## 1.1.3 & 1.2.1

## **Supporting Documents- Civil Engineering Department**

Mapping of courses to employability/ skill development



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Focus on	Assessment
Course Outcome	PO-a	PO-b	PO-c	PO-d	PO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-I	PSO-m	PSO-n	PSO-o	Learning Level	Employability / Entrepreneurship/ Skill Development	Tools to Meas Attainment of
BTCH101-18	: Chemist	try-I (Theor	ry)								1	1	1			Understand &		Class, Quiz, T
CO1:Analyse microscopic chemistry in terms of atomic and molecular orbitals	٧	V	٧	٧	٧		٧									Analyze		and viva
and intermolecular forces. CO2:Rationalise bulk properties and	٧	V	V	٧	٧											Understand & Analyze		Class, Quiz, T and viva
processes using thermodynamic considerations.																		
CO3:Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	٧	٧	٧	٧	٧											Understand & Analyze	Skill Development	Class, Quiz, T and viva
CO4:Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity	٧	٧	٧	٧	٧		٧									Understand & Analyze		Class, Quiz, 1 and viva
CO5:List major chemical reactions that are	٧	V	V	٧	٧		V									Understand & Analyze	1	and viva
used in the synthesis of molecules.  Paper: BTEE-101-18	Rasic Flo	ectrical En	gineering										1		T	1	T	
Paper: BTEE-101-10 CO1:Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and components of low voltage electrical	v	√ V	V	٧	٧		٧		٧	٧						Understand	Skill Development	MSTs, Tutoric Class/Quiz T
installations CO2:Be able to analyze of DC circuits, AC			V	V	٧		V		√							Analyze	Jan Bevelopment	MSTs, Tutori Class/Quiz T
Circuits CO3:Understand the basic magnetic	<b>√</b>	٧	V V	\ \ \ \ \	V V		V		٧	v		√	٧		٧	Understand		MSTs, Tutori Class/Quiz T
circuits and apply it to the working of electrical machines	٧	٧	V				V		٧							Understand		MSTs, Tutor Class/Quiz
electrical machines CO4:Be introduced to types of wiring, batteries, and LT switchgear.	er BTPH11	11-18 Mech	nanics of Sc	√ olids Lab			٧		٧							Understand		

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	-	1															Minor Exams, Quiz
O1: Able to verify the theoretical oncepts/laws learnt in theory courses.	٧	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧		understanding		End Term Exams
O 2: Trained in carrying out precise leasurements and handling sensitive	٧	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧		understanding		Minor Exams, Qui End Term Exams
quipment. O 3: Understand the methods used for stimating and dealing with experimental ncertainties and systematic "errors".	٧	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧	٧	apply	Skill Development	Minor Exams, Qu End Term Exams
O 4: Learn to draw conclusions from data nd develop skills in experimental design.	٧	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧		apply		Minor Exams, Qu End Term Exams
CO 5: Document a technical report which communicates scientific information in a clear and concise manner.	٧	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧		apply		Minor Exams, Qu End Term Exams
																	1
Paper BTPH101-18 Mechanics of Solids CO1:Understand the vector mechanics for a classical system.	٧	٧	٧	٧	٧	٧		٧	٧	٧	٧	٧	٧	٧	understand		Minor Exams, Qu End Term Exams
CO2:Identify various types of forces in nature, frames of references, and	٧	٧	٧	٧	٧	٧		٧	٧	٧	٧	٧	٧	٧	apply		Minor Exams, Q End Term Exam
conservation laws.  CO3:Know the simple harmonic, damped, and forced simple harmonic oscillator for a	٧	٧	٧	٧	٧	٧		٧	٧	٧	٧	٧	٧	٧	apply	Skill Development	Minor Exams, Q End Term Exam
mechanical system. CO4:Analyze the planar rigid body dynamics for a mechanical system.	٧	٧	٧	٧	٧	٧		٧	٧	٧	٧	٧	٧	٧	apply		Minor Exams, C End Term Exam
CO5:Apply the knowledge obtained in this course to the related problems.	٧	٧	٧	٧	٧	٧		٧	٧	٧	٧	٧	٧	٧	apply		Minor Exams, C End Term Exam
			1														
BTCH102-18 CO1:Estimate rate constants of reactions from concentration of reactants/products as a function of time	: Chemist	try-I (Lab)	٧	٧	٧		٧		٧						Understand & Analyze		Practical Exa Class/Quiz Te
CO2:Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc	٧	٧	٧	٧	v		٧		٧						Understand & Analyze	Skill Development	Practical Exa Class/Quiz Te ViVa
CO3:Synthesize a small drug molecule and analyse a salt sample	٧	٧	٧	V	٧		V		٧						Understand & Analyze		Practical Exa Class/Quiz Te ViVa
		1	1			1	1										
Paper BTAM101-18Mathematics-I (Calculs CO1: The fallouts of Rolle's theorem that is	and Linea	r algebra) V	V			٧									Understand & Analyze		Minor Exams, End Term Exam
fundamental to application of analysis to		SE PERSONAL PROPERTY.										4					Minor Exams,

									3			1						
CO 3: The convergence of sequence and																Understand &	Skill Development	Minor Exams, Quiz,
series and to apply different tests of	٧	V	V			٧										Analyze		End Term Exams
convergence.																		
CO 4: To deal with functions of several																Understand &		Minor Exams, Quiz,
variables that are essential in most	٧	V	V			V										Analyze		End Term Exams
branches of engineering.																		
CO 5: The essential tool of matrices and																Understand &		Minor Exams, Quiz,
linear algebra in a comprehensive manner.	٧	V	٧	V		V										Analyze		End Term Exams
linear algebra in a comprehensive manner.																		
		7.5																
Paper BTME101-18 Engineering Graphics 8	Design								_						100			
CO1: design a system, component, or																		
process to meet desired needs within																		
realistic constraints such as economic,																		
environmental, social, political, ethical,																		Minor Exams, Quiz,
																Design		End Term Exams
health and safety, manufacturability, and	V	V	V	V	V	V	V	٧	V	V	V	٧				Design	Skill Development	
sustainability.																		Minor Exams, Quiz,
CO 2: to prepare to communicate																Communicate		End Term Exams
effectively.		-1	1	1	V	V	V	V	V	V	٧	٧				Communicate	+	
	٧	V	V	V														Minor Exams, Quiz,
CO 3: to prepare to use the techniques,																		End Term Exams
skills, and modern engineering tools							.,	1	V	V	V	V				Apply		Elia Term Exame
necessary for engineering practice.	٧	٧	V	V	V	Įν	v	V										
Paper BTMP 101-18 Workshop/Manufactor	uring Prac	ctices									1	1						Minor Exams,
CO1: gain knowledge of the different																		Project based
manufacturing processes which are																		learning,
commonly employed in the industry, to																		Assignments, End
fabricate components using different																Understanding		Term Exams
	V	V	V	V	V	V	٧	٧	V	٧	٧							Minor Exams,
materials.				44 (0.51)														Project based
CO 2: able to fabricate components with																		learning,
their own hands.																		Assignments, End
																Amalu		Term Exams
	1.		,,	1	V	V	V	V	V	٧	٧					Apply	Skill Development	Minor Exams,
	٧	V	V	V	V													Project based
CO 3: Get practical knowledge of the																		learning,
dimensional accuracies and dimensional															Even I District			Assignments, End
tolerances possible with different																		Term Exams
manufacturing processes.										V	V					Understanding		
	٧	٧	٧	٧	٧	٧	٧	V	V									Minor Exams,
CO 4: By assembling different																		Project based
components, they will be able to produce																		learning,
small devices of their interest.																		Assignments, End
Small devices of their interest.																Apply		Term Exams
	V	V	V	V	V	٧	٧	٧	V	١٧	ĮV .							
	No.																	
Paper BTHU-101-18 (English) & Paper BT	HU-102-1	8 (English	lab)										1	1	1			
cot. To help the students become the	T																	Mid Semester
CO1: To help the students become the																		Exams, Assignmen
independent users														1.	V	Understanding		End Term Exams
of English language	V	V	V	V	V	V	V	V	V	٧	٧	٧	٧	٧	V	Officerstanding		
	V	V	V					2000										Mid Semester
CO 2: Students will acquire basic																		Exams, Assignmen
proficiency in listening and speaking skills																		End Term Exams
								1	1,1	V	V	V	V	٧	٧	Understanding		Elia i Silli Elia illo

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															-					
CO 3: Students will be able to						1		1		1						1			1	
understand spoken English language,																				Mid Semester
particularly the																			Skill Development	
	V	V	V	,	V	V	.,	1.								1.				Exams, Assignment
language of their chosen technical field.	V	V	V		V	V	V	٧	٧	٧	٧	٧	٧		٧	٧		Understanding		End Term Exams
CO 4: They will be able to converse																				
fluently																				Mid Semester
																				Exams, Assignment
	V	V	V	1	V	V	V	V	V	V	V	V	V		V	V	V	Understanding		End Term Exams
CO 5: They will be able to produce on their														F TO STATE						
own clear and coherent texts.																				Mid Semester
																				Exams, Assignment
	IV	Į v	I V		IV	I V	V	I V	I V	V	V	I V	I V		٧	٧	V	Understanding		End Term Exams
Paper BTAM201-18Mathematics-II (Differ	ential Eq	uations)									,									
CO1: The mathematical tools needed in			6.0			1000					3.6	25-1								
evaluating multiple integrals and their	V	V		٧	V	V	V		the state of											Minor Exams, Quiz,
usages.																				
																				End Term Exams
CO 2: The effective mathematical tools for																				
the solutions of differential equations that	V	V		٧	V	V	V													
model physical processes.																			Skill Development	Minor Exams, Quiz,
																				End Term Exams
CO 3: The tools of differentiation and													10.00		1000					
integration of functions that are used in																				
various techniques dealing engineering	٧	۷		٧	V	٧	V													
																				Minor Exams, Quiz,
problems.																				End Term Exams
Paper BTCE- 301-18 Surveying & Geomatic	s																			
CO1: Understand the concept, various					Total Sales	100000								0.75				1		
methods and techniques of surveying																				Minor Exams, Quiz,
metrious and teeriniques of surveying	1					.,				1.										
60.2. 6	V			00.00		V				V			٧					Understand		End Term Exams
CO 2: Compute angles, distances and															6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
levels for given area																	E CONTRACTOR			Minor Exams, Quiz,
	٧	٧	٧		٧					V			٧		٧			Analyse and design		End Term Exams
CO 3: Apply the concept of tachometry													T. 19							
survey in difficult and hilly terrain.																				Minor Exams, Quiz,
	٧	V	V		V		V			V			V		1			Application		End Term Exams
CO 4: Select appropriate instruments for										•			- '		V			Application	Employability	Eliu Terrii Exams
data collection and survey purpose																				
data collection and survey purpose																				Minor Exams, Quiz,
	٧	V					٧	100		٧			٧					Understand		End Term Exams
CO 5: Analyze and retrieve the information																				
from remotely sensed data and interpret																				Minor Exams, Quiz,
the data for survey.	٧	V	V		V	V	V			V		V	V		V			Analyse and design		End Term Exams
CO 6: Understand the concepts related to													-		•			Analyse and design		End Term Exams
GIS and GPS and analyze the geographical																				Marie Europe
	.1	1,1	1,		.,	.,	.,													Minor Exams, Quiz,
data.	V	Įv .	IV.		ΙΛ	Ιν	ΙV	Ιv		Ιv		V	٧		٧	٧		Analyse		End Term Exams
						residente.								L.S.C.V			7023			
Paper BTCE- 302-18 Solid Mechanics																				
CO1: Understand the concept of static																				
equilibrium, deformations, and material	1	1								√				1				Understand		Minor Exams, Quiz,
constitutive behaviour.																		- Ideistand		End Term Exams
CO 2: Describe the concepts of stress,																				Life Term Exams
strain and elastic behaviour of materials	,				,													Understand, Analy		
subjected to tension, compression and	1	1		1	1					1				1	1	√				
torsion.																		se		Minor Exams, Quiz,
																				End Term Exams
CO 3: Apply the concept of Mohr's circle in												100								
the stress/strain calculations.	1	1			J		1			1				1	<b>√</b>	1	J	Understand, Analy		Minor France Code
and salessy strain calculations.		'			,		\ \ \			, v				V	٧	V	V	se	Skill Development	Minor Exams, Quiz,

End Term Exams

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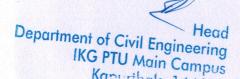
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CO 4: Develop SFD and BMD for different type of beams	٧	1	٧	1		1			1				1	1	1	1	Analyse and Design		Minor Exams, Quiz, End Term Exams
CO 5: Plot elastic curves for beams																			End Term Exams
undergoing displacements	1	1	1	٧		1	1	1	1				1	1	1	1	Analyse		Minor Exams, Quiz, End Term Exams
CO 6: Understand the behaviour of columns and struts under axial loading.	٧	1	٧	1		1	v		1				1	1	٧	1	Undestand, Analyse		Minor Exams, Quiz, End Term Exams
Paper BTCE- 303-18 Fluid Mechanics																			
CO1: Understand the basic terms used in																1.00			
fluid mechanics and its broad principles	٧					V			V		V						Understand		Minor Exams, Quiz, End Term Exams
CO 2: Estimate the forces induced on a										Village III									
plane/ submerged bodies																			Minor Exams, Quiz,
	٧	٧							V		V						Apply		End Term Exams
CO 3: Formulate expressions using																			
dimensionless approach and able to																			
determine design parameters by creating																			
replica of prototype at appropriate scale.																			
scale.	.,	V	.,		.,		1.											F 1 100	Minor Exams, Quiz,
CO 4: Apply the continuity, momentum	V	V	V		V		V		V		V				٧		Analyze	Employability	End Term Exams
and energy principles and design the																			
pipelines used for water supply or sewage																			Minor Exams, Quiz,
under different situation.	٧	V		V					V		V		V	V	V		Evaluate		End Term Exams
CO 5: Calculate drag force exerted by fluid													1	<u> </u>					
on the body of varying shapes and able to																			Minor Exams, Quiz,
minimize them.	٧		٧						V		V			V			Apply		End Term Exams
CO 6: Design and addressing problems in																		1	
open channel ( lined/ unlined) of different																			
shapes and size optimally as per site																			Minor Exams, Quiz,
condition.	٧		I۷	IV			Land 1		٧		٧	٧		٧		٧	Create		End Term Exams
Paper BTAM- 301-18MathematicsIII (Trans	form & F	Discretel																	
CO1: Understand the basic results on	101111 & E	T T						<u> </u>				1	1					1	1
vector function, their properties and fields																			
so as to apply them for solving problems																			
of																			Minor Exams, Quiz,
engineering.		V	V					V	V		V		V		V		Understand		End Term Exams
CO 2: Find length, area and volume using										2016									
integral calculus that is an important																			Minor Exams, Quiz,
application in engineering.		٧	V					٧			٧	V			V		Apply		End Term Exams
CO 3: Solve some real problems in															100				
engineering using Gauss Divergence and																		Skill Development	Minor Exams, Quiz,
Stokes' theorem				٧													Analyze		End Term Exams
CO 4: To formulate Laplace transform of																			
functions and its applications to solve																			
differential equations that form real life																			
problems in																			Minor Exams, Quiz,
engineering.				V				٧	٧		٧		٧				Evaluate		End Term Exams
CO 5: To formulate Fourier Series, its																			
properties and its applications to solve problems in engineering.									,			1							Minor Exams, Quiz,
problems in engineering.								Įν	Įν		٧		lΛ				Apply		End Term Exams

Paper BTEC- 305-18 Basic Electronics & applications in Civil Engineering



CO1: Understand construction of diodes																		
and their rectifier applications.			V				V		v			V				Understand		Minor Exams, Quiz, End Term Exams
CO 2: Appreciate the construction and working bipolar junction transistors and							,	,			,					Understand		Minor Exams, Quiz, End Term Exams
MOSFETs. CO 3: Design Op-Amp IC based			100000	V			V	V	2.11		V					Onderstand	Skill Development	End Term Examp
fundamental applications.	٧						V									Understand		Minor Exams, Quiz, End Term Exams
CO 4: Comprehend working of basic elements of digital electronics and circuits.			V					V	٧	V		V				Understand		Minor Exams, Quiz, End Term Exams
		Paner	HSMC- 13	2-18 Civil F	ngineering	Introduction	on Societa	l & Global I	mnact									
CO1: Introduction to what constitutes Civil Engineering	V															Understand		Minor Exams, Quiz, End Term Exams
CO 2: Understanding the vast interfaces this field has with the society at large							V		V				V	V		Understand		Minor Exams, Quiz, End Term Exams
CO 3: Providing inspiration for doing creative and innovative work for the benefit of the society		٧					V		V				V	V		Application	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Need to think innovatively to ensure Sustainability																Application		Minor Exams, Quiz, End Term Exams
CO 5: Highlighting the depth of engagement possible within civil engineering and exploration of various																		Minor Exams, Quiz,
possibilities of a career in this field	٧		<u> </u>				<u> </u>	<u> </u>		1			V	11		Application	<u> </u>	End Term Exams
Paper BTCE-306-18 Surveying & Geomatics	Lab			<u> </u>														
CO1: Assess horizontal & vertical angles by Theodolite.	٧	٧	V						٨			V	V			Application		Minor Exams, Quiz, End Term Exams
CO 2: Survey the area using different methods of plane tabling and compass survey	٧	٧	V	V					٧			V	V			Application		Minor Exams, Quiz, End Term Exams
CO 3: Compute the reduce levels using various methods of leveling.	٧		V	V					٧			٧	V			Application	Faradayah Wh	Minor Exams, Quiz, End Term Exams
CO 4: Predict the location of any point horizontally and vertically using Tachometry	٧		V	V					٨			V	V			Application	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Setting out curves in the field	٧		V	V					٧			v	V			Application		Minor Exams, Quiz, End Term Exams
CO 6: Use electronic survey instrument	٧			V	V				٧			V	٧			Application		Minor Exams, Quiz, End Term Exams
Paper BTCE-307-18 Fluid Mechanics Lab																		
CO1: Select appropriate pressure															N. C.			
measuring device under different condition of flow.	٧		V			V			٧	V		v			,	Create		Minor Exams, Quiz, End Term Exams
CO 2: Determine the stability of a floating body																Understand		Minor Exams, Quiz, End Term Exams



Minor Exams, Quiz,

End Term Exams

**Employability** 

Application

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Department of Civil Engineering
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CO 3: Understand and apply Bernoulli's

theorem practically

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IKG PTU Main Campus

CO 2: Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk				1										1	Application		Minor Ex
maps. CO 3: Understand the use of emergency management system to tackle the problems	٧													1	Understand	Employability	Minor Ex End Term
CO 4: Discuss the role of media, various agencies and organisations for effective disaster management.		1											٧		Analyse	Linpleyability	Minor Ex End Term
onsaster management. CO 5:Design early warning system and understand the utilization of advanced technologies in disaster management.			1										1		Application		Minor Ex
CO 6:Compare different models for disaster management and plan & design of infrastructure for effective disaster management.			٧										1		Application		Minor Ex
Paper BTCE-406-18 Concrete Testing Lab CO1: Evaluate properties of building materials, such as cement and aggregates	<b>V</b>			<b>√</b>	1	1	1	1	1	1	1	<b>√</b>	1	1	Understand		Minor E
CO 2: Conduct experiments and check the acceptance criteria (if any).	1			√	√ √	1	1	1	٧	1							Minor E
CO 3: Design concrete mixes as per BIS provisions.	1	1	<b>V</b>	<b>V</b>	1	1	1	٧	٨		1	1	<b>V</b>	1	Analyse and design		Minor E
CO 4: Analyze the properties of concrete in fresh and hardened state.	1			<b>V</b>	1	1		1	٠ ٧	٧	1	1	٧	1	Analyse and design	- Employability	Minor E
CO 5: Create a well organized document and present the results appropriately.	1			1	1	<b>V</b>	٧	٧	٧	1							Minor E
CO 6: Understand and apply non destructive testing (NDT) for evaluating concrete quality.	1	1		1	1	1	٧	1	1	٧	٧	1	٧	1	Understand		Minor E
Paper BTCE-407-18 Transportation Lab CO1: Characterize the pavement materials as per the Indian Standard guidelines	٧								٧								Minor I
CO 2: Evaluate the strength of subgrade soil by CBR test.		٧							٧								Minor I
CO 3: Conduct experiments to evaluate aggregate properties.	٧			٧					٧							Employability	Minor E
CO 4:Determine properties of bitumen material and mixes	٧			٧					٧							Employability	Minor E
CO 5: Evaluate the pavement condition by rough meter and Benkelman beam test.  CO 6: .Create a well organized report and present the results appropriately	٧			٧					٧								Minor E
CO 6: .Create a well organized report and present the results appropriately			\ \ \						٧								Minor I

