Investigate the quality Control in Construction of Concrete pavements (C6, Create), Describe Overlay Construction (C2, Understand).

Teaching - Learning Strategies	Contact Hours
Lecture	35
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	4
Revision	2
Others If any:	
Total Number of Contact Hours	45

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessn	nent	CO1	CO2	CO3	CO4			
Quiz								
VIVA								
Assignment / Prese	entation	✓	✓	✓	✓			
Unit test		✓	✓	✓	✓			
Practical Log Book	x/ Record Book							
Mid Semester Exam	mination 1	✓	✓	✓	✓			
Mid Semester Exam	Mid Semester Examination 2			✓	✓			
University Examin	ation	✓	✓	✓	✓			
Feedback Process		3. Stu	ident's Fe	eedback				
Students Feedback	_		-					
	dback through M		•					
4. Feedback b	etween the semes	ster throu	igh goog	le forms				
References.								
	Text Books:		CII		D I D II 1' 1'0			
					ggDr. L. R. Kadiyali&			
	Dr. N. B. La			1 D.: 1 - W 1 (44.				
					and Bridge Work (4th			
	/ *	•	oi Koad	ı ransporı	t and Highways, 2001.			
	Reference Boo		TT' 1		TI I (' D '			
		•	_	•	The Location, Design,			
		-	iaintenan	ce of P	avements, Butterwsorth			
	Heinemann,	•	minerra	Mixtues	in Road Constantion			
		-			in Road Construction,			
	Thomas Telford Services Ltd., 1995.							

			Fac	ulty of I	Engine	ering &	k Technolog	y				
Name of th	ie Dej	partmen	ıt			ineering						
Name of th	ne Pro	ogram		Ma	Master of Technology in Civil Engineering							
				(Tr	(Transportation Engineering)							
Course Co	de			131	60369							
Course Tit	tle			Pay	vemen	t Evalu	ation, Reha	bilitati	on & N	Aainten	ance	
Academic	Year			II								
Semester				III								
Number of	Number of Credits 3											
Course Pr	Course Prerequisite											
Course Sy	nopsi	s		Pav	ement	distress	ses, Paveme	nt reh	abilitati	on tech	miques,	
			Overlay design, Pavement maintenance									
Course Ou	ıtcom	es:										
At the end												
CO1	E	valuate p	oaveme	ent base	d on su	ırface co	onditions.					
CO2	A	ssess str	uctura	l strengt	h of pa	vement	s.					
CO3	S	elect app	appropriate pavement rehabilitation options.									
CO4	P	rioritize	tize pavement maintenance strategies.									
Mapping of	of Cou	ırse Out	comes	(COs)	to Pro	gram C	Outcomes (P	Os) &	Progra	am Spec	ific	
Outcomes				, ,		C	· ·	,	S	•		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	2	PSO3	PSO4	
CO1	3	2	1	3	3	3	2	2	3		3	
CO2	2	1	2	2	3	3	2	2	3		3	
CO3	3	3	3	2	3	2	2	2	3		3	
CO4	3	2	2	2	1	1	2	2	3		3	
Average	2.75	2	2	2.25	2.5	2.25	2	2	3		3	
		•		•		•			•		•	
Course C	Conte	ent:										
		Week)		Т	ours/W	eek)	P (Hours/W	eek)	Total	l Hour/	Week	
2 (3	· · · ccity		1 (11	0	CRY	0	cery	1000	3	*** ****	
Uni							Content					
1.	10	De	fine v	arious	navem	ent dis	tresses and	its tv	nes (C	1 Reme	mber).	
1.					-		hniques for	•	-			
							ork survey v					
							bridge insp					
				zed, C5					(,	
2.							devaluation	(C5.Ev	aluate	C6.Crea	ate).	
							s pavement r			, -1	· - / ɔ	
					-		Analyzed).					
3.							cedures(C2,	Unders	tand):fe	easibility	study	
]					-		avements(C			-	-	
4.				_							/;	
	4. Maintenance of paved and unpaved roads(C3,Apply); Pavement											

management systems(C2,Understand);

Teaching - Learning Strategies and Contact Hours

Teaching - Learning Strategies	Contact Hours
Lecture	35
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	4
Revision	2
Others If any:	
Total Number of Contact Hours	45

Assessment Methods:

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA		✓		✓	
Assignment / Presentation	✓	✓	✓	✓	
Unit test	√	✓	✓	✓	
Practical Log Book/ Record Book					
Mid Semester Examination 1	√	✓	✓	✓	
Mid Semester Examination 2	✓ ✓ ✓				
University Examination	✓	✓	✓	✓	
				•	
Feedback Process	2. Stu	ident's Fe	edback		
Students Feedback is taken through	various	steps			

	dback through Mentor Mentee system
4. Feedback b	etween the semester through google forms
References:	
	Text/Reference Books
	1. Flexible Pavement Rehabilitation and Maintenance,
	Prithvi S. Kandhal, Mary Stoup Gardiner, American
	Society for Testing & Materials publication.
	2. Construction and Rehabilitation of Concrete Pavements
	<u>Under Traffic</u> , ShreenathRao, Deepak Raghunathan, TRB.
	3. STP1348; Flexible Pavement Rehabilitation and
	Maintenance.

			Faci	ulty of I	Engine	ering &	& Technolog	ΣV				
Name of tl	ne Dep	artmer			Civil Engineering							
Name of the Program					Master of Technology in Civil Engineering							
					(Transportation Engineering)							
Course Co	de				60363		<u> </u>					
Course Ti						nent Im	pact Assess	sment				
Academic	Year			II			•					
Semester				III								
Number o	f Credi	its		3								
Course Pr	erequi	site										
Course Sy				Une	derstan	ding th	e importanc	e of er	vironmer	ntal e	ffect of	
·	•					_	re project					
							f that projec					
							o ensure pr		_			
					-		-	-				
						-	project, U					
				Env	/ironm	ental In	npact Assess	sment, (Carbon tra	adıng		
Course Ou		-	_									
At the end												
CO1							civil engin					
~~~							nental risks					
CO ₂				method					titative			
							nanagement	and re	emediatioi	1 tec	hniques	
CO2				t of pred			. 1		1 1' 4	1 .		
CO3				-			tal manager		_	ecnnı	ques of	
CO4							ding will be					
	•						s for environ		•	C		
Outcomes		rse Ou	tcomes	(COs)	to Pro	gram (	Outcomes (I	Os) &	Program	Spe	CHIC	
Outcomes	•											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO	2 PS	O3	PSO4	
CO1	2	2	1	1	2	2	2	2	3		3	
CO2	2	2	1	1	2	2	2	2	3		3	
CO2	2	2	1	1	2	2	2	2	3		3	
CO4	2	2	1	1	2	2	2	2	3		3	
			+	1	2	2	2	2	3		3	
Average	Average 2 2 1		1	1 1	<u> </u>	<u> </u>	<u> </u>	<u> </u>	J		J	
Course	onter	nt•										
Course Content:				Tar	ours/We	aak)	Р (Напре/М	Vools	Total F	lour	Week	
L (Hours/Week)			1 (H)	0	eck)	T (Hours/v			3	** CCK		
Un					U		Content			<u>J</u>		
UII		IIr	derstan	d Techi	nical a	nd pro	cedural aspe	ects of	Environm	ental	Impact	
1,						-	, Understand					
		1 22.51		-		, <b></b>	, = ==== 21213114	,,				

	legal aspects of environmental protection (C1, Remember, C2, Understand)
2.	General Framework for characterizing environmental dislocation and
	disruption due to pollution (C4, Analyze)
3.	Theory and application of mathematical models:- Mathematical
	modelling for water quality systems, Stream and Estuarine models for
	pollution control (C4, Analyze, C6, Create)
4.	Examine Socio economic aspects (C4, Analyze), Evaluate various
	Measures of effectiveness of pollution control activities (C5, Evaluate),
	understand effect of Inter-sector pollutant transfers (C2, Understand),
	determine total impact assessment (C5, Evaluate)

Teaching - Learning Strategies  Teaching - Learning Strategies	Contact Hours
Lecture	35
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	4
Case/Project Based Learning (CBL)	4
Revision	2
Others If any:	
Total Number of Contact Hours	45

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessn	CO1	CO2	CO3	CO4		
Quiz						
VIVA						
Assignment / Prese	entation	✓	<b>✓</b>	✓	✓	
Unit test		✓	<b>✓</b>	<b>✓</b>	✓	
Practical Log Book	x/ Record Book					
Mid Semester Exa	mination 1	✓	<b>√</b>	✓	✓	
Mid Semester Exa	mination 2	✓	<b>✓</b>	<b>✓</b>	✓	
University Examin	ation	<b>✓</b>	✓	<b>✓</b>	✓	
		l			1	
Feedback Process		4. Student's Feedback				
Students Feedback 5. Regular fee 6. Feedback b References:	lentor M	entee sys				
	<ol> <li>Text Books:         <ol> <li>L. W. Canter, Environmental Impact Assessment, 2nd Ed., McGraw-Hill, 1997.</li> <li>P. Judith and G. Eduljee, Environmental Impact Assessment for Waste Treatment and Disposal Facilities, John Wiley &amp; Sons, 1994.</li> </ol> </li> <li>Reference Books:         <ol> <li>G. Burke, B. R. Singh and L. Theodore, Handbook of Environmental Management and Technology, 2nd Ed., John Wiley &amp; Sons, 2000.</li> <li>K. Whitelaw and Butterworth, ISO 14001: Environmental System Handbook, 1997.</li> </ol> </li> <li>R. Welford, Corporate Environmental Management - Systems and Strategies, Universities Press, 1996.</li> </ol>					

			Fac				& Technolog	y			
Name of the			<u>it</u>			ineering					
Name of the Program					Master of Technology in Civil Engineering						
							Engineering)				
Course Co					60365						
Course Ti					dge Ei	ngineer	ing				
Academic	Year			II							
Semester				III							
Number o				3							
Course Pr				NII							
Course Sy	nopsis						, Analyzing t	echnique	es, Pre-st	tress co	oncrete,
Commo	***			Ste	el bridg	e, Bridg	ge in service				
Course Ou At the end			tudar.	o xx;11 1-	. abla 4						
							esthetics				
CO1										das	
							s and there in		ce in bri	age	
CO3							ding on bridg				
CO4							neir maintena		Ducana	- C	····
Outcomes		rse Ou	icomes	(COS)	to Pro	gram (	Outcomes (P	Os) & I	rrogran	a spec	ilic
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3 PSO		
CO1	3	2	2	2	2	2	2	2	3		3
CO2	3	2	2	2	2	2	2	2	3		3
CO3	3	2	2	2	2	2	2	2	3		3
CO4	3	2	2	2	2	2	2	2	3		3
Average	3	2	2	2	2	2	2	2	3		3
Course (	Conte	nt:									
L (	Hours/	Week)		Т (Н	ours/Wo	eek)	P (Hours/W	P (Hours/Week)		Total Hour/Week	
	3				0		0		3		
Un	it				Content					npeten	icies
1		Int	roduct	ion, Pla	anning,	, Aesth	netics and I	Bridge,	C1		
Road bridges				lges, Lo	s, Loading and IRC codes						
									C3		
									C4		
2 Slab Bridges				_			•		C1		
analysis tec								strip,	C2 C3		
finite differe				erence.	ence. Grillage analysis						
3 Pre-stressed							_		C1 C2		
			_	dges and Segmental Box Girder							
					ostructures including Abutments						
4 Railway Brid				Bridges	and IR	S code	s, Steel bridg	ges:	C1		

Truss Bridges and Plate Girder Bridges	C2
	C3

<b>Teaching - Learning Strategies</b>	Contact Hours
Lecture	28
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	6
Case/Project Based Learning (CBL)	6
Revision	2
Others If any:	
Total Number of Contact Hours	42

## **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4
Quiz				
VIVA		✓		✓
Assignment / Presentation	✓	<b>✓</b>	<b>✓</b>	✓
Unit test	✓	<b>✓</b>	<b>✓</b>	✓
Practical Log Book/ Record Book				
Mid Semester Examination 1	<b>√</b>	✓	<b>✓</b>	✓
Mid Semester Examination 2	✓	✓	<b>✓</b>	✓
University Examination	✓	✓	<b>✓</b>	✓
				I
Feedback Process	3. Stu	ıdent's Fe	edback	

Students Feedback	is taken through various steps					
<ol><li>Regular fee</li></ol>	dback through Mentor Mentee system					
<b>6.</b> Feedback b	etween the semester through google forms					
References:						
	Text/Reference Books					
	1. Relevant IRC & IRS codes.					
	2. N. Krishna Raju, "Design of Bridge", Oxford & Ibh. (ISBN					
	8120417984).					
	3. Johnson Victor," Essentials Of Bridge Engineering",					
	Oxford &Ibh, 2016.					
	4. Krishna Raju, "Prestressed Concrete", McGraw Hill					
	Education; Sixth edition.					



