Name of the Department: Civil Engg.

	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-Iong Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Focus on	Assessment
Course Outcome	PO-a	PO-b	PO-c	PO-d	РО-е	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 Measure Attainment of Content of Co
BTCH101-18	: Chemist	y-I (Theor	ry)	1							-		1	-	T	Understand &		Class, Quiz, Te
CO1:Analyse microscopic chemistry in					V		V					1			1.5	Analyze		and viva
terms of atomic and molecular orbitals and intermolecular forces. CO2:Rationalise bulk properties and	V	V	V	V			<u> </u>									Understand & Analyze	1	Class, Quiz, Te and viva
processes using thermodynamic considerations.	v	V	V	V	V						-						-	
CO3:Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	v	v	v	٧	v											Understand & Analyze	Skill Development	Class, Quiz, Te and viva
CO4:Rationalise periodic properties such as ionization potential, electronegativity,	v	v	V	v	v		v		1.11							Understand & Analyze		Class, Quiz, Te and viva
oxidation states and electronegativity CO5:List major chemical reactions that are	v	V	V	v	V	-	V							1		Understand & Analyze		Class, Quiz, Te and viva
used in the synthesis of molecules. Paper: BTEE-101-18			nineering											_			1	1
CO1:Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and	V	V	V	v	v		v		v	v						Understand	Skill Development	MSTs, Tutorial Class/Quiz Te
components of low voltage electrical installations	1	-	-	1.000	-	-	-	-	v							Analyze	Skill Development	MSTs, Tutorial Class/Quiz Te
CO2:Be able to analyze of DC circuits, AC	٧	V	V	V	V		V		v	V		v	v		V	Understand	1.4-4.4	MSTs, Tutorial Class/Quiz Te
Circuits CO3:Understand the basic magnetic	V	V	V	V	V		V						-	-	-	Understand	-	MSTs, Tutoria

CO1: Able to verify the theoretical concepts/laws learnt in theory courses.	v	v	v	v	v	v	100		v	v		V	٧	V		understanding		Minor Exams, End Term Exa
CO 2: Trained in carrying out precise measurements and handling sensitive	v	v	v	v	v	v			v	v		v	v	v		understanding		Minor Exams End Term Exa
equipment. CO 3: Understand the methods used for estimating and dealing with experimental	v	v	V	v	v	v			v	v		v	۷	V	v		Skill Development	Minor Exams End Term Exa
uncertainties and systematic "errors". CO 4: Learn to draw conclusions from data									v	V		V	V	V		apply		Minor Exams
and develop skills in experimental design.	v	v	V	٧	v	V	131			-						apply		End Term Ex
CO 5: Document a technical report which communicates scientific information in a clear and concise manner.	v	٧	v	v	v	۷			۷	٧		v	v	v		apply		Minor Exam End Term Ex
Paper BTPH101-18 Mechanics of Solids	2721			Sec.	19	dia h					2							1
CO1:Understand the vector mechanics for a classical system.	v	V	v	v	v	V		~	۷	v		v	٧	٧	v	understand		Minor Exam End Term E
CO2:Identify various types of forces in nature, frames of references, and	v	v	v	v	v	v		v	٧	v		٧	v	v	٧	apply		Minor Exam End Term E
conservation laws. CO3:Know the simple harmonic, damped, and forced simple harmonic oscillator for a	v	v	v	v	v	v		v	v	v		v	v	v	V	apply	Skill Development	Minor Exan End Term E
mechanical system. CO4:Analyze the planar rigid body dynamics for a mechanical system.	v	v	v	V	v	v		v	۷	v		v	v	v	v	apply		Minor Exan End Term E
CO5:Apply the knowledge obtained in this course to the related problems.	v	v	v	v	v	v		v	٧	V		v	v	v	V	apply		Minor Exar End Term I
	Chomis	toul (Lab)		No.		1			Die stelle									1
CO1:Estimate rate constants of reactions	√ V	v	v	v	v		v		٧							Understand & Analyze		Practical Class/Qui
CO2:Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox	v	v	v	v	v		v		v							Understand & Analyze	Skill Development	Practical Class/Qui ViVa
CO3:Synthesize a small drug molecule and	v	v	v	v	v		v		v							Understand & Analyze		Practical Class/Qu ViVa
from concentration of reactants/products as a function of time CO2:Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc	v	v	V	v	v		v		v							Analyze Understand & Analyze Understand &	Skill Development	
Paper BTAM101-18Mathematics-I (Calculs	and Linea	r algebra)									-		1		-		1	1
CO1: The fallouts of Rolle's theorem that is fundemental to application of analysis to	v	V	٧			v										Understand & Analyze		Minor Ex End Term
engineering CO 2: To apply differential and integral		V	V	v	- min	V		1.57	120.200							Understand & Analyze		Minor Exe End Term

CO 3: The convergence of sequence and series and to apply different tests of	v	V	V		-	V		1				1.5	1	1		Understand & Analyze	Skill Development	Minor End End Terr
convergence. CO 4: To deal with functions of several					-								110			Understand & Analyze		Minor E
variables that are essential in most branches of engineering.	٧	V	V	1.82.03		-	10.21									Understand &		Minor
CO 5: The essential tool of matrices and linear algebra in a comprehensive manner.	۷	٧	v	٧		V										Analyze	10000	End Te
Paper BTME101-18 Engineering Graphics &	Design		Stall.	1211					_	Adres .		1	1	1	-	1	T	T
CO1: design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical,																1422		Minor
health and safety, manufacturability, and sustainability.	V	V	V	v	V	v	V	v	V	v	v	v			-	Design	Skill Development	End Te
CO 2: to prepare to communicate effectively.		110									N	V				Communicate		Minor End Te
CO 3: to prepare to use the techniques,	V	V	V	V	V	V	V	V	V	V						12200-		Minor
skills, and modern engineering tools necessary for engineering practice.	v	V	v	V	v	V	V	v	v	V	V	V				Apply		End To
							1						11-20-1					Mino
Paper BTMP 101-18 Workshop/Manufactu CO1: gain knowledge of the different manufacturing processes which are commonly employed in the industry, to	ring Pract	tices							2.00									Proje learni Assig
fabricate components using different materials.	v	v	v	v	v	V	v	V	V	V	V				-	Understanding	-	Term
CO 2: able to fabricate components with their own hands.				1												Apply		Proje learn Assig Term
	v	V	V	V	V	V	V	V	V	V	V	-	-			Арріу	Skill Development	Mino
CO 3: Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.										V	V					Understanding		learr Assig Tern Mine
CO 4: By assembling different	V	V	V	V	V	V	ľ	İ			1							Proje
components, they will be able to produce small devices of their interest.																Apply		Assig Tern
	٧	V	V	V	V	V	V	V	V	V	V	_		-				
Paper BTHU-101-18 (English) & Paper BT	HU-102-18	B (English la	ab)	_		_	_		-			-	1	1				Mid
CO1: To help the students become the independent users												1				Understanding		Exar
of English language	V	v	v	V	V	V	V	V	V	V	V	V	V	V	V	Understanding		Mid
CO 2: Students will acquire basic proficiency in listening and speaking skills						1		V	V	V	v	V	v	v	v	Understanding		Exar End
	V	V	V		1					185.58								
Ş																		
Head																		

	11111		-		-	1	_						5					11. S. S. S.
CO 3: Students will be able to understand spoken English language, particularly the language of their chosen technical field.	V	V	V	V	v	V	V	V	2	×	V		v	1		Understanding	Skill Development	Mid Semester Exams, Assignmen End Term Exams
CO 4: They will be able to converse fluently						İ		İ		i			Ť			Onderstanding		Mid Semester Exams, Assignment
	٧	V	V	V	V	V	٧	v	v	v	V	v	V	v	v	Understanding	Nu Chairt	End Term Exams
CO 5: They will be able to produce on their own clear and coherent texts.				1.1												125.00		Mid Semester Exams, Assignment
	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	Understanding		End Term Exams
Pages PTAM201 19Math analise II (Differe																		
Paper BTAM201-18Mathematics-II (Differen CO1: The mathematical tools needed in	ntial Equa	ations)	1	1	1	1	1	1	1		-			-	-		and the second	1
evaluating multiple integrals and their usages.	۷	٧	V	V	V	V			1.0									Minor Exams, Quiz, End Term Exams
CO 2: The effective mathematical tools for		1.000	1111	111.5		1000											Market Street	
the solutions of differential equations that model physical processes.	٧	v	v	v	v	v			- 4.1					1.123		Marine 1	Skill Development	Minor Exams, Quiz,
CO 3: The tools of differentiation and				-	-		-	-	-		-	-	-	-	-			End Term Exams
integration of functions that are used in	v	V	V	V	V	V			1			100	2.11	125		and a street		
various techniques dealing engineering problems.	1											S -				16 T 2 T		Minor Exams, Quiz, End Term Exams
Desce DECE 201 48 C																		
Paper BTCE- 301-18 Surveying & Geomatics CO1: Understand the concept, various		1	1	1	1	1	1	1	1		-		-	-	-			1
methods and techniques of surveying	,	10.00			v			1.10	v			V				Understand		Minor Exams, Quiz, End Term Exams
CO 2: Compute angles, distances and			1.1.1.1.1.1								122.0							
levels for given area		v	v	V					V			v	v			Analyse and design		Minor Exams, Quiz, End Term Exams
CO 3: Apply the concept of tachometry		1000																
survey in difficult and hilly terrain.	,	v	V	V		V			V	1.0		V				Application		Minor Exams, Quiz, End Term Exams
CO 4: Select appropriate instruments for				1.0.0					i i			-	ľ			Application	Employability	Life renn Exams
data collection and survey purpose	,	v				V			v			v				Understand		Minor Exams, Quiz, End Term Exams
CO 5: Analyze and retrieve the information from remotely sensed data and interpret			1	1	1.14													
the data for survey.	,	V	V	V	V	1	12.00	1						1.1.1.1	1.4.1.5	Applus and dasim		Minor Exams, Quiz, End Term Exams
CO 6: Understand the concepts related to	1993		1	1		ľ					1	-	V		-	Analyse and design		End Term Exams
GIS and GPS and analyze the geographical		All Solar	1.1.1															Minor Exams, Quiz,
data. √		V	V	V	V	V	V		V	1	V	V	V	V		Analyse		End Term Exams
	-		in the second								100							
Paper BTCE- 302-18 Solid Mechanics CO1: Understand the concept of static		-	-	1	1	1	1	1	1		1	-	-	-	1	1 1		1
equilibrium, deformations, and material	1	*	125			1.1	1.00		1			1				Understand		Minor Exams, Quiz,
constitutive behaviour.		CE III							But its	ALC: S				1201		Understand		End Term Exams
CO 2: Describe the concepts of stress,		2 Parts	100555						1.	1. 1. 1. 1.						1.		ter states
strain and elastic behaviour of materials subjected to tension, compression and	1	1	1						1			1	1	1		Understand, Analy		
torsion.											100	ľ	ľ	1 ×		se		Minor Exams, Quiz, End Term Exams
O 3: Apply the concept of Mohr's circle in																		chu renn chains

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CO 4: Develop SFD and BMD for different		-	-	-	-	-	1	1	1	-	-	-	-	-		-	1	7	_
type of beams	V	٨	1	4		1			×			4		1	1	1	Analyse and Design	1.2.4.9	Minor Exams, Quiz, End Term Exams
CO 5: Plot elastic curves for beams undergoing displacements	V	4	1	V		~	V	V	V			V		1	1	V	Analyse	1	Minor Exams, Quiz, End Term Exams
CO 6: Understand the behaviour of columns and struts under axial loading.	V	4	V	V		4	v		V			~		V	4	1	Undestand, Analyse	1	Minor Exams, Quiz, End Term Exams
Paper BTCE- 303-18 Fluid Mechanics							12-14-5	1205		1						0.86			
CO1: Understand the basic terms used in							100										1		
fluid mechanics and its broad principles	v		1		1	V			v	v							Understand		Minor Exams, Quiz, End Term Exams
CO 2: Estimate the forces induced on a plane/ submerged bodies	v	N					100								1.5				Minor Exams, Quiz, End Term Exams
CO 3: Formulate expressions using dimensionless approach and able to determine design parameters by creating replica of prototype at appropriate scale.																	Apply		Minor Exams, Quiz,
	v	V	V		v	1.1.1	v		v	v	÷	-	-		v	di	Analyze	Employability	End Term Exams
CO 4: Apply the continuity, momentum and energy principles and design the pipelines used for water supply or sewage									1										Minor Exams, Quiz,
under different situation.	V	V	-	V		-	-		V	V		V	V		V		Evaluate		End Term Exams
CO 5: Calculate drag force exerted by fluid on the body of varying shapes and able to minimize them.	v		V				1.18		V	V			V				Apply		Minor Exams, Quiz, End Term Exams
CO 6: Design and addressing problems in open channel (lined/ unlined) of different shapes and size optimally as per site										1		11	İ				, pp /		
condition.	v		V	v				No.12	v	v	v		v			v	Create		Minor Exams, Quiz, End Term Exams
Paper BTAM- 301-18MathematicsIII (Trans	form & [Discrete)																	
CO1: Understand the basic results on	1000	1	1					N 23	125.000	-							A. S	C. C. C. C. C. C. C. C. C. C. C. C. C. C	
vector function, their properties and fields so as to apply them for solving problems of																			Minor Exams, Quiz,
engineering. CO 2: Find length, area and volume using	-	V	V	-	-			V	V	V	-	v	_	Y	v	6.1.5	Understand		End Term Exams
integral calculus that is an important application in engineering.		v	V					v		v	V				~		Apply		Minor Exams, Quiz, End Term Exams
CO 3: Solve some real problems in engineering using Gauss Divergence and									12 20	1								Skill Development	Minor Exams, Quiz,
Stokes' theorem	100			v							6 1 1						Analyze	Skill Development	End Term Exams
CO 4: To formulate Laplace transform of functions and its applications to solve differential equations that form real life															- 1		1421.14		
problems in engineering.											1						Evaluate		Minor Exams, Quiz, End Term Exams
CO 5: To formulate Fourier Series, its				-				v	V	V	-	V	-	-		-	Evaluate	-	End Term Exams
properties and its applications to solve			1.1.1.2	12711	-		1.1.1.1		1511 201										Minor Exams, Quiz,