Paper BTCE-501-18 Engineering Geology																			
CO1: The basic concepts of geological																			
processes and their importance in civil	1	√															Understand		Minor Exams, Quiz,
Engineering																			End Term Exams
CO 2: Identification of rocks and minerals													100000			CAN CA			
and their characteristics	1	1															Understand		Minor Exams, Quiz,
																	Ondoroland		End Term Exams
CO 3: Significance of geological structures			100	V. Ba														Employability	Elia Territ Examis
in civil engineering proj	1	1 1					1 1			1			1				Analysis		Minor Exams, Quiz,
,							1			•			1				Allalysis		End Term Exams
CO 4: Site characterization and geologic			31 2											5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				-	Elia Terrii Exams
considerations in construction	1	1		1	.1	1 1	1	1	1	1	1		1 1			1	Analysis and		
considerations in construction	\ \ \	\ \ \		V	\ \	V	\ \	\ \	V	N N	1		\ \	1		N N	Design		Minor Exams, Quiz,
																			End Term Exams
PaperBTCE-502-18 Elements of Earthquak	o Engino	oring																	
CO1: Understand the phenomenon of	Liigine	I	1			1	1	1	1		1	1	1	T	T		T	1	1
occurrence and history of earthquakes and	1									8.00			1			E MARIE	1		
	\ \												1			4	understand		Minor Exams, Quiz,
classify their kinds and effects.						10000000													End Term Exams
CO 2Appreciate the role of earthquake																			
forces in structural design of building.	1				V		1						1	1	1		understand		Minor Exams, Quiz,
				4/3/															End Term Exams
CO 3: Evaluate and analyze Degree of															1				
Freedom, Spring action, Damping,																			
Equations of motions, Lateral Force	1	1			,														
analysis, Floor Diaphragm	V	V			1								1	1	1		Analyse	Employability	
action, Moment resisting frames and																			Minor Exams, Quiz,
Shear walls.																			End Term Exams
CO 4: Apply various codal provisions																			End Term Exams
related to seismic design of buildings.	1			1			1 1						1 1	1			Desire		Minor Exams, Quiz,
related to seismic design of ballangs.				`			1						\ \	\ \			Design		End Term Exams
CO 5: Acquire new basic knowledge in														-					End Term Exams
earthquake engineering	1												1						Min 5 Out-
earthquake engineering	'												V				Understand		Minor Exams, Quiz,
				1000			1												End Term Exams
Paper BTCE-503-18 Construction Engineeri	ng &Mar	nagement																	
CO1: An understanding of modern	ng camus	I				1	1	1	T				1		1				
construction practices						.,											Understand		Minor Exams, Quiz,
Construction practices						ľ									V		Understand		End Term Exams
CO 2:A good idea of basic construction																			
dynamics- various stakeholders, project	٧		V					V	V			V	V						Minor Exams, Quiz,
objectives, processes, resources required																			End Term Exams
and project economics																			1.5
CO 3: A basic ability to plan, control and														120.00			Analysis and		Minor Exams, Quiz,
monitor construction projects with respect	٧				٧										V		Analyse and		End Term Exams
to time and cost																	design	Employability	End Term Exams
CO 4: An idea of how to optimise											1 - 1 - 1			F 11/2/40			No. 10 Control of the		
construction projects based on costs									V		V		V				Analyse and		Minor Exams, Quiz,
																	design		End Term Exams
CO 5:An idea how construction projects																			
are administered with respect to contract	٧					V			1,1		1								Minor Exams, Quiz,
structures and issues									1		1								End Term Exams
CO 6: An ability to put forward ideas and						CONTRACTOR OF THE						200000000000000000000000000000000000000							
		.,									1.			1000					Minor Exams, Quiz,
understandings to others with effective	V	V				ľ					٧		V				Understand		End Term Exams
communication processes																			

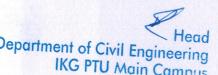
Paper BTCE-504-18 Environmental Engineering



CO1: Understand the impact of humans on environment and environment on humans	٧	T	78.5			٧	v		٧	V		٧			٧	Understand		Minor Exams, Quiz, End Term Exams
CO 2: Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.	٧	V		٧		٧	٧		٧	٧	V	٧	٧	٧	٧	Evaluate		Minor Exams, Quiz, End Term Exams
CO 3:Be able to plan strategies to control, reduce and monitor pollution	٧				V	٧	٧		٧	٧		٧		٧		Create	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Be able to select the most appropriate technique for the treatment of water, wastewater ,solid waste and	٧	V	,	٧	٧		٧		v	V	٧	V	٧	٧		Create		Minor Exams, Quiz, End Term Exams
contaminated air. CO 5: Be conversant with basic environmental legislation	٧						٧		٧	V		٧			٧	Understand		Minor Exams, Quiz End Term Exams
		-																
Paper BTCE-505-18 Structural Engineering CO1: The students will be able to apply their knowledge of structural mechanics in addressing design problems of structural			<b>V</b>	1	1			1	1				1			Analyse and design		Minor Exams, Quiz End Term Exams
engineering CO 2: Ability to understand difference between Working stress and Limit State Philosophy by calculating various design	٧		1	٧	1			1	<b>V</b>				٨			Analyse and design		Minor Exams, Quiz
parameters. CO 3: Design the reinforced concrete beams and slabs using limit state design	1		1	٨	1		1	1	1		1		1			Analyse and design	Employability	Minor Exams, Qui
guidelines of Indian standards. CO 4: They will possess the skills to analyse and design steel structure	1		1	1	1	1	1	1	1		1		1			Analyse and design		Minor Exams, Qui
members CO 5: They will have knowledge of structural engineering	1							1	1									Minor Exams, Qui End Term Exams
																		_
Paper BTCE-506-18 Geotechnical Enginee CO1: Comprehend the various geotechnical field challenges and understand their fundamental, index and engineering properties and then use (apply) the soil as an engineering material	V		٧						٧									Minor Exams, Qui End Term Exams
CO 2:Investigate and write the laboratory reports for soil design properties and parameters by apply the concept of permeability, total and effective stress approaches in soil strength and services.	1		٧		٧				٧								Employability	Minor Exams, Qu End Term Exams
determination CO 3: Apply the various specifications of compaction of soils in the construction of highways and earthen dams.			٧	٧														Minor Exams, Qui End Term Exams



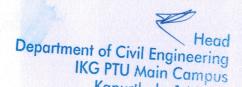
the business situations.	٧													Understand & Analyze	Employability	End Term Exams
of managers and adapt to the various styles of management across organizations.  CO 3: Develop analytical abilities to face		٧						٧						Analyze	Empleyed-life:	End Term Exams  Minor Exams, Quiz
principles and practices of Management  CO 2: Explain the role and responsibilities	٧	٧			٧									Understand & Analyze		End Term Exams  Minor Exams, Quiz
Paper BTCE-509-18 Structural Lab CO1: Describe fundamental concepts and				ı .						1		<u> </u>	-	I		Minor Exams, Quiz
CO 6: Evaluate and compare different echniques of experimental analysis	٧	٧	٧	٧	٧			٧	٧	٧	٧	٧		Understand & Analyze		Practical Exam, Class/Quiz Tests, ViVa
CO 5: Develop peer based learning and working in groups and teams.	٧			٧	٧	٧	٧	٧			٧	٧		Understand & Analyze		Class/Quiz Tests, ViVa
CO 4: Apply various tools that would facilitate the decision making process in the business.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧		Understand & Analyze		Practical Exam, Class/Quiz Tests, ViVa Practical Exam,
CO 3: Develop analytical abilities to face the business situations.				٧	٧	٧	٧	٧	٧	٧	٧	٧		Understand & Analyze	Employability	Practical Exam, Class/Quiz Tests ViVa
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across organizations.				٧	٧	٧	٧	٧	٧	٧	٧	٧		Understand & Analyze		Practical Exam, Class/Quiz Tests ViVa
principles and practices of Management	٧	٧	٧		٧	٧	٧	٧		٧				Understand & Analyze		Class/Quiz Test
Paper BTCE-508-18 Environmental Engine CO1: Describe fundamental concepts and	ering Lab				1									I		Practical Exam.
working in groups and teams.																Minor Exams, Qui
acilitate the decision making process in he business.	٧	٧														Minor Exams, Quiz
the business situations.  CO 4: Apply various tools that would		٧														End Term Exams
organizations.  CO 3: Develop analytical abilities to face															Employability	End Term Exams  Minor Exams, Quiz
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across	٧	٧														Minor Exams, Quiz
CO1: Describe fundamental concepts and principles and practices of Management	٧	٧														Minor Exams, Quiz End Term Exams
aper BTCE-507-18 Geotechnical Lab														1		End Term Exams
O 5: Design the embankment slopes and heck the stability of finite slopes.		٧														Minor Exams, Quiz
consolidation, soil deformation parameters, and calculate settlement magnitude and rate of settlement.		٧		٧												Minor Exams, Quiz, End Term Exams



	٧	٧				٧							Understand &		Minor Exams, Quiz
													Analyze		End Term Exams
						Secretary Designation									
						٧							Understand & Analyze		Minor Exams, Qui
											The state of the s				Minor Exams, Qui
		٧				٧						٧			End Term Exams
5/4/2															
		٧				٧						٧			Minor Exams, Qui End Term Exams
							F1 19 12 1							Employability	Minor Exams, Qui
		٧				٧						٧		Employability	End Term Exams
		٧				٧						٧			Minor Exams, Qui End Term Exams
		٧				٧						٧			Minor Exams, Qui End Term Exams
Par	per BTCE	- 601-18 En	gineering E	conomics,	Estimation	& Costing									1
			1	1	1		1	1	1				Understand		Minor Exams, Qui
	1		1	1	1		1	1	1				Analyse and application		Minor Exams, Qui End Term Exams
1	1		1	1	1		1	1	٧				Analyse and application	Employability	Minor Exams, Qui End Term Exams
1			1	٨	1		1	1	٧	1			Analyse and application		Minor Exams, Qui End Term Exams
٧			1	٧	٧		1	1	1				Understand		Minor Exams, Qui End Term Exams
	7	<b>1 1</b>	Paper BTCE- 601-18 En	Paper BTCE- 601-18 Engineering I	Paper BTCE- 601-18 Engineering Economics,  V  V  V  V  V  V  V  V  V  V  V  V  V	Paper BTCE- 601-18 Engineering Economics, Estimation  V  V  V  V  V  V  V  V  V  V  V  V  V	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing    V   V   V     V   V     V   V     V   V	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing	Paper BTCE- 601-18 Engineering Economics, Estimation & Costing			



						1							1					
CO 4: Apply the concepts of deep foundation and solve problems related with pile foundation.	٧	٧	٧									٧				yse and ication		Minor Exams, Quiz, End Term Exams
Paper PECE- 602B-18 Elective -II(Ground In	nproveme	nt Techniai	ies)															
CO1:To study Insitu densification of cohesion		V	√	٧	٧	٧	٧			٧				٧	Unde	erstand		Minor Exams, Quiz, End Term Exams
CO2:To identify and analyze soil improvement with additions of materials		٧	٧	٧	٧	٧	٧			٧	٧	٧			Unde	erstand	Skill Development	Minor Exams, Quiz
CO3:To learn soil improvement techniques using reinforcing elements		٧	√	٧	٧	٧	٧		٧					٧		lyse and ication	Skill Development	Minor Exams, Quiz
CO4:To have in depth knowledge of geotextile material and its properties	٧										٧					lyse and ication		Minor Exams, Quiz
D	C-11 B4I																	
Paper PECE- 602C-18 Elective — III(Advance CO1: Do earth dam design and stability analysis for all kind of drainage conditions	Soil Mech	v √							٧				٧			lyse and ication		Minor Exams, Quiz
CO 2: Do stability analysis of any kind of slope and its protection		٧		٧					٧							lyse and ication		Minor Exams, Quiz
CO 3: Understand the earth pressure theories and able to calculate lateral earth pressure for different conditions		٧	٧										٧			lyse and ication	Skill Development	Minor Exams, Quiz
CO 4: Evaluate depth of embedment for cantilever as well as anchored sheet piles.		٧		٧									٧			lyse and ication		Minor Exams, Quiz
CO 5: Learn the concept of machine foundation		٧				10			٧							lyse and ication		Minor Exams, Quiz
		Dance	DECE COS	D 10 O	Flactive I.	Coonside	tica Fuelca											
CO1: Identify the functions of geosynthetics	٧	٧	PECE -602	D-18 Open	Elective-I (	Geosynthe	etics Engine	ering)	٧				V		Unde	erstand		Minor Exams, Quiz
CO 2: Select the geosynthetic products		٧		٧			٧		٧						Unde	erstand		Minor Exams, Quiz
CO 3: Identify the testing methods for geosynthetics		٧	٧			٧							٧		Unde	erstand	Skill Development	Minor Exams, Quiz
CO 4: Design withgeosynthetic products		٧		٧									٧		Unde	erstand		Minor Exams, Quiz
Paper BTCE-PECE-602E-18 (Geo Environme	ntal engine	eering)																
CO1:To understand and analyze issues regarding soil contamination	√	√ √													Unde	erstand		Minor Exams, Quiz
CO2:To study cause and effect of water contamintion	1	1		1	1	1	1				٧	1	1	1	Unde	erstand		Minor Exams, Quiz

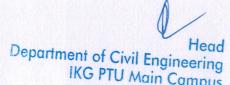


O3:To identify remediation of ontaminants from soil and ground water	1	1		1	1	1	1								Analysis	Skill Development	Minor Exams, Quiz, End Term Exams
O4:To have knowldege of soil waste	7	J							1	1	1	1	1		Analysis		Minor Exams, Quiz, End Term Exams
isposal and stabilization O5:Learn the concept of engineered	·									-1	-1	٦	1		Understand		Minor Exams, Quiz,
andfill	1	1				1			v	V	•	•			- 150 VESS (100		End Term Exams
aper BTCE-PECE -602F-18(Rock Mechanics)																	Minor Exams, Quiz
CO1: Identify the problems associated with underground excavations	1	1													Understand		End Term Exams
CO 2: Classify the rock mass using the reference data	1	1													Understand	- Skill Development	Minor Exams, Qui End Term Exams
CO 3: Understand the failure criteria of	1	1				<b>√</b>			V			1			Analysis		Minor Exams, Qui End Term Exams
CO 4: Determine in-situ stresses from field test data	1	<b>V</b>	<b>V</b>	1	<b>√</b>	1	<b>V</b>	٧	1	1		1	1	1	Analysis and Design		Minor Exams, Qu End Term Exams
															and other self-resident		Third I am related
Paper BTCE-PECE - 603A-18(Design of Conc CO1: To apply the loads on building frames and analyse them using direct and	rete Struc	tures)	1		1			1	1				1		Analyse and Design		Minor Exams, Qu End Term Exams
indirect methods. CO 2: To analyse the concrete	J	-1	1					1	<b>V</b>		1		1		Analyse and Design		Minor Exams, Que
components i.e. continuous beams, flat slabs, tanks and retaining walls, etc CO 3: To design and detail the concrete	V	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	•								J		1		Analyse and	Skill Development	Minor Exams, Q End Term Exams
components i.e. curved beams, flat slabs, tanks and retaining walls, etc	1	1	٧					٨	1		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		<u> </u>		Design  Analyse and	-	Minor Exams, Q
CO 4:To analyse and design the special foundations i.e. raft, pile and machine foundations.	1	1	1					1	1		1	1	1		Design		End Term Exam:
Paper BTCE-PECE-603B-18(Design of Steel	Structures	()													1	1	1
CO1: To apply the knowledge for analysis and design of various components of a	1	1	1					1	1		1		1		Analyse and Design		Minor Exams, C End Term Exam
plate girder. CO 2: To analyse , evaluate and design the different types of beam-column	1	1	1					1	1		٧		1		Analyse and Design		Minor Exams, 0 End Term Exan
connections. CO 3: To design the column bases and footings for a steel structure under various	1	1	1					1	٧		1		1		Analyse and Design	Skill Development	Minor Exams, End Term Exar
loading conditions CO 4:To analyse the loads and design various elements of industrial buildings.	1	J	1					1	1		1		1		Analyse and Design		Minor Exams, End Term Exa
various elements of industrial buildings.  CO 5: To demonstrate the basic knowledge of plastic analysis of simple steel			1					1	1		1		1		Analyse and Design		Minor Exams,

Paper BTCE-PECE-603C-18(Advanced Structural Analysis)

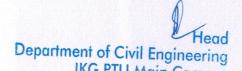


CO 4: Recognize the ideal material for	_	1		_		1												
different repair and retrofitting techniques.	1	1	<b>V</b>	<b>√</b>	√	√	√		٧			1	1	1	1	Understand, Analyse and Design		Minor Exams, Qu End Term Exams
Paper BTCE-PECE-604D-18(Construction C	Cost Analys	sis Methods	s)															
CO1: To Prepare Capital budgeting of a					1			T	1	T	1	_						
Construction site.	1	1	√							1	1	1	<b>√</b>			Understand, Analyse		Minor Exams, Qu End Term Exams
CO 2: To Prepare a Performance statement of a company'	√	1	1							1	1	1	<b>V</b>			Understand, Analyse		Minor Exams, Qu
CO 3: To estimate various financial instrumental such as IRR, Break even analysis			√	1	1	1	1			1	1	<b>√</b>	<b>V</b>			Understand, Analyse	- Skill Development	Minor Exams, Qu
CO 4: To prepare a Job Cost report of a Construction Site.			<b>V</b>	<b>V</b>	1	٧	1									Understand, Analyse		Minor Exams, Qui
		Pan	or RTCE DE	CE 604F 16	010													Liid Terrii Exams
CO1:To Provides a broad understanding of		Гар	T DICE-PE		8(Construct	T Enginee	ering Matei	rials)										
the composition, microstructure, and engineering behavior of various materials used in civil engineering applications	٧	<b>V</b>			1				٧	٧	1	1		1				Minor Exams, Quiz
CO 2: To Introduces various modifications																Understand	Skill Development	End Term Exams
possibilities in construction materials	٧	<b>V</b>			<b>√</b>				1	<b>V</b>	. √	1					Skill Development	Minor Exams, Qui
CO 3: To Understand and Explain Special Concrete	<b>V</b>	<b>√</b>							<b>V</b>	J	J	1				Understand		End Term Exams Minor Exams, Qui
			<u> </u>													Understand		End Term Exams
Paper BTCE-OECE-609(Remote Sensing and	d GIS)																	
CO1:The characteristics of Remote sensing satellites and Applications of remote sensing		٧	1	٧					1			<b>V</b>		1		Understand, Analyse		Minor Exams, Qui
CO 2: The GIS and its Data models		٧	1	<b>V</b>							٧			<b>V</b>		Understand,	Skill Development	End Term Exams Minor Exams, Qui
																Analyse		End Term Exams
	Pap	er BTCE-PE	CE -701A-1	8(Pavemen	nt and geom	netric design	n of Highw	ay)										
O1: Understand patterns of Traffic and its ehaviou	٧					٧			1			<b>V</b>	1	1		Understand, Analyse and Design		Minor Exams, Quiz
O 2: Develop an understanding for arious sight distances and its affects		٧										1	1	1		Understand, Analyse and		Minor Exams, Qui
O 3: Analyse and design Horizontal and ertical curves		٧		٧					1			1	1	<b>V</b>		Design Understand, Analyse and	Skill Development	End Term Exams Minor Exams, Qui
O 4: Apply various tools that would acilitate the decision making process in the business.	٧					٧			1							Design Understand, Analyse and Design		End Term Exams  Minor Exams, Quiz End Term Exams
O 5: Develop and appreciate the concept fintersections	٧								1			1				Understand, Analyse and Design		Minor Exams, Quiz

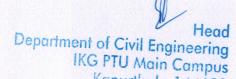


Paper BTCE-PECE -701B-18(Airport planning and Design)

CO1: Understand the detail concepts of the airport engineering	٧				٧		٧		1	1		Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams
CO 2: Able to design runway, taxiway and apron pavements.		٧							1		1	Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams
CO 3: Suggest the runway orientation and the runway length as per FAA & ICAO guidelines.		٧		٧			<b>V</b>			٧	<b>V</b>	Understand, Analyse and Design	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Conceptualise Pavement management system for maintenance	٧				٧		٧					Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams
Paper BTCE-PECE -701C-18(Intelligent Trans	sportation	systems)												
CO1: Understand the concept of Intelligent Transportation system.	٧				٧		1			1		Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 2: Analyse ITS's relevance with Smart growth and energy based planning.									1		<b>√</b>	Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 3: Conceptualise the urban transportation systems using different models.		٧					<b>V</b>			1	1	Understand, Analyse	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Explore methodology for smart city based Transit planning	٧				٧		1					Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 5: Suggest road safety using ITS.												Understand, Analyse		Minor Exams, Quiz, End Term Exams
Paper BTCE-PECE -701D-18(Highway Const.	ruction and	l Managon	mont)					<u> </u>						
CO1: Understand various materials and techniques used to construct pavements.	v √	Ivialiagen	lient,		٧		1	Π	1	1		Understand, Analyse and design		Minor Exams, Quiz,
CO 2: Design the bituminous pavement as per standards		٧				٧		٧	٧		1	Understand, Analyse and design		Minor Exams, Quiz End Term Exams
CO 3: Design thickness and joints including drainage of concrete pavements		٧		٧			٧			1	1	Understand, Analyse and design	Skill Development	Minor Exams, Quiz
CO 4: Suggest maintenance of pavement.	٧				٧		٧					Understand, Analyse and design		Minor Exams, Quiz
CO 5: Conceptualise pavement management systems.	٧	٧	٧	٧						٧		Understand, Analyse and design		Minor Exams, Quiz End Term Exams
Paper BTCE-PECE -701E-18(High Speed Rail	Engineerin	ng)												
CO1: Develop an understanding for high- peed Rails.	٧		٨		٧		1		1	1		Understand, Analyse and design		Minor Exams, Quiz
CO 2: Outline the requirements for design		٧		٧		٧			٧		1	Understand, Analyse and design		Minor Exams, Quiz End Term Exams
CO 3: Design of points, crossing and turnouts.		٧		٧			<b>V</b>			<b>V</b>	1	Understand, Analyse and	Skill Development	Minor Exams, Quiz