# Master of Technology in Civil Engineering (Structural Engineering) 3rd Semester

		1	Facult	y of Eng	ineerin	19 & Te	echnolo	σv				
Name of the	Depart				Enginee			8/				
Name of the Program					Master of Technology in Civil Engineering (Structural							
8					eering)	8.		8	8 (			
Course Code	:			13160								
Course Title				-		)esign	of Plate	es & She	lls			
Academic Ye	ar			II	<i>)</i>		01 1 1000	22 24 2110				
Semester				III								
Number of C	redits			4								
Course Prere		,			ure Med	hanics						
Course Syno							ant wil	l loorn	hout T	hin plates its		
Course Syno	h212									bending and		
				_			•			d detailing of		
				_	plate st	-		i cic. ue	orgii all	a actaining of		
Course Outc	omas:			Toraca	prace si	<u> 1 ucture</u>	•					
At the end of		rse stud	lents w	vill he ak	ale to:							
CO1				using Na		and Lev	w's mei	hod				
							•		1:55-			
CO2							re piate	s by Iini	te differ	ence method.		
CO3	_			shells an								
CO4				folded p					_			
Mapping of Outcomes:			,	,			,	,				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4		
CO1	1	-	3	3	3	3	1	-	3	3		
CO2	1	-	3	3	3	3	1	-	3	3		
CO3	1	-	3	3	3	3	1	-	3	3		
CO4	1	-	3	3	3	3	1	-	3	3		
Average	1	-	3	3	3	3	1	-	3	3		
					-							
Course Con	ntent:											
	urs/Wee	ek)		T (Hours	s/Week)	P	P (Hours/Week)			Total Hour/Week		
	3	/		1			0		4			
Unit			L		Content							
1		Defin	e thin	plate an	plate and shells (C1, Remember), describe Laterally loaded							
thin plates (C2, Understand), Form								-				
		_		nditions						-		
2		_			_		Unders	tand), C	ompare	the Navier's		
		_		_	-	•			-			
				Levy's method (C4, Analyze), Describe Rectangular plates edge conditions and Symmetrical bending of circular plates								
		with v	arrous	s eage co	mailion	s and S	ymmeu	ncai ben	uing or	circular plates		

	square and rectangular plates (C6, Create)
3	Classify the shells (C2, Understand), Interpret the structural action of
	shells (C3, Apply), Beam method of analysis (C4, Analyze)
4	Analysis and design of doubly curved shells and Elliptic parabolic (C4,
	Analyze), Compare Conoid and hyperbolic paraboloid roofs (C4,
	Analyze)

<b>Teaching - Learning Strategies</b>	Contact Hours
Lecture	28
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	25
Problem Based Learning (PBL)	
Case/Project Based Learning (CBL)	
Revision	07
Others If any:	
Total Number of Contact Hours	60

### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	
Practical Log Book/ Record Book					
Mid Semester Examination 1	✓	✓	✓	✓	
Mid Semester Examination 2	✓	✓	✓	✓	
University Examination	✓	✓	✓	✓	

Feedback Process		2. Student's Feedback					
Students Feedback	is taken through various s	steps					
<ol> <li>Regular feed</li> </ol>	back through Mentor Men	ntee system					
2. Feedback be	tween the semester throug	th google forms					
References:							
	Text Books						
	1. G. S. Ramaswamy, (1	1996), Design and Construction of Concrete Shell					
	Roofs, First Edition, CB	S Publishers and distributors. ISBN-13:					
	9780812390995.						
	Reference Books						
	1. Timoshenko and Krie	ger, (2010), Theory of Plates and Shells, Second					
	Edition, Tata McGraw Hill Education Pvt. Ltd., ISBN-13:						
	9780070701250.						
	2. K. Bhaskar, (2013), P	lates: Theories and Applications, First Edition,					
	Ane Books Pvt. Ltd., IS	BN-13: 9789382127024.					



# Master of Technology in Civil Engineering (Structural Engineering)

# Departmental Electives

					0							
		Name of the Department				of Engineering & Technology Civil Engineering						
	Name of the Program				Master of Technology in Civil Engineering (Structural							
					neering		23	υ	<i>5</i> (			
Course Code					0325							
Course Title				_		ted St	ructures					
Academic Yea	r			II	*******	<del></del>						
Semester				III								
Number of Cro	edits			3								
Course Prereq		<u> </u>			rete te	chnolo	ogv					
Course Synops							student	will le	arn aho	out types of		
Course Synops	<b>71</b> .9									<b>5</b> 1		
							fabrication	•				
					-		_		-	Dimensioning		
				and d	letailin	g of jo	oints, Desig	gn of pre	e fabricat	ted Modules.		
<b>Course Outcor</b>	nes:											
At the end of th	e cou	rse stuc	lents v	will be a	able to	:						
CO1	Know	the typ	es of	prefabr	ication	ı syste	ms.					
CO2	Unde	rstand t	he bel	naviour	of she	ll struc	ctures.					
CO3	Desig	n pre-fa	abrica	ted Mo	dules.							
CO4	Do th	e detail	ing of	pre-fat	oricate	d Mod	ules.					
Mapping of Co Outcomes:	ourse	Outco	mes (C	COs) to	Prog	ram O	Outcomes (	POs) &	: Progra	m Specific		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4		
CO1	1	-	3	3	3	3	1	-	3	3		
CO2	1	-	3	3	3	3	1	-	3	3		
CO3	1	-	3	3	3	3	1	-	3	3		
CO4	1	-	3	3	3	3	1	_	3	3		
Average	1	-	3	3	3	3	1	-	3	3		
				· · ·		ı	1	· •	•	1		
<b>Course Cont</b>	ent:											
L (Hour	s/Wee	k)		T (Hours/Week)		k)	P (Hours/Week)		Total Hour/Week			
3					0		0	`				
Unit			·									
1		Classi	fv th	ne fou								
_			•		, , , , , , , , , , , , , , , , , , ,							
							_			11 3// 8		
2		consid	deratio	on of pr	efabric	ated s	tructures (	C6, Crea	ate)			
CO2 CO3 CO4 Average  Course Cont L (Hour	1 1 1 tent:	- - - k) Classi structi Under	- 3 3 3 3 1 - 3 3 3 - 3 3 - 3 3 3 - 3 3 3 3									

	floor system, slab and wall panels (C4, Analyze), Investigate two way load bearing slabs and Wall panels (C6, Create)
3	Discuss Dimensioning and detailing of joints for different structural connections (C2, Understand), Differentiate Construction and expansion joints (C4, Analyze)
4	Discuss the erection of R.C. structures and equipment (C2, Understand), Organize the production, transportation, storing, shuttering and erection of structures (C4, Analyze), Investigate total prefabricated buildings (C6, Create)

Teaching - Learning Strategies	<b>Contact Hours</b>
Lecture	33
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	6
Self-directed learning (SDL) / Tutorial	
Problem Based Learning (PBL)	6
Case/Project Based Learning (CBL)	
Revision	
Others If any:	
Total Number of Contact Hours	45

### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	

Unit test		✓	✓	✓	✓					
Practical Log Boo	ok/ Record Book									
Mid Semester Ex	amination 1	✓	✓	<b>✓</b>	✓					
Mid Semester Ex	amination 2	✓	✓	✓	<b>√</b>					
University Exam	ination	✓	✓	<b>√</b>	✓					
Feedback Proces	SS	2. Student's Feedback								
1. Regular fee	ck is taken through varion edback through Mentor between the semester the	Mentee sy								
References:										
	Text Books: 1. Hass, A. M., Precast Concrete Design and Applications, Taylor & Francis Publishers, ISBN-13: 9780853341970.									
	Reference Books									
	1. A. S. G. Brugg Concrete, CRC P. Applied Science Pub	ress, ISB	N-13: 9	7890619	11838.	Second				

		1	Facult	v of En	ginee	ring & T	Technolo	σv				
Name of the	Denart		ucuit				cemmono	<i>5.</i> 7				
Name of the	•			Civil Engineering  Master of Technology in Civil Engineering (Structural								
Traine of the Frogram					Engineering)							
Course Code				13160327								
Course Title												
Academic Ye	or			II	Design of Industrial Structures							
Semester 1	ai			III								
Number of C	madita			3								
					1:	1	4:					
Course Prere		<u> </u>					uction m		11			
Course Syno	psis								_	an in-depth		
					_			_		trial structure		
				with	the lat	est code	of practi	ce as pe	er the Inc	lian Standard.		
				On	compl	etion o	f this	course	student	gain good		
				confi	dence	in desig	gning ma	ajor ind	lustrial s	tructures like		
						-		-		like gantry		
				_	-	_	•			s, high rise		
				cnim	neys a	na pre-e	ngineered	thin w	alled stru	ictures.		
Course Outco			_									
At the end of												
CO1			•			ıs indust						
CO2							planning	•				
CO3	1	the co										
CO4		rstand t										
Mapping of (	Course	Outco	mes (C	COs) to	Prog	ram Ou	tcomes (	POs) &	Prograi	m Specific		
<b>Outcomes:</b>												
	DO1	DO2	DO2	DO 4	DO5	DO.	DCO1	DC O2	DCO2	DCO.4		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4		
CO1	1	_	3	3	3	3	1	_	3	3		
CO2	1	_	3	3	3	3	1	_	3	3		
CO3	1	_	3	3	3	3	1	_	3	3		
CO4	1	_	3	3	3	3	1	_	3	3		
Average	1	_	3	3	3	3	1	_	3	3		
irroruge		l .		<u> </u>	<b>~</b>	<u> </u>	ı <del>-</del>	1		· · · ·		
Course Con	ntent:											
	urs/Wee	ek)		Т (Ноп	Γ (Hours/Week) P (Hours/Week) Total Hour/Week					Hour/Week		
	3	,			0	, 1	0		1000	3		
Unit		Conte	ent		<u> </u>	l	U		I			
1				Specifi	c real	uirement	s for in	dustrie	s like t	extile, sugar,		
1				-	-					_		
				hemical, etc(C1, Remember); State site layout and external C1, Remember); Discuss Building Work, Standards for								
										glass - Pressed		
		Buuci	urai II.	iaiCI Ial	o meru	unig pia	$\frac{1}{2}$	11 y 111 C 1 S	- Though	1435 - 1 1656U		

	card boards, etc (C2,Understand); Understand concept of multi-storey buildings(C2,Understand); Define steel skeletal structures and Reinforced concrete frames(C1, Remember); Define Workshops, Ware houses - Single storey buildings(C1, Remember); Understand Sheds in steel and reinforced concrete and North-lights(C2,Understand); Single span spherical and other special constructions such as Cooling towers and chimneys, Bunkers and silos' prefabrication - Construction(C3, Apply);
2	Understand various construction techniques for Expansion joints,
	Machine foundations and Other foundations(C2, Understand); Analyze
	various waterproofing techniques like Roofs and roofing, Roof
	drainage(C4,Analyzed); learn about Floors and flooring joists, Curtain
	walling, Outer wall facing, Sound and shock proof
	mountings(C1,Remember); Use of modern hoisting and other
	construction equipments (C3,Apply).
3	Define Circulation, Communication and Transport(C1,Remember);
	understand Fixed points (central cores) Staircases and Grid floor
	sections(C2,Understand); Analyze Lifts refuse disposals and Utilization
	of waste materials(C5,Evaluate); learn use of Cranes, Continuous
	conveyors, Mobile cranes, Transporters, Doors and Sliding
	gates(C3,Apply).
4	Investigate Functional Requirements of Lighting like Natural lighting,
	Protection from the sun, sly lights and window cleaning installations
	Services(C6, Create); Use of Layout, wiring, fixtures, cable and pipe
	bridges(C3,Apply); Understand process of electrical installations and
	lighting substation(C2,Understand); Use of Effluent(C3, Apply).
	Explain Ventilation and fire protection functions (C2, Understand);
	Understand functions of Ventilation, Air-conditioning, Fire escapes and
	chutes, Fire alarms and Hydrants (C2, Understand).

Teaching - Learning Strategies	<b>Contact Hours</b>	
Lecture	28	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)	06	
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)		
Case/Project Based Learning (CBL)	11	
Revision		
Others If any:		

Total Number of Contact Hours	45
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### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

### **Mapping of Assessment with COs**

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	
Practical Log Book/ Record Book					
Mid Semester Examination 1	✓	✓	✓	✓	
Mid Semester Examination 2	✓	✓	✓	✓	
University Examination	✓	<b>√</b>	<b>✓</b>	<b>✓</b>	

Feedback Process	4. Student's Feedback
------------------	-----------------------

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms

### **References:**

### **Text Books**

1. El Reedy, (2010), Construction Management and Design of Industrial Concrete and Steel Structures, Taylor & Francis Group, ISBN-13: 9781439815991.

REFERENCE BOOKS

1. Nelson G. L., (1988), Light Agricultural and Industrial Structures: Analysis and Design Kluwer Academic Publisher,

ISBN-13: 9780442267773.

2. Dr. Raja Rizwan Hussain, (2011), Pre-Cast Concrete for Multi-Storey Structures, Create space Publisher, ISBN: 9781467918220.

Faculty of Engineering & Technology											
Name of the	Denari							<u>-~8,/</u>			
Name of the Program					Civil Engineering  Master of Technology in Civil Engineering (Structural						
8					Engineering)						
Course Code					13160329						
Course Title				-		ce &	Rehabilit	ation of	Structu	ires	
Academic Year					<u> </u>	<u></u>	<u> </u>	ation or	<u>Structu</u>		
Semester Semester											
Number of C	redits			3							
Course Prere	quisite	2		_	rete T	echno	logy				
Course Syno	psis			In t	his co	ourse,	student	will le	earn M	Saintenance &	
	L						of Struc				
				I				•	•	s and different	
					ring te						
Course Outco	omes:					•					
At the end of	the cou	rse stud	lents v	will be a	able to	:					
CO1	Unde	rstand t	he pro	perties	of fres	sh and	hardened	concrete	<del>)</del> .		