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

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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 MOSFETs.			v	v	v	1.000-	v	41 1.6	Understand	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Design Op-Amp IC based fundamental applications.	v			v		1			Understand	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Comprehend working of basic elements of digital electronics and circuits.		v			>	v	v	v	 Understand		Minor Exams, Quiz, End Term Exams

		Paper	HSMC- 132-1	8 Civil Engineering	Introduction, S	ocietal & Glob	al Impact						
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		v			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 possibilities of a career in this field	V								v		Application		Minor Exams, Quiz, End Term Exams

Paper BTCE-306-18 Surveying & Geomatics Lab

CO1: Assess horizontal & vertical angles by Theodolite.	v	V	V			 1	V	v	v	Application		Minor Exams, Quiz, End Term Exams
CO 2: Survey the area using different methods of plane tabling and compass survey	v	v	v	v			V	v	V	Application		Minor Exams, Quiz, End Term Exams
CO 3: Compute the reduce levels using various methods of leveling.	v		v	v	-		×	V	V	Application	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Predict the location of any point horizontally and vertically using Tachometry	v		v	v			1	v	v	Application	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Setting out curves in the field	v		v	v			V	v	V	Application		Minor Exams, Quiz, End Term Exams
CO 6: Use electronic survey instrument	v			v	v		V	v	v	Application		Minor Exams, Quiz, End Term Exams

Paper BTCE-307-18 Fluid Mechanics Lab CO1: Select appropriate pressure measuring device under different condition of flow. v v v v v v v v v Minor Exams, Quiz, End Term Exams CO 2: Determine the stability of a floating body v v v v v v v v v Inderstand

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CO 3: Understand and apply Bernoulli's theorem practically	v						V		v	v	v	v	v	v		Application	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Find discharge of fluid through pipe, orifices and in open channel			J	7					v	v	v	V	1990			Application		Minor Exams, Quiz, End Term Exams
CO 5: Estimate the major and minor losses in pipe.		1		,		v	1.6		v	V	V	v				Create		Minor Exams, Quiz, End Term Exams
CO 6: Estimate the various elements and energy losses in hydraulic jump.	v	v		v					v	v	v	v	v		v	Evaluate		Minor Exams, Quiz, End Term Exams
Paper BTCE-308-18 Solid Mechanics Lab			1.30.00	1														
CO1: Understand the importance of physical properties of steel.	1	V				V	V		¥			V			V	Application		Minor Exams, Quiz, End Term Exams
CO 2: Identify and comprehend code provisions for testing different properties of steel	1	4	V	V		V	V	-	4			V	V	×	V	Application		Minor Exams, Quiz End Term Exams
CO 3: Develop stress-strain curve for axial compression	1	V	V	×		V	V		A			1	1	V	V	Application	- Skill Development	Minor Exams, Quiz End Term Exams
CO 4: Assess hardness and impact strength of steel.	V	1	V	4		4	V		×			V	*	V	4	Application		Minor Exams, Quiz End Term Exams
CO 5: Assess flexural strength of a given material.	1	1	V	1		V	×		V			V	×	V	1	Application		Minor Exams, Quiz End Term Exams
CO 6 : Evaluate fatigue and impact strength of steel.	V	V	V	V		V	1		×		1	1	4	V	V	Application		Minor Exams, Quiz End Term Exams
Paper BTCE-401 Concrete Technology		-						10.00				- 10	E.		202			
CO1: Understand the relevance of different properties of constituent materials on properties of concrete.	1			1	1	100	v	1	×	×	V	V			۳.,	Understand		Minor Exams, Quiz End Term Exams
CO 2: Understand the behaviour and durability aspects of concrete under different loading and exposure conditions.	V				V			1	Å	٨	1	V		1	4	1.2.2.		Minor Exams, Quiz End Term Exams
CO 3: Understand the issues involved in production and use of concrete	V				V			V	×	1	V	V		1.1		Analyse and design	Emplyability	Minor Exams, Quiz End Term Exams
CO 4:Design of concrete mixes as per BIS specifications.	1	*	V	~	4		200	V	V	1	V	V			1	Analyse and design		Minor Exams, Quiz End Term Exams
CO 5: Understand various testing methods for concrete and their applicability	V				V	1	V	*	4	V	V	V		V	V			Minor Exams, Quiz End Term Exams
CO 6: Knowledge of special type of non- conventional concretes.	1				V	v	v	4	V	1	٨	4		V	٨	Understand	5.0.7	Minor Exams, Quia End Term Exams
Paper BTCE-402 Material, Testing & Evalu	ation			1														
CO1: Appraisal about the role of materials in civil engineering	1	1.00				1	1		1		San	~		1	V	Understand, Application	12.01.63	Minor Exams, Quiz End Term Exams

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CO 2: Introduce common measurement instruments, equipments and devices to capture the material response under	1	4		V	V	1	4	٨		V	V	V	4	Understand, Application		Minor Exams, Quiz, End Term Exams
loading CO 3: Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice	v	1	4	1	~	4	4	4		V	V	V	1	Understand, Application	- Employability	Minor Exams, Quiz, End Term Exams
CO 4:Ability to write a technical laboratory report.	V	V	V	V		V	4	V		×			V	Understand, Application		Minor Exams, Quiz, End Term Exams

CO1: Understand the interaction among various processes in the hydrologic cycle.	V								v		v	1			Understand		Minor Exams, Quiz, End Term Exams
CO 2: Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapotranspiration etc	v	V	v	v	v			v	v		v	v	v	v	Analyse		Minor Exams, Quiz, End Term Exams
CO 3: Understand the various component of hydro graphs and able to estimate the run off	v	v	V	v	V			v	v		v	v	v	v	Analyse & Design	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Find the water requirement for different crops and able to proposed appropriate method of applying water.	v	v	V	V	v	v	v	v	v		v	v	V	V	Design		Minor Exams, Quiz, End Term Exams
CO 5: Understand the distribution system of canal and various components of irrigation system	V				V	V	v		V	v	v		v	V	Understand		Minor Exams, Quiz, End Term Exams
COG: Classify dams and spillways, their problems and able to determine forces exerted by fluid on dams.	v	v	v	v	v	V	v	V	v	V	V	v	v	V			Minor Exams, Quiz, End Term Exams

CO1: Appreciate the importance of different modes of transportation and characterize the road transportation.	۷			v					Understand		Minor Exams, Quiz, End Term Exams
CO 2: Alignment and geometry of pavement as per Indian Standards according to topography.		v							Analyse		Minor Exams, Quiz, End Term Exams
CO 3: Assess the properties of highway materials in laboratory		v	v						Analyse & Design	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Understand the importance of railway infrastructure planning and design.	٧			v					Design		Minor Exams, Quiz, End Term Exams
CO 5: Identify the functions of different component of railway track	٧								Understand	AP Jay	Minor Exams, Quiz, End Term Exams
CO 6: Outline the importance of Airport Infrastructure	v			v							Minor Exams, Quiz, End Term Exams
Paper BTCE-405 Dis	aster Prep	paredness				New S				(CH-R) al	
dentify various types of disasters, their causes, effects & mitigation measures.		1				-la	V	×	Understand		Minor Exams, Quiz, End Term Exams

CO 2: Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk				٨							1			V		Application		Minor E End Ter
maps. CO 3: Understand the use of emergency management system to tackle the	V												1	V		Understand		Minor End Te
problems CO 4: Discuss the role of media, various agencies and organisations for effective		V											V			Analyse	Employability	Minor End Te
disaster management. CO 5:Design early warning system and understand the utilization of advanced			1										V			Application		Minor End Te
technologies in disaster management. CO 6:Compare different models for disaster management and plan & design of infrastructure for effective disaster management.			V										×			Application		Minor End Te
a start to car to car to the lab																		
Paper BTCE-406-18 Concrete Testing Lab CO1: Evaluate properties of building materials, such as cement and aggregates	V			V	V	1	V	V	1	1	V	V	4	V		Understand		Minor End Te
CO 2: Conduct experiments and check the acceptance criteria (if any).	×			4	V	V	V	V	٨	V								Minor End T
CO 3: Design concrete mixes as per BIS provisions.	1	V	V	V	V	1	V	V	4		V	4	V	~		Analyse and design	Fanlauchility	Minor End To
CO 4: Analyze the properties of concrete in fresh and hardened state.	1			V	V	1		V	V	V	V	¥	V	V		Analyse and design	Employability	Minor End To
CO 5: Create a well organized document and present the results appropriately.	4			×	V	4	1	V	Å	V								Mino End T
CO 6: Understand and apply non destructive testing (NDT) for evaluating concrete quality.	ł	V		V	V	4	1	V	V	1	4	V	V	V	1	Understand		Mino End T
Paper BTCE-407-18 Transportation Lab																a l'Andres		10
CO1: Characterize the pavement materials as per the Indian Standard guidelines	v								v				1		1			Mino End T
CO 2: Evaluate the strength of subgrade soil by CBR test.		v					3		v		J.S.N.							Mino End T
CO 3: Conduct experiments to evaluate aggregate properties. CO 4:Determine properties of bitumen material and mixes	۷			V					v		1		18-1		1		Employability	Minor End T
CO 4:Determine properties of bitumen material and mixes	٧			v					v					100				Mino End T
CO 5: Evaluate the pavement condition by rough meter and Benkelman beam test.	۷			v					v	1						Par 264		Mino End T
CO 6: .Create a well organized report and present the results appropriately		1	v						v									Mino End T
rough meter and Benkelman beam test.																		

Paper BTCE-501-18 Engineering Geology

CO1: The basic concepts of geological processes and their importance in civil Engineering	4	4												Understand		Minor Exams, Quiz, End Term Exams
CO 2: Identification of rocks and minerals and their characteristics	1	×				1								Understand		Minor Exams, Quiz, End Term Exams
CO 3: Significance of geological structures in civil engineering proj	V	V				V	1		V		V			Analysis	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Site characterization and geologic considerations in construction	V	4	×	V	×	V	V	V	V	V	×	N	1	Analysis and Design		Minor Exams, Quiz, End Term Exams

PaperBTCE-502-18 Elements of Earthquake Engineering

CO1: Understand the phenomenon of occurrence and history of earthquakes and classify their kinds and effects.	1					ñ.		1,0		 ×			<u>(</u>)	understand		Minor Exams, Quiz, End Term Exams
CO 2Appreciate the role of earthquake forces in structural design of building.	٨			V		V	100			V	V	V	- 24	understand		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.	٨	×		×						×	×	×		Analyse	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Apply various codal provisions related to seismic design of buildings.	٨	. 1180	V			V				V	V			Design		Minor Exams, Quiz, End Term Exams
CO 5: Acquire new basic knowledge in earthquake engineering	٨				1016					V				Understand		Minor Exams, Quiz, End Term Exams

Paper BTCE-503-18 Construction Engineering & Management

CO1: An understanding of modern construction practices					v	12.14		111	West way			-	v	Understand		Minor Exams, Quiz, End Term Exams
CO 2:A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics	v		v				v	v			v	v				Minor Exams, Quiz, End Term Exams
CO 3: A basic ability to plan, control and monitor construction projects with respect to time and cost	٧			v									v	Analyse and design	Employability	Minor Exams, Quiz, End Term Exams
CO 4: An idea of how to optimise construction projects based on costs								v		v		v		Analyse and design		Minor Exams, Quiz, End Term Exams
CO 5:An idea how construction projects are administered with respect to contract structures and issues	v				v			v	1.1.2.1	v						Minor Exams, Quiz, End Term Exams
CO 6: An ability to put forward ideas and understandings to others with effective communication processes	V	v			v					v		v		Understand		Minor Exams, Quiz, End Term Exams