CO 3: Aanalyse rural sanitation approaches						<u> </u>		-										
along with the low cost excrete disposal system and sustainable wastewater treatment procedure.																Analyze	Skill Development	
vastewater treatment procedure.	V		V			V	V		1	N/	.,	<b>.</b> ,			1.			Minor Exams, Qu
O 4: Resolve various issues encountered									V	V	V	V	V		V			End Term Exams
n rural sanitation.	V	V		V		V	V		٧	٧		V				Application		Minor Exams, Qu End Term Exams
aper BTCE-PECE-702C-18(Air and Water (	Quality N	Modeling)																
CO1: Model Development and mass											T			1	1	1	<u> </u>	T
palance along with equilibrium principles.	V	1	1/	V		.,										Create		Minor Exams, Qu
CO 2: Develop lake water quality		•	V	V		V			V	V	٧	٧	٧	٧				End Term Exams
nodeling, ground water quality modeling and numerical methods.	V		V						.,							Create		Minor Exams, Qu
O 3: Do modeling for air pollution, self									V	V		V	14	V	٧		Skill Development	End Term Exams
cleaning of atmosphere and stack																Create		Minor Exams, Qu
emission. CO 4: Understand about Water Quality	٧	V	٧	V			3.1		V	٧	V	V	V	V	V			End Term Exams
Index, Air Quality Index and Delphi Method.	n/															Understand		Minor Exams, Qu
victiod.	I v				V		٧		V	V		V						End Term Exams
Paper BTCE-PECE-702D-18(Solid and Hazar	dousWa	ste Manage	ement)															
CO1: Understand various concepts related	100							1	1	- 1	1	1			1			
o collection, storage and transportation of																		
vastes along with application																Understand		
of recycling and reuse of wastes.																Understand		Minor Exams, Qu
	٧					V	V		V	V		1,			.,			End Term Exams
O 2: Apply different processing												V		-	V			End Term Exams
echnologies related to solid wastes and																Croote Apply		Minor Exams, Qu
heir treatment.	٧	٧	٧	V			V		V	V	V	V	V	1		Create, Apply		End Term Exams
O 3: Analyse various treatment methods													1	-				Elia Terrii Exams
or hazardous wastes & their disposal and																		
lso apply different disposal																Create,apply	Skill Development	
nethods of hazardous wastes.																Create, apply		Minor Exams, Qu
	٧	٧	٧	V			٧		V	V	V	V	V	J.	1 1 5 5			End Term Exams
O 4: Design, develop, operate and													•	1				Life Territ Exams
losure of landfills. Also, to manage and																		
nonitor the behavior of landfill																Design		Minor Exams, Qu
naterials and sites.	٧	٧	٧	٧			٧		V	V	V	1	1	,,	,,			End Term Exams
O 5: Understand and apply municipal										•	·	V	V	V	V			End Term Exams
olid waste rules and other rules.																Understand		Minne 5 0.
	٧					V	V		V	V		V				Understand		Minor Exams, Qu End Term Exams
aper BTCE-PECE-702E-18(EIA and LCA)																		Teria renin Exams
D1: Understand about EIA in detail and							1	1			1	1						
ales, various notifications (2000) and																L		
rojects required in the EIA Process	V					1	1									Unddrstand, Apply		Minor Exams, Qu
2: Understand various risks, its issues						V	V		V	V		٧			٧			End Term Exams
nd their impacts. They should also be																		
ple to learn about criteria for selection of																		
A methodology, impacts, evaluation and																Create		
ethods																Cicale		
				1.														Minor Exams, Qu

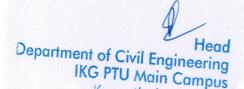


CO 2: To understand the concept of		1						-						100				
groundwater and well hydraulics.																	1	
grand wen nyurudnes.	1,1	.,																Minor Exams, Q
CO 3: To understand the water quality	1	- V	V	V		٧			٧	V		V	V	V	V	Analyse	Skill Development	End Term Exam
tandards and groundwater management.		N COL															1	End Term Exam
tandards and groundwater management.																		Minor Exams, 0
20 4: Undotdata-t	V	V	V	V		٧			V	V		V	V	V	V	Analyse & Design		End Term Exam
CO 4: Understand the impact of climate													-	·	1	Analyse & Design	+	End Term Exam
change on hydrological cycles and																		
groundwater	٧	٧	٧	٧		V	V	V	V	V		V	V	,	.,	Design		Minor Exams, C
Paner PTCE DECE 702D 10/11 1 1 1												1	- Iv	IV	Iv	Design		End Term Exam
Paper BTCE-PECE -703D-18(Hydraulic Mo	elling)	1																
CO1: To have an overall knowledge about		A BROWN									1000					1		
he basics of hydraulic modeling																		
	V					V			V	V						Understand		Minor Exams, 0
O 2: To understand the concept of gravity					200	(2h)										Understand		End Term Exam
ominated and friction models.															70.00			
	V	V							.,									Minor Exams, 0
O 3: Use of remote sensing and	199	4 2 1 1 1 3	1 1 1 1 1 1 1 1						V	V		3X 10 X				Apply	Skill Development	End Term Exan
eographic information system in water		4 3000															Skill Development	
uality modeling.	V	1	1										2012					Minor Exams, 0
0 4: Understand the concepts and		1	V		V		V		V	V				V		Analyze		End Term Exam
										344.00								
odels in groundwater hydrology.																		Minor Exams, (
	٧	V	1 2 2 2	٧					V	V		V	1/	1		Evaluate		
					Marie Talk			5000		101511		1,		Iv .		Evaluate		End Term Exam
per BTCE-PECE -703E-18(Transient in Clo	sed Condi	uits)																
01: Identify the basic numerical scheme		1813	All STATES	A 18 18 18 18 18 18 18 18 18 18 18 18 18				1				The second			100			
r unsteady flow in closed conduits.		A STATE OF THE STA																
	٧		V															Minor Exams, C
2: Implement comprehensive and	With the same						V			٧	V			٧		Understand		End Term Exam
fective flow control, achieving efficient																		
ater utilization, and maintaining rich																		
uvial environments.		.,		1.														Minor Exams, C
O 3: Detect and analyze the flow		1		V	٧	٧		٧			V		V			Apply	Skill Development	End Term Exam
																1777		End Term Exam
ansients through pumps and related																		Mines France G
rdraulic structures.		٧					V		V					1		Analyze		Minor Exams, C
0 4: Analyze pipe networks including														V	-	Arialyze		End Term Exam
ımps, valves, surge tanks, etc																		
		٧	٧		V						.,							Minor Exams, Q
											Įv		Įv			Evaluate		End Term Exams
per BTCE-PECE -703F-18(Urban Hydrolog	and Hyd	raulics)																
1: Provide an overview of urban											1			_	T	1		
drology and Urban water supply							9 40 9											
mand forecast.	1					V			1,									Minor Exams, O
2: Identify tools and approaches for						2 3 2 3 3			V	V						Understand		End Term Exam
oan water management.												1770.65						
		V																Minor Exams, Q
3:Learn the important types of storm				4						٧						Apply		End Term Exam
ter infrastructure used in urban																		
inage systems.																		Minor Exams, C
		V	٧		٧		٧		V	V					1	Analyze	Skill Development	End Term Exam
4: Learn the operation and												1				/ lalyze	Skiii Development	End Term Exam
nagement of urban drainage system	25 NO. 15 TO 18																	
to develop storm water management			4															Minor Exams, C
to develop storm water management dels.	,	V								٧			V	٧		Evaluate		End Term Exam
nagement of urban drainage system d to develop storm water management dels.  5: Design urban drainage systems and		V	1 2 2 2 2 2	7 S. 200 E. S. 1923		THE COURSE OF THE STATE	White the Property of the Parket											
d to develop storm water management dels.  5: Design urban drainage systems and		V											A STATE		100			
to develop storm water management dels.  5: Design urban drainage systems and ictures such as culverts, OSD systems		V																
to develop storm water management dels.  5: Design urban drainage systems and		V																Minor Exams, Q



Spritters of the composition of control of the control of the composition of the control of the	Paper BTCE-OECE-701-18(Metro Systems CO1: Understand the importance of Metro		0			1														
CO 2. Understand the construction methods of fundamental and levelated with the construction and cleared with the construction of the construction		١,,															1		1	1
matricing of understground and elevated via	CO 2: Understand the construction	- V			V				V			V	V			V		Understand		Minor Exams, C
Set of the significance of traffic energement systems by incorporating the consequent systems of traffic consequent systems and systems of traffic consequent systems of traffic consequent systems of traffic consequents																		Onderstand		End Term Exam
CO. 3. To relate the significance of traffic regiments, and the state of the state	station			V		,	.,													Minor Exams, C
management systems by incorporating the companying fraging interpretation of companying of Testific General Companying of Testific General Companying of Testific General Companying of Testific General Companying of the Companyin	CO 3: To realize the significance of traffic		77-19			- V	V	V		٧			V		V			Apply		End Term Exam
Someption of Traffic Engineering.  V V Analyze  Employability  Minor End Traffic Engineering.  V V Analyze  Employability  Minor End Traffic Engineering the concepts  V V V V V V Evaluate  Employability  Minor End Traffic Engineering and Endographic Endograp	management systems by incorporating the	e																7		Liid Terrii Exam
20.4 To enable the importance of staffy in metro by understanding the concepts growing and the process of the control of the c																			Familiantita	
n metro by understanding the concepts growing year metro.  V V V V V V V V V V V V V V V V V V V				٧					V		,,								Employability	Minor Exams, C
ignaling vystem  V V V Seuluate  Mino  Sol Understand the importance of lectrical and mechanical system in metro.  V V V Seuluate  Mino  Stage BTCE-OCCE-702-18[Traffic Management)  OI, To have an overall incoviding for the affic components and assess the traffic Analyse of the affice operation and assess the traffic Analyse  Apply  Skill Development  Minor  Sci Understand of the analyse of the affic seminal interaction.  O S. Provide is rounding of the affice operation  Analyse  Skill Development techniques  O S. Collect Traffic data, sraffic volume university and studies and spot and university and studies and and university and studies and spot and university and studies and university and university and university and university and university and unive											V					٧		Analyze		End Term Exam
20.5 Understand the importance of electrical and mechanical system in metro.  V V V Evaluate  End Telescrized and mechanical system in metro.  V V V V Evaluate  End Telescrized and mechanical system in metro.  V V V V V V V V V V V V V V V V V V V				./																
Intertical and mechanical system in metro.  V V V V Evaluate  Eval				V	V		٧						V		V			Evaluate		Minor Exams, C
Page # BTCE-OCE-703-18(Fraffix Management)  TOIL To have an overall knowledge of the fraffix components and assess the traffic haracteristics and related problems.  V	electrical and mechanical system in metro																	Lvaluate		End Term Exam
Page BTCE-OECE-702-18(Traffic Management)  TOUT: To have an overall knowledge of the profit of the p	and an animal system in metro.			1	.,															Minor France 6
Pages BTC-GCE-TO-2-8[Rrafic Management)  7. To have an overall knowledge of the praffic components and assess the traffic hamagement in any number of the praffic components and assess the traffic hamagement in any number of the praffic planning and its management in any number o				V	Iv		V						V		V			Evaluate		Minor Exams, Q End Term Exam
The part of the pa	Paper BTCE-OECE-702-18(Traffic Managen	ment)																		End Term Exam
raffic components and assess the traffic harbarcetristics and per lateder problems.  V V V V V V V V V V V V V V V V V V V	201: To have an overall knowledge of the	1				1														
Apply  Apply  Skill Development  Minor  20 - Everlope a strong knowledge base of raffic planning and its management in any variansportation area  O - Everlope in the first control evers and its techniques in variansportation area  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques in variansportation.  O - Everlope in the first control evers and its techniques.  V V V V V V V V V V V V V V V V V V V	raffic components and assess the traffic											1 1 1 2			7	- 1399	1		1	
Minor ratio planning and its management in any rangopration need of control works and its techniques   V	haracteristics and related problems.	1	/					V				1								
O.2. Develop a strong knowledge base of farfic planing and its management in any variansportation in a first planing and its strangence in any variansportation area of the control evices and its techniques in variansportation.  O.3. Enderstand different types of Traffic danagement techniques in variansportation.  O.4. Understand different types of Traffic danagement techniques with variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data, traffic volume punt, intersection studies and spot and urrary speed studies and variansportation.  O.5. Collect Traffic data variansportati												V			\ \					Minor Exams, Q
raffic planning and its management in any rangopartation are rangopartation are rangopartation are rangopartation are rangopartation are rangopartation in rangopartation interaction.  O 3: Provide knowledge of traffic control evides and its christingus in anapopartation interaction.  V V V Analyze  Skill Development Minor End Tr V V V Analyze  Minor Collect Traffic data, traffic volume pure, intersection studies and spot and urrery speed studies and v V V V V Apply  O 5: Collect Traffic data, traffic volume pure, intersection studies and spot and urrery speed studies and v V V V V V V V V V V V V V V V V V V	O 2: Develop a strong knowledge base of			7 7 7														Understand		End Term Exams
Apply O3: Provide knowledge of traffic control evices and its techniques in variansportation interaction.  O4: Understand different types of Traffic languagement techniques with variance of the variance of	raffic planning and its management in any		30	V																End Term Exami
0.3. Provide knowledge of traffic control wives and its tendingues in anaportation interaction.  V V V V V V V V V V V V V V V V V V	ansportation area										٧		V							Minor Exams, C
evices and its techniques in anapportation interrection.  O 4: Understand different types of Traffic lata, traffic volume unrt, intersection studies and spot and urney speed studies and spot and urney speed studies and spot and urney speed studies and remarks of the control o	O 3: Provide knowledge of traffic control																The same	Apply		End Term Exam
ransportation interaction.  O \$1 chinderstand different types of Traffic fanagement techniques  V  O \$1 collect Traffic data, traffic volume punt, interaction studies and spot and urriver years of studies and your analyse them.  O \$1 collect Traffic data, traffic volume punt, interaction studies and your analyse them.  V  V  V  V  Apply  Evaluate  Minor End Te volume te factors and remedies of accident volume.  Investigate & determine the ellective factors and remedies of accident volume.  2 2 Able to collect and represent cident data to identify black spots.  V  V  V  V  V  Apply  Employability  Minor I ad feet your of view.  V  V  V  V  V  V  V  V  V  V  V  V  V	evices and its techniques in			V		,,												1		Cha renn Exam
O 4: Understand different types of Traffic danagement types of Traffic danagement types of Traffic volume punt, intersection studies and spot and urrney speed studies and volume yeek studies and spot and urrney speed studies and volume yeek studies and yeek them.  Apply  V  V  Apply  Evaluate  End Tr  Minor End Te  Winor E				•		\ \ \				٧					V				Skill Development	Minor Exams, O
Apply  Apply  Evaluate  V  V  V  Evaluate  Minor factors and so safety  V  V  V  Apply  Employability  Minor is dafety point of view.  V  V  V  V  Apply  Employability  Minor is dafety point of view.  V  V  V  V  Apply  Employability  Minor is dafety point of view.  V  V  V  V  Apply  Employability  Minor is dafety point of view.  V  V  V  V  Employability  Minor is dafety point of view.  V  V  V  V  Employability  Minor is dafety point of view.  V  V  V  Employability  Minor is dafety point of view.  V  V  Employability  Minor is dafety point of view.  V  V  Evaluate  Employability  Minor is dafety point of view.  V  V  Employability  Minor is dafety point of view.  V  V  Employability  Minor is dafety point of view.  V  V  V  Evaluate  Employability  Minor is dafety point of view.  V  V  Evaluate  Employability  Minor is dafety point of view.  V  V  Evaluate  Employability  Minor is dafety point of view.  V  V  V  Evaluate  Employability  Employabili	O 4: Understand different types of Traffic	100					54											Analyze	- Skiii Bevelopinent	End Term Exam
O S: Collect Traffic data, traffic volume punt, intersection studies and spot and urner yspeed studies and spot and urner yspeed studies and without speed studies and without	lanagement techniques																			Liid Tellii Exalli
O 5: Collect Traffic data, traffic volume punt, intersection studies and spot and purpose of studies and studies and suppose of studies and studies and suppose of studies and studies of studies and studies of								V						V			V			Minor Exams, Q
Junt, intersection studies and spot and unique years of studies and spot and unique years and writher to analyse them.  Apply  Minor End Te view of the present content of the present of	O 5: Collect Traffic data, traffic volume																	Evaluate		End Term Exams
purney speed studies and writher to analyse them.  V V V Apply Employability Minor I End Te  Signer BTCE-OECE-703-18(Road Safety)  11. Investigate & determine the ellective factors and remedies of accident voivolved.  12. Able to collect and represent cident data to identify black spots.  V V V Apply Employability Minor I End Te  13. Understand the role of intelligent insport system in Road safety  14. To massage the traffic system from ad safety v V V V Evaluate  15. Understand various traffic inagement systems for safety & safety v V V Evaluate  16. To massage the traffic systems for safety & safety v V V V V V V V V V V V V V V V V V V	ount, intersection studies and spot and																			- Torrit Exami
Apply  Apply  Minor End Te  Apply  Apply  Minor End Te  Apply  Apply  Minor End Te  Apply  Minor End Te  Apply  Apply  Minor End Te  Apply  Minor End Te  Apply  Apply  Employability  Minor End Te  E	ourney speed studies and	٧								V			1			1 .				
Apply End Te sper BTCE-OECE-703-18(Road Safety)  D1: Investigate & determine the work of the factors and remedies of accident vivolved.  D2: Able to collect and represent cident data to identify black spots.  V V V V Understand  End Te Minor I Employability  Apply  End Te Minor I Employability  Minor I End Te Minor I En	orther to analyse them.											4				\ \				Minor Exams, Q
D1: Investigate & determine the ollective factors and remedies of accident volved.  10: Investigate & determine the ollective factors and remedies of accident volved.  10: Able to collect and represent cident ify black spots.  10: Apply  10:						7												Apply		End Term Exams
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Illective factors and remedies of accident volved.  1	per BTCE-OECE-703-18(Road Safety)			100																
Noived.  12: Able to collect and represent cident data to identify black spots.  13: Understand the role of intelligent nsport system in Road safety  14: To massage the traffic system from do safety point of view.  15: Understand various traffic nagement systems for safety & safety  15: Understand various traffic nagement systems for safety & safety various traffic nagement systems for safety & safet	01: Investigate & determine the											T								
20.2: Able to collect and represent cident data to identify black spots.  V V V Apply  Employability Minor I Color and Safety V V V V V V V V V V V V V V V V V V V		٧						V				,								
Apply  Employability  Minor I and safety point of view.  V  V  V  V  V  V  V  V  V  V  V  V  V												\ \ \			\ \					Minor Exams, Qu
O 3: Understand the role of intelligent ansport system in Road safety  V  V  Analyze  Employability  Minor I End Ter  Analyze  V  V  V  V  V  V  V  V  V  V  V  V  V	2: Able to collect and represent																	Understand		End Term Exams
Apply  Apply  Apply  Apply  Analyze  Employability  Minor I End Te  Analyze  V  V  V  V  V  V  V  V  V  V  V  V  V	cident data to identify black spots.			٧							J									
nsport system in Road safety  4:To massage the traffic system from dd safety point of view.  V  V  V  V  V  V  V  V  V  V  V  V  Employability  Minor I  End Tei  Minor I  End Tei  Tei  Tei  Tei  Tei  Tei  Tei  Tei											•		V							Minor Exams, Q
4:To massage the traffic system from ad safety point of view.  V  V  V  V  V  V  V  V  V  V  V  V  V																		Apply		End Term Exams
4:To massage the traffic system from d safety point of view.  V  V  V  V  V  V  V  V  V  V  V  V  V	nsport system in Road safety			٧		V														
d safety point of view.  V  V  V  Minor E  Evaluate  Evaluate  End Ter  nagement systems for safety & safety  V															V				Employability	Minor Exams, Q
5: Understand various traffic anagement systems for safety & safety V	4:To massage the traffic system from																	Analyze		End Term Exams
5: Understand various traffic	d safety point of view.	٧						V												
nagement systems for safety & safety V														٧			٧			Minor Exams, Qu
																		Evaluate		End Term Exams
rovement strategies V V V V Minor F	nagement systems for safety & safety	٧								V										
Apply End Ter	rovement strategies												٧			٧				Minor Exams, Qu

Paper BTCE-OECE-704-18(Environmental Impact Assessment)