CO2	Knov	v the str	ategie	s of ma	intena	nce ar	nd repairir	ng.			
CO3	Get a	n idea c	of repa	airing te	chniqu	ies.					
CO4	Unde	rstand t	he pro	perties	of rep	airing	materials	•			
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes:									and Creatifie		
11 0	our se	Outco	ines (	cos) to	) Prog	ram (	Jutcomes	(POS) &	z Progr	am specific	
11 0	PO1	PO2	PO3	PO4	PO5	PO6		PSO2	PSO3	PSO4	
Outcomes:	1		<u> </u>	, , , , , , , , , , , , , , , , , , ,				. ,		<u>-</u>	
Outcomes:  COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
Outcomes:  COs  CO1	PO1	PO2	PO3	PO4 3	PO5	PO6	PSO1 1	PSO2	PSO3 3	PSO4	
Outcomes:  COs  CO1  CO2	PO1 1 1	PO2	PO3 3 3	PO4 3 3	PO5 3 3	PO6	PSO1 1 1 1	PSO2	PSO3 3 3	PSO4 3 3	
Outcomes:  COs  CO1  CO2  CO3	PO1 1 1 1	PO2	PO3 3 3 3	PO4 3 3 3 3 3 3	PO5 3 3 3	PO6 3 3 3	PSO1 1 1 1	PSO2	PSO3 3 3	PSO4  3 3 3	
COs CO1 CO2 CO3 CO4	PO1 1 1 1 1	PO2	PO3 3 3 3 3	PO4 3 3 3 3	PO5 3 3 3 3	PO6 3 3 3 3	PSO1  1 1 1 1 1	PSO2	PSO3  3  3  3  3	PSO4  3 3 3 3	
COs CO1 CO2 CO3 CO4 CO5	PO1 1 1 1 1 1 1	PO2	PO3 3 3 3 3 3	PO4 3 3 3 3 3 3	PO5 3 3 3 3 3	PO6 3 3 3 3 3	PSO1  1 1 1 1 1 1	PSO2	PSO3  3  3  3  3  3	PSO4  3 3 3 3 3 3	
COs CO1 CO2 CO3 CO4 CO5	PO1 1 1 1 1 1 1 1 1	PO2	PO3 3 3 3 3 3	PO4 3 3 3 3 3 3	PO5 3 3 3 3 3	PO6 3 3 3 3 3	PSO1  1 1 1 1 1 1	PSO2	PSO3  3  3  3  3  3	PSO4  3 3 3 3 3	
COs CO1 CO2 CO3 CO4 CO5 Average Course Coi	PO1 1 1 1 1 1 1 1 1	PO2	PO3 3 3 3 3 3	PO4 3 3 3 3 3 3	PO5 3 3 3 3 3 3 3	PO6 3 3 3 3 3 3	PSO1  1 1 1 1 1 1	PSO2	PSO3  3 3 3 3 3 3	PSO4  3 3 3 3 3	
COs CO1 CO2 CO3 CO4 CO5 Average Course Coi	PO1 1 1 1 1 1 1 1 1 tent:	PO2	PO3 3 3 3 3 3	PO4 3 3 3 3 3 7 (Hou	PO5 3 3 3 3 3 3 3	PO6 3 3 3 3 3 3	PSO1  1 1 1 1 1 1 1	PSO2	PSO3  3 3 3 3 3 3	PSO4  3 3 3 3 3 3 3	
COs CO1 CO2 CO3 CO4 CO5 Average Course Coi	PO1 1 1 1 1 1 1 1 tent:	PO2	PO3 3 3 3 3 3 3	PO4 3 3 3 3 3 T (Hou	PO5  3 3 3 3 3 3 3 0 0 0	PO6 3 3 3 3 3 3	PSO1  1 1 1 1 1 1 1 P (Hours 0 Content	PSO2  s/Week)	PSO3  3 3 3 3 3 Tota	PSO4  3 3 3 3 3 3 3 4 Hour/Week 3	
Outcomes:  COs  CO1  CO2  CO3  CO4  CO5  Average  Course Con  L (Ho	PO1 1 1 1 1 1 1 1 tent:	PO2	PO3 3 3 3 3 3 3	PO4 3 3 3 3 3 T (Hou	PO5  3 3 3 3 3 3 3 0 0 0	PO6 3 3 3 3 3 3	PSO1  1 1 1 1 1 1 1 P (Hours 0 Content	PSO2  s/Week)	PSO3  3 3 3 3 3 Tota	PSO4  3 3 3 3 3 3 3 H Hour/Week	
Outcomes:  COs  CO1  CO2  CO3  CO4  CO5  Average  Course Con  L (Ho)	PO1 1 1 1 1 1 1 1 tent:	PO2  Ek)  Discu Exam	PO3 3 3 3 3 3 3 ss Secine Q	PO4 3 3 3 3 3 3 T (Hour reviceable quality A	PO5 3 3 3 3 3 3 3 ars/Wee 0	PO6 3 3 3 3 3 3 4 b)	PSO1  1 1 1 1 1 1 1 Content rability or	PSO2  s/Week)  f Structure constru	PSO3  3  3  3  3  Tota  res (C2, action (	PSO4  3 3 3 3 3 3 3 4 Hour/Week 3 Understand) - C4, Analyze) -	
Outcomes:  COs  CO1  CO2  CO3  CO4  CO5  Average  Course Con  L (Ho)	PO1 1 1 1 1 1 1 1 tent:	PO2  Ek)  Discu Exam	PO3 3 3 3 3 3 3 ss Secine Q	PO4 3 3 3 3 3 3 T (Hour reviceable quality A	PO5 3 3 3 3 3 3 3 ars/Wee 0	PO6 3 3 3 3 3 3 4 b)	PSO1  1 1 1 1 1 1 1 Content rability or	PSO2  s/Week)  f Structure constru	PSO3  3  3  3  3  Tota  res (C2, action (	PSO4  3 3 3 3 3 3 3 4 Hour/Week 3	
Outcomes:  COs  CO1  CO2  CO3  CO4  CO5  Average  Course Con  L (Ho)	PO1 1 1 1 1 1 1 1 tent:	PO2  Discu Exam Defin Perme	PO3 3 3 3 3 3 3 ss Se ine Q e Frese eabilit	PO4  3  3  3  3  T (Hour reviceable puality Ash concerns y - Cra	PO5  3 3 3 3 3 3 3 distriction and the second and t	PO6 3 3 3 3 3 3 a b b d Du nce for opertific (C2, 1)	PSO1  1 1 1 1 1 1 1 1 Content rability of concrete (C1, R) Understan	PSO2  s/Week)  f Structure emember emember and - Discounting emembers and - Discount	PSO3  3  3  3  3  Tota  res (C2, action (cr) – Express the	PSO4  3 3 3 3 3 3 3 4 Hour/Week 3 Understand) - C4, Analyze) - clain Strength - Effects due to	
Outcomes:  COs  CO1  CO2  CO3  CO4  CO5  Average  Course Con  L (Ho)	PO1 1 1 1 1 1 1 1 tent:	PO2  Discu Exam Defin Perme clima	PO3 3 3 3 3 3 3 ss Se ine Q e Frese eabilite –	PO4  3 3 3 3 3 3 T (Hour reviceable puality Ash concrety - Cra	PO5  3 3 3 3 3 3 3 irs/Wee 0	PO6 3 3 3 3 3 3 4 b) Dunce for operting (C2, 1) - cl	PSO1  1 1 1 1 1 1 1 1 Content rability or concrete (C1, R Understanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderstanderst	PSO2  s/Week)  f Structure emember and - Disconstructure - Wear	PSO3  3  3  3  3  Tota  Tes (C2, action (c) – Expense the and expense the angle of the angle o	PSO4  3 3 3 3 3 3 3 4 Hour/Week 3 Understand) - C4, Analyze) - blain Strength -	

	Corrosion mechanism (C2, Understand) - Examine the Effects of cover thickness and cracking (C4, Analyze) - Distinguish the Methods of corrosion protection (C4, Analyze) - Explain Inhibitors - Resistant
	steels – Coatings - Catholic protection (C2, Understand), Define
	Construction Scan (C1, Remember).
2	Define Chemical admixtures (C1, Remember), Describe the function of repairing materials: Patching materials, resurfacing, sealing, waterproofing, bonding materials (C2, Understand)
	Examine the Special types of repair materials (C4, Analyze), Explain the Selection and evaluation of repairing materials (C2, Understand)
	Define Expansive cement (C1, Remember)- Define Polymer concrete
	(C1, Remember) – Define Ferro cement (C1, Remember), Define Fiber
	reinforced concrete (C1, Remember) - Describe Fiber reinforced plastics
	(C2, Understand).
3	Define Diagnosis and Assessment of Distress (C1, Remember) -
	Explain Visual inspection (C2, Understand) – Describe Non destructive
	tests (C2, Understand), Classify semi destructive and destructive tests
	(C2, Understand)
	Discuss Rust eliminators and polymers coatings for rebars during repair (C2, Understand), Explain Shotcrete - Epoxy injection (C2, Understand)
	- Explain Mortar repair for cracks (C2, Understand) - Describe Shoring
	and underpinning (C2, Understand). Design Small crack and large crack
	repair (C6, Create)
4	Describe the Techniques for Repair and strengthening of structures (C2,
	Understand), Discuss structural concrete strengthening (C2,
	Understand), Examine Strengthening by SIMCON (C4, Analyze),
	Design Retrofit using FRP composites and base isolation techniques
	(C6, Create)

<b>Teaching - Learning Strategies</b>	Contact Hours	
Lecture	33	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial		
Problem Based Learning (PBL)	6	
Case/Project Based Learning (CBL)	6	
Revision		
Others If any:		
Total Number of Contact Hours	45	

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

#### **Mapping of Assessment with COs**

Mapping of Assessment with COs								
Nature of Assessr	CO1	CO2	CO3	CO4	CO5			
Quiz								
VIVA								
Assignment / Prese	entation	✓	✓	✓	✓	<b>✓</b>		
Unit test		✓	✓	✓	✓	<b>✓</b>		
Practical Log Bool	k/ Record Book							
Mid Semester Exa	mination 1	✓	<b>✓</b>	✓	✓	✓		
Mid Semester Exa	mination 2	✓	✓	✓	✓	<b>✓</b>		
University Examin	nation	<b>✓</b>	✓	✓	✓	✓		
Feedback Process	6	Student's Feedback						
Students Feedback	is taken through variou	s steps						
	k through Mentor Mente	-						
2.Feedback between	en the semester through	google for	rms					
References:								
	Text Books  1. Shetty M. S., (2008), Concrete Technology, Seventh Edition, S. Chand & Company Ltd. ISBN-13: 9788121900034.  Reference books  1. Ravindra K. Dhir, M. Roderick Jones & Li Zheng, (2005), Repair and Renovation of Concrete Structures, American Society of Civil Engineers, ISBN-13: 9780727734051.  2. A. R. Santha Kumar, (2006), Concrete Technology, First Edition, Oxford University Press, ISBN-13: 9780195671537.							

# **Faculty of Engineering & Technology**

Name of the ProgramMaster of Technology in Civil Engineering (Str Engineering)Course Code13160331	ructural						
Course Code 13160331							
Course Title Design of Bridges							
Academic Year II							
Semester III							
Number of Credits 3							
Course Prerequisite Reinforced Concrete Structures							
Course Synopsis Design of reinforced concrete bridges is normal	lly done on						
the basis of a structural analysis. The purpose of	of the						
analysis is to find a distribution of sectional force	ces which						
fulfils equilibrium and is suitable for design.							
Course Outcomes:							
At the end of the course students will be able to:							
CO1 Understand the load distribution and IRC standards							
CO2 Design the slab bridges							
CO3 Design the Arch bridges							
CO4 Design the bridge bearings, hinges and expansion joints.							
Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program S	Specific						
Outcomes:							
COs PO1 PO2 PO3 PO4 PO5 PO6 PSO1 PS PSO3 O2	PSO4						
CO1         1         -         3         3         3         1         -         3	3						
CO2 1 - 3 3 3 3 1 - 3	3						
CO3         1         -         3         3         3         1         -         3	3						
CO4         1         -         3         3         3         1         -         3	3						
Average   1   -   3   3   3   1   -   3	3						
Course Content:							
L (Hours/Week) T (Hours/Week) P (Hours/Week) Total Ho	our/Week						
	3						
Unit Content							
1 Explain Load Distribution Theory as per I.R.C(C2, U1	Explain Load Distribution Theory as per I.R.C(C2, Understand);						
Define loading standards for Bridge slabs(C1, Remember); U	Define loading standards for Bridge slabs(C1, Remember); Understand						
Effective width method as per I.R.C(C2, Understand)							
Pigeaud's and Courbon's method(C2, Understand); State As	· -						
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	and analysis of a typical bridge floor as per Hendry-Jaeger method -						
Morice – Little version of Guyon and Massonet method(C1, I							
C4, Analyzed)							
• /	Understand and analyze Slab Bridges, Straight and skew slab bridges, T						
beam bridges and Balanced cantilever bridges(C2,U	_						
C4, Analyzed); Design of articulation and Continuous girds							

	bridges(C6,Create);			
3	Define Arch Bridges(C1,Remember); Understand and analyze Single			
	span closed and open spandrel symmetrical type (structural			
	arrangements and functions only)(C2,Understand, C4,Analyzed);			
	Design of bow string girder bridges(C6,Create);			
4	Define various types of bridges, including box culvert, single span rigid			
	frame bridges, and pre stressed composite T beam bridges(C1,			
	Remember); Identify the structural components of bridges, such as slab			
	base, gusset base, and grillage foundation(C1, Remember);Demonstrate			
	the ability to design slab base and gusset base for different bridge			
	configurations(C3, Apply); Analyze the structural integrity of various			
	bridge components, including slab base, gusset base, and grillage			
	foundation(C4, Analyzed)			

<b>Teaching - Learning Strategies</b>	Contact Hours
Lecture	26
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	10
Problem Based Learning (PBL)	5
Case/Project Based Learning (CBL)	
Revision	4
Others If any:	
Total Number of Contact Hours	45

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	

Quiz	Duiz								
VIVA									
VIVA									
Assignment / Pres	entation	✓	✓	✓	✓				
Unit test		✓	✓	✓	✓				
Practical Log Boo	k/ Record Book								
Mid Semester Exa	amination 1	<b>✓</b>	<b>✓</b>	<b>✓</b>	✓				
Mid Semester Exa	amination 2	<b>✓</b>	<b>✓</b>	✓	✓				
University Exami	nation	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>				
		I							
Feedback Proces	s	1.	1. Student's Feedback						
Students Feedback	x is taken through variou	s steps							
1.Regular feedbac	k through Mentor Mente	e system	1						
	en the semester through								
References:									
	Text Books								
	1. Johnson Victor, (2007), Essentials of Bridge Engineering, Sixth								
Edition, Oxford & IBH Publishing Co. Ltd., ISBN-13: 9788120417175.									
Reference books									
	1. Wilbur Jay Watson, (2910), General Specifications for Concrete								
	Bridges, Nabu Press, ISBN-13: 9781177206587.								
	2. Portland Cement Association, (2010), Continuous Concrete Bridges,								
	Cambridge Scholars Publishing, ISBN-13: 978115337241.						Bridges,		
Cambridge Scholars Fublishing, 13D1v-13. 9/611333/241.									

Faculty of Engineering & Technology											
Name of the	Denart		Civil Engineering								
Name of the								vil Engin	eering (S	tructural	
	<b></b>			Master of Technology in Civil Engineering (Structural Engineering)							
<b>Course Code</b>				13160333							
Course Title				Composite Structures							
Academic Ye	ar			II							
Semester				III							
Number of C	redits			3							
<b>Course Prere</b>	quisite	<del>)</del>		NIL							
Course Synop	psis			Stress Strain relationship of composite materials, methods of analysis, finite element analysis of plates with Laminated plates.							
Course Outco	omes:										
At the end of	the cou	rse stuc	lents v	vill be a	able to	<u>.                                    </u>					
CO1	Analy	ze com	posite	structu	ıres						
CO2	Do m	icrosco	pic an	d macre	oscopi	c anal	ysis				
CO3	Analy	ze sanc	ze sandwich and laminated plates								
CO4	Unde	rstand t	he fail	lure crit	eria fo	r com	posites.				
CO5	Know	the fat	ricati	on tech	niques						
Mapping of Outcomes:	Course	Outco	mes (C	COs) to	Prog	ram (	Outcomes	(POs) &	Program	Specific	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
CO1	1	-	3	3	3	3	1	-	3	3	
CO2	1	-	3	3	3	3	1	-	3	3	
CO3	1	-	3	3	3	3	1	-	3	3	
CO4	1	-	3	3	3	3	1	-	3	3	
CO5	1	-	3	3	3	3	1	-	3	3	
Average	1		3	3	3	3	1	-	3	3	
Course Con	itent:										
L (Ho	ırs/Wee	k)		T (Hou	rs/Wee	k)	P (Hours	/Week)	Total H	Iour/Week	
,	3				0		0	Í		3	
Unit		Conte	ent					J.			
1				posite r	nateria	ıls and	l its applic	ations (C	1, Remen	nber), State	
		Differ	entiat	e elastic	e const	tant fo	Classify ma or anisotrop	`	-	, .	
ī		motor	iola (	C4, An	olyzo)						

2	Describe the concept of mesh in FEM and displacement function (C2,			
	Understand), Compare the matrix for plate elements (C4, Analyze),			
	Design and analysis of plates using FEM (C6, Create), Drive Stress-			
	Strain Matrix – Stiffness matrix of plate element (C6, Create)			
3	Classify the mechanics of materials approach (C2, Understand),			
	Compare Micro mechanics, Mechanics of materials approach, elasticity			
	approach to determine material properties, Macro Mechanics (C4,			
	Analyze), Interpret the Stress-strain relations with respect to natural			
	axis, arbitrary axis (C3, Apply), Examine the material properties and			
	Experimental characterization of lamina (C4, Analyze)			
4	Discuss failure criteria for composites (C2, Understand), Differentiate			
	the Governing differential equation for a general laminate, angle ply and			
	cross ply laminates (C4, Analyze), Formulate and derive differential			
	equation for laminated plates (C6, Create)			

<b>Teaching - Learning Strategies</b>	<b>Contact Hours</b>
Lecture	28
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	8
Problem Based Learning (PBL)	
Case/Project Based Learning (CBL)	5
Revision	4
Others If any:	
Total Number of Contact Hours	45

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	CO5	

Quiz									
VIVA									
Assignment / Presentation			✓	✓	<b>✓</b>	<b>✓</b>			
Unit test		✓	✓	✓	<b>√</b>	<b>✓</b>			
Practical Log Book	Z/ Record Book								
Mid Semester Exar	mination 1	✓	✓	<b>✓</b>	<b>✓</b>	<b>✓</b>			
Mid Semester Exar	mination 2	✓	✓	✓	<b>✓</b>	<b>✓</b>			
University Examin	ation	<b>✓</b>	✓	<b>✓</b>	<b>√</b>	<b>✓</b>			
Feedback Process		1. Student's Feedback							
Students Feedback	is taken through various	steps							
	through Mentor Mentee								
	n the semester through g	google f	orms						
References:									
	<b>Text Books</b> 1. Madhujit Mukhopad	dhyay	(2010) N	Mechanica	s of Cor	mnosite I	Materials		
	and Structures, First					-			
	9788173714771.	Lamon	, Official	Diacksv	van 1 vi.	Lu., 1	SD11-13.		
	Reference books								
	1. Jones, R.M., (199	8). Me	chanics of	of Com	osite N	faterials.	Second		
	Edition, Taylor and Fra	, ·		-		•	Second		
	2. Atul K. Kaw, (20						Second		
	Edition, CRC Press, IS			•	Posite IV	141011415,	Second		

		1	- Tacı	ılty of Eı	าสากคอ	ring d	& Techn	ology					
Name of the	Denart		acı		Engin			ology					
Name of the	•				Master of Technology in Civil Engineering (Structural								
					Engineering)								
Course Code					13160335								
Course Title					Design of Tall Buildings								
Academic Ye	ar				II								
Semester					III								
Number of C	redits			3									
Course Prere		<u> </u>			tural A	analv	sis						
Course Syno	_	-						s. Thr	ee dii	mensio	onal analysis,		
	F ~ - ~										Plane frame		
				syste		J	,		-	, ,			
Course Outco	omes:												
At the end of	the cou	rse stuc	lents	s will be	able to								
CO1	Know	the typ	oes (	of tall bui	ldings	1							
CO2	Analy	ze the	olan	e frame s	vstems	s by d	ifferent r	nethods					
CO3				wall syst									
Mapping of (				•						rograr	n Specific		
Outcomes:				(000)	, v <b>g</b> .			s (± 05)		- <b> </b>	~ <b>P • • • • •</b>		
COs	PO1	PO2	PO	3 PO4	PO5	PO6	PSO1	PSO2	PSC	03	PSO4		
CO1	1	-	3	3	3	3	1	-	3	3	3		
CO2	1	-	3	3	3	3	1	-	3	3	3		
CO3	1	-	3	3	3	3	1	-	3	3	3		
Average	1	-	3	3	3	3	1	-	3	3	3		
Course Con													
L (Ho	urs/Wee	ek)		T (Hou	rs/Wee	k)		rs/Week)	)   '	Total	Hour/Week		
	3	1			0			0			3		
Unit		_	••				Conten				1) 61 10		
1				-				• '			nd) - Classify		
		the bu	ildi	ngs accor	ding to	o NBO	C (C2, U1	nderstar	<b>nd)</b> – 1	Explai	n the types of		
	load wind load, Seismic load, Quasi static approach (C2, Understand).								nderstand).				
2		Discuss the plane frame system (C2, Understand)- Describe the method											
		of Calculation of wind load (C2, Understand) – Explain approximate											
			method (C2, Understand) – Appraise the significance of cantilever and factor methods (C5, Evaluate) – Explain Kani's method (C2,										
								_					
							ostitute f	rame m	etnoc	i ior d	lead load and		
				(C2, Uno									
3		3 Explain Shear Wall System (C2, Understand), Describe Rosman's							nd), I	be Rosman's			

	analysis, Design aspect, RC frame and shear wall interaction – Equivalent frame method (C2, Understand), Compare the different methods of analysis (C4, Analyze), Design of shear wall system (C6, Create)
4	Discuss In-filled Frame Systems: Importance – Methods of analysis
	(C2, Understand), Compare Equivalent truss and frame method, Force-
	displacement method (C4, Analyze), Design and analysis of in filled
	frame system (C6, Create)

reaching Ecarining Strategies and Contact	Hours	
Teaching - Learning Strategies	<b>Contact Hours</b>	
Lecture	32	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	8	
Problem Based Learning (PBL)		
Case/Project Based Learning (CBL)	5	
Revision		
Others If any:		
Total Number of Contact Hours	45	

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3		
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓		
Unit test	✓	✓	<b>✓</b>		

Practical Log Book/ Record Book							
Mid Semester Examination 1			<b>✓</b>	✓			
Mid Semester Examination 2			✓	✓			
University Examin	University Examination			<b>✓</b>			
		I	1	<u> </u>	1		
Feedback Process		1	. Studen	t's Feedb	ack		
1.Regular feedback	is taken through various through Mentor Mentee on the semester through go	systen					
References:							
	Text Books  1. Bryan Stafford Smith and Alex Coull, (2011), Tall Building Structures: Analysis and Design, Wiley India, ISBN-13: 9788126529896.  Reference books  1. Sarwar Alam Raz, (2002), Structural Design in Steel, Second Edition, New Age International, ISBN-13: 9788122432282.						



# Master of Technology in Civil Engineering (Remote Sensing and GIS) 3rd Semester

		1	Facult	v of Fr	gineer	ring	& T	`echnolo	σv			
Name of the	Denart		racuit					CHHOIO	gy			
Name of the	•			_	Civil Engineering  Master of Technology in Civil Engineering (Remote							
ivalite of the	riogra	111			Sensing and GIS)							
Course Code					13160370							
Course Title					σe Pr	oce.	ccina					
Academic Ye	ar			II	Digital Image Processing							
Semester Semester	aı			III								
Number of C	redits			4								
Course Prere		`			e Proc	eccin	σ					
Course Syno							_	esing inc	ludec i	Introduction	on Image	
Course Syno	ps15			_				_			erstanding	
					_			_	•	- Change	_	
						-				_	s and Radar	
				1 -	e analy	•	PCI	Бресии	imas	C 1 mary 51	and Radai	
Course Outc	omes:			Imag	c anary	, 515.						