Paper BTCE-504-18 Environmental Engineering

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							1								1				A Real Production	
CO1: Understand the impact of humans on environment and environment on humans	v		Т				v	v		v	v		v				v	Understand		Minor Exams, Quiz, End Term Exams
O 2: Be able to identify and value the ffect of the pollutants on the nvironment: atmosphere, water and soil.	v	v	,	,			v	v		v	v	v	v		v	v	v	Evaluate		Minor Exams, Quiz End Term Exams
O 3:Be able to plan strategies to control, educe and monitor pollution	v				v		v	v	1.28	v	v		v			v		Create	Employability	Minor Exams, Qui End Term Exams
O 4: Be able to select the most ppropriate technique for the treatment f water, wastewater ,solid waste and	v	V		v	v			v		v	v	v	v		v	v		Create		Minor Exams, Qui End Term Exams
ontaminated air. 20 5: Be conversant with basic environmental legislation	v							v		V	v		v				v	Understand		Minor Exams, Qui End Term Exams
		-					1					1								
Paper BTCE-505-18 Structural Engineering CO1: The students will be able to apply heir knowledge of structural mechanics in addressing design problems of structural	V	1		٨	V				V	4	1				V			Analyse and design		Minor Exams, Qu End Term Exams
ngineering O 2: Ability to understand difference etween Working stress and Limit State 'hilosophy by calculating various design	V	~		1	V				V	N					×			Analyse and design		Minor Exams, Qu End Term Exams
parameters. CO 3: Design the reinforced concrete beams and slabs using limit state design	1	1		4	1			V	1	1			1		V			Analyse and design	Employability	Minor Exams, Qu End Term Exams
guidelines of Indian standards. CO 4: They will possess the skills to analyse and design steel structure	1	V		4	1		1	V	~	4			V		1			Analyse and design		Minor Exams, Q End Term Exams
members CO 5: They will have knowledge of structural engineering	1								1	V						-				Minor Exams, Qu End Term Exams
a star for 10 Countralial Engineer	dag		1			1								112	1.			- <u>Anna 1997</u>	Mi Serti Serti	-
Paper BTCE-506-18 Geotechnical Engineer 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	v	'							v										Minor Exams, Qu 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 determination		,	1		v					v									Employability	Minor Exams, Q End Term Exam
CO 3: Apply the various specifications of compaction of soils in the construction of highways and earthen dams.	4	,	,	v																Minor Exams, Q End Term Exams

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		-	-	-	-	-	2012			1					
CO 4: Able to apply the knowledge of consolidation, soil deformation parameters, and calculate settlement magnitude and rate of settlement.		٧		V											Minor Exams, Quiz, End Term Exams
CO 5: Design the embankment slopes and check the stability of finite slopes.		٧													Minor Exams, Quiz, End Term Exams
Paper BTCE-507-18 Geotechnical Lab										B					_
CO1: Describe fundamental concepts and principles and practices of Management	v	٧													Minor Exams, Quiz, End Term Exams
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across organizations.	v	٧													Minor Exams, Quiz, End Term Exams
CO 3: Develop analytical abilities to face the business situations.	12.4.4	٧	27											Employability	Minor Exams, Quiz, End Term Exams
CO 4: Apply various tools that would facilitate the decision making process in the business.	v	v													Minor Exams, Quiz, End Term Exams
CO 5: Develop peer based learning and working in groups and teams.															Minor Exams, Quiz, End Term Exams
														1	
Paper BTCE-508-18 Environmental Enginee CO1: Describe fundamental concepts and	ring Lab									1			Understand &		Practical Exam.
principles and practices of Management	٧	٧	v	19	v	V	V	v		v		10	Analyze		Class/Quiz Tests
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across				v	٧	v	v	v	v	v	v	v	Understand & Analyze		Practical Exam, Class/Quiz Tests, VīVa
organizations. CO 3: Develop analytical abilities to face the business situations.			2.2.5	V	v	v	v	v	v	v	v	v	Understand & Analyze	Employability	Practical Exam, Class/Quiz Tests, ViVa
CO 4: Apply various tools that would facilitate the decision making process in the business.	v	v	v	v	v	v	v	v	v	v	v	v	Understand & Analyze		Practical Exam, Class/Quiz Tests, ViVa
CO 5: Develop peer based learning and working in groups and teams.	v	3040	Sin	v	v	v	v	v			v	v	Understand & Analyze		Practical Exam, Class/Quiz Tests, ViVa
CO 6: Evaluate and compare different techniques of experimental analysis	v	v	v	v	v		Nil	v	٧	V	v	v	Understand & Analyze		Practical Exam, Class/Quiz Tests, ViVa
	4	in the second			-48-41-	12 19 19	1.19	1		A Cla	d ng k			A-1 M 8 - 2	
Paper BTCE-509-18 Structural Lab CO1: Describe fundamental concepts and		-			1	1				1	1		in the second		Minor Exams, Quiz
principles and practices of Management	٧	v		1	v								Understand & Analyze		End Term Exams
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across organizations.		v						v					Understand & Analyze		Minor Exams, Quiz End Term Exams
CO 3: Develop analytical abilities to face	v			1									Understand &	Employability	Minor Exams, Quiz

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CO 4: Apply various tools that would facilitate the decision making process in the business.	v	v	v	v		Understand & Analyze		Minor Exams, Quiz, End Term Exams
CO 5: Develop peer based learning and working in groups and teams.				v		Understand & Analyze		Minor Exams, Quiz, End Term Exams
Paper BTCE-532-18 Training – II*		an an an an an an an an an an an an an a	- Mirne					
CO1: Describe fundamental concepts and principles and practices of Management			v	v	v			Minor Exams, Quiz, End Term Exams
CO 2: Explain the role and responsibilities of managers and adapt to the various styles of management across organizations.			v	v	v			Minor Exams, Quiz, End Term Exams
CO 3: Develop analytical abilities to face the business situations.			V	v	v		Employability	Minor Exams, Quiz, End Term Exams
CO 4: Apply various tools that would facilitate the decision making process in the business.			v	v	v			Minor Exams, Quiz, End Term Exams
CO 5: Develop peer based learning and working in groups and teams.			v	v	v		5 13.4	Minor Exams, Quiz, End Term Exams

				Paper BTCE	- 601-18 Er	ngineering l	Economics,	Estimation	& Costing							-
CO1: Have an idea of basic principles and elements of economics in general.						V	٨	V		V	V	V		Understand		Minor Exams, Quiz End Term Exams
CO 2: Be able to carry out and evaluate enefit/cost, life cycle and breakeven inalyses on one or more economic ilternatives.		4		×		4	V	×		٨	V	V		Analyse and application		Minor Exams, Quiz End Term Exams
CO 3: Be able to understand the technical pecifications for various works to be performed for a project and how they mpact the cost of a structure.	4		¥	V		V	V	V		V	¥	V		Analyse and application	Employability	Minor Exams, Quiz, End Term Exams
204: Be able to quantify the worth of a tructure by evaluating quantities of constituents, derive their cost rates and suild up the overall cost of the structure.	V		4			V	Y	V		1	٧	×	V	Analyse and application		Minor Exams, Quiz End Term Exams
CO 5: Be able to understand how competitive bidding works and how to ubmit a competitive bid proposal			V			V	V	V	dank.	4	1	V		Understand		Minor Exams, Quiz, End Term Exams

CO1: Understand the methods of surface and subsoil exploration and to prepare investigation report.	v			v			v	٧	٧	Analyse and application		Minor Exams, Quiz, End Term Exams
CO 2:Estimate the stresses in soils and bearing capacity of soil for shallow foundation	v	v							v	Analyse and application	- Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Design various types of shallow foundation and to estimate settlement.	٧	v	v						v	Analyse and application		Minor Exams, Quiz, End Term Exams

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CO 4: Apply the concepts of deep foundation and solve problems related with pile foundation.	v	v	V		Nº T	1						v			Analyse and application		Minor Exams, Quiz, End Term Exams
Paper PECE- 602B-18 Elective -II(Ground In	noroveme	nt Technia	ues)														
CO1:To study Insitu densification of			1				1								and the second		
cohesion	250	v	٧	v	V	v	v			V			1.	٧	Understand		Minor Exams, Quiz, End Term Exams
CO2:To identify and analyze soil improvement with additions of materials		٧	v	٧	v	٧	V			v	v	v	1.00		Understand	Skill Development	Minor Exams, Quiz, End Term Exams
CO3:To learn soil improvement techniques using reinforcing elements		v	v	v	v	v	V		V					v	Analyse and application	- Skil Development	Minor Exams, Quiz, End Term Exams
CO4:To have in depth knowledge of geotextile material and its properties	v										v				Analyse and application		Minor Exams, Quiz, End Term Exams
Paper PECE- 602C-18 Elective - III(Advance	Soil Mech	anics)															
CO1: Do earth dam design and stability			1.000		1	1	N 121-2			1					and the second second		
analysis for all kind of drainage conditions	٧	V			2.11				v	1	1.0164		v		Analyse and application		Minor Exams, Quiz, End Term Exams
CO 2: Do stability analysis of any kind of slope and its protection		v		v			1	-	v						Analyse and application		Minor Exams, Quiz, End Term Exams
CO 3: Understand the earth pressure theories and able to calculate lateral earth pressure for different conditions	1	v	v										v		Analyse and application	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Evaluate depth of embedment for cantilever as well as anchored sheet piles.		v		v						18			v		Analyse and application]	Minor Exams, Quiz, End Term Exams
CO 5: Learn the concept of machine foundation		v		Sec.		19			٧						Analyse and application		Minor Exams, Quiz, End Term Exams
		Paner	PECE -502	D-18 Onen	Flactive	Geosynthe	etics Engine	oring)									
CO1: Identify the functions of		, uper	1							1	1		1				
geosynthetics	۷	v				N= 1			v				V		Understand		Minor Exams, Quiz, End Term Exams
CO 2: Select the geosynthetic products		v		v			V		v						Understand	Chill Davalagement	Minor Exams, Quiz, End Term Exams
CO 3: Identify the testing methods for geosynthetics		v	v			v				1			v		Understand	 Skill Development 	Minor Exams, Quiz, End Term Exams
CO 4: Design withgeosynthetic products		v		v		Sec.	1.00		Stark.	120		1	v		Understand		Minor Exams, Quiz, End Term Exams

Paper BTCE-PECE-602E-18 (Geo Environme	ental engin	eering)			0.000			and the second			1-				
CO1:To understand and analyze issues regarding soil contamination	1	4								W.			Understand		Minor Exams, Quiz, End Term Exams
CO2:To study cause and effect of water contamintion	1	4	4	1	*	V			×	×	٨	V	Understand	12.2	Minor Exams, Quiz, End Term Exams

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03:To identify remediation of	-	T				1									Analysis	Skill Development	Minor Exams, Quiz,
ontaminants from soil and ground water	V	1		1	1	4	V								r nom y are		End Term Exams
O4:To have knowldege of soil waste isposal and stabilization	~	×		10,					V	V	4	V	~		Analysis		Minor Exams, Quiz, End Term Exams
OS:Learn the concept of engineered andfill	V	V				4			Ń	×	×	×	V		Understand		Minor Exams, Quiz, End Term Exams
aper BTCE-PECE -602F-18(Rock Mechanics)		112	4				1										
201: Identify the problems associated vith underground excavations	V	V								10.00		1			Understand		Minor Exams, Quiz, End Term Exams
CO 2: Classify the rock mass using the reference data	V	V								1					Understand	- Skill Development	Minor Exams, Quiz End Term Exams
CO 3: Understand the failure criteria of	V	V				4			V			V			Analysis		Minor Exams, Quiz End Term Exams
соск CO 4: Determine in-situ stresses from field test data	1	1	V	V	1	~	1	N	V	*		~	1	4	Analysis and Design	la mistra	Minor Exams, Quiz End Term Exams
				-	-	-	-	11		-							121 12 122
Paper BTCE-PECE - 603A-18(Design of Conc CO1: To apply the loads on building	rete Struc	tures)	1		b	1		1	1				~		Analyse and Design		Minor Exams, Qui End Term Exams
frames and analyse them using direct and indirect methods. CO 2: To analyse the concrete				-	-	-	-		V	-	1		~		Analyse and Design		Minor Exams, Qui End Term Exams
components i.e. continuous beams, flat slabs, tanks and retaining walls, etc	٧	V	V		-		-	4	v	-					Analyse and	- Skill Development	Minor Exams, Qu
CO 3: To design and detail the concrete components i.e. curved beams, flat slabs, tanks and retaining walls, etc	1	V	V	10.3				V	V		N	1	×		Design	-	End Term Exams Minor Exams, Qu
CO 4:To analyse and design the special foundations i.e. raft, pile and machine	1	1	V					1	V		٨	, · · ·	4		Analyse and Design		End Term Exams
foundations.			-												Part of the second		
Paper BTCE-PECE-603B-18(Design of Steel CO1: To apply the knowledge for analysis and design of various components of a	Structure	5)	4				1	1	V		4		V		Analyse and Design		Minor Exams, Qu End Term Exams
plate girder. CO 2: To analyse , evaluate and design the different types of beam-column	1	1	~			1		V	1		V		V		Analyse and Design	Contract Street	Minor Exams, Qu End Term Exams
connections. CO 3: To design the column bases and	1.100-	1	1					4	×		1		V		Analyse and Design	Skill Development	Minor Exams, Qu End Term Exams
footings for a steel structure under various loading conditions CO 4:To analyse the loads and design						-		1	1		1		1		Analyse and Design	1	Minor Exams, Q End Term Exams
various elements of industrial buildings.	1	1	1		1	1	1			-		-				-	
CO 5: To demonstrate the basic knowledge of plastic analysis of simple steel	V	1	V					V	1		1		V		Analyse and Design		Minor Exams, Q End Term Exam