CO1: Knowledge about EIA tools &					1110		1	T								1		
methodologies and identify the suitable																Understand		Minor Exams, Qui
methodology and prepare Rapid EIA. CO 2: Be able to access different case	V		1			٧	٧		٧	٧		٧			٧			End Term Exams
studies/examples of EIA in practice																E -1 -1-		Minor Exams, Qui
	٧	٧	٧			٧	V		V	V	V	V	V	V	٧	Evaluate	Employability	End Term Exams
CO 3:Access different case																	Linployability	
studies/examples of EIA in practice.	V			V		V	V		V	V		V		V		Create		Minor Exams, Qui End Term Exams
CO 4:Understand the phenomena of											12.00		F-7-7/2					
impacts on environment.	V	V	V	V			V		V	V	V	V	V	V		Create		Minor Exams, Qui
Paper BTCE-OECE-705-18(Construction M	atorials)									1		1						
CO1: To Provides a brief description about	T	1	1	1		T		_				1	1					1
different types of materials used in		10 F 3									1. 18			10000				
building construction for											100							
members like foundation, masonry,	1		1										100		14.28			
arches, lintels, balcony, roof, floor, doors,	'											V			100	understand		
windows, stairs, plastering, painting and														1.3				Minor Exams, Qu
other general topics.																		End Term Exams
CO 2: Understand the properties of various						100 PK 174 1												End Term Exams
construction materials, their uses and their				1 1		1						1 ,						
different applications.	V			\ \ \		V		1				1	1	1		understand	Employability	Minor Exams, Qu End Term Exams
O 3: To know the various latest and															777 17 19			
nodern construction materials, properties and their uses.	1	1		1								1	1	1		Analyse		Minor Exams, Que
CO 4: Able to understand the relationship												100						
petween material properties and tructural form.	1		\ \			1		1				1	1			Design		Minor Exams, Que
CO 5: Able to understand the importance	J. W. J.		1000									1						
of experimental verification of material properties.	1											1				Understand		Minor Exams, Qu End Term Exams
							1											Elia Terrii Exams
Paper BTCE-BTMC-701-18(Management- I	(Organizati	ional Behav	vior))				_											
CO1: Learn the development of the field of																		
organizational behavior and explain the micro and macro approaches.	1				1							1			1	understand		Minor Exams, Qu
CO 2: Analyse and compare different																		End Term Exams
models used to explain individual																		
pehaviour related to motivation and	1			1 1		✓				1		1	1	\ \	9.2	understand		Minor Exams, Qu
ewards																		End Term Exams
O 3: Identify the various leadership styles					175.55												Employability	
	1	1		1								1 1	1	1		Analyse	Linpioyaumiy	Minor Exams, Qu
nd the role of leaders in a decision													'			7 thanyou		End Term Exams
nd the role of leaders in a decision naking process																		
naking process			A TO THE WAY OF THE		FOR STATE OF	1		1				1	1			Design		Minor Exams, Q
naking process O 4:Explain group dynamics and	<b>V</b>		<b>√</b>									'	'			Dosigii		End Term Exams
naking process O 4:Explain group dynamics and emonstrate skills required for working in	٧		1			'			TO SHEET SHE									
naking process O 4:Explain group dynamics and emonstrate skills required for working in roups (team building)	٧		٧			,												Ena Tonn Enam
naking process O 4:Explain group dynamics and emonstrate skills required for working in roups (team building) O 5:Create an adaptable stress	٧		1			· ·		٦				1		1		Understand		
aking process O 4:Explain group dynamics and emonstrate skills required for working in roups (team building) O 5:Create an adaptable stress anagement plan for academic success			√			· ·		1				٧		1		Understand		Minor Exams, O
aking process D 4:Explain group dynamics and emonstrate skills required for working in oups (team building) D 5:Create an adaptable stress anagement plan for academic success corporating selected techniques			√					1				1		1		Understand		Minor Exams, Q
								1				<b>1</b>		٧		Understand		Minor Exams, Q
naking process O 4:Explain group dynamics and emonstrate skills required for working in roups (team building) O 5:Create an adaptable stress anangement plan for academic success acorporating selected techniques aper BTCE 802-18(Smart Cities)								<b>V</b>				<b>√</b>		<b>V</b>		Understand		Minor Exams, Que End Term Exams



CO 2: Develop an understanding for various sight distances and its affects				T							
CO 3: Learn how to analyze and compare existing smart community projects.	V		V	V	V		٧	,	,	Apply	Minor Exams, Quiz, End Term Exams
CO 4: Understand the importance of different smart system.	V					٧			V	Analyze	Minor Exams, Quiz, End Term Exams
O 5: Understand latest technologies used in intelligent building.		V		٧						Evaluate	Minor Exams, Quiz, End Term Exams
	ĮV.	V		٧			V	V		Evaluate	Minor Exams, Quiz, End Term Exams

(Signature of Head of Department)

Note: Provide Mapping for all courses of all programs offered by the Department

Department of Civil Engineering
Kapurthala-144603

Name of the Department: Civil Engg. M. Tech Civil Engg. CO PO MTST101 - 18 Advanced Structural Analysis Conduct investigations of complex problems Design/development of solutions Project management and finance Environment and sustainability The engineer and society Analysis and Design Skill Research and Innovation ndividual and team work Engineering Knowledge Sustainable Outlook Modern tool usage Life-long Learning Problem Analysis Communication Focus on Assessme Employability nt Tools to PO-PO PO PO PO PSO PSO PSO-PO-f PO-g PO-c PO-i PO-k Measure ng Course 0 Level Entrepreneur Attainment Outcome ship

CO1: Analyze the skeleton structures using stiffness analysis code.	٧	V	٧	٧	٧	٧	٧	٧	٧		٧	٧	٧	V	V	Exceller	can be entrepreneur in designing and can get employed in Design department	Minor Exams, Quiz, End Term Exams
CO 2:2.Use direct stiffness method understanding its limitations		٧		٧		٧		٧		٧				٧		Good		Minor Exams, Quiz, End Term Exams

MTST102 - 18Advanced Solid Mechanics



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		
Course Outco	PO-					I E		7								Learnir Focus on Em	Assessme nt Tools to Measure Attainment of CO
CO1: Solve simple problems of elasticity and plasticity understanding the basic concepts.	٧	٧	٧	٧		٧	٧	٧	٧		V	٧	٧	٧	٧	Exceller Yes	Minor Exams, Quiz, End Term Exams

													197					
CO 2:Apply numerical methods to solve continuum problems.		٧		V						٧				<b>V</b>		Good		Minor Exams, Quiz, End Term Exams
MTST901 -	18 TH	eor	y of Th	in Pl	ates a	and S	hells											
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-	PO b	PO-c	PO-	PO- e	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-	PSO- m	PSO n	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure

Department of Civil Engineering
IKG PTU Main Computer
Kapurthole-14460

CO1: 1.Use analytical methods for the solution of thin plates and shells.	٧	V	٧		٧	٧		V	٧	V	V	V		V	V	Good	Yes	Minor Exams, Quiz, End Term Exams
CO 2:Use analytical methods for the solution of shells.	٧		٧		٧	٧	٧		٧		٧		<b>v</b>	٧	٧	V.Good	Yes	Minor Exams, Quiz, End Term Exams
CO 3: Apply the numerical techniques and tools for the complex problems in thin plates.			V		٧		٧		٧		٧	٧	٧	<b>V</b>	٧	Exceller	Yes	Minor Exams, Quiz, End Term Exams
CO 4: Apply the numerical techniques and tools for the complex problems in shells.	٧	٧		٧			٧	٧		٧		٧		٧		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST902 - 18- Theory and Applications of Cement Composites

Department of Civil Engineerin IKG PTU Main Camp Kapurthala-144

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO					PO-g								PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure

CO1: Formulate constitutive behaviour of composite materials — Ferrocement, SIFCON and Fibre Reinforced Concrete - by understanding their strain- stress behaviour.	٧	٧	٧	* <b>V</b>	٧	٧		V		V	٧	V	٧	V	Good	yes	Minor Exams, Quiz End Term Exams
CO 2:Classify the materials as per orthotropic and anisotropic behaviour		<b>V</b>		٧		٧	٧		٧		٧		٧		Exceller	yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineeri IKG PTU Main Cama Kapurthala-144

CO 3: Estimate strain constants using theories applicable to composite materials.	v	٧	<b>V</b>	٧		٧	٧	٧	٧	٧	V.Good	yes	Minor Exams, Quiz, End Term Exams
CO 4: Analyse and design structural elements made of cement composites.	<b>v</b>		٧		٧	٧	٧	٧	v		Good	yes	Minor Exams, Quiz, End Term Exams

MTST903 - 18 - Theory of Structural Stability

Department of Civil Engineering IKG PTU Main Campus Kapurthala-14460

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			Assessme
Course Outco		PO-I	РО-с	PO-d	IPO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	<b>P</b> O-l	PSO-n	PSO-r	PSO-c	Learnin Focus	s on Em	nt Tools to
CO1:Determin e stability of columns and frames	٧	٧																Minor Exams, Quiz End Term Exams
CO 2:Determine stability of beams and plates		٧		<b>V</b>														Minor Exams, Quiz End Term Exams

Department of Civil Engineerin IKG PTU Main Camp Kapurthela-144

Course Outcome	PO- a	PO-	PO-c	PO-	PO-	PO-f	PO-g	PO-h	PO-i	PO-	PO-k	PO-I	PSO- m	PSO- n	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessment Tools to Measure Attainment of CO
systems MTST904-1	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems N	Modern tool usage	The engineer and society	Environment and sustainability pour	s for	Struc	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			Exams
stability criteria and concepts for analysing discrete and continuous		٧	٧															Minor Exams, Quiz End Term Exams

CO1: Solve ordinary and partial differential equations in structural mechanics using numerical methods	٧	٧	٧	٧		٧	٧		٧		٧	٧	٧	٧	V.Good	i Yes	Minor Exams, Quiz, End Term Exams
CO 2:Write a program to solve a mathematical problem.		٧		V	٧		٧	V		٧	4	٧	٧		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST905 - 18- Structural Health Monitoring

Department of Civil Engineering IKG PTU Main Compus Kapurthala-144603

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO a	PO-b	PO-c	PO-	PO-e	PO-f	PO-g		PO-i						PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1: Diagnosis the distress in the structure understanding the causes and factors.	٧	٧	٧	٧	٧		٧		٧		٧	٧	٧	٧	٧	Good	yes	Minor Exams, Quiz, End Term Exams

CO 2:Assess the health of structure using static field methods.	V		٧	٧	٧		٧	٧		٧	٧	٧	٧		V.Good	yes	Minor Exams, Quiz, End Term Exams
CO 3: Assess the health of structure using dynamic field tests.	٧	٧	V	٧	٧		<b>V</b>		٧		٧	7.	٧	v	Good	yes	Minor Exams, Quiz, End Term Exams
CO 4: Suggest repairs and rehabilitation measures of the structure	٧		٧	٧		٧	٧		٧	٧		٧	٧		Excellen	yes	Minor Exams, Quiz, End Term Exams

MTST906 - 18 - Structural Optimization



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO a	PO-b	РО-с	PO-	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-	PSO-	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1: Use Variational principle for optimization	٧	٧		V	٧		٧	٧		V	٧		V	V		Good	yes	Minor Exams, Quiz End Term Exams
CO 2:Apply optimization rechniques to structural steel and concrete members.		٧		٧			٧		٧			٧		٧		Good	yes	Minor Exams, Quiz End Term Exams

Course Outcome	PO-	PO-	РО-с	PO-	PO-	PO-f	PO-g	PO-	PO-I	PO-	PO-k	PO-I	PSO- m	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems in	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
CO 3:Design using frequency constraint. MTST111-1	9 0	v	v	lecia-	V Lab	٧		٧	<b>V</b>		٧	V		٧	V	Good	yes	Minor Exams, Quiz End Term Exams

CO1: Design and Detail all the Structural Components of Frame Buildings.	٧	V	V	٧		٧	٧	V	٧		٧	٧	Good	Yes	Minor Exams, Quiz, End Term Exams
CO 2:Design and Detail complete Multi-Story Frame Buildings.		٧	V		٧		٧	٧		٧		٧	Good	Yes	Minor Exams, Quiz, End Term Exams

MTST112- 18- Advanced Concrete Lab

The State of	
Engineering Anowiedge	
Problem Analysis	
Design/development of solutions	
Conduct investigations of complex problems	JUS
Modern tool usage	
The engineer and society	
Environment and sustainability	
Ethics	
Individual and team work	
Communication	
Project management and finance	
Life-long Learning	
Analysis and Design Skill	
Research and Innovation	
Sustainable Outlook	
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Kapurthala-14

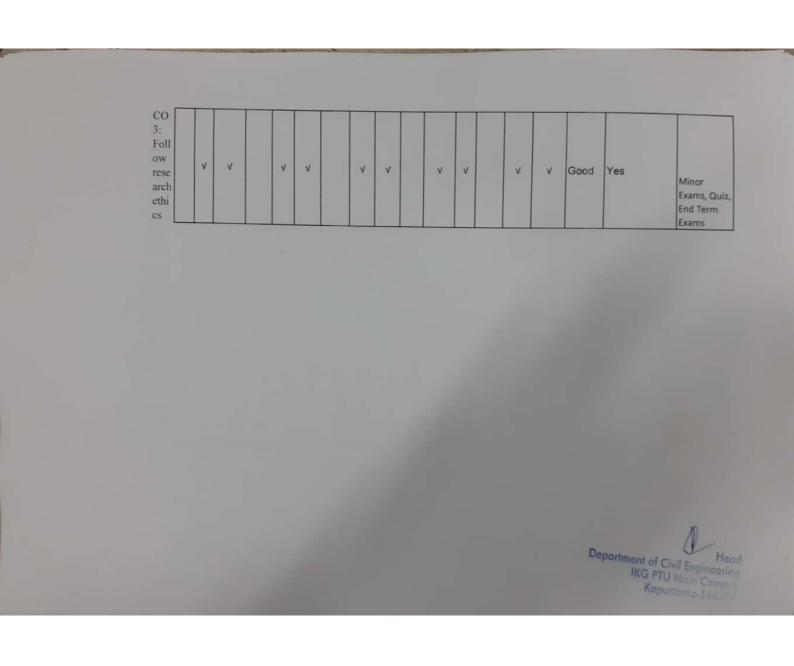
Course Outcome	PO-a	PO-b	РО-с	PO-	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-I	PSO- m	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Design high grade concrete and study the parameter s affecting its performan ce.	٧	٧		٧	٧		₹.	~		٧	٧		v	٧		Good		Minor Exams, Quiz, End Term Exams
CO2. Conduct Non- Destructiv e Tests on existing concrete structures.		٧		٧		٧		>		>		٧		٧		Good		Minor Exams, Quiz, End Term Exams

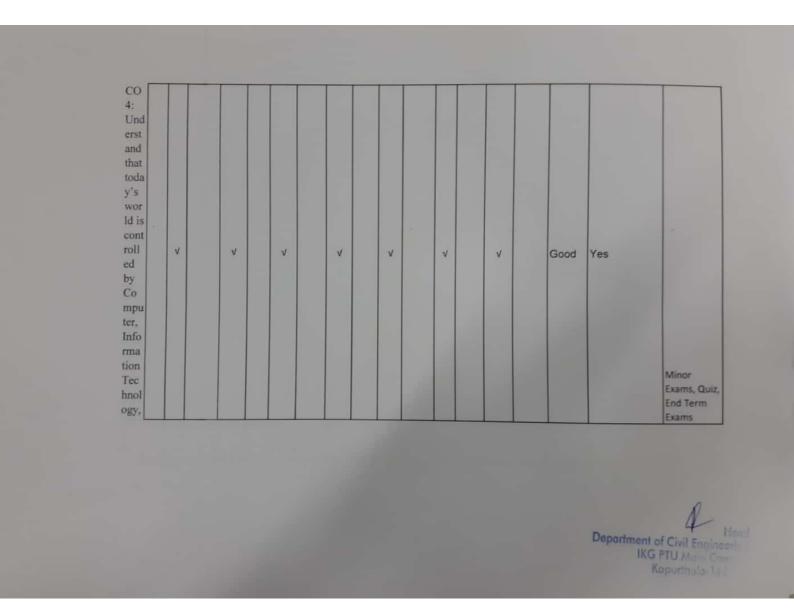
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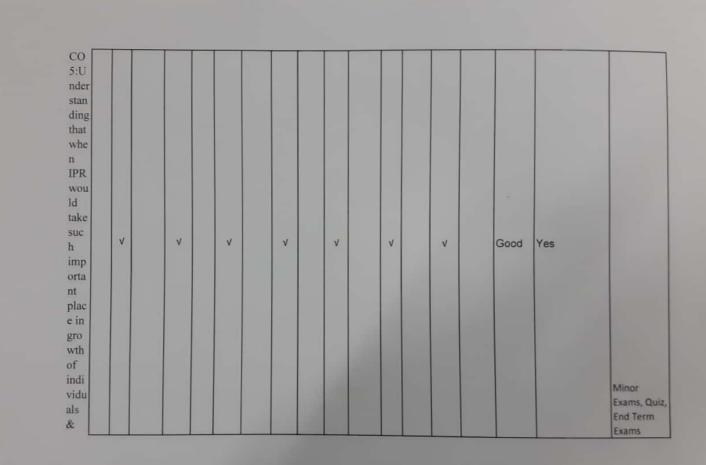
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	ndividual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
CO3. Apply engineerin g principles to understan d behavior of structural/elements.		V	٧		V	٧		٧	V		V	٧		V	٧	Good	Yes	Minor Exams, Q End Term Exams

Course Outcome	PO a	PO b	РО-с	PO- d	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-I	PSO-m	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
Und erst and rese arch pro ble m for mul atio n.	V	٧		٧	~		٧	V		V	V		٧	v		Good		Minor Exams, Quiz, End Term Exams
CO 2: Ana lyze rese arch relat ed info rma tion		V		v		<b>v</b>		v		٧		v		٧	C	Good Y	'es N E	Minor xams, Quiz, nd Term xams

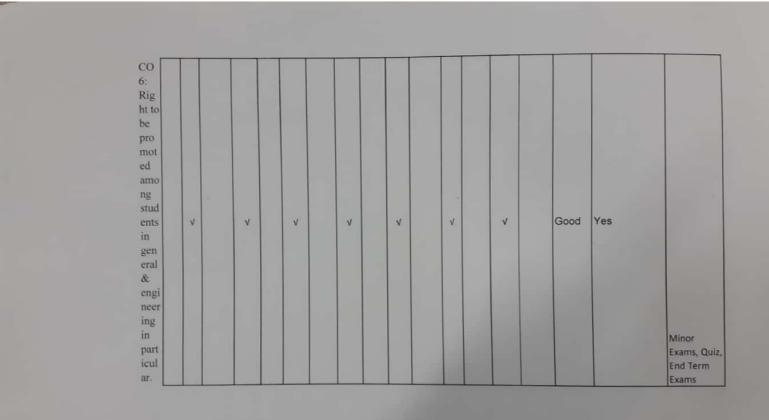
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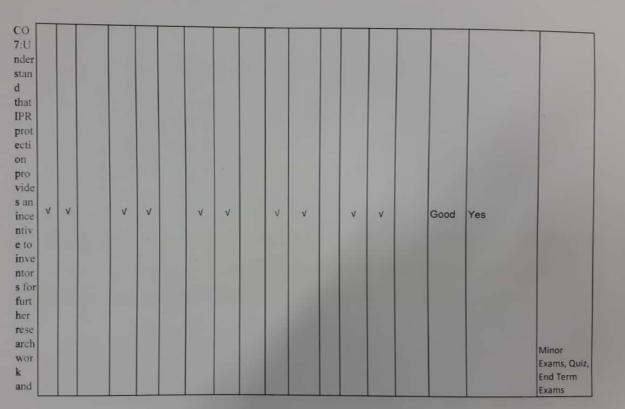












MTST201 - 18 Finite Element Method in Structural Engineering



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outc		₽O-l	PO-c	PO-0	IPO-e	PO-f	PO-g	PO-h	PO-i	PO-j	PO-k	PO-	PSO-r	PSO-1	PSO-c	Learnii	Focus on Emp	Assessme nt Tools to Measure Attainment of CO
CO1. Use Finite Element Method for structural analysis.	٧	٧		٧		٧		٧		V	16	٧	٧	<b>V</b>	V	Good	Yes	Minor Exams, Quiz, End Term Exams

			solutions	of complex problems			ainability				finance						
finite element	- Str	uet	ural		mics												End Term Exams
Solve continuum problems using	v	r	٧		٧	٧		٧	٧		٧	٧	٧	<b>V</b>	Good	Yes	Exams, Quiz,
Execute the Finite Element Program/ Software.	V			٧		٧		٧		٧		٧	V		Good	Yes	Minor Exams, Quiz End Term Exams

Analysis and Design St

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Research and Innovati

Sustainable Outlook

Engineering Knowledge

Problem Analysis

Design/development of

Conduct investigations

Modern tool usage

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Environment and susta

Ethics

Individual and team wo

Communication

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Course Outcome	PO-	PO b	РО-с	PO-	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-	PSO- m	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Analyze and study dynamics response of single degree freedom system using fundamental equation of motion.	٧	٧	٧		٧	V		٧		٧		V		<b>V</b>	٧	Good	Yes	Minor Exams, Quiz, End Term Exams
CO2. Analyze and study dynamics response of Multi degree of freedom system using fundamental theoryand equation of motion.		٧		٧		٧		V		٧		~		٧		Good	Yes	Minor Exams, Quiz End Term Exams

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CO3.Use the available software for dynamic analysis.		٧	٧		٧	٧		٧	٧		V	٧		٧	٧	Good	Yes	Minor Exams, Quiz, End Term Exams
MTST907 - 1	18– A	dva	nced S	100000	esigr	1										i		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-b	РО-с	PO- d	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO	PSO m	PSO-	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO a	PO b	РО-с	PO- d	PO-e	PO-f	PO-g	-	PO-i	PO-	PO-k	PO-I	PSO m	PSO n		Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1. Select proper formwork, accessorie s and material.	٧	٧			٧	٧			٧	٧			٧	٧		Good	Yes	Minor Exams, Quiz End Term Exams

Design the form work for Beams, Slabs, columns, Walls and Foundations.	٧			٧	<b>v</b>		٧	<b>v</b>		٧	٧		Good	Yes	Minor Exams, Quiz, End Term Exams
CO3. Design the form work for Special Structures.	,	1	<b>V</b>		٧	٧		٧	٧		٧	٧	Good	Yes	Minor Exams, Quiz, End Term Exams
CO4. Understan d the working of flying formwork.	1	v		V	V		v	٧		٧	v		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST909 - 18 - Design of High Rise Structures

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO					PO-g			PO-		200			PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure

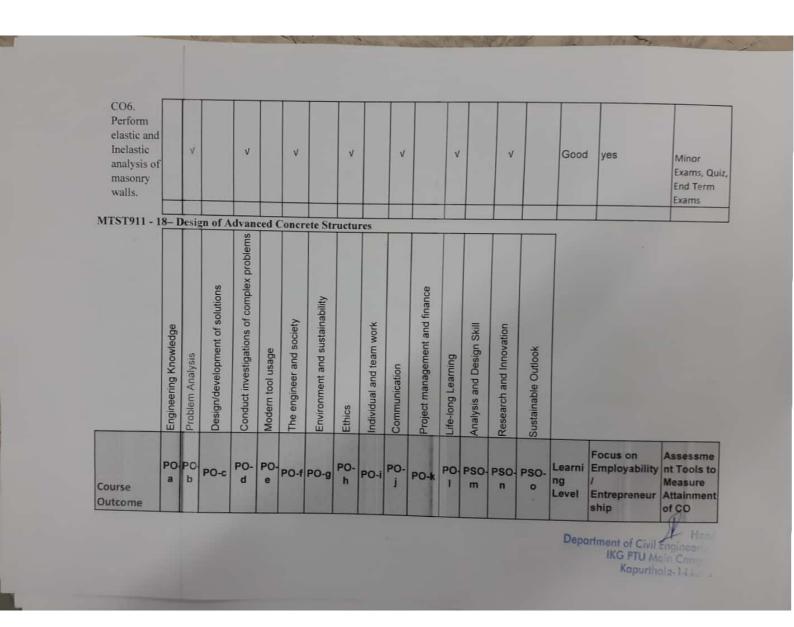
CO1. Analyse, design and detail Transmission / TV tower, Mast and Trestles with different loading conditions.	٧	V			V	V			V	٧			٧	٧		Good	yes	Minor Exams, Quiz, End Term
CO2. Ana lyse, design and detail the RC and Steel Chimney.		٧		V		٧		V		٧		٧		<b>V</b>		Good	yes	Minor Exams, Quiz, End Term Exams
e. design and detail the tall buildings subjected to different loading conditions using relevant codes.		V	٧			٧	V			٧	٧			٧	٧	Good	yes	Minor Exams, Quiz, End Term Exams

PO-PSO-nF	-nPSO-r	PSO-c	-o Learni	ir Focus on I	nt Tools to Measure Attainment of CO
		v v	v v	v v Good	v v Good yes

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CO2. Analyse Reinforce d Masonry Members.	V		٧	٧		٧	٧		٧	V		Good	yes	Minor Exams, Quiz End Term Exams
CO3. Determine interaction s between members.	V	٧		٧	V		٧	٧		٧	V	Good	yes	Minor Exams, Quiz End Term Exams
CO4. Determine shear strength and ductility of Reinforce d Masonry members.	٧		٧	٧		٧	٧		~	٧		Good	yes	Minor Exams, Quiz, End Term Exams
CO5. Check the stability of walls	٧		٧	V		٧	٧		٧	٧		Good	yes	Minor Exams, Quiz End Term Exams

Department of Civil Engineering IKG PTU Main Compus Kapurthala-144603



CO1. Analyse the special structures by understan ding their behaviour.	٧	٧		٧	٧		٧	٧		٧	٧	Good	Yes	Minor Exams, Quiz, End Term Exams
CO2. Design and prepare detail structural drawings for execution citing relevant IS codes.		√	. ✓		. ✓	٧		V	>		V	Good	Yes	Minor Exams, Quiz, End Term Exams

MTST912 - 18 - Advanced Design of Foundations

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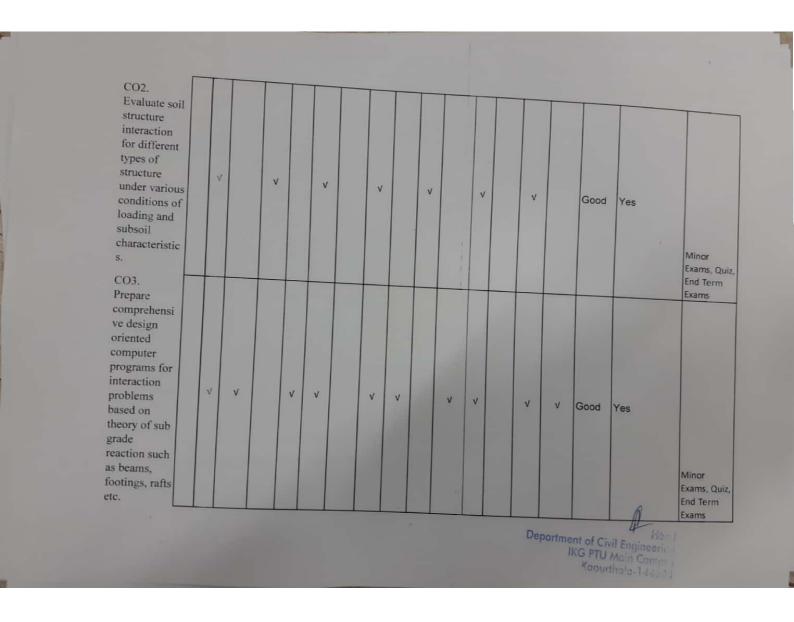
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-		PO-c				PO-g	-			1-1-	PO-	PSO- m	PSO-	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Decide the suitability of soil strata for different projects.	<b>V</b>	٧			<b>√</b>	٧			٧	٧			٧	٧		Good		Minor Exams, Quiz, End Term Exams

CO2, Design shallow foundation s deciding the bearing capacity of soil.	٧		٧	٧		٧	٧		V	v		Good	Yes	Minor Exams, Quiz, End Term Exams
CO3, Analyze and design the pile foundation	٧	٧		V	٧		٧	٧		V	<b>V</b>	Good	Yes	Minor Exams, Quiz, End Term Exams
Understan d analysis methods for well foundation	٧		٧	V		٧	٧		٧	٧		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST913 - 18 - Soil Structure Interaction



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO b		PO-			PO-g		PO-i	PO-	PO-k	PO-	PSO- m	PSO- n	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Understand soil structure interaction concept and complexities involved.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Yes	Minor Exams, Quiz, End Term Exams





MTST914 - 18 - Design of Industrial Structure



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-	PO-	PO-c	PO- d	PO-	PO-f	PO-g	PO-	PO-i	PO-	PO-k	PO-	PSO- m	PSO-		Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1. Unde	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Yes	Minor Exams, Quiz, End Term
CO2, Prepar	re ti	٧		٧		٧		٧		٧		٧		٧		Good	Yes	Minor Exams, Quiz, End Term
CO3. Condu	ict :	٧	٧		٧	٧		٧	٧		٧	٧		٧	V	Good	Yes	Minor Exams, Quiz, End Term

CO4. Conduct model testing for free and forced vibrations		٧		V		V		٧		V		٧		V		Good	Yes	Minor Exams, Qui End Term Exams
																	Yes	
MTST114 -	18 –	Nur	merica	l Ana	lysis	Lab										_		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-	PO-b	РО-с	PO-	PO-	PO-f	PO-g	PO-	PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure

CO1. Find Roots of non- linear equations by Bisection method and Newton's method.	٧	V		٧	٧		٧	V		٧	٧		٧	٧		Good	yes	Minor Exams, Quiz, End Term Exams
CO2. Do curve fitting by least square approximations		٧		V		V		٧		٧		V		٧		Good	yes	Minor Exams, Quiz, End Term Exams
CO3. Solve the system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/ Gauss - Jorden Method		٧	٧		٧	· V		٧	٧		٧	٧		٧	٧	Good	yes	Minor Exams, Quiz, End Term Exams

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IKG PTU Main Camp
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CO4. To Integrate Numerically Using Trapezoidal and Simpson's Rules	٧		٧		٧	11	٧		٧		<b>V</b>	٧		Good	yes	Minor Exams, Quiz, End Term Exams
CO5. To Find Numerical Solution of Ordinary Differential Equations by Euler's Method, Runge- Kutta Method.	V	٧		V	V		٧	٧		٧	>	V	٧	Good	yes	Minor Exams, Quiz, End Term Exams

MTST231 - 18 Mini Project



	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO b		PO- d	PO-e		PO-g		PO-i						PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Identify structural engineering problems reviewing available literature.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Yes	Minor Exams, Quiz, End Term Exams

techniques used to analyze complex structural systems.	v			٧		V	٧		٧		<b>V</b>	٧	+	Good	Yes	Minor Exams, Quiz End Term Exams
CO3. work on the solutions given and present solution by using his/her technique applying engineering principles.	,	/	٧		٧	٧	٧	٧		<b>√</b>	٧	٧	٧	Good	Yes	Minor Exams, Quiz End Term Exams

Name of the Department: Civil Engg. PhD CO PO

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	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Bridge Engineering	3																	
Course Outcome	Selection and and a character of the selection of the sel	P O- b	PO-c	PO d	P O- e	PO-f	PO-g	PO h	P 0-i	100	PO- k	PO-	PSO m	PSO-	PS O- o	Learning Level	bility / Entrepre	Assess ment Tools to Measure Attainme nt of CO

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CO1: Understand the codal provisions for loading and design standards of bridges	٧			٧		٧	٧	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO2:. Design and detail of different types of reinforced concrete bridges		٧				٧	٧	<b>V</b>	٧	٧	Ý	<b>▼</b>	Minor Exams, Quiz, End Term Exams
CO 3: Design the substructure including pier and pier cap and abutments.		٧	V			٧	٧	٧	<b>V</b>	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO 4: Design the various types of foundations for bridges and to know about their construction detail	٧			٧		٧	٧	>	<b>~</b>	<b>V</b>	٧	<b>V</b>	Minor Exams, Quiz, End Term Exams

Department of Civil Engineering
IKG PTU Main Campus
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CO 5: To know about different types of bearings, joints and handrails	٧					٧	٧	٧	٧		٧	٧	Minor Exams, Quiz, End Term Exams
CO 6: To know abo	٧			٧		٧	٧	<b>v</b>	٧		٧	V	Minor Exams, Quiz, End Term Exams

Paper: Advance Construction Technology

CO1:To develop understanding of design considerations and various aspects of stability in earthen dams.	v			, logy	٧		٧	٧	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term
CO 2: . To get knowledge about special foundations for different conditions.		٧					٧	٧	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams

CO 3: To develop a thorough understanding of structural aspects of high rise buildings and tall chimneys and also problems of high rise construction.	V	<b>v</b>		<b>V</b>			V	٧	<b>V</b>	√	٧		٧	<b>v</b>	Minor Exams, Quiz, End Term Exams
CO 4: To know the advantages of pre-fabricated construction and its design aspects.	٧	V		V			V	V	٧		٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO 5: To know basic concept of prestressing.	٧			٧	٧		٧	٧	V		٧				Minor Exams, Quiz, End Term Exams
CO 6: To get introduced to advanced construction materials like geosynthetics etc.			٧				v	V	v		V	V		*	Minor Exams, Quiz, End Term Exampari

Paper: Research Methodology

, and the second section of		2001	764															
CO1:Understand						_			Т			T	1		1			1
significance of	1	1	1							1	1							
Research and		1				1				1	1						1	
literature survey,			l									1						
types and		1										1			1			
teachniques of	V	V	V			V	V		١.,		١.	Ι.						1
carrying out		'	*			"	V		\ \ <b>v</b>	∨	٧	<b>V</b>	٧		٧	٧	\ \	
research. Learn						ŀ												Minor
literature survey	1			1						1				ľ				Exams,
and how to																		Quiz, End
conduct review.				1														Term
	_	-	-	-	_	_		<u> </u>	<u> </u>	_								Exams
CO2:Formulate a																		
research problem	V	V		٧		1	V		٧	V	V	V	V			V	v	
											1 = 1					_	,	
CO3: Learn																		
various																		1 2
techniques of																		
data collection		٧		٧		٧			٧	٧	٧	٧	٧			٧	٧	1
and sampling																		
methods																		
CO4:Analysis of																		Minor
data with									v	V	v	v	v			,,		Exams,
statistics										.	١ '	١ '	•			٧	٧	Quiz, End
													i,					Term
ı L									$\perp$									Exams

CO5: Enabling the students develop a proposal and methodology in detail. Develop a thesis using latest software tools.	V	V V	<b>V V</b>	√	V	
CO6: Understanding Ethics in Research and develop a research paper		V	<b>V V</b>	٧	٧	Minor Exams, Quiz, End Term Exams

Advanced	<b>Foundation</b>	Design and	Construction
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CO1: Identify and formulate solution to design foundation system for a structu	V		٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	Minor Exams, Quiz, End Term Exams
CO2: Analyse and design pile foundations.	٧	٧		٧		٧	٧		٧	٧	٧	٧	٧.	٧	Minor Exams, Quiz, End Term Exams

CO3: Evaluate the importance of well foundation, retaining wall, sheet piles and shoring.	٧	٧	٧	٧	>		>	>	¥-	٧	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO4: Suggest suitable ground improvement technique for specific soil.				V			٧	٧			<b>&gt;</b>	٧	٧	√	٧	
CO5: Examine and discuss effects of earthquakes and construction under water on foundations	٧	v	٧				٧	٧		٧	٧	٧	٧	V	٧	Minor Exams, Quiz, End Term Exams

Paper: Environment Engineering and Management

CO1:Learn how to characterize water and wastewater.	V	٧	٧		٧	V		8	٧	. <b>V</b>	٧	>	٧		٧	v	Minor Exams, Quiz, End Term Exams
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CO2:Grasp the fundamentals of air pollution and its associated environmental impacts.	V	V		٧	V		V	٧	٧	v	<b>V</b>	V	٧	Minor Exams, Quiz, End Term Exams
CO3:Earn to describe the key concepts of air quality management	V	V		<b>v</b>	٧		٧	<b>v</b>	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO4: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare		v		٧	٧		V	٧	٧	V	٧	V	٧	Minor Exams, Quiz, End Term Exams
CO5:Appreciate the importance of EIA as an integral part of planning process.		٧		٧	٧		٧	٧	٧	٧	٧	. V	٧	Minor Exams, Quiz, End Term

Paper: Advanced Geoinformatics

- Speri Advanced	COIL	HOLL	natic	2													
CO1:Identificati on of rocks and														.66			
minerals, their																1	Minor
characteristics,	V	V	V		٧	V		V	٧	V	٧				V	<b>√</b>	Exams,
mode of occurence				ŀ									1	İ			Quiz, End
occurence																ĺ	Term Exams
CO2:The basic			-	<u> </u>				-	_	-			-			/	Exams
concepts of																1	
geological													1				
processes and		V			V			V	v	V	٧				v .	V	
their importance in Civil			ļ						i	-					٠		
Engineering														1			
Engineering																	
CO3: Principles																	
of Remote																9	
Sensing and		٧			V			V	v	٧	v	٧			V	V	
Photogrammetry											Ė	·			•	•	
		$\dashv$							-								
CO4: GIS and																	Minor
data models						1		v	V	v	V	v			٧	V	Exams,
											•				V	V	Quiz, End
									l		-						Term
CO5: Hyper		$\dashv$	$\neg$				$\neg$			-		_					Exams
spectral remote								V	V	V	V	٧			٧	٧	
sensing						_									_		

Paper: Civil Engineering Applications of Remote Sensing and GIS

CO1 Understand Photogrammetry: types, calculations and interpretation	V	٧		٧		V	٧	٧	<b>V</b>	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO2: Understand Principles of Remote sensing and Satellite images	٧	V	v		٧			٧	٧	<b>&gt;</b>	<b>V</b>	٧	٧	٧	
CO3: Understand GIS and its Data models. Global positioning system, Applications of Remote Sensing		V						٧	٧	٧	٧	٧	٧	<b>V</b>	
CO4: Remote Sensing and GIS data modeling in environment, urban planning and site selection								v	٧	٧	٧	٧	٧	٧	Minor Exams, Quiz, End Te <b>D</b> eparti

Exams,
Quiz, End
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Pavement design,																
CO1: Design of pavement using various methods.	٧			V		٧		V	٧	٧	٧		٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO2: Analysis and design of rigid pavement.	V	٧			٧			٧	٧		>	٧		٧	٧.	Minor Exams, Quiz, End Term Exams
CO3: Understand various methods of pavement construction.	V	٧	٧		,			٧	٧		٧	٧		٧	٧	Minor Exams, Quiz, End Term Exams
CO4: 4. Generate Pavement maintenance management							· r	√	٧		٧			V	٧	

Paper: Hydrauli	c Engi	neer	ing													
CO1: Develop																
forecasting				1	_	l		1		1				İ		Minor
models for	1,		1	1,		١,,	,	١,,	,,	١,,	١.,	١.,	٠,	.,		Exams,
operation of	"		1	"		\ \ \		*	ľ	<b>'</b>	*	<b>'</b>	\ \	V	\ \ \	Quiz, End
hydrologic	1		1	1												Term

system

systems

CO2:Formulate and solve conjunctive use of surface water and groundwater resource utilization problem	٧	٧		٧		٧		٧	٧	٧		V	٧	Minor Exams, Quiz, End Term Exams
CO3:Design spillways and energy dissipation structures	v	٧	V	v		٧		٧	٧		-	٧	٧	Minor Exams, Quiz, End Term Exams
CO4:Understand the characteristics of Soft Computing Techniques								٧				٧	٧	

## **COMPUTER AIDED DESIGN METHODS**

CO1: Learn how to use CAD and its scope.	>			>	٧	>			٧	<b>V</b>	٧	<b>V</b>	٧			٧	٧	Minor Exams, Quiz, End Term Exams
--	---	--	--	---	---	---	--	--	---	----------	---	----------	---	--	--	---	---	---

CO2: Identification of computer graphics like clipping, segmentation, shading etc.	٧	V			V		v	V	٧	V		٧	٧	Minor Exams, Quiz, End Term Exams
CO3:Understand computer aided linkage displays and synthesis.	٧	٧	V		٧		٧	٧	. •	٧		٧	٧	Minor Exams, Quiz, End Term Exams
CO4:Enabling the students to develop various matrix methods of structural analysis.							٧	٧	٧			V	V	
CO5: Evaluate data base management and retrieving of data.	٧	٧	<b>v</b>	<b>V</b>			٧	٧	٧	٧		٧	٧	Minor Exams, Quiz, End Term Exams

**ADVANCED STRUCTURAL ENGINEERING** 

CO1:Evaluate and analyze three dimensional elasticity problems.	٧			٧		V	The second second	v	V	V	V	v	٧	٧	٧	Minor Exams, Quiz, End Term Exams
CO2:Understand or learn matrix methods of structural analysis with computer program.	V	v			٧	×		٧	٧	٧	٧	٧		٧.	<b>V</b>	Minor Exams, Quiz, End Term Exams
CO3:Analyze and design of plate and shell structures using proper software.	٧	٧	٧					٧	٧	<b>V</b>	٧			v V	٧	Minor Exams, Quiz, End Term Exams
CO4:Understand multi – variable and multi – objective optimization								v	V	v				٧	٧	

GEOTECHNICAL ENGINEERING

	_	_		_	 	1.5									-
CO1: Analyze and identify problems related to foundations for earthen dams/slopes on expansive soils	٧			V	٧		v	٧	V	V	٧		V	٧	Minor Exams, Quiz, End Term Exams
CO2: Understand the behaviour of rocks under dynamic conditions.	· v	٧					V	٧		٧			٧	٧	Minor Exams, Quiz, End Term Exams
CO3: Apply Finite element method to geotechnical problems	٧	٧	٧				٧	٧		٧			٧	٧	Minor Exams, Quiz, End Term Exams
CO4:Analyse and Specify site investigation techniques for report writing of Pile and Infrastructure projects			****				>	<b>V</b>		٧			٧	٧	

**Town & Country Planning** 

CO1: Understand the Basic Definitions, Concepts related to Town Planning, Infrastructure Development, etc.	٧		٧		V					٧	٧	٧		٧	٧	Minor Exams, Quiz, End Term Exams
CO 2: To develop: an appreciation of the scope and breadth of planning practice as it has emerged historically and in its contemporary manifestation in India and abroad.		V	2	V		,	<b>√</b>	<b>v</b>	<b>v</b>	<b>v</b>	<b>v</b>		<b>v</b>	V	V	Minor Exams, Quiz, End Term Exams

CO 3: To explore the capacities for planners to work collaboratively in addressing transportation and urban infrastructure	V	٧		٧	V		٧	٧		٧	٧	Minor Exams, Quiz, End
infrastructure challenges.					п							Term Exams

Name of the Department: Civil Engg.