At the end of		rse stud	lents v	vill be a	able to							
CO1							e of	image pr	ocessi	ng in Civil	Engineering	
CO2										technique		
CO3										,		
	study and analyze the				iate methods to improve data merging and image analysis							
CO4	analy	ze the a	pprop	riate mo	ethods	to im	npro	ve data r	nergin	g and imag	ge analysis	
CO4 Manning of O												
Mapping of C												
Mapping of 0							Out					
Mapping of Outcomes:	Course	Outco	mes (C	COs) to	Progi	ram	Out	comes (	POs) o	& Progra	m Specific	
Mapping of Outcomes:	PO1	Outco	mes (C	PO4	Progr	ram PO	Out	PSO1	POs) o	& Progra	m Specific PSO4	
Mapping of Outcomes:  COs  CO1	PO1	PO2	PO3	PO4 3	PO5	PO 3	Out	PSO1	POs) o	& Program PSO3 3	PSO4	
Mapping of Outcomes:  COs CO1 CO2	PO1 1 1	PO2	PO3 3 3	PO4  3 3	PO5 3 3	PO 3 3	Out	PSO1 1 1	POs) o	PSO3  3  3	PSO4  3 3	
Mapping of Outcomes:  COs  CO1  CO2  CO3	PO1  1 1 1	PO2	PO3 3 3 3	PO4  3 3 3	PO5 3 3 3	PO 3 3 3 3	Out	PSO1 1 1 1 1 1	POs) o	PSO3  3  3  3	PSO4  3 3 3 3	
Mapping of Outcomes:  COs  CO1  CO2  CO3  CO4	PO1 1 1 1 1 1	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3	PO5 3 3 3 3	PO 3 3 3 3 3 3	Out	PSO1  1 1 1 1 1	POs) o	PSO3  3 3 3 3	PSO4  3 3 3 3 3	
Mapping of Outcomes:  COs  CO1  CO2  CO3  CO4  Average	PO1 1 1 1 1 1 1	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3	PO5 3 3 3 3	PO 3 3 3 3 3 3	Out	PSO1  1 1 1 1 1	POs) o	PSO3  3 3 3 3	PSO4  3 3 3 3 3	
Mapping of COutcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con	PO1 1 1 1 1 1 1 ntent:	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3 3	PO5  3 3 3 3 3	PO 3 3 3 3 3 3 3	Out	PSO1  1 1 1 1 1	PS 02	PSO3  3 3 3 3 3	PSO4  3 3 3 3 3 3	
Mapping of COutcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con	PO1 1 1 1 1 1 1	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3	PO5  3 3 3 3 3	PO 3 3 3 3 3 3 3	Out	PSO1  1 1 1 1 1	PS 02	PSO3  3 3 3 3 3	PSO4  3 3 3 3 3	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3 3	PO5 3 3 3 3 3 3	PO 3 3 3 3 3 3 3	Out	PSO1  1 1 1 1 1 1 0 (Hours/V	PS 02	PSO3  3 3 3 3 3	PSO4  3 3 3 3 3 4 Hour/Week	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con	PO1 1 1 1 1 1 urs/Wee	PO2	PO3  3 3 3 3 3	PO4  3 3 3 3 T (Hou	PO5  3 3 3 3 3 1 1	PO 3 3 3 3 3 3 3 k)	Out	PSO1  1 1 1 1 1 0 (Hours/V	PS 02	PSO3  3 3 3 3 Total	PSO4  3 3 3 3 3 Hour/Week 4	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)	PO3  3 3 3 3 3 9	PO4  3 3 3 3 T (Hou	PO5  3 3 3 3 3 3 1 syste	PO 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	P CoSate	PSO1  1 1 1 1 1 1 0 (Hours/V	PS O2	PSO3  3 3 3 3 Total	PSO4  3 3 3 3 3 Hour/Week 4	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)  Image retriev	PO3 3 3 3 3 3 3 4 0 0 0 0 0 0 0 0 0 0 0 0	PO4 3 3 3 3 3 T (House cessing Data	PO5 3 3 3 3 3 3 rs/Wee 1	PO 3 3 3 3 3 3 3 4 k) m; Sats —	P Co-Sate Co	PSO1  1 1 1 1 1 1 O (Hours/V O ontent llite date compressi	POs) o  PS O2 Veek)	PSO3  3 3 3 3 3 Total  quisition Satellite	PSO4  3 3 3 3 3 Hour/Week 4  Storage and System (C1,	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)  Image retriev Reme	PO3 3 3 3 3 3 ce proceval – ember)	PO4  3 3 3 3 T (House cessing Data; Data	PO5 3 3 3 3 3 3 syste Forma	PO 3 3 3 3 3 3 3 3 3 4 5 5 5 5 5 5 5 5 5 5	P Co	PSO1  1 1 1 1 1 1 Ontent Illite date compression age display	PS O2	PSO3  3 3 3 3 Total  Quisition Satellite stem - Cu	PSO4  3 3 3 3 3 4 Hour/Week 4  Storage and System (C1, arrent Remote	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)  Image retriev Reme Sensin	PO3 3 3 3 3 3 3 ce procedural – ember) ng S	PO4  3 3 3 3 3 T (House cessing Data; Data ystems.	Programa Produce Preproduce Prepr	PO 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	P Constant C	PSO1  1 1 1 1 1 1 0 (Hours/V 0 ontent llite date compression age displayed of reference of the component).	POs) of PS O2	PSO3  3 3 3 3 3 Total  [uisition Satellite stem – Culy sensed	PSO4  3 3 3 3 3 Hour/Week 4  Storage and System (C1,	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)  Image retriev Reme Sensin Under	PO3 3 3 3 3 3 3 ce proceval – ember) ng Syrstand	PO4  3 3 3 3 3 T (House cessing Data; Data ystems.); Radi	PO5 3 3 3 3 3 3 rs/Wee 1 syste Forma produc Prep ometri	PO   3   3   3   3   3   3	P Constant C	PSO1  1 1 1 1 1 1 1 0 (Hours/V 0 ontent llite date compressionage displayed go of recommend to the compression of the compressi	POs) o  PS O2	PSO3  3 3 3 3 3 Total  [uisition Satellite stem - Culty sensed ortions and	PSO4  3 3 3 3 3 Hour/Week 4  Storage and System (C1, arrent Remote Id data; (C2, arren	
Mapping of CO Outcomes:  COs  CO1  CO2  CO3  CO4  Average  Course Con  L (Ho	PO1 1 1 1 1 1 urs/Wee	PO2  k)  Image retriev Reme Sensin Under Geom	PO3  3 3 3 3 3 3 ce proceval – ember) ng Syrstand aetric desired	PO4  3 3 3 3 3 T (House pata pata pata pata pata pata pata pat	Programme Programme Programme Produce Prepometri on Racon Racon Programme Programme Prepometri Prep	PO     3     3     3     3	P Co	PSO1  1 1 1 1 1 1 1 Ontent Illite date of the properties of the correction of the co	POs) of PS O2	PSO3  3 3 3 3 3 Total    uisition   Satellite   Stem - Culy   Sense   Cult   Stem   Cult   Stem   Cult   Cult   Stem   Cult   Stem   Cult   Stem   Cult   Cult   Stem   Cult   Cult   Stem   Cult   Cu	PSO4  3 3 3 3 3 3 Hour/Week 4  Storage and System (C1, arrent Remote Id data; (C2, Id corrections-	

2	Image Rectification and Restoration. Image enhancement- Contrast
	Manipulation – Gray-Level (C2, Understand, C4, Analyzed); Thresh
	holding- Level Slicing Contrast Stretching. Convolution – Edge
	Enhancement – Spatial feature manipulation. Image transformations;
	Pattern recognition, Image classification, Image fusion and change
	detection. Pattern recognition – Shape analysis- Textural and contextual
	analysis. (C6,Create);
3	Multi temporal Data merging - Change detection procedures- Multi
	sensor image merging - Merging of image data with Ancillary data
	Incorporating GIS Data in automated land cover classification.
	(C2,Understand, C4,Analyzed), (C6,Create);
4	Atmospheric correction – Hyper-spectral image analysis techniques.(C1,
	Remember), (C4, Analyzed)

<b>Teaching - Learning Strategies</b>	Contact Hours	
Lecture	30	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	21	
Problem Based Learning (PBL)	5	
Case/Project Based Learning (CBL)		
Revision	4	
Others If any:		
Total Number of Contact Hours	60	

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	

Quiz									
VIVA									
Assignment / Pres	entation	✓	<b>✓</b>	<b>~</b>	✓				
Unit test		✓	✓	✓	✓				
Practical Log Boo	k/ Record Book								
Mid Semester Exa	mination 1	✓	✓	✓	✓				
Mid Semester Exa	mination 2	✓	✓	✓	✓				
University Examin	nation	✓	✓	✓	✓				
		<u> </u>	I	l	<u> </u>				
<b>Feedback Proces</b>	s	1. Student's Feedback							
1.Regular feedbac 2.Feedback betwe	x is taken through varion is through Mentor Menten the semester through	tee system							
References:									
	Text Books:  1. John R Jenson "Introducing Digital Image Processing" Prantice Hall. New Jersy 1986.  2. R. A. Schowengergt, "Techniques for Image Processing and Classification in Remote Sensing"; 1983  Reference Books:  1. Remote Sensing & Image Interpretation Thomas M. Lillesand, Ralph W.Kiefer,  2. Image Interpretation in Geology Drury S.A.  3. Robert A Schowengergt, "Remote Sensing – Models and Methods for Image Processing – Academic Press 1997 Hord R M, Academic Press,								



# Master of Technology in Civil Engineering (Remote Sensing and GIS)

# **Departmental Electives**

Faculty of Engineering & Technology											
	of the Department         Civil Engineering           of the Program         Master of Technology in Civil Engineering (Remote										
Name of the	Progra	m						gy in Civ	il Eng	ineering (	Remote
				1	ing and	I GIS	)				
Course Code				1316							
<b>Course Title</b>			Web and Mobile GIS								
Academic Yo	ear			II							
Semester			III								
Number of C	Credits	3									
Course Prer	equisite	)		GIS							
Course Syno	psis			Web	GIS, it	ts fun	ctio	n, web r	nappir	ng, mobile	GIS
<b>Course Outc</b>	omes:										
At the end of	the cou	rse stuc	lents w	ill be a	able to:	:					
CO1	Publi	sh geos	patial o	lata in	web er	nviror	me	nt.			
CO2								ronment	-		
CO3								bile app		ns	
CO4								olatform			
Mapping of							_			& Prograi	m Specific
Outcomes:			( -	/	- 8				/		
COs	PO1	PO2	PO3	PO4	PO5	PO	6	PSO1	PS	PSO3	PSO4
									<b>O2</b>		
CO1	1	-	3	3	3	3		1	-	3	3
CO2	1	-	3	3	3	3		1	-	3	3
CO3	1	-	3	3	3	3		1	-	3	3
CO4	1	-	3	3	3	3		1	-	3	3
Average	1	ı	3	3	3	3		1	-	3	3
Course Co	ntent:										
L (Ho	urs/Wee	k)		T (Hou	rs/Wee	k)	P	(Hours/V	Veek)	Total	Hour/Week
	3				0			0	, , ,		3
Unit						L	Co	ontent			
1		Defin	ition.	concen	t of W	eb G			of W	eb GIS. c	omponents of
_											
		web GIS, internet, web GIS v/s Internet GIS, Distributed GIS, users and stake holders of web GIS, advantages and limitations of web GIS,							*		
		overview of Web GIS.(C2, Understand); (C1, Remember, C4,									
			Analyzed)								
2		Static and interactive web mapping, Web-map services, open GIS web									
_		map server, Geographic Mark-up Language - principles and									
		characteristics, commercial web mapping programs. (C2, Understand);									
				iber, C				rr <u></u>	r81	(02,	- 112121211111),
3		1						nformati	ion for	r the nuhl	ic, display of
			_		•	_					ation, sharing
	and distribution of spatial data as well as management of spatial data,										

	Style Layer Description (SLD), Open layers, Geo-server applications. (C2,Understand, C4,Analyzed), (C6, Create);
4	Location based services, Case studies on Mobile Solutions; Mobile App Development Approaches, HTML5 Geolocation; Creating a Mobile App, jQuery Mobile - Components, Event Handling, Mobile Configuration Third-party APIs; Google Maps API; ArcGIS API; Leaflet API, Mobile App development in Android, IOS platforms (C4, Analyzed)

Teaching Dearning Strategies and Contact Hours					
Teaching - Learning Strategies	<b>Contact Hours</b>				
Lecture	26				
Practical					
Seminar/Journal Club					
Small group discussion (SGD)					
Self-directed learning (SDL) / Tutorial	10				
Problem Based Learning (PBL)	5				
Case/Project Based Learning (CBL)					
Revision	4				
Others If any:					
Total Number of Contact Hours	45				

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	
Unit test	✓	✓	✓	✓	

Practical Log Boo								
Mid Semester Exa	mination 1	✓	✓	✓	✓			
Mid Semester Exa	mination 2	<b>✓</b>	<b>✓</b>	✓	✓			
University Examin	nation	<b>✓</b>	<b>✓</b>	<b>✓</b>	✓			
Feedback Proces	S	1	Studen	t's Feedb	oack			
2.Feedback betwe	k through Mentor Mente en the semester through	•						
References:								
	TEXTBOOKS:							
	_	raphy: Development and Prospects, Kraak, M. and						
		and Francis, London, 2001. cation in Local Government, Tereshenkov,						
	• Web GIS Applic A., VDMVerlag, 2		ocal Gove	ernment,	Tereshenk	ov,		
	• GIS for Web Dev		Adding wh	ere to you	ur web ap	plications.	•	
	Davis, S, First Edition, The Pragmatic Programmers LLC,2007.							
	REFERENCE BOOKS:							
	<ul> <li>Web GIS: Principles and Applications, Pinde Fuand Jiulin Sun, ESRI Press, 2011</li> </ul>							
	Dynamic and M	pandRunning,MaximilianoFirtman.,jQuery,O'Reilly,2012 c and Mobile GIS, Drummond, J., & Group, F., First Edition, ss Taylor and Francis Group,2007.						