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

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CO 4: Recognize the ideal material for					T	1	1	1	1	1	-	1	-	1	-	Lindenteed	1	-
different repair and retrofitting techniques.	1	1	1	V	1	V	1		V			V	V	V	4	Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams
Paper BTCE-PECE-604D-18(Construction C	Cost Analy	sis Method	is)															And Andrews
CO1: To Prepare Capital budgeting of a Construction site.	~	~	~		100	-				~	~	×	~			Understand,		Minor Exams, Quiz,
CO 2: To Prepare a Performance statement of a company'	1	1	1	1					-							Analyse Understand,		End Term Exams
CO 3: To estimate various financial										V	V	V	V			Analyse	Skill Development	Minor Exams, Quiz, End Term Exams
instrumental such as IRR, Break even analysis			V	V	4	X	V			V	V	×	×			Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 4: To prepare a Job Cost report of a Construction Site.			V	V	V	V	V									Understand, Analyse		Minor Exams, Quiz, End Term Exams
		Day	ATCE DE			1.00	1	101										End Term Exams
CO1:To Provides a broad understanding of		Pa	per BICE-PE	CE-604F-18	B(Construct	ion Engine	ering Mater	ials)	1	-	-		-					1.00 C
the composition, microstructure, and engineering behavior of various materials used in civil engineering applications	V	V			V				¥	4	v	V		v				Minor Exams, Quiz,
CO 2: To Introduces various modifications											-					Understand	Skill Development	End Term Exams
possibilities in construction materials	V	V		1	V				v	V	V	V					Skill Development	Minor Exams, Quiz,
CO 3: To Understand and Explain Special Concrete	V	V							V	V	V	V				Understand		End Term Exams Minor Exams, Quiz,
Paper BTCE-OECE-609(Remote Sensing and	(CIS)				1000		20 U 7		1			-	-			onderstand		End Term Exams
CO1:The characteristics of Remote sensing	1 (15)	1	1	1	1	1		-		-						_		
satellites and Applications of remote sensing CO 2: The GIS and its Data models		¥	1	V					V			V		v		Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 2. The GIS and its Data models		1	4	V							V			V		Understand, Analyse	Skill Development	Minor Exams, Quiz, End Term Exams
	Pap	er BTCE-PE	CE -701A-1	8(Pavemen	it and geon	antric docia	n of Waha		1466	11								
CO1: Understand patterns of Traffic and its					Le uno Beon	leane desig	n of Highw	ay)										1
behaviou CO 2: Develop an understanding for	V	1.64			1	V		1.14	٨			٧	V	V		Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams
various sight distances and its affects		٧								1.7.1.3		1	V	1		Understand, Analyse and		Minor Exams, Quiz,
CO 3: Analyse and design Horizontal and vertical curves		۷		v					V			V	4	V		Design Understand, Analyse and Design	Skill Development	End Term Exams Minor Exams, Quiz,
CO 4: Apply various tools that would facilitate the decision making process in the business.	۷					v			V							Understand, Analyse and Design		End Term Exams Minor Exams, Quiz, End Term Exams
CO 5: Develop and appreciate the concept of intersections	٧								V			¥			3	Understand, Analyse and Design		Minor Exams, Quiz, End Term Exams

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

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CO1: Understand the detail concepts of the airport engineering	v		1	1	-	v			V			V	V	1.11	Understand, Analyse and		Minor Exams, Quiz,
CO 2: Able to design runway, taxiway and	1					30		1212			_				Design Understand,		End Term Exams
apron pavements.	7	v										V		V	Analyse and Design	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Suggest the runway orientation and the runway length as per FAA & ICAO guidelines.		v		٧		2			٨				V	×	Understand, Analyse and Design	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Conceptualise Pavement management system for maintenance	٧					٧			V						Understand, Analyse and Design	- Inc	Minor Exams, Quiz, End Term Exams
Paper BTCE-PECE -701C-18(Intelligent Tran	sportation	n systems)															
CO1: Understand the concept of Intelligent Transportation system.	v					٧	1.1		٨				V		Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 2: Analyse ITS's relevance with Smart growth and energy based planning.			1.00									V		V	Understand, Analyse		Minor Exams, Quiz, End Term Exams
CO 3: Conceptualise the urban transportation systems using different models.		v							٧				V	N	Understand, Analyse	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Explore methodology for smart city based Transit planning	v		i ist			٧			V						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	nuction an	d Manage	ment)	N.W.W													
CO1: Understand various materials and techniques used to construct pavements.	v					v			٧			1	V		Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
CO 2: Design the bituminous pavement as per standards		v	1				v			v		*		V	Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
CO 3: Design thickness and joints including drainage of concrete pavements		v		٧					۷				V	V	Understand, Analyse and design	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Suggest maintenance of pavement.	۷	122				٧			٧						Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
CO 5: Conceptualise pavement management systems.	٧	v	v	v									v		Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
Paper BTCE-PECE -701E-18(High Speed Rail	Engineeri	ing)			12011		2.5.8.5										La Statis
CO1: Develop an understanding for high- speed Rails.	٧		1			v			V			1	~		Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
CO 2: Outline the requirements for design		v		1			٧					1		V	Understand, Analyse and design		Minor Exams, Quiz, End Term Exams
CO 3: Design of points, crossing and turnouts.		v		v				and a	٨				V	V	Understand, Analyse and design	Skill Development	Minor Exams, Quiz, End Term Exams

Department of Civil Engineering

CO 3: Aanalyse rural sanitation approache: along with the low cost excrete disposal system and sustainable	s																Anakas	Skill Development	
wastewater treatment procedure.	V		V			~	2										Analyze		Minor Exams, Quiz,
O 4: Resolve various issues encountered			1	-	-		v	-	V		V	V	V	V	_	V	2		End Term Exams
n rural sanitation.	1.11											1 1					Application		Minor Exams, Quiz,
	V	V		V		٧	V		V	2020	V		v				Application		End Term Exams
Paper BTCE-PECE-702C-18(Air and Water (Quality M	odeling)																	
CO1: Model Development and mass	T C	1	1			1	1	1	1		1	1	-			-	1		-
palance along with equilibrium principles.	v	V	V	v													Create	37.	Minor Exams, Quiz,
CO 2: Develop lake water quality		-					100		V		V	V	V	V	V			-	End Term Exams

modeling, ground water quality modeling and numerical methods.	V		v						v	v	1	v		v	V	Create		Minor Exams, Quiz, End Term Exams
CO 3: Do modeling for air pollution, self							1000		and the second second								Skill Development	
cleaning of atmosphere and stack						1.1	1.5		 1.							Create		Minor Exams, Quiz,
emission.	V	V	V		V	1.00		1 63	1					100		Create		
CO 4: Understand about Water Quality				1		-		-		V	V	V	V	V	V			End Term Exams
Index, Air Quality Index and Delphi		100		100						1								and the second
Method.	4	1 2 2		1.0				1.00		1.11	1000			1		Understand		Minor Exams, Quiz,
Weenou.	v	-				V	-	V	V	V		V						End Term Exams

Paper BTCE-PECE-702D-18(Solid and HazardousWaste Management)

CO1: Understand various concepts related to collection, storage and transportation of wastes along with application of recycling and reuse of wastes.					, st										Understand		Minor Exams, Quiz,
CO 2: Apply different processing	1.00				V	V	-	V	V	-	V	-		V			End Term Exams
technologies related to solid wastes and their treatment.	V	V	v	v		V		V							Create, Apply		Minor Exams, Quiz, End Term Exams
CO 3: Analyse various treatment methods for hazardous wastes & their disposal and also apply different disposal methods of hazardous wastes.		V	v	v		V		1		ľ	ľ				Create, apply	Skill Development	Minor Exams, Quiz,
CO 4: Design, develop, operate and closure of landfills. Also, to manage and monitor the behavior of landfill materials and sites.	v	v	v	v		V		V	V	V	V	V	V		Design		End Term Exams Minor Exams, Quiz,
CO 5: Understand and apply municipal solid waste rules and other rules.	v				v	v		v	v		v	V	v		Understand		End Term Exams Minor Exams, Quiz, End Term Exams

Paper BTCE-PECE-702E-18(EIA and LCA)

CO1: Understand about EIA in detail and rules, various notifications (2000) and projects required in the EIA Process	v			V	v		N							Unddrstand, Apply	Minor Exams, Quiz,
CO 2: Understand various risks, its issues								-		V	-		v		End Term Exams
and their impacts. They should also be	1.1.1.1	100						2. 1. 1. 1.					1.0		
able to learn about criteria for selection of				The second							1				
EIA methodology, impacts, evaluation and					1.0	14.				1000				Create	
methods		George Charles						e fentisi		111500					Minor Exams, Quiz,
V	/	V	V		V		v	V	V	V	V	N	N		End Term Exams

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))					
CO 2: To understand the concept of		1		-	-	1	-	-										
groundwater and well hydraulics.																and the second]	
	V	V	V	V	100					12.20								Minor Exams, Qu
CO 3: To understand the water quality					-	V	-	-	V	V		V	V	V	V	Analyse	Skill Development	End Term Exams
standards and groundwater managemen	t.	100				1000	30 647	12.3										
60 At Hadavas 145 1	V	V	V	V		V		1.	V	V		V	V	N	V	Analyse & Design		Minor Exams, Qu End Term Exams
CO 4: Understand the impact of climate								1 N		100	-	-				Analyse & Design		End Term Exams
change on hydrological cycles and											100							
groundwater	V	V	V	V		V	V	V	v	v	1.	V	V	V	V	Design		Minor Exams, Qui End Term Exams
Paper BTCE-PECE -703D-18(Hydraulic Mo	odelling)																	
CO1: To have an overall knowledge about	t						1		1		-	-						
the basics of hydraulic modeling								100									1.	Minor Exams, Qui
CO 2: To understand the concept of gravit	V	_			_	V			V	V						Understand		End Term Exams
dominated and friction models.	CY I				100				10.00									Cita renn cauns
dominated and metion models.															1			Minor Exams, Qui
CO 3: Use of remote sensing and	V	V	-	_	_				V	V						Apply	in the second se	End Term Exams
															-	10000	Skill Development	Life Term Exams
geographic information system in water			1.0				1.1		1.00	1.0								Minor Exams, Qui
quality modeling.	V	V	V		V		V		V	V				N		Analyze		End Term Exams
CO 4: Understand the concepts and																Analyze		End Term Exams
models in groundwater hydrology.		1.1																
	V	V	1	V			1.1		V	V		V	1	1		Evaluate		Minor Exams, Quiz
Paper BTCE-PECE -703E-18(Transient in Cl	lored Cor	a desta a			199				6		_		1.	v	-	Evaluate		End Term Exams
CO1: Identify the basic numerical scheme	I Sea Cor	iouits)	-	-	-				No.									
for unsteady flow in closed conduits.		1.00		1														T
or disteady now in closed conduits.								1 1 1	10 10 10									Minor Exams, Quiz
CO 2: Implement comprehensive and	V	-	V	-			V	1		V	V			V	1.1.1	Understand		End Term Exams
effective flow control, achieving efficient							1.	1.7.1.1.						-	-			Lind Ferrir Exams
water utilization, and maintaining rich				1.00														
fluvial environments.	111 11							10	10.13							1		Minor Exams, Quiz
CO 3: Detect and analyze the flow	-	V	-	V	V	V		V	and the second	.2. 1.3	V		V			Apply	Skill Development	End Term Exams
			1.0			1.0							-				onan bereiopinent	Lind renni chanis
transients through pumps and related hydraulic structures.							100											Minor Exams, Quiz
	-	V	-				V		V					V		Analyze		End Term Exams
CO 4: Analyze pipe networks including												-	-	ľ	-	Analyze		End Term Exams
oumps, valves, surge tanks, etc			1.000	100			100		1 1 1 1 1 1	17 2 2 3 4								Minor Exams, Quiz
	1	V	V		V	1		10011	1.000		V		V			Evaluate		End Term Exams
Paper BTCE-PECE -703F-18(Urban Hydrolog	gy and H	ydraulics)									NY II	10						
O1: Provide an overview of urban						1	1	1	1		-	-	_	_			and a second second	and the second
ydrology and Urban water supply		1000			1 1	3 1 M M	S. 126.91	1.1.1.	1000									
emand forecast.	V	1				V		12.3			1000							Minor Exams, Quiz
O 2: Identify tools and approaches for				-	-	-	-	-	V	V		-	_	_		Understand		End Term Exams
rban water management.											10 121							
	V	V							10.000									Minor Exams, Quiz
0 3:Learn the important types of storm				-	-	-		-	-	V			-	_		Apply		End Term Exams
ater infrastructure used in urban					1.00			1	1.1.1.1.1.1.1									
rainage systems.	V	V	V		1			1						1				Minor Exams, Quiz,
0 4: Learn the operation and		-	ľ	-	V	-	V	-	V	V	-					Analyze	Skill Development	End Term Exams
anagement of urban drainage system	1777			1 and 1			A CONT		SPACE &									
d to develop storm water management	101							1.810			0							
odels.	V	V		100				L.C.N										Minor Exams, Quiz,
5: Design urban drainage systems and			-		-	-	a started a		1	V			V	V		Evaluate		End Term Exams
ructures such as culverts, OSD systems			10.00		11/2				10000									
d street pipe drainage systems			1.00		14.			1 March	100000	In the second		100						1. 1. 1. 1. 1. The
the anomale systems					17.00		1		1.									Minor Exams, Quiz,