BTCE	-301:	Fluid	Mechan	nics-I

	Engineering Knowledge	Problem	Design/develo	Conduct investigations	Modern tool	The engineer and society	Environment	Ethics	Individual and	Communicatio	Project	Life-long	Analysis and Design Skill	Research and Innovation	Sustainable		
Course Outcome	РО-а	PO-	PO-	PO-	PO-e	PO-f	PO-	PO h	PO i	- PO j	P O- k	P 0- 1	PS O- m			Learning Level	Measure

1111	Т	1		1	_									
the knowledge of the basic principles of fluid mechanics for analysis and														
design of type of flow regime in a given														
engineering system, to construct an appropriate (fixed,	٧		V		٧	V	V	V	V	1		Cood		
deforming, or moving) control volume for a given engineering system and apply the principles of conservation of mass,									V	V	V	Good	Employability	Minor Exams,
momentum, and energy to														Quiz, End Term Exams

CO 2: Ability to calculate the hydrostatic forces and moments on planar and			and the sales								
curved submerged and floating surfaces to analyze fluid flow problems with the	٧	٧	٧			٧	٧	V	Good	Employability	
application of the momentum and energy equations.											Minor Exams, Quiz, End Term

	1	1			 											
CO 3: Ability to present data or governing equations in non-dimensional form, design experiments, and perform model studies and to decide when appropriate to use ideal flow		V	V			V	V	V			V	V	V	Good	Employability	
concepts and the Bernoulli equation.																Minor Exams, Quiz, End Term Exams
CO 4: Ability to solve for internal flow in pipes and channels through simple solutions of the Navier-Stokes equations, Moody chart and head-loss equations.		٧	٧	٧	٧	V	<b>V</b>		V	V	V		٧	Good	Employability	Department IKC  Minor Exams, Quiz, End Term Exams

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	Ι	Т	1	<u> </u>	Т	T	1	Г	Т	Τ	Т	1	Г	_		T		
CO 5: Ability to solve for external flow, evaluate lift				2														
and drag,			BATTLE OF													Street and the second		
know when there is possibility of flow separation, apply streamlining	٧		٧		v		٧		٧		٧		٧		٧	Good	Employability	
concepts for drag reduction by using experimental correlations																		Minor Exams, Quiz, End Term Exams
CO 6: An understanding of how fluid mechanics applies to Civil, biological and environmental	V		√.	V		٧		٧		٧		٧		٧		Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE-302:

Rock Mechanics & Engineering Geology

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-	PO-	PO-e	PO-f	PO-		PO-	PO-	P O- k	P 0-	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Students will be able to critically review the importance of Engg. Geology and their applications to Civil Engineering practices.	٧	٧	٧	٧	٧	√	٧	٧	٧	<b>v</b>	<b>√</b>		<b>√</b>	· V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

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CO 2: Students will be able to identify and classify common minerals and rocks using		٧		٧		٧		٧		٧		٧		٧		Good	Employability	
basic geological classification system.																		Minor Exams, Quiz, End Term Exams
CO 3: Students will be able to know about Geological structures (Joint, veins, crack, faults, and fold), reasons of formation for each type and their side effects on the engineering projects.	٧	٧	V	V	V	٧	٧	V	V	V	V	V	V	V	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

			ı	<u> </u>	_		ı -		I		T			1		<u> </u>	<del></del>	
CO 4: Students will be able to know the characteristics of earthquake and measures taken to construct structures like		٧		٧		٧		٧		٧		٧		٧		Good	Employability	
tunnels, highways,																		Minor Exams,
dams etc. in rocks.																		Quiz, End Term Exams
CO 5: Students will be able to determine physical and Civil properties of rock in term of density, porosity, permeability, and hardness.	٧	<b>V</b>	٧	٧	V	V	٧	٧	٧	٧	٧	٧	٧	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

		т —			т —	Ι	Т		Г	Т				т —	Г			1
CO 6: Students will have knowledge of																		
Field and laboratory test procedures and be able to interpret test results needed to estimate intact and rock		٧		٧		٧		٧		٧		٧		V		Good	Employability	Minor Exams,
mass properties.																		Quiz, End Tern Exams
CO 7: Students will be to identify problems in rock mass and able to provide improvement in the properties of rock mass.	٧	V	V	٧	٧	٧	٧	٧	V	٧	V	٧	٧	V	٧	Good	Employability	Minor Exams, Quiz, End Tern Exams

CO 8: Students will be able to understand the role of																		
Geology in the design and construction process of underground opening in Rock.		٧		٧		٧	100 to 10	٧		٧		٧		٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 9: Students will be able to apply geological concepts and approaches on rock engineering projects	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE-303: Strength of Materials

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	РО-а	PO		PO-	PO-e				PO-		P O- k	P 0-	PS O-m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Concepts of free body diagrams of structures and to check stability (Beams and frames)	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

	<u> </u>	T	Ι	Π	Τ		T	Т	Т	Т	Т	Т		Т	Т	Ī		
CO 2: Concepts of stress and strain of axially loaded members, Civil and thermal properties.		V	٧		٧	٧		V	٧		✓	V		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Concepts of shear force and bending																		
moment diagrams of different beams with different loading conditions and relation between loads, shear force and bending moment	٧	V	V	٧	V	V	٧	V	V	V	٧	٧	V	V	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

		<u> </u>	<u> </u>		П				Π	Τ	1			Τ	<u> </u>	I	1	1
CO 4: Concepts of straight beams,																		
bending stress of beams, flitched beams, shear stress formula for beams and shear stress distribution in		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term
beams.				A CONTRACTOR OF THE PERSON OF														Exams
CO 5: Concepts of crippling load of an axially loaded column under different end conditions.	V	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Concepts of torsion and failure theories		٧	٧		٧	٧		٧	٧		٧	٧	۰	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE-304:

Surveying

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-		PO-	PO-	PO-f	PO-		PO-	PO-	P O- k	P 0-1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Understand the principles and objective of surveying.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Calculate the horizontal distance on plane and sloping surface.		٧	٧		٧	٧		√	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

	A A SULL AND A SULL AN																	
CO 3: Do angular and elevation measurements with different types of equipments.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Analyze the closed traverse and will be able to balance it.		٧			٧			٧			٧			٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design simple circular curves for horizontal and vertical alignments.	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Plot the topographical map of an area	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE-305: Building

Materials

and

Construction

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	BO	PO-	PO- d	PO-e		no		PO-	PO-	D	P 0-	PS O- m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Students will have sufficient knowledge of materials in construction	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Students will be able to design the concrete mixes according to the situations		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Employability	Department IKG Minor Exams, Quiz, End Term Exams

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co 3: Students will have sufficient knowledge to think critically in terms of achieving the goals of "Shelter for all".	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	V	٧	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Students will have knowledge of the revolutionary materials in construction		٧			٧			٧			٧			٧		Good	Employability	Minor Exams, Quiz, End Term Exams Minor Exams,

BTCE-306: Fluid Mechanics Lab

Engineering Knowledge
Problem Analysis
Design/development of solutions
Conduct investigations of complex problems
Modern tool usage
The engineer and society
Environment and sustainability Ethics
Individual and team work
Communication Project management and
Life-long Learning
Analysis and Design Skill
Research and Innovation
Sustainable Outlook

Course Outcome	PO-a	PO-	PO-c	PO- d	PO-e	PO-f	PO-g	PO h	PO-	PO j	P O k	0-	PS O- m	PS O- n		LLOSPBIRA	Focus on Employabilit y / Entrepreneurship	Assessment Tools to Measure Attainment of
CO 1: Predict the metacentric height of floating vessel and appreciate its utility in vessel design.	٧	٧		V	٧		٧	٧		٧	٧		V	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Calibrate various flow measuring devices (venturimeter, orifice meter and notches).	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	√	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Authenticate the Bernoulli's theorem experimentally	6	√	٧		√	√		٧	٧		٧	٧	c	٧	٧	Good		Minor Exams, Quiz, End Term Exams
CO 4: Assess the discharge of fluid over broad crested weir	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Department of CIKG PTU Kap Minor Exams, Quiz, End Term Exams

Civil Engine U Main Car ourthala-14

ourse Outcome	РО-а	PO-	PO-c	PO-	PO-	PO-f	PO- g	PO-	PO-	PO-j	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Employabilit y /	Assessment Tools to Measure Attainment of CO
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
of concepts and their pplications in the laboratory.  3TCE-307: S	treng	th of	Mate	rial L	∆ab													Minor Exams, Quiz, End Term Exams
CO 6: Compare ood inderstanding	V	√.	٧	٧	V	٧	٧	٧	٧	٧	V	V	٧	٧	٧	Good	Employability	
CO 5: Compute various losses and velocity in pipe flow in ield	( S. 1884)							2000								Good	Employability	Minor Exams, Quiz, End Term Exams

CO 1:

the

Understand

physical

steel.

importance of

properties of

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V

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Department of Civil Engin IKG PTU Main C Kapurthala-

Skill
Development
Minor Exams,
Quiz, End Term
Exams

Good

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CO 2: Identify and comprehend code provisions for testing different properties of steel.		٧	٧		V	V		V	٧		٧	V		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 3: Develop stress –strain curve for axial compression, axial tension and shear.	٧	٧	٧	V	٧	V	٧	٧	٧	٧	٧	٧	V	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 4: Evaluate fatigue and impact strength of steel using suitable equipment.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 5: Assess hardness of steel using Rockwell and Brinell apparatus.	٧		Q.	٧			٧			٧			٧			Good	Skill Development		PTU Main C Kapurthala-1
CO 6: Compute load carrying capacity of a leaf spring.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	

BTCE-401: Geomatics Engineering

	Engineering Knowledge	Problem Analysis	Design/development o	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	and tinance Life-long Learning	Analysis and Design Skill	Research and	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-	PO-	PO-	PO-f	PO-	PO-	PO-		P O- k	P 0-	PS O- m		PS O-	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Get a brief idea about history of Photogramme try and its advancement in the field of surveying	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: To aware students the different methods of survey measurements using EDM		٧	٧		٧	٧		٧	٧	Ü	√	V		٧	٧	Good		Minor Exams, Quiz, End Term Exams

CO 3: To aware students to different types of Total	V	V	V	V	V	V	V	V	V	V		/   ,	/ V		/   v	Good	Skill Development	
station and make them able to use it in field.																		Minor Exams, Quiz, End Term Exams
CO 4: To aware students the different																		LAGIIIS
components, uses, and operations involved in Remote Sensing		V			٧			٧			V			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: To introduce the concept of GIS, Its different Components and application in the field of Civil Engineering field.	٧		٧	٧	<	٧	٧		٧	٧		V	V		V	Good		Department of IKG For King For
CO 6: To aware students to different types of GPS Recivers.	٧	√	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good		

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	Engineering Knowledge	Problem Analysis	Design/developmen t of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project	Life-long Learning	Analysis and Design Skill	Research and	Sustainable Outlook			
Course Outcome	PO-a	PO.			PO-		BO		PO-		D	P 0- 1	PS O- m	PS O- n	PS O-	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Design the bar charts and milestone charts for residential construction buildinigs.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Apply the PERT and CPM techniques to the various complex civil engineering projects	6.		√			٧			√			٧	٥		٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE 402: Construction Machinery and Works

	Т	T	T	T	T	1	1	T	т—		_	_	_		_			
CO 3: Solve the optimistic time and minimum cost for the various projects by applying various methods.	٧	٧	٧	V	V	٧	V	V	V	V	V	٧	٧	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Design and use the different construction machinery in order to get the maximum output.	٧			٧			٧			٧			٧			Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: 5Understand the operations of concrete batching and bitumen plants	٧	٧	٧	٧	V	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	Good		Minor Exams, Quiz, End Term Exams

BTCE-403: DESIGN OF CONCRETE STRUCTURES -1

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	BO	PO-	PO-			DO		PO-		D	P	PS O-m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Identify and utilize the cement, steel, aggregates and admixtures to obtain the desired reinforced cement concrete.	٧	<b>V</b>	t .	√	√		<b>V</b>	٧		٧	√		٧	<b>V</b>		Good	Employability	Departmer IK Minor Exams, Quiz, End Term Exams

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CO 2: Prepare concrete mixture having desired properties and assess its quality in fresh and hardened state using Indian		V	V		V	٧		V	V		V	V		v	٧	Good	Employability	Minor Exams,
standard methods.																		Quiz, End Term Exams
CO 3: Ability to understand difference between Working stress and Limit State Philosophy by calculating various design parameters.	٧	٧	V	٧	٧	٧	٧	V	✓	٧	V	V	V	V	٧	Good		Minor Exams, Quiz, End Term Exams

		T	T	T	1	Π	T	Т	Π	Т	Т	Т	Г	Т	Т	T	1	1
CO 4: Analyze a reinforced concrete member under flexure, shear and torsion using limit state design philosophy.	٧	٧		٧	V		V	V		٧	V		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design the reinforced concrete beams and slabs using limit state design guidelines of Indian standards.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Access the structural safety and serviceability of reinforced concrete beams and slabs as per Indian standards for Limit state design	<b>√</b>	٧		٧	✓		٧	<b>∨</b>		٧	٧		٧	٧		Good		epartment of Civi IKG PTU Kapur Minor Exams, Quiz, End Term Exams

BTCE- 404: Fluid Mechanics-II

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO		PO-	PO-e	PO-f	BO		PO-		D	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Distinguish and identify different types of fluid flow.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Formulate equation of flow through different media/obstruc	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	D	epartment of Civi IKG PTU Kapu Minor Exams,
tions for a laminar and turbulent flow.							88791 TS 4879											Quiz, End Term Exams

		T	Π	Τ	T	Π	Τ	Π	Π	Τ	T	T		T	T			T	1
CO 3: Apply the principles of conservation of energy and momentum in the flow studies in open channels and simple pipe network.		<b>V</b>	٧		V	٧		V	V		V	٧		٧	V	Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 4: Design pipe network and open channels for passing a given discharge.	٧	٧		٧	V		٧	٧		٧	V		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 5: Evaluate the effect of channel shapes on the discharge parameters.			٧			٧	s.		٧			٧			٧	Good	Employability	Minor Exams, Quiz, End Term Exams	<b>P</b>
CO 6: Understand and apply the theory of hydraulic jumps and surges.	٧	٧	٧	٧	٧	٧	٧	√	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Departme II Minor Exams, Quiz, End Term Exams	nt of Civil KG PTU M Kapurl

BTCE-405: IRRIGATION ENGINEERING -I

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-	PO-	PO-e	PO-f	PO-		PO-	PO j	B	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Identify the basic understanding of soil water plant relationship.	٧	٧		٧	٧		V	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Understand different irrigation techniques and the related theories.		٧	٧		٧	٧		٧	٧		٧	٧		√ .	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Apply different theories/meth ods to design lined and unlined canals.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Department IKG Minor Exams, Quiz, End Term Exams

nt of Civil E G PTU Mai Kapurtha

ourse utcome	PO-a	PO- b	PO- c	PO-	PO-	PO-f	PO-	PO- h	PO-	PO-	P O- k	P O- I	PS O- m	PS O- n	PS O- o	Learning Level	Employabilit y / Entrepreneu	Assessment Tools to Measure Attainment of
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			partment of Civil E IKG PTU Ma Kapurth
CO 6: Demonstrate the knowledge related to the water logging, osses, economics of ining, etc.		√ × STI	√ RUC?	ΓURA	V LA	√ NALY	SIS-	√ •I	V		V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design different nydraulic structures equired for effective river raining works				٧			V	· Daniel :		٧			٧		San San San San San San San San San San	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Estimat the yield of tube-well using differen formulae.		V			V			٧			V	,		V		Good	Employability	Minor Exams, Quiz, End Term Exams

	T	Π	T	T		T	T	Π	T	Π	Π		Π	Π	T	T	
٧	٧	٧	V	V	٧	V	٧	٧	٧	<b>V</b>	٧	٧	V	٧	Good	Skill development	Minor Exams, Quiz, End Tern Exams
٧	V		V	٧		V	V		V	٧		٧	٧		Good	Skill development	
																	Minor Exams, Quiz, End Term Exams
	٧	٧		٧	٧		٧	٧		√	V		٧	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams
٧	<b>V</b>	٧	٧ .	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams
	٧	V V	V V	V V												V         V	V V V V V V V V V V V V V V V V V Good development  V V V V V V V V V V V V V V Good Skill development

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-c	PO-	PO-	PO-f	PO-	PO-h	PO-	PO j	P O- k	P 0-	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Evaluate properties of various building materials, such as cement, aggregates, bricks and tiles.	٧	V		٧	٧		٧	٧		V	V		٧	√		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Conduct experiments and check the acceptance criteria (if any).		٧	٧		√	٧		٧	٧		<b>V</b>	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 3: Design concrete mixes by relevant code provisions.	٧	V	٧	٧	٧	٧	V	V	٧	V	٧	V	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Analyze the properties of concrete in fresh and hardened state.	V	V		V	٧		٧	٧		٧	٧		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Create a well-organized document and present the results appropriately.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	<b>V</b>	√	Good		Minor Exams, Quiz, End Term Exams

BTCE-408:	Engineering Knowledge	Problem Analysis	evelopment of	Conduct investigations of complex problems	l usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	long Lea	Analysis and Design Skill	Research and	Sustainable Outlook		De	partment of Civil E IKG PTU Ma Kapurth	Head Engineering ain Campus ala-1448
Course Outcome	PO-a	PO-	PO-	PO-	PO e	PO-f	PO-	PO-h	PO-	PO-	P O- k	P O- I	PS O- m	PS O- n	PS O- o	Learning Level		Measure	

CO 1: Verify theoretical formulas by conducting experiments.	٧	٧	٧	٧	٧	٧	V	V	٧	٧	٧	٧	٧	٧	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 2: Predict the behavior of statically determinate beams and trusses.		V			V			٧			٧			٧		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 3: Understand two hinged arch and three hinged arch structures.	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 4: Demonstrate the influence lines for statically determinate and indeterminate beams.	٧	√ .	٧	٧	<b>V</b>	٧	√	٧	٧	٧	√	٧	٧	√	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams

CO 5: Observe and compute deflections of simply supported beams, curved beams and frames using classical methods.		٧			٧			٧			V			٧		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 6: Outline the deflected shapes of columns and struts with different end conditions	V		٧	٧		٧	٧		٧	√		√	٧		٧	Good		Minor Exams, Quiz, End Term Exams

BTCE-501: DESIGN OF STEEL STRUCTURES -1

¢ .	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of		The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	long Lea		Research and	Sustainable Outlook			Department of Civil IKG PTU M Kapurti	ain Can
Course Outcome	PO-a	PO-	PO-	PO-	PO-	PO-f	PO-	PO-	PO-	PO-	P O- k	P O- I	PS O- m		PS O- o	Loamina	Focus on Employabilit y / Entrepreneu rship	Measure	

	1	T	T	T	T	T	1	T	1	1	Т	1	Т	1	_	Т		
CO 1: Recognize the properties of structural steel and permissible stresses under different types of loading conditions as per Indian	٧	V		V	V		V	V		V	V		V	V		Good	Employability	
standards for limit state design.																		Minor Exams, Quiz, End Term Exams
CO 2: Estimate safe load carrying capacity and efficiency of different steel fasteners like rivets, bolts & welds.	٧		٧	V		٧	٧		<b>V</b>	٧		٧	√		√	Good		Minor Exams, Quiz, End Term Exams

CO 3: Salast										1	1		1	
co 3: Select safe and economical steel sections for different structural members		٧	V	٧	٧	٧	٧	V	٧	٧	٧	Good	Employability	
under various loading/stress conditions.														Minor Exams, Quiz, End Term Exams
CO 4: Analyze forces and stresses in tension, compression, flexural members and roof truss members of structural steel.	,	V		٧		٧		V		<b>√</b>		Good	Employability	Minor Exams, Quiz, End Term

CO 5: Design steel structura members i.e.																		
ties, struts, beams, columns, bases, roof trusses, other associated components and connections	٧		٧	٧		V	V		V	V		V	٧		V	Good	Employability	
under different conditions of limit states.																		Minor Exams, Quiz, End Term Exams
CO 6: Evaluate structural safety, stability and economy of various steel structural members to achieve sustainability	√ .	√		٧	<b>v</b>	6	V	V		V	<b>V</b>		٧	V		Good	c	Minor Exams, Quiz, End Term Exams

BTCE - 502: Geotechnical Engineering

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-c	PO-d	PO-	PO-f	PO-	PO h	PO-	PO	P O- k	P 0- 1	PS O- m		PS O-		Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Comprehend the various geotechnical field challenges and understand their fundamental, index and engineering properties and then use (apply) the soil as an engineering material.	V	٧	٧	V	٧	٧	<b>V</b>	٧	٧	<b>V</b>	✓	V	٧	V	٧	Good		Minor Exams, Quiz, End Term Exams

	T	1	Т	T	T	T	T	1	Т	1	Т	_	Т	1	T			
CO 2: Apply the various specifications of compaction of soils in the construction of highways and earthen dams.		V			\ \			V			V			V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Able to																		
apply the knowledge of consolidation, soil deformation parameters, and calculate	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good	Employability	
settlement magnitude and															*			Minor Exams,
rate of settlement.																		Quiz, End Term Exams

	т —		_															
CO 4:																		
Investigate and write the laboratory reports for soil design properties and parameters by apply the		٧			٧			V			V			V		Good	Employability	
concept of total and effective stress approaches in soil strength determination																		Minor Exams, Quiz, End Term Exams
CO 5: Design the embankment slopes and check the stability of finite slopes.	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good		Minor Exams, Quiz, End Term Exams

BTCE-503: STRUCTURAL ANALYSIS-II

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-c	PO-	PO-	PO-f	PO-	PO h	PO-	PO-	_	P	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Identify determinate and indeterminate structures and compute the indeterminacie s of those structures.	V	√		٧	٧		٧	٧		V	V		٧	V		Good	Skill development	Minor Exams, Quiz, End Term Exams

	T	T	Π	Π	T	Τ	T	T	Т	T	T	Т	Т	T	Г	T		T
CO 2: Predict the response of structures ((Beams, frames and trusses) in terms of bending moments, shear forces and displacements using classical	00152.00	V	٧		V	V		V	V		٧	V		V	٧	Good	Skill development	Minor Exams, Quiz, End Term
methods.  CO 3: Apply methods for analysis to indeterminate structures i.e. conventional methods and approximate methods to various structures.	V		√	V		٧	V		V	٧		√ V	V		V	Good	Skill development	Minor Exams, Quiz, End Term Exams