Faculty of Engineering & Technology											
Name of the l											
Name of the l	Progra								Remote		
					ing and	l GIS	5)				
<b>Course Code</b>				1316	0372						
<b>Course Title</b>					Remo	te Se	nsin	ıg			
Academic Ye	ar			II							
Semester				III							
Number of C	redits			3							
<b>Course Prere</b>	quisite	,		Remo	ote Ser	sing					
Course Synor	osis			Satel	lite ser	isors,	, Ag	ro-Mete	orologi	cal Applic	cations of
				Optio	al, Mi	crow	ave,	Therma	ıl and I	Hyper spec	etral Remote
				Sensi	ing, cro	op inf	form	natics, C	rop cor	ndition and	d cropping
				syste	<u>m ana</u> l	ysis 1	<u>usin</u>	g differe	nt sens	ors	
Course Outco	omes:										
At the end of t	the cou	rse stuc	lents w	ill be a	able to:						
CO1	Acqui	re state	of art se	ensor da	ata to re	etriev	e cro	p parame	eters.		
CO2	Analy	ze the ba	asic ve	getation	param	eter a	ınd t	heir inter	action v	vith differe	nt parts of the
		omagne									
CO3					a to stu	dy the	e cro	p conditi	ons du	ring various	s stages of
~ .		ltural pr			40	1.0				20 1 1	
CO4			it sensc	ors to pr	edict ai	nd foi	recas	st the vari	iables a	ffecting the	e agricultural
Mapping of C	produ		m og ( <b>(</b>	(Oa) to	Duage	40.772	O.,4	20m25 (	DOa) 6	- Duoguan	n Cnasifia
Outcomes:	Jourse	Outcol	nes (C	Os) to	rrogi	am	Out	comes (.	r Os) e	t Frogran	ii Specific
Outcomes.											
COs	PO1	PO2	PO3	PO4	PO5	PO	6	PSO1	PS	PSO3	PSO4
COS	101	102	100		100	10		1501	02	1.00	1201
CO1	1	-	3	3	3	3		1	-	3	3
CO2	1	-	3	3	3	3		1	-	3	3
CO3	1	-	3	3	3	3		1	-	3	3
CO4	1	-	3	3	3	3		1	-	3	3
Average	1	-	3	3	3	3		1	-	3	3
Course Cor	tent:										
	ırs/Wee	k)		Т (Ноп	rs/Wee	k)	P	(Hours/V	Week)	Total	Hour/Week
E (Hot	3	K)			T (Hours/Week)		_	0	, vecky	10001	3
Unit		Content									
1		Satell	ite ser	sors a	nd the	eir cl			s. Prin	ciples in	strumentation
1	Satellite sensors and their characteristics, Principles, instrumentation and approaches of estimating crop water requirement/crop ET, Remote and approaches of estimating crop water requirement.										
sensing of water stress (thermal/optical approaches), various cr											
											transpiration.
		_								_	
2			(C2, Understand); (C1, Remember, C4, Analyzed) Surface and vadose zone soil moisture estimation using microwave								

	optical and hyper spectral remote sensing techniques; Soil mapping large-scale high spatial resolution mapping of soil texture information; Assessment, Prediction and Monitoring of Droughts through satellite retrieved causal variable information; Flood mapping and monitoring; Water resources mapping; Real-time weather monitoring (C2, Understand); (C1, Remember, C4, Analyzed)
3	Crop classification and crop area estimation using digital analysis; Crop stress assessment using satellite data; Crop parameter retrieval, cropping pattern & cropping indices analysis, Crop yield modeling and estimation. Crop water requirements, Irrigation water requirements (C2, Understand); (C1, Remember, C4, Analyzed)
4	ICT application in agriculture at village/block scale, Demonstration on DSS in agriculture; Precision farming (C2, Understand); (C1, Remember, C4, Analyzed)

Teaching - Learning Strategies	<b>Contact Hours</b>				
Lecture	26				
Practical					
Seminar/Journal Club					
Small group discussion (SGD)					
Self-directed learning (SDL) / Tutorial	10				
Problem Based Learning (PBL)	5				
Case/Project Based Learning (CBL)					
Revision	4				
Others If any:					
Total Number of Contact Hours	45				

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
_	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	

Quiz							
VIVA	⁷ A						
Assignme	Assignment / Presentation		✓	✓	✓		
Unit test		✓	✓	✓	✓		
Practical 1	Log Book/ Record						
Book							
Mid Seme	ester Examination 1	✓	✓	✓	✓		
Mid Seme	ester Examination 2	✓	✓	✓	✓		
University	y Examination	✓	✓	✓	✓		
			<u> </u>	I			
Feedback	x Process	2.	Student's Fee	dback			
Referen ces:	TEXTBOOKS:  • Applicationsofremotesensinginagriculture.,M.D.Steven,J.A.Clark,Butterwort hpublisher,London,1990  • Manual of Remote Sensing, Ustin, S, Remote Sensing for Natural Resource						
		t and En			Brd Edition, Vol		
	<ul> <li>Agro meteorology and sustainable agriculture. M. V. K. Sivakumar, R. Gommes, W.BaierAgriculturalandForestMeteorology103(2000)11–26</li> <li>Application radar in Agriculture, Holmes M.G., Remote sensing applications to agriculture, Butter worth publisher, London, 1990.</li> </ul>						
	REFERENCE BO		-				
	Introduction     Oxford & IE	_	meteorology ( shing Co. Pvt		nd edition by	H.S. Mavi,	
	Remote Sensing fo	r Agricu	lture, Ecosyst	ems, and Hy	drology, Man	fred Owe; G	uido

	Faculty of Engineering & Technology									
Name of the	Denart				Engin			8/		
Name of the							ology in Civ	vil Engi	neering (	Remote
	8				ng and					
Course Code				13160	_		<u> </u>			
Course Title						sino (	Geology			
Academic Ye	ar			II	ote Sen	ism's (	Geology			
Semester Semester				III						
Number of C	redits			3						
Course Prere					ote Sen	cina				
Course Syno		·			ation,		cept of	romoto	sensing	nlotforms
Course Syno	haia				,				_	
										l processing,
C O-4-				Hyar	ogeoio	gy, Si	ubsurface e	xpiorai	ion techni	iques
Course Outc			1 4 .	:11 1	.1.1 . 4 :					
At the end of	1						. 10			
CO1	_						ical features			
CO2							from satelli		es.	
CO3							ce explorati			
CO4				_			idehazardzo			
Mapping of Outcomes:	Jourse	Outcol	mes (	COS) to	Progr	ram C	Jutcomes (	POS) o	t Prograi	n specific
COs	PO1	PO2	PO	PO4	PO5	PO6	S PSO1	PS O2	PSO3	PSO4
CO1	1	-	3	3	3	3	1	-	3	3
CO2	1	_	3	3	3	3	1	-	3	3
CO3	1	-	3	3	3	3	1	-	3	3
CO4	1	ı	3	3	3	3	1	-	3	3
Average	1	-	3	3	3	3	1	-	3	3
Course Con	ntent:									
		k)		T (Hou	rs/Weel	k)	P (Hours/	Week)	Total	Hour/Week
	L (Hours/Week)			0			0			3
	3									
Unit	3				<u> </u>	· ·	Content			
Unit	3	Source	es of			and Pa	Content assive Radia	tion, El	ectromagn	etic Radiation-
Unit 1	<u> </u>			Energy, A	Active a		assive Radia			etic Radiation-
_		Reflec	tance	Energy, A	Active a	Absor	assive Radia	mal En	nissions, In	nteraction with
	<u> </u>	Reflec Atmos	tance phere	Energy, A , Transm e, Atmos	Active a ission, pheric	Abson windo	assive Radia rption, Theo ows, Spectra	mal En al reflec	nissions, Instance of	
_	3	Reflec Atmos feature	tance sphere es, ar	Energy, A , Transm e, Atmos	Active a ission, pheric conce	Abson windo	assive Radia rption, Theo ows, Spectra	mal En al reflec	nissions, Instance of	nteraction with Earth's surface
_		Reflec Atmos feature Remer	tance sphere es, ar nber,	Energy, A , Transm e, Atmos nd Multi C4, Anal	Active and a second concept of the second co	Abson windought of	essive Radia rption, Ther ows, Spectra Remote S	rmal En al reflec ensing.	nissions, Instance of 1 (C2, Und	nteraction with Earth's surface
1		Reflec Atmos feature Remer Variou spacec	tance phere es, ar mber, as typerafts	Energy, A , Transm e, Atmos nd Multi C4, Anal es of pla used	Active a lission, pheric conce lyzed) tforms, for	Abson windought of	rption, Therefore, Spectra Remote S	rmal Enal reflections ensing.	t, manned	nteraction with Earth's surface lerstand); (C1,
1		Reflec Atmos feature Remer Variou spaced differe	tance sphere es, ar mber, as typ crafts enttyp	Energy, A , Transm e, Atmos nd Multi C4, Anal es of pla used esofplatfo	Active a ission, pheric conce lyzed) tforms, for forms-	Absorpt of differ data	rent types of a acquisi	rmal Enal reflections.  Faircraft tion	t, manned chara	nteraction with Earth's surface derstand); (C1, and unmanned cteristics of
1		Reflect Atmost feature Remer Various spaced differed airborn	tance sphere es, an mber, us typerafts enttypeneand	Energy, A , Transm e, Atmos nd Multi C4, Anal es of pla used esofplatfo spacebor	Active a hission, pheric conce lyzed) tforms, for orms- ne,IRS	Absorpt of  differ data  Satelli	rent types of a acquisi	rmal End reflectensing.  Faircraft tion  ANDS A	t, manned - chara	nteraction with Earth's surface derstand); (C1, and unmanned cteristics of KONOS,
1		Reflect Atmost feature Remer Variou spaced differe airborn Quickl	tance sphere sphere, as typerafts enttype heand bird,	Energy, A , Transm c, Atmos nd Multi C4, Anal es of pla used esofplatfo spacebor Geoeye, I	Active a lission, pheric conce lyzed) tforms, for orms- ne,IRS: Komps	Absorwindo pt of differ data	rent types of a acquisi teSensors,L	rmal Enal reflections aircraft tion  ANDS A Will, M.	t, manned - chara  AT,SPOT,I	nteraction with Earth's surface derstand); (C1, and unmanned cteristics of

	Analyzed)
3	Optical, Thermal and Microwave; Resolutions-spatial, spectral, radiometric
	and temporal, signal to noise ratio, LiDAR data acquisition and processing.
	(C2, Understand); (C1, Remember, C4, Analyzed)
4	Subsurface exploration techniques, geophysical investigations — electrical resistivity and seismic methods. Hydrogeology - principles of groundwater and ground water geology Ground water flow, surface and ground water interaction; controls of ground water occurrence and movement Ground water geology: Hydro geological properties of different rocks, structures and land form sand their detection from remotely sensed data, Ground water targeting and resource assessment Ground water targeting in different geologic terrains, rain water harvesting, artificial ground water recharge. (C2, Understand); (C1, Remember, C4, Analyzed)

<b>Teaching - Learning Strategies</b>	Contact Hours
Lecture	26
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	10
Problem Based Learning (PBL)	5
Case/Project Based Learning (CBL)	
Revision	4
Others If any:	
Total Number of Contact Hours	45

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					

VIVA							
Assignment / Presentation		✓	<b>✓</b>	✓	<b>✓</b>		
Unit test		✓	✓	✓	✓		
Practical Lo	g Book/ Record						
Book							
	er Examination 1	<b>✓</b>	<b>✓</b>	<b>√</b>	<b>✓</b>		-
	er Examination 2	✓	<b>/</b>		✓ ·		-
		Ť	•	•			
University E	Examination	✓	✓	✓	✓		
Feedback P	rocess	3. Stu	ident's Feed	lback			
1.Regular fe	edback is taken thro edback through Me between the semeste	ntor Mentee	system	S			
	TEXTBOOKS:						
<ol> <li>Remote Sensing Geology, Ravi P. Gupta, Springer Verlag Publications, 2017.</li> <li>Remote sensing: Principles and Interpretation, Floyd F. Sabins., W.H. Freeman and Company, 2020.</li> <li>TextBookofEngineeringGeology, N. ChennaKesavulu., MacMillanLtd., NewDelhi. 2018</li> </ol>							ın
	REFERENCE BO	OOKS:					
	<ul> <li>4. Principles of Geomorphology, Thornbury, W.D., New Age International Publishers, 2018.</li> <li>5. Image Interpretation in Geology, Druary, S.A., Allen and Unwin Ltd, 2004.</li> <li>6. Remote Sensing and Image Interpretation, Thomas Lilles and, Ralph W. Kiefer, Jonathan Chipman, Wiley Publishers, 2015</li> </ul>						
	7. Fundamentals		-	rge Joseph, (	C		
	Jeganathan, University Press, 2015						

Faculty of Engineering & Technology										
Name of the I					Engin					
Name of the I	Master of Technology in Civil Engineering (Remote									
	Ser									
<b>Course Code</b>				1316						
<b>Course Title</b>					al Nav	igation S	Satellite S	System	1	
Academic Ye										
Semester				III						
Number of C	redits			3						
<b>Course Prere</b>	quisite	;					ge Proce			
Course Synor	osis									rdinate system,
				GNSS	S Surve	y , Satell	ite Orbits	and sig	gnal	
Course Outco										
At the end of t										
CO1						ir functio	ns			
CO2		GNSS :								
CO3							llite signa			
CO4	Identi	fy error	sources	and ap	ply cor	rections	in GNSS	observa	ations	
Mapping of C Outcomes:	ourse		`	,	Progi	ram Ou	tcomes (	ŕ	x Prograi	m Specific
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PS O2	PSO3	PSO4
CO1	1	-	3	3	3	3	1	-	3	3
CO2	1	-	3	3	3	3	1	-	3	3
CO3	1	-	3	3	3	3	1	-	3	3
CO4	1	-	3	3	3	3	1	-	3	3
Average	1	_	3	3	3	3	1	-	3	3
							l			1
Course Con	tent:									
	ırs/Wee	k)		T (Hou	rs/Wee	k) F	(Hours/V	Veek)	Total	Hour/Week
2 (110)	3	)			0		0	, , , ,	10001	3
Unit						C	ontent			
1		Histor	v of (	inss:	GPS			es and	Segments	s, GLONASS
_										
		system- Services and Segments, Galileo System- Services and Segments, Regional Navigation Satellite Systems (RNSS),								
		_		_					•	derstand); (C1,
		Remember, C4, Analyzed)								
2		Definition and scope of Geodesy, Earth, Geoid and Ellipsoid of rotation,								
		Reference surfaces and coordinate systems in Geodesy, Indian Geodetic								
		System and Everest Spheroid, WGS 84, Geodetic coordinate systems,								
										2, Understand);
			ememb							
3							n and Dis	ssemin	ation.	