Minor Exams, Quiz, End Term Exams

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Paper BTCE-OECE-701-18(Metro Systems and Engineering)

taper oree oree tor tolmetro systems	anucngi	neering)																	
CO1: Understand the importance of Metro System	0							1		-	T	1	-	-	1	-	_		1000
	V		V			1000													Minor Exams, Qu
CO 2: Understand the construction methods of underground and elevated							V			1	V	V	-		V		Understand	_	End Term Exams
station		V		V	V	V	1												Minor Exams, Qu
CO 3: To realize the significance of traffic									-			V		V	-		Apply		End Term Exams
management systems by incorporating the concepts of Traffic Engineering.	e				3													Employability	
CO 4: To realize the importance of safety in metro by understanding the concepts		V		-			V	-	V	-		-			V		Analyze		Minor Exams, Qu End Term Exams
signaling system	1	V	V		V										1			1000	Minor Exams, Qu
CO 5: Understand the importance of electrical and mechanical system in metro.				1	-							V		V		-	Evaluate	-	End Term Exams
		V	V		V		1.10		1	9		v		v			Evaluate		Minor Exams, Qui End Term Exams
Paper BTCE-OECE-702-18(Traffic Managen	nent)																_		chu renn exams
CO1: To have an overall knowledge of the						1	1	1	1	_			-						
traffic components and assess the traffic characteristics and related problems.	v					v					v			v					1.94
CO 2: Develop a strong knowledge base of		-	-	-	-				1.000								Understand		Minor Exams, Qui End Term Exams
raffic planning and its management in any ransportation area		V							v			v			-				Minor Exams, Qui
O 3: Provide knowledge of traffic control evices and its techniques in		v		v									-	-			Apply	_	End Term Exams
ransportation interaction. O 4: Understand different types of Traffic		-	1000		1			V						V				Skill Development	Minor Exams, Qui
Anagement techniques	٧				1 11	V	in a cha		100			1					Analyze	-	End Term Exams
O 5: Collect Traffic data, traffic volume		-	-	-	-	-	-						V			V	Evaluate		Minor Exams, Qui End Term Exams
ount, intersection studies and spot and ourney speed studies and	٧							v				٧			v			1	
urther to analyse them.						1	19.00	1.12	2.1		<u>.</u>						Apply		Minor Exams, Quiz End Term Exams
and the second second second second second second second second second second second second second second second											1.0						1.464		Lind Term Exams
aper BTCE-OECE-703-18(Road Safety) D1: Investigate & determine the	-	-	_	-		DEC 1													
ollective factors and remedies of accident volved.	٧	1				v	1.51	131/2	1.000		v			v					
O 2: Able to collect and represent	-	-	-	-		5.10	1		1.5.5		1.1						Understand		Minor Exams, Quiz
cident data to identify black spots.		v				1.0.1		12.16	v			V					Understand		End Term Exams
3: Understand the role of intelligent	1997									_							Apply		Minor Exams, Quiz End Term Exams
insport system in Road safety		V		V										v				Employability	Minor Exams, Quiz
4:To massage the traffic system from ad safety point of view.	v					V				-							Analyze		End Term Exams
5: Understand various traffic						V						1	٧			v	Evaluate	1	Minor Exams, Quiz
nagement systems for safety & safety	v				1		123	v				V			N		Evaluate	1	End Term Exams

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Apply

Minor Exams, Quiz,

End Term Exams

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

improvement strategies

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CO1: Knowledge about EIA tools & methodologies and identify the suitable								100								111	Understand		Minor Exams, Quiz,
methodology and prepare Rapid EIA.	V					v	v	1.1.1	v		٧		v		1	v	Onderstand	2 . J	End Term Exams
CO 2: Be able to access different case studies/examples of EIA in practice	v	v	V		12.3	V	V		V	-	v	V	V	V	v	×	Evaluate		Minor Exams, Quiz, End Term Exams
CO 3:Access different case									-				-	i i	1			Employability	
studies/examples of EIA in practice.	v			v		V	V	1.1.1	v		v		v		v		Create		Minor Exams, Quiz, End Term Exams
CO 4:Understand the phenomena of impacts on environment.	N	N	1	1													Create		Minor Exams, Quiz, End Term Exams
	1		T.	1.	3.5	1	1×	-	Iv		V	V	Iv	V	V.				End Term Exems
Paper BTCE-OECE-705-18(Construction Ma				_			NO CON												Sec. 2 Concerns
CO1: To Provides a brief description about different types of materials used in building construction for							1.1			1									
members like foundation, masonry, arches, lintels, balcony, roof, floor, doors,	1				111	1							1				understand		
windows, stairs, plastering, painting and other general topics.																			Minor Exams, Quiz, End Term Exams
CO 2: Understand the properties of various construction materials, their uses and their different applications.	V			V		4		V					V	V	×		understand	Employability	Minor Exams, Quiz, End Term Exams
CO 3: To know the various latest and modern construction materials, properties and their uses.	V	×		V	-				1.1.1.1				V	V	4		Analyse		Minor Exams, Quiz,
CO 4: Able to understand the relationship between material properties and	V		1			1		1					1	1			Davis		End Term Exams Minor Exams, Quiz,
structural form. CO 5: Able to understand the importance			<u> </u>	-				, v					Ň	Ň			Design		End Term Exams
of experimental verification of material properties.	V					1							V		1.1		Understand		Minor Exams, Quiz, End Term Exams
Paper BTCE-BTMC-701-18(Management- I	Organiza	tional Beha	vior))						19.94	135	17.14		1						
CO1: Learn the development of the field of		T	1	1	1	T	T	T	1000	1		-	1	1	1		1	-	1
organizational behavior and explain the micro and macro approaches.	4				V								4			¥	understand		Minor Exams, Quiz, End Term Exams
CO 2: Analyse and compare different models used to explain individual behaviour related to motivation and	V			1	Lesien I	V				1	٨		1	×	V		understand		Minor Exams, Quiz,
rewards CO 3: Identify the various leadership styles			12.72						1.2.4.7	-					-			Employability	End Term Exams
and the role of leaders in a decision making process	V	*		V									V	1	*		Analyse		Minor Exams, Quiz, End Term Exams
CO 4:Explain group dynamics and demonstrate skills required for working in groups (team building)	1		V			V		4					1	V			Design		Minor Exams, Quiz, End Term Exams
CO 5:Create an adaptable stress management plan for academic success incorporating selected techniques	۲							4				in an	V		1		Understand		Minor Exams, Quiz, End Term Exams
Paper BTCE 802-18(Smart Cities)			-	23.87	1.15 25	1000	Gilles,					R	1.11						
CO1: Obtain basic knowledge and concept		1	1	1	1	-	1	1			-	The Later	-	-	1	-	1	10-10-10-10-10-10-10-10-10-10-10-10-10-1	1
of smart cities and associated challenges.				1.44		Rine's	1	-	1.577.5459	616	19836		2				Understand		Minor Exams, Quiz, End Term Exams

Department of Civil Engineering

CO 2: Develop an understanding for various sight distances and its affects						T	1				1 1		_	
CO 3: Learn how to analyze and compare	V		V	V	_		v		V	v		Apply		Minor Exams, Quiz,
xisting smart community projects.	V			1.0										End Term Exams
0 4: Understand the importance of fferent smart system.								V			v	Analyze	Skill Development	Minor Exams, Quiz, End Term Exams
O 5: Understand latest technologies used intelligent building.		√	-	V		-						Evaluate		Minor Exams, Quiz, End Term Exams
	V	V		v					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

Deportment of Civil Engineering IKG PTU Main Campus Kapurthala-144673

Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of comp	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	Assessme
		tions	complex problems			ity				ance						

Department of Civil Engineerin IKG PTU Main Compu Kopurthala-14460

CO1: Analyze the skeleton structures using stiffness analysis code.	V	v	V	V	V	V	V	V	V		V	v	V	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		v		V		V		v		V				V		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-							1								Learnir	Focus on Emp	Assessme nt Tools to Measure Attainmen of CO
CO1: Solve simple problems of elasticity and plasticity understanding the basic concepts.	V	V	V	V		V	V	v	V		V	v	V	V	V	Exceller	Yes	Minor Exams, Quiz End Term Exams

Department of Civil Engineerin IKG PTU Main Came Knowthgla-144

					197			
CO 2:Apply numerical methods to solve continuum problems.	v	v		v		V	Good	Minor Exams, Quiz, End Term Exams

MTST901 - 18 Theory of Thin Plates and Shells

	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- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO-	PSO m	PSO n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO

Department of Civil Engineeric IKG PTU Main Compu-Kapurthala-144402

	_	_								-	-				-			
CO1: 1.Use analytical methods for the solution of thin plates and shells.	v	V	V		v	V		v	v	V	v	V		V	V	Good	Yes	Minor Exams, Quiz, End Term Exams
CO 2:Use analytical methods for the solution of shells.	v		v		v	v	V		v		V		V	v	v	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		V		V		v		V	V	V	۷.	V	Exceller	Yes	Minor Exams, Quiz, End Term Exams
CO 4: Apply the numerical techniques and tools for the complex problems in shells.	v	v		V			V	v		V		V		V		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	a	PO	PO-c	PO- d	PO-	PO-f	PO-g	PO- h	PO-I	PO- j	PO-k	PO	PSO- m	PSO	P\$0- 0	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Toois b Measure Altainmen of CO

Department of Civil Engineering BIG PTU Advant Communication Kopportunity Land

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

Department of Civil Engineer IKG PTU Main Camp Kapurhala-144

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

MTST903 - 18 - Theory of Structural Stability

Head Department of Civil Engineering IKG PTU Main Compus 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			
Course Outco	20-1															Learni	Focus on Em	Assessme nt Tools to Measure Attainment of CO
CO1:Determin e stability of columns and frames	v	v																Minor Exams, Quiz, End Term Exams
CO 2:Determine stability of beams and plates		V		V														Minor Exams, Quiz End Term Exams

Department of Civil Engineerin IKG PTU Main Comp Kapurthela-144

CO 3: 3.Use stability criteria and concepts for analysing discrete and continuous systems	V	v									Minor Exams, Quiz, End Term Exams
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MTST904-18- Analytical and Numerical Methods for 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 Outcome	POa	PO	PO-c	PO- d	PO- e	PO-f	PO-g		PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO

Kapurthala-14

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

MTST905 - 18- Structural Health Monitoring

Department of Civil Engineering IKG PTU Main Comput 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			
Course Outcome		PO-	PO-c	PO- d			PO-g		PO-i		PO-k				PSO- o	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.	v	~	v	V	V		v		v		V	~	٧	V	V	Good	yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineerin IKG PTU Main Com Kopurthala-14

CO 2:Assess the health of structure using static field methods.	V		V	v	v		V	٧		V	v	V	V		V.Good	yes	Minor Exams, Quiz, End Term Exams
CO 3: Assess the health of structure using dynamic field tests.	~	v	v	V	V		V		V		V	7.	V	V	Good	yes	Minor Exams, Quiz, End Term Exams
CO 4: Suggest repairs and rehabilitation measures of the structure	V		V	V		v	V		v	V		V	V		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	PO	PO-c	PO- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1: Use Variational principle for optimization	v	v		v	v		V	٧		v	V		v	V		Good	yes	Minor Exams, Quiz, End Term Exams
CO 2:Apply optimization techniques to structural steel and concrete members.		v		v			v		v			v		v		Good	yes oportment of Ci	Minor Exams, Quiz, End Term Exams,
CO 3:Design using frequency constraint.		v	V		V	V		v	V		V	V		V	V	Good	yes	Minor Exams, Quiz, End Term Exams
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MTSTIII-	18-SI	truc	tural D	esign	Lab						_	_				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	PO-c	PO- d	PO-	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO

Department of Civil Englaceria IKG PTU Main Comp Kopurthalast

CO1: Design and Detail all the Structural Components of Frame Buildings.	V	V	v	~		v	V	v	V		V	v	G	bood	Yes	Minor Exams, Quiz, End Term
CO 2:Design and Detail complete Multi-Story Frame Buildings.		V	v		V		v	v		v		v	G	ood	Yes	Exams Minor Exams, Quiz, End Term Frams

MTST112-18- Advanced Concrete Lab

Engineering Knowledge Problem Analysis Design/development of solutions Conduct investigations of complex problems Modern tool usage The engineer and society The engineer and society Environment and sustainability Ethics Ethics Communication	Sustainable Outlook
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Department of Civil Engineerin IKG PTU Main Came Kapurthala-14

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	PSO m	PSO n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Design high grade concrete and study the parameter s affecting its performan ce.	V	v		V	v		V	v		v	v		v	v		Good		Minor Exams, Quiz, End Term Exams
CO2. Conduct Non- Destructiv e Tests on existing concrete structures.		V		v		V		v		V		V		v		Good		Minor Exams, Quiz, End Term Exams

Department of Civil Engineeri IKG PTU Main Campo Kapurthola-14

rch Met	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability		ndividual and team work	Communication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
oly ineerin ciples erstan chavior ctural/ nents.		V	v		V	V		V	V		V	v	-	V	V	Good	Yes	Minor Exams, Quiz, End Term Exams

Course Outcome	PO a	PO	PO-c	PO- d	POe	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO- I	PSO m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
cor Und erst and rese arch pro ble m for mul atio n.	V	v		v	~		V	v		v	v		v	v		Good		Minor Exams, Quiz, End Term Exams
CO 2: Ana lyze rese arch relat ed info rma tion		V		v		~		V		V		v		V	G	icod Y	′es E	Ainor xams, Quiz, nd Term xams

Department of Civil Engineerin IKG PTU Main Camm Kapurthela-14 de

CO 3: Foll ow rese arch ethi cs	V	v	v		V	v		V	V		~	v	Good	Yes	Minor Exams, Quiz, End Term Exams
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Department of Civil Engineering IKG PTU Main Commun Kopurthala-144.00



Department of Civil Engineer IKG PTU Man Crim Kapurthala-14

CO 5:U nder stan ding that whe n IPR wou Id take suc h imp orta nt plac e in gro	V	V	V	v	V	v	v	Good	Yes	
										Minor Exams, Quiz, End Term Exams

Department of Civil Engineering IKG PTU Main Comm Kapurthale 144



Department of Civil Engineerin IKG PTU Main Commu Kapurthala-144 Mi

O U U der an PR rot cti n ro ide an nce tiv to n ve tor for	V	V	v	V	~	~	v	v	v	Good	Yes	
er ese												
or nd												Exams, Quiz, End Term Exams

MTST201 - 18 Finite Element Method in Structural Engineering

Department of Civil Engine IKG PTU Ma Con Kapurthala-14

	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	•	20-1	PO-c	PO-c	iPO-e	PO-f	PO-g	PO-ł	PO-i	PO-j	PO-k	PO-	PSO-r	PSO-r	PSO-o	Learni	r Focus on Em	Assessme nt Tools to Measure Attainmen of CO
CO1. Use Finite Element Method for structural	v	v		v		v		v		v		V	V	V	V	Good	Yes	Minor Exams, Quia End Term

Department of Civil Engineerie IKG PTU Main Come Kapurthola-1444

CO2. Execute the Finite Element Program/ Software.	v		v		v	V		V		v	V		Good	Yes	Minor Exams, Quiz, End Term Exams
CO3. Solve continuum problems using finite element	V	V		V	V	V	V		v	v	V	v	Good	Yes	Minor Exams, Quiz, End Term Exams

MTST202 - 18 - Structural Dynamics

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Department of Civil Engineerie IKG PTU Main Comm Kopurthela-14.44

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	Learni ng Level	1	Assessme nt Tools to Measure Attainment of CO
CO1. Analyze and study dynamics response of single degree freedom system using fundamental equation of motion.	v	V	V		v	v		V		V		~		V	V	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.		~		v		V		v		~		>		~		Good	Yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineerin IKG PTU Main Can on Kapurthala 14

CO3.Use the available software for dynamic analysis.		×	V		V	V		V	V		V	v		V	V	Good	Yes	Minor Exams, Quiz, End Term Exams
MTST907 - 1	8- A	dva	nced St	teel D	esig	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	PO b	PO-c	PO- d	PO	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO	PSO m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainmen of CO

Department of Civil Engineeri IKG PTU Main Contro Kapurthela-14-

	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- d	POe	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO- I	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO
CO1. Select proper formwork, accessorie s and	v	v			v	v			V	v			V	v		Good	Yes	Minor Exams, Quiz End Term

Kapurthala-1

CO2. Design the form work for Beams, Slabs, columns, Walls and Foundatio ns.	V		V	V		V	V		V	V		Good	Yes	Minor Exams, Quiz, End Term Exams
CO3. Design the form work for Special Structures.	٧	V		V	V		v	v		v	V	Good	Yes	Minor Exams, Quiz, End Term Exams
CO4. Understan d the working of flying formwork.			v	v		~	V		V	V		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST909 - 18 - Design of High Rise Structures

Department of Civil Engineerin IKG PTU Main Com Kapurthala-14

	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	PO	PO b	PO-c	PO- d	PO- e	PO-f	PO-g	PO- h	PO-	PO-	PO-k	PO	PSO- m	PSO- n	PSO-	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO

Department of Civil Engineer IKG PTU Main Con-Kapurthala-1

CO1. Analyse, design and detail Transmission / TV tower, Mast and Trestles with different loading conditions. CO2. Ana	V	~			v	V			v	~	*		V	v		Good	yes	Minor Exams, Quiz, End Term Exams
lyse, design and detail the RC and Steel Chimney, CO3, Analys		V		v		V		v		v		V		٧		Good	yes	Minor Exams, Quiz, End Term Exams
e. design and detail the tall buildings subjected to different loading conditions using relevant codes.		v	V			V	V			V	V			v	V	Good	yes	Minor Exams, Quiz, End Term

MTST910 - 18	- D	esigr	of M	asonry	y Str	uctur	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	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outco	20-															Learnir	Focus on Em	Assessme nt Tools to Measure Attainment of CO
CO1. Understan d the masonry design approache	V	2			v	V			~	~			~	~		Good	yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineering IKG PTU Main Composition Kapurthe a 14 1

CO2. Analyse Reinforce d Masonry Members.	V			v	v		V	V		V	V		Good	yes	Minor Exams, Quiz, End Term Exams
CO3. Determine interaction s between members.	v		V		v	v		V	v		v	V	Good	yes	Minor Exams, Quiz, End Term Exams
CO4. Determine shear strength and ductility of Reinforce d Masonry members.	N	1		V	V		V	V		~	~		Good	yes	Minor Exams, Quiz, End Term Exams
CO5. Check the stability of walls	1	Ĩ		v	v		v	v		V	V		Good	yes	Minor Exams, Quiz, End Term Exams

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analysis of masonry walls. MTST911 - 1		Desi			ced (Conci		ructu	res		JCe	V				Good	yes	Minor Exams, Qu End Term Exams
	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- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO- I	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainment of CO

Department of Civil Engineer IKG PTU Main Com Kapurthola-14

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

MTST912 - 18 - Advanced Design of Foundations

Department of Civil Engineering IKG PTU Main Comp Kapurthala-144/03

	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- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO- o	ng	Focus on Employability / Entrepreneur ship	Measur
CO1. Decide the suitability of soil strata for different projects.	V	V			V	V			v	٧			v	v		Good		Minor Exams, Qu End Term Exams

CO2. Design shallow foundation s deciding the bearing capacity of soil.	V		V	V		v	V		v	V		Good	Yes	Minor Exams, Quiz, End Term Exams
CO3. Analyze and design the pile foundation CO4.	v	V		v	V		V	V		V	V	Good	Yes	Minor Exams, Quiz, End Term Exams
Understan d analysis methods for well foundation	V		V	v		V	v		V	V		Good	Yes	Minor Exams, Quiz, End Term Exams

MTST913 - 18 - Soil Structure Interaction

Department of Civil Engline IKG PTU Main Co Kapurthala-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	PO	PO-c	PO- d	PO	PO-f	PO-g	PO- h	PO-i	РО- ј	PO-k	PO-	PSO- m	PSO- n	PSO- 0	Learni ng Level	Focus on Employability / Entrepreneur ship	Assessme nt Tools to Measure Attainmen of CO
CO1. Understand soil structure interaction concept and complexities involved.	V	v		v	v		v	v		v	v		v	v		Good	Yes	Minor Exams, Quiz End Term Exams

Department of Civil Englished IKG PTU Mage Con-Kepurtheda 1

characteristic s.		v		v	V		v		V	v		Good	Yes	Minor Exams, Quiz,
CO3. Prepare comprehensi ve design oriented computer programs for interaction problems based on theory of sub grade reaction such as beams, footings, rafts etc.	~ ,		v	v	,	ν		v	~	v	v	Good	Yes	End Term Exams Minor Exams, Quiz, End Term

CO4. Analyze different types of frame structure founded on stratified natural deposits with linear and non-linear stress-strain characteristic 5.		v	~		v		V		V		V	v		Good	Yes	Minor Exams, Quiz, End Term
CO5. Evaluate action of group of piles considering stress-strain characteristic s of real soils.	v	v	v	v		V	v	v		v	v	v	V	Good	Yes	Exams

MTST914 - 18 - Design of Industrial Structure

Department of Civil Employed IKG PTU Mole Co Kopurtnele-14

	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- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO- I	PSO- m	PSO- n	PSO- o	ng	Focus on Employability / Entrepreneur ship	Measure
CO1. Unde	V	V		٧	v		v	v		v	v		V	v		Good	Yes	Minor Exams, Quiz End Term
CO2. Prepar	re ti	۷		V		V		V		V		v		٧		Good	Yes	Minor Exams, Quiz End Term
CO3. Condu —	ict :	V	V		v	٧		۷	٧		٧	٧		v	٧	Good	Yes	Minor Exams, Quiz End Term

Department of Civil Engineer IKG PTU Man Con Kapurthela-1-

CO4. Conduct model testing for free and forced vibrations	v	v	v	v	V	V	v	Good	Yes	Minor Exams, Quiz, End Term Exams
									Yes	

MTST114 - 18 - Numerical Analysis Lab

Course Outcome	POa	PO b	PO-c	PO- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO- o	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	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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CO1. Find Roots of non- linear equations by Bisection method and Newton's method.	v	V		V	V		v	V		V	V		V	v		Good	yes	Minor Exams, Quiz, End Term Exams
CO2. Do curve fitting by least square approximatio ns		v		√		V		V		V		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		~	v		V	- V		v	v		V	~		V	V	Good	yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineering IKG PTU Main Compo Konumission

CO4. To Integrate Numerically Using Trapezoidal and Simpson's Rules	V		V		V	V		v		V	V		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	V		V	v	v	V		v	<	~	V	Good	yes	Minor Exams, Quiz, End Term Exams

MTST231 - 18 Mini Project

Department of Civil Engineering IKG PTU Main Campus Thouring's 144600

	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- d	PO- e	PO-f	PO-g	PO- h	PO-i	PO- j	PO-k	PO-	PSO- m	PSO- n	PSO- o	Learni ng Level	Focus on Employability / Entrepreneur ship	Measure
CO1. Identify structural engineering problems reviewing available literature.	v	v		4	٨		4	×		v	*		v	~		Good	Yes	Minor Exams, Qui End Term Exams

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CO2. Study different techniques used to analyze complex structural systems.	v		v		v	v		V		~	v		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.	~	V		v	٧	v	v		>	v	V	v	Good	Yes	Minor Exams, Quiz, End Term Exams

Department of Civil Engineer IKG PTU Main Com Kepuring 2-1

Name of the Department: Civil Engg. PhD CO PO

Bridge 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		Р О- Ь	PO- c	PO d	P 0- e	PO- f	PO-g	PO h	P 0-i		PO- k	P0-	PSO-E	PSO n	PS O- o	Learning Level	Employa bility /	Assess ment Tools to Measure Attainme nt of CO

Head Department of Civil Engineering IKG PTU Main Campus Kapurthala-144603

CO1: Understand the codal provisions for loading and design standards of bridges	v			٧		v	٧	v	V	٧	٧	v	Minor Exams, Quiz, End Term Exams
CO2:. Design and detail of different types of reinforced concrete bridges		v		÷		v	٧	V	٧	٧	V	v	Minor Exams, Quiz, End Term Exams
CO 3: Design the substructure including pier and pier cap and abutments.	4	v	٧			v	٧	v	۷	٧	v	v	Minor Exams, Quiz, End Term Exams
CO 4: Design the various types of foundations for bridges and to know about their construction detail	v			v		v	v	v	٧	v	v	v	Minor Exams, Quiz, End Term Exams