CO 4: Understand the causes of additional stresses in																		
beams, arches, trusses & frames and draw the ILD of various force quantities.		٧			٧	,		٧			V			٧		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 5: Suggest suitable method for analysis of different types of multistoried frames.	٧		V	٧		٧	٧		٧	٧		√	٧		٧	Good		Minor Exams, Quiz, End Term Exams

	Engineering Knowledge	Problem Analysis	Design/developme nt of solutions	ond	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work		1	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable		Depa	rtment of Civil Eng IKG PTU Main Kapurthala	Head pineering Campus -144603
Course Outcome	PO-a	PO-	PO-	PO- d	PO-	PO-f	PO-	PO-	PO-	PO-	P O- k	P O- I	PS O- m	PS O- n	PS O- o	Learning Level		Assessment Tools to Measure Attainment of CO	

CO 1: Appreciate the importance of different modes of transportation and characterize the road transportation.	٧	٧		٧	V		V	V		٧	V		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Align and design the geometry of pavement as per Indian Standards according to topography.		٧	٧		٧	٧		V	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Assess the properties of highway materials in laboratory.	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams

		Т	_	Г	Т	Г	Т	Г		Т	Т	Т		Т	Т	T		
CO 4: Understand the importance of drainage, construction methods for various roads, pavement failure and its maintenance.	٧	٧		٧	V		V	V		V	٧		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Compute the transportation cost of highway project and outline the sources of highway financing.	٧		٧	٧		٧	٧		٧	٧		٧	٧		V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Interpret the traffic data after conducting traffic survey and describe the traffic characteristics, traffic safety and traffic environment interaction.	V	٧		V	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Department of CIKG PTI Kap  Minor Exams, Quiz, End Term Exams

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BTCE-505: Environment Engineering-I

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome	PO-a	PO-	PO-c	PO- d	PO-	PO-f	PO-		PO-	PO-	P O- k	P O- I	PS O- m	PS O- n	PS O-	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Understand the different water demands their estimation and forecasting.	٧	V	٧	٧	V	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams	1
CO 2: Understand sources of water and their development.		٧			٧			٧			٧			٧		Good	Employability		of Civil E PTU Mai Kapurtha
CO 3: Analyze water quality parameters.	٧		٧	<b>V</b>		٧	٧		٧	٧		٧	٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams	

CO 4: Understand and design water treatment processes.	٧	٧		٧	V		٧	٧	~	V	٧		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design Water conveyance systems.																Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Develop and design drinking water system for rural areas	V		٧	٧		٧	٧		٧	٧		√	٧		٧	Good		Minor Exams, Quiz, End Term Exams

BTCE-506: Transportation Engineering Lab

	Engineering Knowledge	Problem Analysis	Design/development of solutions	investigations ex problems	l usage	The engineer and society	nment and	Ethics	Individual and team work	Communication	Project management	Lea	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		De	partment of Civil IKG PTU M Kapurth	Head Engineering ain Campus ala-144603
Course Outcome	PO-a	PO- b	PO-	PO-	PO-e	PO-f	PO-	PO h	PO-	PO-	P O- k	P O- I		PS O- n	0-	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	

		Т	T	T	Τ	Γ	Т	Т	Π	Т	Т	Т	Γ	Т	Т	Γ	Т	T
CO 1: Characterize the pavement materials as per the Indian Standard guidelines.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	. V	٧	٧	V	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Evaluate the strength of subgrade soil by CBR test.	٧	٧		٧	٧	300 16	V	٧		٧	٧		٧	V		Good	Employability	Minor Éxams, Quiz, End Term Exams
CO 3: Conduct experiments to evaluate aggregate properties.			٧			٧			٧			٧			٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Determine properties of pitumen material and mixes	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Evaluate the pavement condition by rough meter and Benkelman beam test.			٧			٧			٧			٧		6	٧	Good	Employability	Department of IKG P K Minor Exams, Quiz, End Term Exams

Civil Engine 'U Main Ca purthala-14

CO 6: Create a well-organized report and	٧		٧	٧	V	V	٧	٧	٧	٧	٧	Good	Employability	
present the results appropriately		901 45		Manager 1										Minor Exams, Quiz, End Tern Exams

BTCE-507: Geotechnical Engineering Lab

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations complex problems	Modern tool usage	The engineer and socie	Environment and sustainability	Ethics	Individual and team wor	Communication	Project management ar finance	Life-long Learning	Analysis and Design Sk	Research and Innovation	Sustainable Outlook				
Course Outcome	PO-a	PO-	- PO- c				P.O.		PO-		Р	Р	PS		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Understand the procedure for classifying coarse grained and fine grained soils.	<b>V</b>		٧	٧		٧	<b>V</b>		· <b>V</b>	٧		٧	٧		٧	Good	Employability		Civil Engir

	Π	T	1	Π	Τ		Π	Т	Т	Т	Т	Т	Т	T	Т	T		T
CO 2: Evaluate the index properties of soil.																Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Determine the engineering properties of soil.		V	٧		٧	V		٧	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Interpret the results of compaction test for	٧	V		٧	V		٧	٧		V	V		٧	V		Good	Employability	
relative compaction in the field.																		Minor Exams, Quiz, End Term Exams
CO 5: Apply modern engineering tools effectively and efficiently for			√			٧			٧			٧			٧	Good	Employability	
geotechnical engineering analysis.				¢					¢.									Minor Exams, Quiz, End Term Exams

CO 6: Conduct experiments, analyze and interpret	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	V	Good	Employability	
results for geotechnical engineering design.						KW-1												Minor Exams, Quiz, End Term Exams

BTCE-508: Computer Aided Structural Drawing

BTCE-508: C	Engineering Knowledge	Problem Analysis	Design/development of solutions	investigations ex problems	Modern tool usage	_	Environment and sustainability	Ethics	Individual and team work		Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	ш ⊻ PO-а	PO-	PO-c	PO-			PO.		PO-		P	P 0-1	PS	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Create, dimension and sketch a plot/plan for representation /expression of civil engineering designs.	٧	٧		٧	٧		٧	✓		٧	√ '		٧	✓		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 2: Draft construction/d esign drawings including structural drawings for civil engineering projects.		٧	٧		٧	V		٧	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Produce structural drawing of reinforced concrete elements such as beams, slabs and staircases.	<b>V</b>	٧		٧	٧		٧	٧		٧	V		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Develop structural drawing of steel elements such as connections, tension members, compression members, beams, column base and roof trusses.	√		√	٧		٧	V		V	<b>V</b>		V	V		٧	Good	Employability	Departmen IK Minor Exams, Quiz, End Term Exams

ortment of Civil E IKG PTU Ma Kapurth

CO 5: Understand various connection details.		V			V			٧			V			٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Gain proficiency in CAD software.	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE 601: Design of Concrete Structures-2

	Engineering Knowledge		Design/development of solutions	investigations of problems		d society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-		PO-				PO-		D	Р	PS	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Analyze and Design different types of R.C.C Stair Case.	٧	٧	•	٧	٧		√	٧		٧	٧		٧	∜		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 2: Analyze and Design different types of R.C.C Foundation Systems.	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Analyze and Design different types of R.C.C Compression Members.		٧	٧		٧	٧		٧	٧		٧	٧		V	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Analyze and Design different types of R.C.C Continuous and Curved	٧	V		٧	V		V	V		V	√		٧	√		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Analyze and Design different types of R.C.C Domes.			٧			٧			V			٧			٧	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 6: Analyze and Design different types						1	V	V	V	V	Good	Employability	
of RCC	٧	\ \	٧	V	V	V	V	V					Minor Exams,
Retaining Wall													Quiz, End Term
and Water							Table 1						Exams
Tanks.													

BTCE 602: Elements of Earthquake Engineering

<b>BTCE 602: El</b>	lemen'	ts of	Earti	nquak	te Er	iginee	ring												
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome		PO-		PO-	PO-e		PO.		PO-		P	P O- I	PS O- m		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	
CO 1: Understand the phenomenon of occurrence and history of earthquakes and classify their kinds and	√ I	√		٧	√		٧	٧		V	✓		V	٧		Good	Employability	Department IK( Minor Exams, Quiz, End Term Exams	of Ci G PTU Kapi

CO 2: Recognize source and types of structural vibrations.	٧		٧	٧		٧	٧		٧	٧		٧	٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Evaluate and analyze Degree of Freedom, Spring action, Damping, Equations of motions, Lateral Force analysis, Floor Diaphragm action, Moment resisting frames and Shear walls.		V	V		√	V		٧	٧		٧	√ .		V	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Design structure for seismic forces having adequate Lateral Strength, Stiffness, and ductility.	٧	٧		٧	٧		√	√		٧	V	C.	٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams

tment of Civi IKG PTU I Kapur

CO 5: Appraise and implement provisions of IS1893-			V			V			V			V			V	Good	Employability	
2002(Part-I), IS 13920 and IS 4326.						A(50)												Minor Exams, Quiz, End Term
CO 6: Understand and apply the theory of hydraulic jumps and surges.	<b>V</b>	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good		Minor Exams, Quiz, End Term Exams

BTCE-603: FOUNDATION ENGINEERING

Course Outcome	РО-а		PO- c		PO- e			PO-i		P	- O a Life	a o a	n O a		Learning Level	Employabilit y / Entrepreneu	Assessment Tools to Measure Attainment efft CO IKG
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	engineer and society	Environment and sustainability	Individual and team work	Communication	Toject management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			

it of Civil Eng G PTU Main Kapurthala

CO 1: Apply fundamental concept of mathematics, statics and mechanics to																		
understand the essentials of the methods of soil exploration and stability analysis.	٧	٧	٧	٧	٧	٧	V	V	٧	V	V	V	V	٧	V	Good	Employability	Minor Exams, Quiz, End Term
CO 2: Analyze and design a variety of sectechnical engineering tructures occurred bundations, siles, retaining alls, slopes and interpret ata.		√			٧			v			V			<b>√</b>		Good		Minor Exams, Quiz, End Term

	T	T	T	1		<del></del>		-	 		-						
CO 3: Recognize behavior of soils in slopes, behind retaining structures and phenomena affecting foundation capacity and	٧		٧		V		V	V	V	V		V		V	Good	Employability	Minor Exams,
cO 4: Determine allowable bearing pressures and load carrying capabilities of different foundation	V	٧		٧	V		V	<b>√</b>	V	V		٧	<b>V</b>		Good	Employability	Quiz, End Term Exams
systems.																	Quiz, End Term Exams

		√			٧		٧		٧		٧	Good	Employability	
														Minor Exams, Quiz, End Term Exams
٧		٧	v	٧		٧	٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
	✓	✓												- Cood Employability

CO 7: Identify the appropriate deep well/Cassion foundation type for different soil profiles.	V	DIC.	√ AL M		√ ODS	ZINC	√ V		٧		٧		٧		٧	Good	Employability	Minor Exams, Quiz, End Term Exams	
BTCE-604: N	UME	RICE	AL M		פעט	THE CONTRACT OF THE CONTRACT O	IVIL		×		Б		≡	<u>_</u>					
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		3		
Course Outcome		PO-			PO-	PO-f	PO-	PO-	PO-	PO-	P O- k	P O- I	PS O- m	PS O- n	PS O-		Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Demonstrate the concept of approximation s and errors in the implementation and development of numerical methods.	V	V	٧	V	٧	٧	٧	<b>√</b>	٧	V	V	. ✓	٧	V	V	Good	Skill Development	Department of Civ IKG PTU Kapu Minor Exams, Quiz, End Term Exams	vil Engi Main ( urthala-

																		<
CO 2: Select an appropriate solution to an engineering																	Skill	
problems dealing with the roots of equations through numerical methods.		٧	٧		٧	٧	evacit.	٧	٧		٧			<b>V</b>	٧	Good	Development	Minor Exams, Quiz, End Term Exams
CO 3: Execute the solution using of problems involving linear algebraic equations and appreciate the application of these problems in fields of engineering.	٧	V	V	V	٧	٧	V	٧	V	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 4: Apply the techniques to fit curves to data and be	٧			٧			٧			٧			V		Good	Skill Development		
capable of choosing the preferred method for any particular problem.																	Minor Exams, Quiz, End Term Exams	
CO 5: Evaluate the solution of the problems through the numerical integration and differentiation and solve ordinary and partial		V	<b>V</b>		V	V		V	V		٧	٧		V	Good	Skill Development	artment of Civil Engine	Heak
differential equations and eigen value problems through various techniques.													v			Jepe	Minor Exams, Quiz, End Term Exams	ampu

CO 6: Able to use New Marks Method for civil engineering problems.	٧	٧		٧	٧		٧	٧		٧	٧		٧	V		Good		Minor Exams, Quiz, End Term Exams
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**BTCE 605: Professional Practice** 

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-		PO-	PO-		PO		PO-		P O- k	P O- I	PS O- m	PS O- n		Learning Level	Focus on Employabilit y 1 Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: On completion of the course, the students will be able to:	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Apply different types of estimates in order to estimate any type of structure.		٧			٧			٧			٧			٧		Good	Employability	Department IKC  Minor Exams, Quiz, End Term Exams

T	- 1										П	П						
CO 3: Calculate unit cost per cubic meter of a reinforced concrete structure, earthen embankment and unit cost per square meter for a given highway project.		V	√		<b>V</b>	√		V	√		V	٧		√	√	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Carry out the analysis of rates and bill preparation for different materials and components of the project.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Develop a detailed quantity survey reports and abstract summary of the project.			٧			٧			٧			√			V	Good	Employability	Department of IKG PT Kannan Kannan Exams, Quiz, End Term Exams

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CO 6: Prepare a bid analysis and invite	٧	٧	٧	٧	٧	٧	√	V	٧	V	V	V	٧	٧	V	Good	Employability	Minor Exams,
contractors																		Quiz, End Term
through tender notices.																		Exams

BTCE-606: E	NVIR	ONN	MENT	TAL E	ENG	INEE	RIN	G –	II									
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-		PO-				PO-	PO-	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Demonstrate a firm understanding of various sanitation systems and their suitability.	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	√	√	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Design sewer and drainage systems layout for communities.		٧			V			٧			٧			√		Good <sup>-</sup>	Employability	Department of CIKG PTI Kar Minor Exams, Quiz, End Term Exams

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												П						
CO 3: Evaluate the waste water characteristics to determine the degree of treatment required.		٧	٧	(12.13.14)	٧	٧		٧	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Explain the physical, chemical and biological techniques of wastewater treatment.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Compare the applicability of treatment technologies under different conditions																Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Design the treatment units and assess the efficacy of an entire treatment system	٧		V	V		√ V	٧		٧	V		V	V		٧	Good	Employability	epartment of Civil IKG PTU M Kapurth Minor Exams, Quiz, End Term Exams

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	Т		Π		T	T								
CO 7: Ability to make decisions regarding the														
treatment plant site selection, operation and maintenance and the need of advanced	٧	V	V	V \	/	٧	٧	•	√ .	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE -607: ENVIRONMENTAL ENGINEERING LABORATORY team work

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage		Environment and sustainability	Ethics	Individual and team worl		Project management	Life-long Learning	Analysis and Design Sk	Research and Innovatio	Sustainable Outlook				
Course Outcome		PO.			PO e		PO.		PO-		P O- k	Р	PS O- m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of	
CO 1: Conduct experiments as per standard methods of sampling and analysis.	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	Good	Employability	Department of IKG For Minor Exams, Quiz, End Term Exams	(apurth

Design Skill

Innovation

CO 2: Demonstrate the expertise to characterize water and	٧	٧		٧	٧		٧	V		V	V		٧	٧		Good	Employability	Minor Exams, Quiz, End Term
wastewater samples. CO 3: Understand the importance of laboratory analysis as a controlling factor in the treatment of water and wastewater.		٧	٧		V	٧		٧	٧		٧	٧		V	V	Good	Employability	Exams
CO 4: Record the experimental observations and interpret the analysis results.	V	٧		٧	٧		√	٧		V	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Use the analysis results for making informed decisions about the drinkability of water and disposal of wastewater.			٧			٧			٧			V			٧	Good	Employability	epartment of Civil IKG PTU M Kapurt Minor Exams, Quiz, End Term Exams

Gineering Camp

CO 6: Evaluate and compare different techniques of	٧	٧	٧	٧	V	٧	٧	٧	V	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams,
experimental analysis																		Quiz, End Term Exams

BTCE-608: COMPUTER AIDED STRUCTURAL DRAWING -

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-			PO-		PO				D	P O- I	PS	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Create, dimension and sketch a plot/plan for representation /expression of civil engineering designs.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

											П							
CO 2: Draft construction/d esign drawings including structural drawings for civil engineering projects.		V			٧			٧			٧			٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Produce structural drawing of reinforced concrete elements such as beams, slabs and staircases.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Develop structural drawing of steel elements such as connections, tension members, compression members, beams, column base and roof trusses.		V			✓			√			V			✓		Good	Employability	Department of C IKG PT Kar Minor Exams, Quiz, End Term Exams

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CO 5: Understand various connection			٧			٧			٧			٧			٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Gain proficiency in CAD software.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE 801: Design of Steel Structures - II Research and Innovation Analysis and Design Skill Project management and The engineer and society Individual and team work Conduct investigations of Engineering Knowledge Design/development of Sustainable Outlook Modern tool usage Life-long Learning complex problems **Environment and** Problem Analysis Communication sustainability solutions finance Ethics Assessment Focus on Employabilit Tools to PS PS PS Learning PO-PO-PO-PO Measure PO-PO- PO-PO-0-0-0-0-0-PO-f PO-a Level Entrepreneu Attainment of d е n 0 k m Course CO rship Outcome

			П				П		T	П	Т	T	T	T	T				
CO 1: Demonstrate knowledge of basic concepts for analysis and design of various structural steel elements like ties, struts, beams, columns and fasteners.	V	V		V	٧		√	V		V	٧		V	٧		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 2: Identify importance of various elements of a plate girder and their design.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 3: Compile various loads for a foot bridge, and thereby design its elements including wooden deck, cross beam and main girder	V	c	٧	٧		V	V		V	V		٧	٧		V	Good	<b>E</b> mployability	Department of Civilia IKG PTU Kapu Kapu Minor Exams, Quiz, End Term Exams	Main Car irthala-12

			П		П			T	П	П	T	Т		П					
CO 4: Plan structural framing of industrial																			
building for given design data and design various elements like gantry girder, column bracket, mill bent and bracings.		٧			٧			٧			٧			V		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 5: Identify various loads and load combinations for design of different components of a railway bridge as per the railway			٧			٧			V			٧			٧	Good	Employability	Minor Exams, Quiz, End Term Exams	4,
code.  CO 6: Design various elements of a railway bridge for given design data.	V	V	V	V	V	٧	٧	V	٧	٧	٧	V .	٧	٧	٧	Good	Employability	K	TU Ma (apurth:

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Focus on	Assessment
Course Outcome	PO-a	PO-		PO-d	PO-	PO-f	PO-	PO-	PO- i	PO-	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level		Tools to Measure Attainment of
CO 1: Identify various types of disasters, their causes, effects & mitigation measures.	٧	٧		√	V		٧	٧		٧	V		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.		٧	V	i.	V	٧		V	V		٧	٧		V	. ✓	Good	Employability	Department of IKG F K Minor Exams, Quiz, End Term Exams

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CO 3: Understand the use of emergency management system to tackle the problems.	٧	٧	٧		٧	٧		V	V		٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Discuss the role of media, various agencies and organisations for effective disaster management & preparedness for future through various case studies.		V		V			V			٧		V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design early warning system and understand the utilization of advanced technologies in disaster management.	V	V	V		٧	V		٧	V		V	V	\ \ \	Good	Employability	Department IKG  Minor Exams, Quiz, End Term Exams

nent of Civil Er IKG PTU Mair Kapurtha

						-						
CO 6: Compare different models for												
disaster management and plan & design of infrastructure for effective disaster	<b>V</b>	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Tern Exams

**BTCE-803 IRRIGATION ENGINEERING-II** 

IIII.	UAL	1101	LDI				1	T									
ngineering Knowledge	Analysis		conduct investigations fromplex problems	Aodern tool usage	engineer ety			dual and	Communication	ect	-long	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
	PO-								PO j	P O- k	P 0- 1	PS		PS O- o	Learning Level	Employabilit y /	Assessment Tools to Measure Attainment of CO
	Engineering Knowledge	Engineering Knowledge  Problem Analysis	Engineering Knowledge  Charles Analysis  Design/development of solutions	Engineering Knowledge  Problem Analysis  Design/development of solutions  Conduct investigations of complex problems	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Modern tool usage	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Of complex problems Of complex problems The engineer and society	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Of complex problems Of complex problems The engineer and society Environment and sustainability	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems of complex problems The engineer and society Environment and sustainability Ethics	Engineering Engineering A Problem Ana B Solutions Conduct inv of complex p of compl	Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Of complex problems The engineer and society Environment and sustainability Ethics Individual and team work Communication	Engineering Knowledge Problem Analysis Conduct investigations of complex problems Conduct investigations of complex problems The engineer and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Communication of communication work Communication of communication	Engineering Knowledge  Problem Analysis  Design/development of solutions Conduct investigations of complex problems Conduct investigations of complex problems The engineer and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Figure 1. The engineer and society Figure 2. On the control of society Fig	Engineering Knowledge  Problem Analysis  Design/development of solutions Conduct investigations of complex problems Conduct investigations of complex problems The engineer and society Environment and society Environment and sustainability Ethics Individual and team work Communication work Communication  Troject management O d Life-long Learning Analysis and Design	Engineering Knowledge Problem Analysis  Design/development of solutions Conduct investigations of complex problems Conduct investigations of complex problems The engineer and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Communication Individual and team work Communication Individual and team work Communication Individual and team Society Analysis and Design Od Skill Research and Innovation	Engineering Knowledge Problem Analysis  Design/development of solutions Conduct investigations of complex problems Conduct investigations of complex problems The engineer and society Environment and society Environment and society Environment and society Environment and society Environment and society Environment and society Communication Individual and team work Communication Individual and team work Communication Individual and team work Communication For Sustainable Outlook Od Skill Research and Innovation Sustainable Outlook	Engineering Knowledge Problem Analysis On Design/development of solutions Conduct investigations of complex problems Of comple	Begineering Knowledge  a O O O Conduct investigations of complex problems of complex p