	Structure of Signal, Navigation messages. Pseudo range measurements, Atmospheric effects, Antenna phase center offset and variation, Multipath, system accuracy characteristics, Data formats, Error budget.(C2, Understand); (C1, Remember, C4, Analyzed)
4	Planning a GNSS Survey, Positioning methods – point positioning, relative positioning, Static, Differential, RTK, and Field data collection. Ambiguity resolution, Post processing, real time processing, Accuracy measures, software modules, GIS and GNSS data integration, Applications of GNSS(C2, Understand); (C1, Remember, C4, Analyzed)

Teaching - Learning Strategies	<b>Contact Hours</b>	
Lecture	26	
Practical		
Seminar/Journal Club		
Small group discussion (SGD)		
Self-directed learning (SDL) / Tutorial	10	
Problem Based Learning (PBL)	5	
Case/Project Based Learning (CBL)		
Revision	4	
Others If any:		
Total Number of Contact Hours	45	

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					
Assignment / Presentation	✓	✓	✓	✓	

Unit test	st			✓	✓		
Practical Log Book/ Record Book							
Mid Semester Ex	camination 1	✓	✓	✓	✓		
Mid Semester Ex	camination 2	✓	✓	✓	✓		
University Exam	ination	<b>✓</b>	✓	✓	✓		
						<u> </u>	
Feedback Proce	SS	4	. Studen	t's Feedb	ack		
Students Feedback is taken through various steps  1.Regular feedback through Mentor Mentee system  2.Feedback between the semester through Google forms  References:							
	Text Books  1. Rangawala, Building Construction (2010) ISBN No. 978-93-80358-15-4, Charotar Publications Pvt. Ltd. 28th Edition  Reference books  1. P.C. Varghese, Engineering Materials, 1st edition, PHI Learning.  2. S.K. Duggal, Building Materials, 3rd Edition, New Age International Publishers.  3. Sushil Kumar, Building Construction, Standard Publishers Distributors.  4. M. S. Shetty, Concrete Technology: Theory and Practice, S. Chand Publishers.  5. A. R. Santhakumar, Concrete Technology, Oxford University Press						

Faculty of Engineering & Technology										
Name of the l	Denart		acuity		Engin		Common	<i>5.</i> ]		
Name of the l							ov in Civ	il Eno	ineering (	Remote
	rogra			Master of Technology in Civil Engineering (Remote Sensing and GIS)						
<b>Course Code</b>				1316		. 010)				
Course Title						Survevin	g and Ca	rtograi	hv.	
Academic Ye	ar			II	inced c	our veyiii	g and Ca	rtogra	Jily	
Semester Semester	<u>aı</u>			III						
Number of C	redits			3						
Course Prere		`		_	nced S	Surveyin	σ			
Course Synor		,						211i2	d electron	ic equipment,
Course Synor	7515						phic princ		ı cicciion	re equipment,
Course Outco	omes:			goode	by und	cartogra	pine prine	ргов		
At the end of t		rse stud	lents w	ill be a	able to:					
CO1							preparatio	n		
CO2		electronic surveying								
CO3		out astronomical observations for accurate surveying								
CO4		projection and datum parameters for a map ,Map the features with GPS								
Mapping of C										
Outcomes:	3 <b>0 u</b> 1 s <b>c</b>	o uteo.		05, 60	1108	um ou	(s	35, 4	a i i ogi mi	поресть
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PS O2	PSO3	PSO4
CO1	1	-	3	3	3	3	1	-	3	3
CO2	1	-	3	3	3	3	1	-	3	3
CO3	1	-	3	3	3	3	1	-	3	3
CO4	1	-	3	3	3	3	1	-	3	3
Average	1	-	3	3	3	3	1	-	3	3
				•						
Course Cor	itent:									
	ırs/Wee	k)		T (Hou	rs/Wee	k) I	P (Hours/V	Veek)	Total	Hour/Week
_ (=100	3	,			0		0	- 7		3
Unit						C	ontent		1	
1		Introd	uction	to to	oogran			scale o	of topogra	phical maps,
_				-						topographical
		survey methods. Precise level and Precise levelling (C2, Understand);								
		(C1, Remember, C4, Analyzed)								
2		Basic principles, classifications, applications, comparison with								
		conve	-	-					-	ectromagnetic
										and EDM
			instruments, application of Lasers in distance measurement. (C2, Understand); (C1, Remember, C4, Analyzed)							
3								size	and shap	e, coordinate
										utation, polar

	motion. Earth and its gravity field – anomaly, gravity potential, geoid and deflection to vertical. Celestial sphere, meridians and vertical circles, astronomical coordinate systems, astronomical triangle, determination of azimuth (C2, Understand); (C1, Remember, C4, Analyzed)
4	Definition, scope and content the spheroid, map scale, co-ordinate system, methods of mapping, relief maps, thematic maps, map projections, classification, principles of construction of common projections, cylindrical, conical, azimutal, and globular projections, properties and uses an choice of projections, plane co-ordinates, UTM system, projection used in Survey of India topographical sheets, map reproduction. (C2, Understand); (C1, Remember, C4, Analyzed)

Teaching - Learning Strategies	Contact Hours
Lecture	26
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	10
Problem Based Learning (PBL)	5
Case/Project Based Learning (CBL)	
Revision	4
Others If any:	
Total Number of Contact Hours	45

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					
VIVA					

Assignment / Pres	ssignment / Presentation			✓	✓			
Unit test	Unit test			<b>✓</b>	<b>✓</b>			
Practical Log Bool	k/ Record Book							
Mid Semester Exa		✓	✓	<b>✓</b>	<b>✓</b>			
Mid Semester Exa	mination 2	✓	✓	<b>✓</b>	<b>✓</b>			
University Examin	nation	✓	✓	<b>✓</b>	<b>✓</b>			
Feedback Process	Student's Feedback							
1.Regular feedbacl	Students Feedback is taken through various steps  1.Regular feedback through Mentor Mentee system  2.Feedback between the semester through google forms  References:							
	Text Books  1. Gopi, "Advanced surveying: Total station, GIS and Remote Sensing", Pearson Education India, 2007.  2.Borden D. Dent, Jeffrey Troguson, Thomas W. Hodler, "Cartography: Thematic map Design", McGraw-Hill Higher Education, 2008.Reference books  3. Hoffman. B, H. Lichtenegga and J. Collins, "Global Positioning System – Theory and Practice", Springer – Verlag Publishers, 2001.  4. Wolfgang Torge, "Geodesy", Berlin: de Gruyter, 2001.							

	Faculty of Engineering & Technology									
Name of the	Denart		ucure,			eering	100111010	<i>5.</i> /		
Name of the							ogy in Civ	il Eng	ineering (	Remote
	<b></b>				ing and		-6,			
<b>Course Code</b>				1316						
Course Title						ognitio	n and Ma	chine I	earning	
Academic Ye	ar			II	111 1100	ogiiiioi	ii diid ivid			
Semester				III						
Number of C	redits			3						
Course Prere		ج			nced S	Surveyir	1g			
Course Synor	_							studen	ts with a	comprehensive
,	•		understanding of pattern recognition and machine lear techniques applied to Remote Sensing & GIS data. The cowill cover fundamental concepts, algorithms, and pracapplications in the context of civil engineering environmental monitoring.					ata. The course and practical		
Course Outco	omes:									
At the end of	the cou	rse stud	lents w	ill be a	able to	:				
CO1		erstand problem framing, feature selection, and dimensionality reduction g methods like PCA.								
CO2	_	re discr igation,			sifiers	such as	LDA, Mul	ti-laye	r perceptr	on, back
CO3		unsupe nen Mar					like cluste	ring, V	ector Quai	ntization,
CO4	Learn estim	-	generat	tive mo	dels, p	robabili	istic grapł	ical m	odels, and	density
Mapping of Outcomes:	Course	Outco	mes (C	COs) to	Prog	ram Ou	itcomes (	POs) &	& Prograi	m Specific
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PS O2	PSO3	PSO4
CO1	1	_	3	3	3	3	1	-	3	3
CO2	1	_	3	3	3	3	1	_	3	3
CO3	1	_	3	3	3	3	1	-	3	3
CO4	1	_	3	3	3	3	1	_	3	3
Average	1	_	3	3	3	3	1	_	3	3
		ı				ı — —				<u>.                                     </u>
Course Con			1			1				
L (Ho				T (Hou		k)	P (Hours/	Week)	Total	Hour/Week
<b></b>	3	1			0		0			3
Unit		<u> </u>					Content			
1								on and	Machine	Learning
	Historical Overview and Evolution Applications in Civil Engineering with emphasis on Remote Sensin GIS (C2, Understand); (C1, Remember, C4, Analyzed)					ote Sensing &				
		G15 (	ت2, Uno	derstand	a); (Cl,	, Kemen	nber, C4, <i>A</i>	malyze	a)	

2	Types of Machine Learning: Supervised, Unsupervised, and Semi- supervised				
	Feature Selection and Extraction in Geospatial Data				
	Model Evaluation Metrics for Remote Sensing Applications. (C2,				
	Understand); (C1, Remember, C4, Analyzed)				
3	Linear Regression and its Applications, Decision Trees, Random				
	Forests, and their use in Land Cover Classification, Support Vector				
	Machines for Spatial Data Analysis, Introduction to Neural Networks in				
	Remote Sensing (C2, Understand); (C1, Remember, C4, Analyzed)				
4	Clustering Techniques (K-means, Hierarchical) for Unsupervised				
	Learning, Principal Component Analysis (PCA) in Geospatial Analysis				
	Spatial-Temporal Analysis using Machine Learning, Case Studies and				
	Real-world Projects (C2, Understand); (C1, Remember, C4, Analyzed)				

Teaching - Learning Strategies	Contact Hours
Lecture	26
Practical	
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	10
Problem Based Learning (PBL)	5
Case/Project Based Learning (CBL)	
Revision	4
Others If any:	
Total Number of Contact Hours	45

#### **Assessment Methods:**

Formative	Summative
Multiple Choice Questions (MCQ)	Mid Semester Examination 1
Viva-voce	Mid Semester Examination 2
Objective Structured Practical Examination	University Examination
Quiz	Dissertation
Seminars	Multiple Choice Questions (MCQ)
Problem Based Learning (PBL)	Short Answer Questions (SAQ)
Journal Club	Long Answer Question (LAQ)
	Practical Examination & Viva-voce
	Objective Structured Practical Examination

Nature of Assessment	CO1	CO2	CO3	CO4	
Quiz					

VIVA							
Assignment / Presentation			✓	✓	✓		
Unit test			<b>√</b>	✓	<b>✓</b>		
Practical Log Boo	k/ Record Book						
Mid Semester Exa	mination 1	<b>✓</b>	<b>✓</b>	✓	<b>✓</b>		
Mid Semester Exa	mination 2	<b>✓</b>	<b>✓</b>	✓	<b>✓</b>		
University Examin	nation	<b>✓</b>	<b>✓</b>	✓	✓		
1.Regular feedbac	x is taken through various k through Mentor Mentee en the semester through G	system					
	Text Books S. Marsland, "Machine & Hall/CRC, 2009. R. O. Duda, P. E. Har Edn., Wiley India, 2007 Reference books C. Bishop, "Pattern Rec I. H. Witten, "Data Min Techniques," 2nd Edn.,	et, and ' cognitic ing: Pr	D. G. St on and Ma actical Ma	ork, "Pa achine Le	ttern Cla	ssificatio	on," 2nd



# **SEMESTER - IV**

Course Code	Course Title
13160432	Dissertation Phase-II

			Г	14	C To		0.7				
NI C 41	P	4						<u>Cechnolo</u>	gy		
	Name of the Department Civil Engin					C					
Name of the Program					Master of Technology in Civil Engineering (Structural						
				Engineering)							
Course Co				13160432							
Course Ti				-	ertatio	n Pha	se-II				
Academic	Year			II	$\coprod$						
Semester				IV							
Number o	f Cred	its		1							
Course Pr	erequi	isite		NIL							
Course Sy	nopsis			In thi	is cour	se, stu	dent wi	ill compl	ete the the	esis work.	