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CO 5: To know about different types of bearings, joints and handrails	v					v	v	v	v		v	v	Minor Exams, Quiz, End Term Exams
CO 6: To know abo	v			٧		v	v	v	٧	1	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			v		v	v	v	v	٧	v	√	Minor Exams, Quiz, End Term Exams
CO 2: . To get knowledge about special foundations for different conditions.		v				v	٧	٧	v	v	٧	v	Minor Exams, Quiz, End Term Exams

Department of Civil Engineering IKG PTU Main Campus Kapurthala-144603
CO 3: To develop a thorough understanding of structural aspects of high rise	v	v		v			v	v	v	V	V		v	v	Minor	
buildings and tall chimneys and also problems of high rise construction.						•									Exams, Quiz, End Term Exams	
CO 4: To know the advantages of pre- fabricated construction and its design aspects.	٧	v		v			۷	٧	v		v	v	V	v	Minor Exams, Quiz, End Term Exams	
CO 5: To know basic concept of prestressing.	v		14	v	v		V	v	v		v				Minor Exams, Quiz, End Term Exams	÷
CO 6: To get introduced to advanced construction materials like geo- synthetics etc.			٧				V	V	V		v	V			Minor Exams, Quiz, End Term Examportment of Civil Engine IKG PTU Main Car	Head

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Paper: Research Methodology

CO1:Understand significance of Research and literature survey, types and teachniques of carrying out research. Learn literature survey and how to conduct review.	f 	√.	v		v	v	v	v	v	v	√.	v	v	v	Minor Exams, Quiz, End Term Exams
CO2:Formulate a research problem		v		v		٧	v	v	۷	۷	٧		٧	٧	
CO3: Learn various techniques of data collection and sampling methods		v		v	v		v	v	v	v	v		v	v	
CO4:Analysis of data with statistics							v	v	v	v	V		v	٧	Minor Exams, Quiz, End Term Exams

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

Advanced Foundation Design and Construction

CO1: Identify and formulate solution to design foundation system for a structu	v		v	v	v	v	v	v	v	v	v	٧	v	٧	Minor Exams, Quiz, End Term Exams
CO2: Analyse and design pile foundations.	v	v		v		v	v		v	v	v	v	. V	v	Minor Exams, Quiz, End Term Exams

	_	_	_	_									-	T	T	1
CO3: Evaluate the importance of well foundation, retaining wall, sheet piles and shoring.	٧	~	v		v	v		v	v	v	v	v	v	v	v	Minor Exams, Quiz, End Term Exams
CO4: Suggest suitable ground improvement technique for specific soil.					v			v	v		٧	v	v	V	v	
CO5: Examine and discuss effects of earthquakes and construction under water on foundations	v	v	٧					v	٧	V	v	~	>	v	v	Minor Exams, Quiz, End Term Exams

Paper: Environment Engineering and Management

CO1:Learn how to characterize water and v wastewater.	v	v	v	v	v			٧	. V	٧	٧	٧		v	٧	Minor Exams, Quiz, End Term Exams
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CO2:Grasp the			<u> </u>		T	1	1	<u> </u>		1	1		Τ	1	1	
fundamentals of air pollution and its associated environmental impacts.	v	٧		v	v			v	v	v	v	v		v	v	Minor Exams, Quiz, End Term Exams
CO3:Earn to describe the key concepts of air quality management	v	v		v	v			v	v .	v	v	v		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		v	v			٧	v	v	٧	V		V	v	Minor Exams, Quiz, End Term Exams
CO5:Appreciate the importance of EIA as an integral part of planning process.		٧		v	v			٧	v	V	۷	٧		· v	٧	Minor Exams, Quiz, End Term _D eportme Exams

Paper: Advanced Geoinformatics

CO1:Identificati on of rocks and minerals, their characteristics, mode of occurence	v	v	v	,	,	,	,	v	v	v			v	v	Minor Exams, Quiz, End Term Exams
CO2:The basic concepts of geological processes and their importance in Civil Engineering	v	v		~		v		v	v	٧			v	v	
CO3: Principles of Remote Sensing and Photogrammetry		v		v		v	,	v	v	v	v		v	v	
CO4: GIS and data models						v	v	/	٧	v	v	X	v	v	Minor Exams, Quiz, End Term Exams
CO5: Hyper pectral remote ensing						٧	v	/	v	٧	۷		v	v	

Paper: Civil Engineering Applications of Remote Sensing and GIS

													2.2				
CO1 Understand Photogrammetry: types, calculations and interpretation	v	٧		٧		v	v	٧	v	v	v	٧		٧	٧	Minor Exams, Quiz, End Term Exams	
CO2: Understand Principles of Remote sensing and Satellite images	V	v	v		v			~	v	V	V	v		v	٧		
CO3: Understand GIS and its Data models. Global positioning system, Applications of Remote Sensing		v						~	~	v	V	V		v	V		
CO4: Remote Sensing and GIS data modeling in environment, urban planning and site selection								٧	v	٧	V	٧		۷	v	Minor Exams, Quiz, End Te D epartm Exams	nent o IKG

Pavement design, Construction and maintenance

01							ince							 -		
CO1: Design of pavement using various methods.	v			v		v		v	v	v	v		v	v	v	Minor Exams, Quiz, End Term Exams
CO2: Analysis and design of rigid pavement.	v	v			v			v	v		v	v		v	√.	Minor Exams, Quiz, End Term Exams
CO3: Understand various methods of pavement construction.	v	v	v					v	v		٧	v		٧	v	Minor Exams, Quiz, End Term Exams
CO4: 4. Generate Pavement maintenance management system								v	v		v			v	٧	

Paper: Hydraulic Engineering

CO1: Develop forecasting models for operation of hydrologic systems	v		v		٧	v		v	v	v	v	v	v		v	1	Minor Exams, Quiz, End Term Exangport	Head Head IKG PTU Main Compus
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2

CO2:Formulate and solve conjunctive use of surface water and groundwater resource utilization problem	v	v		v	v		v		v	v		v	v	Minor Exams, Quiz, End Term Exams
CO3:Design spillways and energy dissipation structures	v	v	v	,×	v		v	4	v		-	٧	v	Minor Exams, Quiz, End Term Exams
CO4:Understand the characteristics of Soft Computing Techniques							v					٧	v	

COMPUTER AIDED DESIGN METHODS

CO1: Learn how to use CAD and its scope.	v		v	v	٧		v	v	v	v	v			v	v	Minor Exams, Quiz, End Term Exams
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CO2: Identification of computer graphics like clipping, segmentation, shading etc.	v	v			v	-		v	v	v	v		v	V	Minor Exams, Quiz, End Term Exams
CO3:Understand computer aided linkage displays and synthesis.	۷	v	v		v			v	v	.v	v		٧	v	Minor Exams, Quiz, End Term Exams
CO4:Enabling the students to develop various matrix methods of structural analysis.							-	v	v	٧			v	v	
CO5: Evaluate data base management and retrieving of data.	v	v	v	v				v	v	V	٧		v	٧	Minor Exams, Quiz, End Term Exams

ADVANCED STRUCTURAL ENGINEERING

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CO1:Evaluate and analyze three dimensional elasticity problems.	v			v		۷		v	v	v	v	v	v	v	v	Minor Exams, Quiz, End Term Exams
CO2:Understand or learn matrix methods of structural analysis with computer program.	v	v			v	4		v	v	v	v	v		v	V	Minor Exams, Quiz, End Term Exams
CO3:Analyze and design of plate and shell structures using proper software.	v	v	v					v	v	V	v			v	v	Minor Exams, Quiz, End Term Exams
CO4:Understand multi – variable and multi – objective optimization								٧	v	v				v	٧	

GEOTECHNICAL ENGINEERING

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

Town & Country Planning

CO1: Understand the Basic Definitions, Concepts related to Town Planning, Infrastructure Development, etc.	v		V		v					v	v	v		V	v	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		V		7	√	V	V	V	V		V	v	v	Minor Exams, Quiz, End Term Exams

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CO 3: To explore the capacities for planners to work collaboratively in addressing transportation and urban infrastructure	v	v		v	v		٧	٧		v	v	Minor Exams, Quiz, End
								8				Quiz, End
			Tri.					1				Term
challenges.												Exams

Department of Civil Engineering IKG PTU Main Campus Topurthala-144603

Name of the Department: Civil Engg.

BTCE - 301: Fluid Mechanics-I

	Engineering Knowledge	Problem Analveis	Design/develo	Conduct investigations	Modern tool	The engineer and society	Environment	Ethics	Individual and	Communicatio	Project	Life-long	Analysis and Design Skill	Research and	Sustainable			
Course Outcome	PO-a	PO- b	PO- c	PO- d	POe	PO-f	PO- g	PO h	PO	- PO j	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure

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, deforming, or moving) control volume for a given engineering system and apply the principles of conservation of mass, momentum, and energy to	V	V	V	V	V	V	V	 Good	Employability	Minor Exams, Quiz, End Term Exams

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and floating surfaces to analyze fluid flow problems with the application of the momentum and energy V V V V V Good Employability Minor Exams,			1		-	1	T	1	T	1				and the second second	
with the application of the momentum and energy Minor Exams,	calculate the hydrostatic forces and moments on planar and curved submerged and floating surfaces to analyze fluid	V	v					V		v		v	Good	Employability	
the momentum and energy Minor Exams,	with the			-	-						-	-			
	application of the momentum and energy equations.														

	T	T	T	TT		T	T	1	T	T	T		-		-			
CO 3: Ability to present data or governing equations in non- dimensional form, design experiments, and perform	V	v				V	V	V				v	v	V	Good	Employability	/	
and perform model studies and to decide when appropriate to use ideal flow concepts and the Bernoulli equation.																	Minor Exams, Quiz, End Term	
CO 4: Ability to solve for internal flow in pipes and channels through simple solutions of the Navier- Stokes equations,	v	V	v		v	√	v		v		v	V		v	Good	Employability	Exams	ent of Civil E KG PTU Ma Kapurth
Moody chart and head-loss equations.																	Minor Exams, Quiz, End Term Exams	

				Τ		T	1		Γ	Г	Γ				1		
CO 5: Ability to solve for external flow, evaluate lift																	
and drag, know when there is possibility of flow separation, apply streamlining	v	V		v		v		V		v		v		v	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 systems	V	V.	V		V		v		v		V		V		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- c				-		PO- i		Р	P 0- 1	PS	5-051	PS 0- 0	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment o CO
CO 1: Students will be able to critically review the importance of Engg. Geology and their applications to Civil Engineering	v	v	v	v	v	V	V	V	V	. √	V	V	V	~	v	Good	Employability	Minor Exams, Quiz, End Term

CO 2: Students will be able to identify and classify common minerals and rocks using basic geological classification system.		V		V		V		v		V		V		v		Good	Employability	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.	v	v	v	v	v	V	v	v	v	v	v	V	v	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams

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CO 4: Students will be able to know the characteristics																		
of earthquake and measures taken to construct structures like tunnels, highways,		V		V		V		V		V		V		V		Good	Employability	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.	V	V	v	v	v	v	V	v	v	V	V	v	v	v	v	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 6: Students will have knowledge of Field and laboratory test procedures and be able to interpret test results needed to estimate		V		V		V		V		v		v		V		Good	Employability	
intact and rock mass properties.			ti per												-			Minor Exams, Quiz, End Term Exams
CO 7: Students will be to identify problems in rock mass and able to provide improvement in the properties of rock mass.	v	V	V	V	V	V	v	V	v	v	V	V	v	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams

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

BTCE-303: Strength of Materials

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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-a	PO	PO-		PO e		PO		PO- i		P O- k	Р	PS O- m		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Concepts of free body diagrams of structures and to check stability (Beams and frames)	V	v	V	v	v	V	V	v	V	v	v	V	V	v	v	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 2: Concepts of stress and strain of axially		V	V		v	v		v	v		v	v		v	V	Good	Skill Development	
loaded members, Civil and thermal properties.		it in														12.12.440		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	v	V	V	V	v	V	v	v	V	v	~	V	V	v	V	Good	Skill Development	Minor Exams, Quiz, End Term

CO 4: Concepts of straight beams,																		
bending stress of beams, flitched beams, shear stress formula for beams and shear stress distribution in		V	V		V	V		V	V		V	V		V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
beams.																	-	Exams
CO 5: Concepts of crippling load of an axially loaded column under different end conditions. CO 6:	V	v		v	v		v	~		V	~		V	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
Concepts of torsion and failure theories		٧	v		٧	٧		٧	٧		V	v		v	V	Good	Skill Development	Minor Exams, Quiz, End Tern Exams