CO 1: Understand the functioning and design consideration	٧	√	٧	V	٧	٧	٧	√	٧	٧	٧	٧	٧	٧	٧	Good	Employability	
of various components of Diversion Head Work.																		Minor Exams, Quiz, End Term Exams
CO 2: Analyze the various parameters of hydraulic structures for seepage and uplift pressure.	٧	٧		٧	٧		٧	٧		٧	V		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Recognize the concept and principles of silt control devices.		٧	٧		٧	V		٧	٧		V	V		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Design water distribution systems, regulators, canal falls, outlets, cross drainage works, weirs and barrages of irrigation network.	V	V		٧	V		V	V		V	٧	,	V	V		Good	Employability	partment of Civil Er IKG PTU Mai Kapurtha Minor Exams, Quiz, End Term Exams

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CO 5: Apply knowledge to select best canal fall, outlet and		٧		V		٧		٧		٧	Good	Employability	
cross drainage works according to real time situation.													Minor Exams, Quiz, End Term Exams
CO 6: Identify appropriate energy dissipation devices suitable for hydraulic structures as per site condition.	٧	√	V	٧	V	V	٧	√	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE-804	Trans	spor	tatio	n En	gine	eering	g-1	I										
V	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage		Environment and sustainability	Ethics	Individual and team work	-	Project management and	ife-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Department of C IKG PTU Kap	Head ivil Engineering J Main Campus purthala-1446!
Course Outcome		PO.	PO-				PO.		PO-	PO-	P O- k	P O- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of

					1		П			П		П						
CO 1: Understand the importance of railway infrastructure planning and design.	٧	٧	٧	√	٧	٧	٧	٧	٧	٧	√	V	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Identify the functions of different component of railway track.		٧			٧			V			٧			٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Apply existing technology to design, construction and maintenance of railway track.		٧	٧		٧	٧		٧	٧		٧	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Apprehend the advanced international technology being used in the field of railway engineering.	V			٧			V			٧			٧			Good	Employability	Department of Civil IKG PTU N Kapurt Minor Exams, Quiz, End Term Exams

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CO 5: Outline the importance of Airport Infrastructure planning and design.																Good		Minor Exams, Quiz, End Term Exams
CO 6: Evaluate the major issues and problems of current interest to airport engineering	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	V	V	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams

**BTCE-805 PROJECT** 

BTCE-805	Knowledge		of	ations of	ge	d society	0		team work		ment and	ng	Design Skill	Innovation	Outlook			
	Engineering Knov	Problem Analysis	Design/development solutions	Conduct investigations complex problems	Modern tool usage		Environment and sustainability	Ethics	Individual and te		Froject management	Life-long Learning	Analysis and De	Research and In	Sustainable Ou		I	Assessment
Course Outcome		PO-		PO- d		PO-f	PO-	PO h	PO-	PO-	P O- k	P 0- 1		PS O- n	PS O- o	Learning Level	Employabilit	

											_			_				
CO 1: Identify a suitable problem after conducting a thorough literature survey .	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Prepare hypothesis and select a suitable method to obtain the solution.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Design and conduct experiment		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Record observations, data, and results and their interpretation	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Use software applications effectively to write technical reports and oral presentations			٧			٧			٧			٧			V	Good	Employability	Department of IKG PT Karen Minor Exams, Quiz, End Term Exams

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CO 6: Applying modern engineering tools for the	٧	V	٧	٧	٧	٧	٧	٧	٧	V	٧	V	٧	٧	٧	Good	Employability	
system design,																		Minor Exams,
simulation and analysis																		Quiz, End Term Exams

## DTCE ON DVNAMICS OF STDUCTUDES

<b>BTCE-806</b>	DYN	IAN	IICS	OF ?	STP	LUCT	LUR	ES											
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	nnance Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome	PO-a	PO				·	PO		PO-		D	Р	PS	PS O- n	PS	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Demonstrate the fundamental theory of dynamic equation of motion for dynamic systems.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development		vil Enginee Main Can urthala-144

										$\neg$	П	Т		П	П			
CO 2: Identify the concepts of																		
mathematics, science, and engineering by developing the equations of motion for vibratory systems and solving for the free and forced	٧	٧		٧	V		٧	V		٧	V		٧	√		Good	Skill Development	Minor Exams, Quiz, End Term Exams
response. CO 3: Model the response of single- degree-of- freedom (SDOF) systems to pulse and harmonic and periodic excitations and discrete lumped mass multi-degree- offreedom (MDOF) systems.		V	V		V	٧		V	V		٧	V		V	V	Good	Skill Developmen	t Department of Civil I IKG PTU Ma Kapurth Minor Exams, Quiz, End Term Exams

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CO 4: Understand the response spectrum concept.	٧	٧		٧	٧		٧	V		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 5: Evaluate the solution of the problem through the concepts of viscous damping, coulomb damping (by friction) and equivalent damping.	٧		V	٧		V	٧		V	٧		V	٧		٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 6: Analyze dynamic analysis of various structures using Numerical Methods.	٧		٧	٧		V	٧		٧	٧		V	٧		٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 7: Analyze dynamic analysis of various structures using Numerical Methods.	٧	٧	٧	<b>V</b>	√	٧	٧	٧	٧	٧	٧	V	٧	V	٧	Good	Skill Developmen	Department of Civil E IKG PTU Ma Kapurtha Minor Exams, Quiz, End Term Exams	in Ca

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO.			PO-	PO-f	PO		PO-	PO-	P O- k	P O- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Demonstrate the knowledge of theory of elasticity, solution of simultaneous equations by different techniques.	٧	٧	V	٧	٧	٧	V	V	٧	٧	٧	V	٧	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Understand the concept and terminology related to the concept of finite element analysis.		V			V			٧			V			V		Good	Skill Development	Department of IKG I  Minor Exams, Quiz, End Term Exams

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CO 3: Apply different methods, such as Stationary principles, Rayleigh-Ritz, weighted residual method in the	V	V		V	<b>V</b>		V	V		V	V		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
analysis.  CO 4: Develop various types of matrix, such as element stiffness matrix, load vector, and equilibrium and compatibility conditions for different types of problems using different types of elements.	٧		<b>V</b>	√	c	V	٧		<b>√</b>	V		<b>V</b>	<b>√</b>		Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 5: Analyze the determinate and indeterminate problems	٧	٧	V	٧	V	٧	٧	V	٧	√	Good	Skill Development	
related to beams, frames, trusses, plates.													Minor Exams, Quiz, End Term Exams
CO 6: Execute the solution using a logic and structured approach offered by the finite element method	٧	V	V	٧	٧	V	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE-808 A	Engineering Knowledge	Problem Analysis	Design/development of solutions	investigations of problems	tool usage	r and society	Environment and sustainability	Individual and team work	unication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		De	epartment of Civil IKG PTU M Kapurth	H Enginee lain Cam hala-144
Course Outcome		PO.	PO-			•	BO	PO-	PO-	P	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	

					A STATE OF	William St. A.					Y. Control							
CO 1: Demonstrate the fundamental theory design of RC elements.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Apply the design principles to the large span concrete roofs as per IS code.		٧			٧			٧			٧			<b>V</b>		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Analyze the behaviour of slabs for different loading and boundary conditions.	٧	٧	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Design the components of chimney.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Analyze and design the different type of retaining systems as per requirements.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Department of Civil Engise IKG PTU Main Control Kapurthala Minor Exams, Quiz, End Term Exams

CO 6: Design the water tanks of different shapes and capacities	,	٧		٧	٧		V	٧		٧	٧		V	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
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BTCE - 809 PRESTRESSED CONCRETE

RICE - 803	PK	FOI	KES	SED	CU	NCN						_				1		
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	РО-а	PO			PO-		PO		PO-	PO-	Р	P 0- 1	PS O- m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Understand the material characteristics of structural materials, such as high strength concrete and high strength steel, etc.	٧	V	٧	٧	٧	٧	٧	V	٧	V	V	√	٧	V	V	Good	Skill Development	Department IKG  Minor Exams, Quiz, End Term Exams

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CO 2: Understand and apply the concept and terminology related to the prestressed concrete.		٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 3: Analyze the beam sections carrying the prestressed force, external loads and timedependan t effects, such as creep, shrinkage and other losses.		٧	٧		٧	V		V	V		√	✓		٧	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 4: Evaluate and interpret the use of different prestressing systems on the PSC beams.	٧	V		V	٧		V	٧		V	v <b>√</b>		٧	V		Good	Skill Development	Department of Cink GPTU IKG PTU Kapu Minor Exams, Quiz, End Term Exams	U Main Ca curthala-1

CO 5: Design prestressed concrete beams and slabs for flexure, shear and torsion.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good		Minor Exams, Quiz, End Term Exams
CO 6: Apply various provisions prescribed by IS 1343 to the design of prestressed concrete members	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE-810 GROUND IMPROVEMENT TECHNIQUES

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	unication	Project management and finance	ife-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	РО-а	PO-	PO-c		PO-e		PO		PO-		Р	Р	PS O- m	PS	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of

CO 1: Evaluate the existing characteristics of the soil to be improved.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Understand the mechanism of ground improvement.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Select a suitable type of ground improvement technique considering the existing soil.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Design various ground improvement techniques.		٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Monitor the efficiency of ground improvement methods.	√	C	٧	٧		٧	٧		٧	٧		٧	٧	6	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 6: Apply the selected ground improvement methods at site.	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	Good		Minor Exams, Quiz, End Term Exams
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## **BTCE-812 EARTH AND EARTH RETAINING**

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-			PO-	•	PO		PO-	PO-	D	Р	PS O- m			Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Design of earthen dams considering seepage analysis and seepage control.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 2: Analysis of earth retaining structures for their stability against earth pressure.		٧	٧	√	٧		٧	٧			٧			√		Good		Minor Exams, Quiz, End Term Exams
CO 3: Prediction of lateral earth pressures associated with different earth systems.	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	Ý	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Applying engineering knowledge for the designing of earth retaining structures in various site conditions.	٧	٧		٧	<b>√</b>		V	V					٧	√		Good	Skill Development	Minor Exams, Quiz, End Terr Exams

CO 5: Evaluation of rigid retaining structures																	Skill	
using appropriate design methods, factors of safety, earth pressure diagrams.	٧	V	√	√	٧	٧		٧	٧			٧	٧	٧	٧	Good	Development	Minor Exams, Quiz, End Term Exams
CO 6: Evaluation of flexible retaining structures using appropriate design methods, factors of safety, earth pressure diagrams	٧	V		٧	V		V	V		V	٧		٧	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams

## BTCE-813 REINFORCED EARTH AND GEOTEXTILES

ILL	1110	1.0-				T				T					
Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design	Research and	Innovation	Sustainable Outlook

Course Outcome	PO-a	PO-	PO- c	PO-	PO-	PO-f	PO-	PO-	PO-	PO-	P O- k	P O- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of
CO 1: Understand the principle of reinforced earth and different types of reinforcement	٧	٧		٧	√		٧	٧		٧	٧		٧	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Identify the types and functions of geosynthetics.		V			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Compare the different geosynthetics products for different construction		٧	٧	V	V	√	٧	٧	٧	٧	V	V	V	V	V	Good	Skill Development	Minor Exams, Quiz, End Terr Exams
CO 4: Identify the testing methods for	V	V		V	V		V	V		٧	V	1	V	V		Good	Skill Developmen	Department of IKG I  Minor Exams, Quiz, End Terre Exams

geosynthetics.

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CO 5: Compare natural and artificial geosynthetics.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Design of paved and unpaved roads, embankments and retaining walls with different types of geosynthetics.		V	٧		٧	٧		٧	٧		٧	٧		٧	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams

DTCE 914	ENVIDO	NMENTAL.	IMPACT	ASSESSMEN
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	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	The engineer and society	Environment and sustainability	Ethics	ndividual and team work	unication	Project management and finance	ife-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Depart	ment of Civil Engi IKG PTU Main C Kapurthala-	Head neering campus 144603
Course Outcome		PO.	PO-					PO-		Р		PS O- m	PS O- n	PS O- o	II earning	Focus on Employabilit y / Entrepreneu rship	Measure	

																	T	
CO 1: Understand the concepts of environmental impact analysis and legislations involving EIA.	٧	٧	٧	٧	٧	√	٧	٧	٧	٧	٧	٧	V	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Identify the factors for assessing the impacts of		٧			٧			٧			٧			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
field projects.  CO 3: Use the methodologies to set up environmental indices and quantify the impacts.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Assess the environmental , socio- economic and health impacts of different projects.	٧	٧	٧	٧	٧	٧	٧	V	٧	V	√	V	٧	√	√	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 5: Design an environmental proposal and evaluate the available alternatives.		٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Demonstrate knowledge of professional and ethical responsibilities	V	٧	٧	٧	٧	٧	٧	٧	٧ .	٧	V	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

## BTCE 815 ADVANCED ENVIRONMENTAL ENGG.

	Engineering Knowledge	Problem Analysis	Design/development of solutions		Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	g g	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-	PO-d	PO-e	PO-f	PO-	PO h	PO- i	PO j	P O- k	P 0-1	PS	PS O- n	PS O- o	Learning Level	Entrepreneu	Measure

CO 1: Understand the basic concepts of inter- relationship between different ecosystems with environment.	V	V	√	٧	V	J	V	٧	٧	٧	٧	V	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Compute the causes of different types of pollution along with related regulations (local, national, and international).		٧	٧		V	٧		V	V		٧	٧		V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams

						<del>- 1</del>						Т						
CO 3: Explain the mechanisms of air pollutants transport/disp ersion in the atmosphere and select the systems to control them at different sources.		V	٧		V	٧		√	✓		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Prepare the life cycle assessment of Solid waste from its generation to disposal.	٧	٧		٧	٧		٧	٧		٧	V		٧	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Evaluate different methods of solid waste management and identify the suitable disposal alternatives available.	٧	٧	٧	٧	٧	٧	٧	V	٧	√	V	<b>√</b>	V	V	V	Good	Skill Development	Department of IKG PK Minor Exams, Quiz, End Term Exams

of Civil Eng PTU Main Kapurthala

CO 6: Explain different types of hazardous waste and	٧	٧	V	V	V	V	V	٧	V	V	Good	Skill Development	
correspondingly appropriate method for its treatment and disposal.													Minor Exams, Quiz, End Term Exams

## BTCE 816 FLOOD CONTROL & RIVER ENGINEERING

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	_ 1	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome		PO-					PO		PO-		P O- k	Р	PS		PS O- o	Learning Level		Assessment Tools to Measure Attainment of	
CO 1: Appropriate the importance of river engineering and its social and environmental impacts.	٧	V		V	٧		٧	V		V	V		٧	٧		Good	Skill Development	Department of CIKG PTIKG	ivil Engi U Main ( purthala

T																			
CO 2: Compute and forecast flood by various methods.		٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 3: Identify suitable flood control method and select one according to economical condition.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 4: Evaluate suitable method for river training and channel improvement.	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 5: Predict sediment load carried by river and its impact on flow.	V	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 6: Understand the concept of River Regime theories.		٧	٧		٧	٧		V	V		V	٧		V	V	Good	Skill Development	Department IKO t Minor Exams, Quiz, End Term Exams	G PTU Kapu

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-		PO-d	PO-e		PO		PO-		P O- k	P 0- 1	PS	PS O- n	PS O- o	Learning Level	y /	Assessment Tools to Measure Attainment of CO
CO 1: Understand the importance of hydrological data in water resources planning.	٧	٧	٧	٧	٧	٧	٧	V	V	٧	V	V	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Design of rain gauge network according to requirement.		V	٧		٧	٧		٧	V		٧	V		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Compute depth of precipitation, run-off and infiltration over the basin by different methods.		٧	٧		V	V		V	٧		V	V		V	V	Good	Skill Development	Department IKC  Minor Exams, Quiz, End Term Exams

of Civil En PTU Mair Kapurthal

CO 4: Design peak flow and fix design floods.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Compare suitable type of dams according to site requirements.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Design different types of dams i.e; gravity dams, earthen dams, arch and buttress dams.	٧	٧	٧	٧	V	٧	V	V	٧	٧	٧	V	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

DTCE	919	DA	VEN	MENT	<b>DESIGN</b>
KIC H.	-מומ	FA	VI		DESIGN

	Engineering Knowledge	roblem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	E E	roject management	-long Lea	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			Department of Civi IKG PTU I Kapul	il Engine Main Car rthala-14
Course Outcome		PO-	PO-				PΩ		PO-		P O- k	P 0- 1	PS		PS 0- 0	LIASENINA	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	

CO 1: Identify the different types of pavement and factors affecting their design.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Design the flexible pavement using different methods and as per latest Indian Standard.	•	٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Understand the factors affecting Bitumen mix design and design procedure of bitumen mix	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Design the rigid pavement using different methods and as per latest Indian Standard.		٧	٧		٧	٧		٧	٧		٧	V		٧	٧	Good	Skill Development	Department IKG Minor Exams, Quiz, End Term Exams

of Civil En PTU Main Kapurthal

CO 5: Evaluate the pros and cons of various other low cost pavements proposed by	V	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good		Minor Exams, Quiz, End Tern Exams
IRC. CO 6: Assess the need of overlay and design accordingly.	٧	V	٧	٧	V	٧	V	٧	٧	V	٧	٧	V	V	٧	Good	Skill Development	Minor Fxams.

**BTCE-819 TRAFFIC ENGINEERING** 

<b>BTCE-819</b>	TRA	FFI	CEN	GIN	LL	KING	1									
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage		Environment and sustainability	Ethics	Individual and team work		Project management and finance	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		
Course Outcome		PO.	PO-	PO-	PO-e	PO-f	PO-	PO h	PO-	PO-	P O- k	PS O- m	PS O- n	PS O- o	Learning Level	Measure

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CO 1: Understand the characteristics related to road user, vehicle, and traffic stream.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Conduct the various traffic studies to collect the data related to traffic.		٧			٧			٧			٧			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Create the solution of the problem related to traffic regulation and control.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Tern Exams
CO 4: Design the traffic signal timing for pre-timed and traffic actuated signals.	٧	٧	٧	٧	V	٧	٧	٧	V	٧	٧	٧	٧	V	٧	Good	Skill Development	Minor Exams, Quiz, End Tern Exams

CO 5: Outline the procedure to assess the road safety audit.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Access the need of modernization in traffic engineering.	٧	٧	٧		٧		٧		٧		٧	٧	٧	٧	٧	Good	Havalanmant	Minor Exams, Quiz, End Term Exams

**BTCE-820 BRIDGE ENGINEERING** 

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	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	finance Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome		PO-				•	PO		PO-		P	P - O-	PS	PS	PS	Learning	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Learn the basics of bridge classification, choice of bridge type, investigations for the bridges.	٧	٧	٧	V	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	V	Good	Skill Development		f Civil En TU Mair apurthal

г													901					
CO 2: Learn loadings on the bridge, IRC loadings, and load combinations for the specific problem.		٧	٧		٧	٧		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Understand the load distribution on a specific bridge system.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Analyze and design Steel and RCC bridge deck system.		٧			V			٧	~		V			٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Conceptualize the design of bridge substructures.	٧	V	V	V	٧	V	V	V	V	V	٧	V	V	٧	٧			Minor Exams, Quiz, End Term Exams

BTCE-821 INFRASTRUCTURE DEVELOPMENT &

	Engineering Knowledg	Problem Analysis	Design/development o solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO-	PO-c	PO-	PO e		PO-		PO-	PO	P O- k	P 0- 1	PS O- m	PS O- n	PS 0- 0	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Understand the impact of infrastructure development on the economic development of a country.	٧	٧	٧	٧	٧	٧	٧	٧	٧	٧	V	٧	٧	٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Strategies the policy process for infrastructure development.		٧	٧		٧	V		٧	٧		٧	٧		٧	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 3: Identify and compare the best tools for effective project		V	٧		V	٧		٧	٧		٧	V		V	V	Good	Skill Development	
evaluation, management and control.																		Minor Exams, Quiz, End Term Exams
CO 4: Demonstrate the construction components of various infrastructure sectors like highway, ports & aviation, oil & gas, power, telecom, railway and irrigation.	√	√		٧	٧		∨	V		٧	٧		V	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 5: Remember the																		
necessary conceptual insights, perspectives and the tools required for effective infrastructure management.		V	٧		٧	٧		V	٧		√	V		V	٧	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Choose the best financing option for a project.	٧	٧		٧	٧		٧	٧		٧	٧		٧	٧		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 7: Develop a skill to retrieve essons from case studies in nternational/ National project management.	٧		V	<b>√</b>		√	V		<b>V</b>	<b>v</b>		٧	٧		<b>√</b>	Good		Minor Exams, Quiz, End Term Exams

CO 8: Document the different phases in the life cycle of an		V			V			V			V			V		Good	Skill Development	
infrastructure project.																		Minor Exams, Quiz, End Term
CO 9: Gather background information and research regarding various infrastructure sectors and describe its impact on the project.	٧	<b>√</b>	√	٧	V	٧	٧	V	V	٧	V	V	٧	٧	٧	Good		Minor Exams, Quiz, End Term