Course Or											
At the end	of the	course	stude	nts wil	l be ab	ole to:					
CO1							ov revie	wing ava	ailable lite	erature.	
CO2										related to civil	
		neering	_		1		,	I			
CO3				1		£ ~ ~ 1,,,	.:				
				evelopi				· (	DO-) 0 D	\	
Outcomes		rse Oi	itcom	es (CC	es) to 1	Progra	am Out	comes (	POS) & P	Program Specific	
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	
COs	101	102	103	104	103	100	1301	1302	1303	1504	
CO1	3	3	3	3	3	3	3	3	3	3	
CO2	3	3	3	3	3	3	3	3	3	3	
CO3	3	3	3	3	3	3	3	3	3	3	
Average	3	3	3	3	3	3	3	3	3	3	
	1				ı					-1	
Course (	Conte	nt:									
L (He	L (Hours/Week) T (Hours/Week) P (Hours/Week) Total Hour/Week						otal Hour/Week				
`	0				0			2		1	
Experin	<b>Experiment</b> Content										
No.	-							-			
1.		Ident	tify th	ne prob	olem (	C2. U	ndersta	nd), Imi	olement t	he suitable solution	
			•		`					estigate and develop	
				n (C6,			(	,	<i>y</i> //	<i>5</i>	

<b>Teaching - Learning Strategies</b>	Contact Hours
Lecture	
Practical	-
Seminar/Journal Club	
Small group discussion (SGD)	
Self-directed learning (SDL) / Tutorial	-
Problem Based Learning (PBL)	-

Case/Project Based Learning (CBL)	-
Revision	1
Others If any:	
Total Number of Contact Hours	-

#### **Assessment Methods:**

Formative	Summative				
Multiple Choice Questions (MCQ)	Mid Semester Examination 1				
Viva-voce	Mid Semester Examination 2				
Objective Structured Practical Examination	University Examination				
Quiz	Dissertation				
Seminars	Multiple Choice Questions (MCQ)				
Problem Based Learning (PBL)	Short Answer Questions (SAQ)				
Journal Club	Long Answer Question (LAQ)				
	Practical Examination & Viva-voce				
	Objective Structured Practical Examination				

#### **Mapping of Assessment with COs**

Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Quiz					
VIVA	✓	<b>✓</b>	<b>✓</b>	✓	<b>✓</b>
Assignment / Presentation					
Unit test					
Practical Log Book/ Record Book	✓	<b>✓</b>	<b>✓</b>	<b>✓</b>	✓
Demonstration	✓	✓	<b>✓</b>	<b>√</b>	<b>✓</b>
Mid Semester Examination 1					
Mid Semester Examination 2					
University Examination (External	✓	✓	✓	✓	✓
Practical)					

# Feedback Process1. Student's Feedback

Students Feedback is taken through various steps

- 1. Regular feedback through Mentor Mentee system
- 2. Feedback between the semester through Google forms



## 9. MAPPING OF COURSE OUTCOMES, PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Sem.	Course	Course	C	P	P	P	P	P	P	PS	PS	PSO3	PSO4
	Code	Title		O	02	О3	<b>O</b> 4	05	<b>O</b> 6	01	<b>O2</b>		
				1									
I	131601	Researc	3	3	3	-	-	-	-	3	3	_	-
	38	h											
		Method											
		ology &											
		IPR											
Ι	131601	Seminar	1										
	07												
Ι	131601	Paveme	3	3	3	2	2	1	1	2	2	3	3
	32	nt											
		Material											
		S											
Ι	131601	Urban		3		2	2.	2.		2	2	3	3
	33	Transpo					6	4					
		rtation											
		System											
		Plannin											
		g											
I	131601	Geometr		1.	3	2.	2.	2.	2	2	2	3	3
	34	ic		5		75	75	5					
		Design											
		of											
		Transpo											
		rtation											

	1	l — ·		1	I	ı		1			1	<del>                                     </del>
		Facilitie										
		S										
Ι	131601	Ground	2	3	3	3	2.	2	2	2	3	3
	35	Improve					5					
		ment										
II	131601	Paveme	2.	1.	2	2.	2.	1.	2	2	3	3
	36	nt	75	75		5	5	75				
		Material										
		s Lab										
I	131601	Geometr	2.	1.	2	2.	2.	1.	2	2	3	3
	37	ic	75	75		5	5	75				
		Design										
		Lab										
Ι	131601	Advanc	-	-	3	3	3	3	3	3	3	3
	14	e Pre-										
		Stressed										
		Concret										
		e Design										
Ι	131601	Structur	-	-	3	3	3	3	3	3	3	3
	15	al										
		Dynami										
		cs										
Ι	131601	Matrix	-	-	3	3	3	3	3	3	3	3
	16	Methods										
		of										
		Structur										
		al										
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		Analysis										
I	131601	Design	1	-	3	3	3	3	1	-	3	3
	17	of										
		Concret										
		e										
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		al										
		Systems										
I	131601	Matrix	-	-	3	3	3	3	3	3	3	3
	18	Methods										
		of										
		Structur										
		al										
		Analysis										
		Lab										
		(STAA										
		D PRO)										
I	131601	Design	1	-	3	3	3	3	1	-	3	3
	19	of										
		Concret										
		e and										
		Structur										
		al										
		Systems										
		Lab										
		(STAA										
		D PRO)										
I	131601	Principl	3	1.	-	-	-	-	-	-	1	1

	T		1	1	1	1				1	ı	1
	43	es of		75								
		Remote										
		Sensing										
I	131601	Geograp	1	1.	1	1	2	-	-		1	1
	08	hical		25								
		Informat										
		ion										
		Systems										
		,										
I	131601	Photogr	3.	1.	2.	3	2	1	-	1.	2.5	2.0
	39	ammetr	0	8	3					3		
		у										
I	131601	Applicat	2	3	2.	0.	1.	2.	-	2	3.0	1.5
	40	ion of			5	8	5	5				
		Remote										
		Sensing										
I	131601	Geograp	3.	1.	2.	0.	1.	0.	-	1.	2.5	0.5
	41	hical	0	8	3	8	0	5		3		
		Informat										
		ion										
		Systems										
		Lab										
Ι	131601	Photogr	3.	1.	2.	0.	1.	0.	-	1.	2.5	0.5
	42	ammetr	0	8	3	8	0	5		3		
		y Lab										
II	131602	Minor	3	3	2	3	3	3	3	3	2	3
	38	Project										

	101600							l				
II	131602	Analysis	2	1	3	3	3	1	2	2	3	3
	32	and										
		Design										
		of										
		Paveme										
		nt										
II	131602	Transpo	2	2	2	3	2	2	2	2	3	3
	33	rt										
		Econom										
		ics										
II	131602	Traffic	3	1	3	3	2	2	2	2	3	3
	34	Enginee										
		ring and										
		Manage										
		ment										
II	131602	Airport	2.	2.	2.	3	2	2	2	2	3	3
	35	Infrastru	5	75	5							
		cture,										
		Plannin										
		g and										
		Design										
**	101600											
II	131602	Paveme	2.	1.	2	2.	2.	1.	2	2	3	3
	36	nt	75	75		5	5	75				
		Design										
		Lab										
II	131602	Traffic	2.	2	2.	2.	2.	2	2	2	3	3
	37	Lab	75		25	5	5					

II	121602	A malvaia	1		3	3	3	3	1		3	3
111	131602	Analysis	1	-	3	3	3	3	1	-	3	3
	32	and										
		Design										
		of										
		Paveme										
		nt										
II	131602	Transpo	1	-	3	3	3	3	1	-	3	3
	33	rt										
		Econom										
		ics										
II	131602	Traffic	3	1	3	3	2	2	2	2	3	3
	34	Enginee										
		ring and										
		Manage										
		ment										
II	131602	Airport	2.	2.	2.	3	2	2	2	2	3	3
	35	Infrastru	5	75	5							
		cture,										
		Plannin										
		g and										
		Design										
**	121602			1							2	2
II	131602	Paveme	2.	1.	2	2.	2.	1.	2	2	3	3
	36	nt	75	75		5	5	75				
		Design										
		Lab										
II	131602	Traffic	2.	2	2.	2.	2.	2	2	2	3	3
	37	Lab	75		25	5	5					
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II	131602	Finite	1	_	3	3	3	3	1	_	3	3
	14	Element										
		Analysis										
**	121.602							2	_		2	
II	131602	Theory	1	-	3	3	3	3	1	-	3	3
	15	of										
		Elasticit										
		y and										
		Plasticit										
		У										
II	131602	Limit	1	-	3	3	3	3	1	-	3	3
	16	State										
		Design										
		of Steel										
		Structur										
		es										
II	131602	Earthqu	1	-	3	3	3	3	3	3	3	3
	17	ake										
		Resistan										
		t Design										
II	131602	Structur	1	1	3	3	3	3	1	1	3	3
	18	al										
		Enginee										
		ring lab										
		(CASTI										
		NG)										
II	131602	Finite	1	-	3	3	3	3	1	-	3	3
	39	Element										
		Analysis										

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		Lab										
II	131602	Geospat	3	1.	1	2	-	-	-	-	1	1
	40	ial Data		75								
		Processi										
		ng and										
		Modelli										
		ng										
II	131602	Satellite	1.	-	0.	-	0.	0.	-	-	-	2
	41	Image	75		25		75	75				
		Processi										
		ng										
II	131602	Advanc	2	0.	1	0.	3	-	-	-	3.0	2.0
	42	ed GIS		75		75						
II	131602	GPS &	2	1	1	0.	3	-	-	2	3	1
	43	Surveyi				75						
		ng										
II	131602	Advanc	2	1	1	1	3	-	-	2	3	1
	44	ed GIS										
		Lab										
II	131602	Satellite	-	-	3	3	3	3	3	3	2.5	2.5
	45	Image										
		Processi										
		ng Lab										
III	131603	Disserta	3	3	3	3	3	3	3	3	3	3
	67	tion										
		Phase-I										
	1					1		1	1		l	

III	131603	Intellige	2.	2.	2	2	1.	1.	2	2	3	3
	57	nt	8	4			4	2				
		Transpo										
		rtation										
		Systems										
III	131603	Constru	2.	2.	2.	3	2	2	2	2	3	3
1111	55	ction	5	75	5	3			2	2	3	3
	33		3	13	3							
		Project										
		Manage ment &										
		BOT										
		BOI										
III	131603	Traffic	3	2	2	3	2	2	2	2	3	3
	68	Manage										
		ment										
		and										
		Road										
		safety										
III	131603	Highwa	1	2	3	1	2	2	2	3	3	
	59	у										
		Constru										
		ction										
		Practice										
		s										
III	131603	Paveme	2.	2	2	2.	2.	2.	2	2	3	3
	69	nt	75			25	5	25				
		Evaluati										
		on,										
		Rehabili										

		tation &										
		Mainten										
		ance										
III	131603	Environ	2	2	1	1	2	2	2	2	3	3
	63	ment										
		Impact										
		Assessm										
		ent										
III	131603	Bridge	3	2	2	2	2	2	2	2	3	3
	65	Enginee										
		ring										
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III	131603	Theory	1	-	3	3	3	3	1	-	3	3
	05	&										
		Design										
		of Plate										
		and										
		Shell										
III	131603	Pre-	1	-	3	3	3	3	1	-	3	3
	25	Fabricat										
		ed										
		Structur										
		es										
III	131603	Design	1	-	3	3	3	3	1	-	3	3
	27	of										
		Industri										
		al										
		Structur										
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III	131603	Mainten		1	-	3	3	3	3	1	-	3	3
	29	ance &											
		Rehabili											
		tation of											
		Structur											
		es											
III	131603	Design		1	_	3	3	3	3	1	_	3	3
	31	of											
		Bridges											
***	121602			1		_	2	2				2	
III	131603	Compos .		1	-	3	3	3	3	1	-	3	3
	33	ite											
		Structur											
		es											
III	131603	Design		1	-	3	3	3	3	1	-	3	3
	35	of Tall											
		Building											
		s											
III	131603	Digital	-	1	_	3	3	3	3	1	_	3	3
111	70	Image		1	_	3		3		1	_	3	
	/0	Processi											
		ng											
III	131603	Web		1	-	3	3	3	3	1	-	3	3
	71	and											
		Mobile											
		GIS											

III	131603	Argo	1	Τ_	3	3	3	3	1	_	3	3
111	72	Remote	1						•			
	12											
		Sensing										
III	131603	Remote	1	-	3	3	3	3	1	-	3	3
	73	Sensing										
		Geology										
III	131603	Global	1	-	3	3	3	3	1	-	3	3
	74	Navigati										
		on										
		Satellite										
		System										
III	131603	Advanc	1		3	3	3	3	1	_	3	3
111			1	-	3	3	3	3	1	-	3	3
	75	ed .										
		Surveyi										
		ng and										
		Cartogra										
		phy										
III	131603	Pattern	1	-	3	3	3	3	1	-	3	3
	76	Recogni										
		tion and										
		Machine										
		Learnin										
		g										
IV	131604	Disserta	3	3	3	3	3	3	3	3	3	3
	32	tion										
	) <u> </u>	Phase-II										
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Note: C-Credits