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	ndividual 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- d	PO	PO-f			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
CO 1: Understand the principles and objective of surveying.	v	v		V	V		V	v		v	v		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Calculate the horizontal distance on plane and sloping surface.		V	v		V	V			V		v	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 3: Do angular and elevation measurements with different types of equipments.	V	v	v	V	v	V	v	v	V	v	v	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Analyze the closed traverse and will be able to balance it.		V			V			v			v			v		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design simple circular curves for horizontal and vertical alignments.	٧		v	v		V	V		V	V		V	٧		V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Plot the topographical map of an area	٧	V	v	V	v	V	v	v	V	V	V	V	V	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams
BTCE-305: Building Materials and Construction																	IKG P	Hea Civil Engineerin TU Main Campu apurthala-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			
Course Outcome		PO	• PO- c					235				P 0-			0- 0		Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Students will have sufficient knowledge of materials in construction	V	V		v	V		v	v		۷	V		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Students will be able to design the concrete mixes according to the situations		٧	V		V	V		V	V		V	v		٧	V	Good	Employability	Department of (IKG PT Ka Minor Exams, Quiz, End Term Exams

CO 3: Students will have sufficient knowledge to think critically in terms of achieving the goals of "Shelter for all".	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Students will have knowledge of the revolutionary materials in construction		v			V			v			V			v		Good	Employability	Minor Exams, Quiz, End Term 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 finance Life-long Learning	TT
Analysis and Design Skill	2.04
Research and Innovation	1100
Sustainable Outlook	

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Course Outcome	PO-a	PO- b	- PO- c	PO- d	e PO-). PO-f	PO- g	PO h	PO- i	- PO- j	P O- k	- 0-			PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	467.4
CO 1: Predict the metacentric height of floating vessel and appreciate its utility in vessel design.	v	v		V	V		v	v		V	V		v	V		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 2: Calibrate various flow measuring devices (venturimeter, orifice meter and notches).	v	v	v	v	V	v	v	V	V	v	v	v	V	v	v	Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 3: Authenticate the Bernoulli's theorem experimentally	6	v	V		V	V		V	v		v	v	•	V	V	Good		Minor Exams, Quiz, End Term Exams	D
CO 4: Assess the discharge of fluid over broad crested weir	v	v		V	v		v	v		V	v		v	v		Good	Employability	Department of Ci	X

CO 5: Compute various losses and velocity in pipe flow in field																Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 6: Compare good understanding of concepts and their applications in the laboratory.	V	V	v	V	٧	v	V	V	v	V	V	V	v	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams	
BTCE-307: St	Engineering Knowledge			investigations ex problems		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		PO			PO		BO		- PO- i	PO	D	Р	PS	PS	PS	Learning Level	Employabilit y / Entrepreneu	Assessment Tools to Measure Attainment of CO	1
Outcome											And the second s	And in case of the local division of the loc							

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

BTCE-401: Geomatics Engineering

	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	Life-long Learning	Analysis and Design Skill	Research and	Sustainable Outlook			
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e		PO		PO- i		P		PS	PS O- n			Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Get a brief idea about history of Photogramme try and its advancement in the field of surveying	V	v		V	V		v	v		v	v		V	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: To aware students the different methods of survey measurements using EDM		v	v		v	v		v	V	•	v	v		v	v	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 3: To aware students to different types of Total station and make them able to use it	V	V	V	V	V	V	V	v	v	V	V	v	/ _		v	V	Good	Skill Developmen	t Minor Exams, Quiz, End Term	
in field. CO 4: To aware students the different																			Exams	
components, uses, and operations involved in Remote Sensing		V			V			V			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.	v		V	V		V	v		v	V		v	v		1	/ (Good	Skill Development	Department o IKG Minor Exams, Quiz, End Term Exams	S of Civil Eng PTU Main Kapurthala
CO 6: To aware students to different types of GPS Recivers.	v	v	V	V	v	v	v	v	v	V	v	v	٧	V	V		Good	1		
BTCE 4	02: Co	onstr	uctio	n Mac	hine	ery an	d W	orks												
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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 Innovation	Sustainable Outlook					
Course Outcome	PO-a	PO	PO- c	PO- d	PO- e		BO		PO-	PO- j	D	Ρ	PS O- m	1223	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO		
CO 1: Design the bar charts and milestone charts for residential construction buildinigs.	v	V		V	V		V	V		v	v		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams		
CO 2: Apply the PERT and CPM techniques to the various complex civil engineering projects	6		v			V			v			~	6		v	Good	Employability	Minor Exams, Quiz, End Term Exams		

CO 3: Solve the optimistic time and minimum cost for the various projects by applying various methods.	v	V	V	V	V	V	V	V	V	V	V	v	V	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.	V			V			v			v			v			Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: 5Understand the operations of concrete batching and bitumen plants	V	V	v	V	V	V	V	V	٧	V	v	v	٧	V	v	Good		Minor Exams, Quiz, End Term Exams

BTCE-403: DESIGN OF CONCRETE STRUCTURES -1

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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-a	PO- b		PO- d			00		PO-			Р	PS O- m	PS O- n		Loarning	Focus on Employabilit y / Entrepreneu rship	Measure	F
CO 1: Identify and utilize the cement, steel, aggregates and admixtures to obtain the desired reinforced cement concrete.	V	V	•	V	V		V	V		v	v		V	V		Good	Employability	Departme Ik Minor Exams, Quiz, End Term Exams	nt of Civil G PTU N Kapuri

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

		Τ	Γ	Γ		1	Т	Т	Г	Τ	Т	Т	Г	Τ	Τ	T	1	
CO 4: Analyze a reinforced concrete member under flexure, shear and torsion using limit state design philosophy.	V	V		V	V		V	V		V	V		V	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.	V	v	V	v	v	v	v	V	v	v	v	v	v	v	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	V	V		V	V		V	V		V	~		v	V		Good	Employability	Department of Civil Engine IKG PTU Main Ca Kapurthala-14 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- c	PO- d	PO		DO		PO-i		D	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: Distinguish and identify different types of fluid flow.	v	v	v	v	v	v	v	٧	V	V	v	v	v	V	٧	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Formulate equation of flow through different media/obstruc tions for a laminar and turbulent flow.	V	v		V	v		V	v		v	v		v	V		Good	D	epartment of Civil IKG PTU M Kapurt Minor Exams, Quiz, End Term Exams

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CO 3: Apply the principles of conservation of energy and momentum in the flow studies in open channels and simple pipe network.		V	v		V	V		V	V		v	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Design pipe network and open channels for passing a given discharge.	v	v		V	V		v	V		v	v		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Evaluate the effect of channel shapes on the discharge parameters.			V			v			V			V			v	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Understand and apply the theory of hydraulic jumps and surges.	V	V	V	v	V	V	V	v	V	٧	V	V	V	V	v	Good	Employability	Department of IKG F Minor Exams, Quiz, End Term Exams

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	finance Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome	PO-a	PO- b	- PO- c	PO- d	e PO-	PO-f	PO- g			- 90- j	Р	P - 0-	PS	6 PS	S PS	S L	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Identify the basic understanding of soil water plant relationship.	V	V		V	v		v	V		V	v		V	V		G	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Understand different irrigation techniques and the related theories.		V	v		V	v		v	v		v	V		V	v	G	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Apply different theories/meth ods to design lined and unlined canals.	V	v	V	V	v	V	v	٧	v	v	V	V	v	v	V	G	Good		Department o IKG F Minor Exams, Quiz, End Term Exams

ourse utcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	PO- h	PO- i	PO- j	P O- k	P 0- 1	PS O- m	PS O- n	PS 0- 0	Learning Level	Employabilit y / Entrepreneu	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	unu	Project management	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			partment of Civil IKG PTU M Kapurth
CO 6: Demonstrate the knowledge related to the water logging, osses, economics of ining, etc. BTCI	E- 406	v : STI	v RUCT	ΓURA		√ NAL)	(SIS-	V	V		V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Design different hydraulic structures equired for effective river raining works				V			V			V			V			Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Estimat the yield of tube-well using differen formulae.		V			V			V			1	,		V		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 1: Differentiate between determinate and indeterminate structures.	V	V	V	V	v	V	V	V	V	V	V	V	V	V	V	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 2: Evaluate deflections in structures using various methods.	V	v		v	V		V	v		v	V		٧	V		Good	Skill development	
(Beams, frames and trusses)																		Minor Exams, Quiz, End Term Exams
CO 3: Examine the causes for additional stresses in arches, trusses and cables.		v	V		V	V		V	V		V	V		V	v	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 4: Draw ILD for various forces in determinate structural systems	٧	v	v	v	v	v	V	٧	٧	V	V	v	v	٧	٧	Good	Skill development	Minor Exams, Quiz, End Term Exams

BTCE-407: CONCRETE TECHNOLOGY 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- b	PO- c	PO- d	PO	PO-f	PO- g		PO-	PO	_	P	PS O- m		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Evaluate properties of various building materials, such as cement, aggregates, bricks and tiles.	V	V		v	v		V	v		V	v		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Conduct experiments and check the acceptance criteria (if any).		V	V		v	v		v	V		~ ~	V		٧	v	Good		Minor Exams, Quiz, End Term Exams

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

BTCE-408: Structural Analysis Lab

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems		The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	ng Lea	Analysis and Design Skill	Research and	Sustainable Outlook		De	epartment of Civil IKG PTU M Kapurti	Head Engineering ain Campus hala-1448
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	PO h	PO- i	PO- j	P O- k	P 0- 1	PS O- m	PS O- n	0-	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	

CO 1: Verify theoretical formulas by conducting experiments.	v	V	v	v	V	V	V	v	v	v	V	V	v	V	v	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 2: Predict the behavior of statically determinate beams and trusses.		v			v			V			V			V		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 3: Understand two hinged arch and three hinged arch structures.	V	V	V	v	٧	v	v	v	V	v	v	v	V	v	v	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 4: Demonstrate the influence lines for statically determinate and indeterminate beams.	v	V	v	v	v	V	v	٧	V	V	v	v	v	V	V	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.		v			V			V			V			V		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 6: Outline the deflected shapes of columns and struts with different end conditions	v		√	v		v	v		V	V		v	v		v	Good	Skill development	Minor Exams, Quiz, End Term Exams

BTCE-501: DESIGN OF STEEL STRUCTURES -1

r	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of		The engineer and society	Environment and sustainability	Ethics	Individual and team work	J L	Project management	-long Lea	Analysis and Design Skill	Research and	Sustainable Outlook				He vil Engineeri Main Camp urthala-1446
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO e	PO-f	PO- g	PO h	PO- i	PO- j	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	earning	Focus on Employabilit y / Entrepreneu rship	Measure	

		T	T	1	T	T	1	1	1	1	T	-	1	1	-	-		
CO 1: Recognize the properties of structural steel and permissible stresses under different types of loading conditions as per Indian	v	v		v	v		v	v		V	V		V	V		Good	Employability	
standards for limit state design.																		Minor Exams, Quiz, End Tern Exams
CO 2: Estimate safe load carrying capacity and efficiency of different steel fasteners like rivets, bolts & welds.	v		V	V		v	v		V	v		V	V		V	Good	a the second	Minor Exams, Quiz, End Term Exams

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CO 3: Select safe and economical steel sections for different structural members under various loading/stress conditions.	V	v	V	V	V	V	V	V	V	V	Good	Employability	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		V		v		V		v		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 5: Design steel structural members i.e. ties, struts,																		
beams, columns, bases, roof trusses, other associated components and	v		v	v		V	v		V	v		v	V		v	Good	Employability	
connections under different conditions of imit states.																		Minor Exams, Quiz, End Term Exams
CO 6: Evaluate structural afety, stability and economy of various teel structural members to chieve ustainability	√.	V		v	v		V	v		V	V		V	V		Good		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 sustainability	Ethics	Individual and team work	Communication	Project management	Life-long Learning	Analysis and Design Skill	Research and	Sustainable Outlook			
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	PO h	PO- i	PO j	P O- k	P 0- 1	PS	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
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	V	V	V	V	V	V	V	v	v	V	v	V	V	v	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 2: Apply the various specifications of compaction of soils in the construction of highways and earthen dams.		V			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 settlement magnitude and rate of settlement.	V		V	V		v	v		V	v		V	V		V	Good		Minor Exams, Quiz, End Term Exams

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CO 4:																		
Investigate and write the laboratory reports for soil design properties and parameters by apply the		V			v			V			V			v		Good	Employability	
concept of total and effective stress approaches in soil strength determination																		Minor Exams, Quiz, End Term
CO 5: Design the embankment slopes and check the stability of finite slopes.	v		v	v		V	V		v	V		v	v		V	Good	Employability	Exams 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 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- b	PO- c	PO- d	POe	PO-f	PO. g	PO h	PO-	PO j	P O- k	P 0- 1	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	v		V	v		V	v		V	v		V	V		Good	skill development	Minor Exams, Quiz, End Term Exams

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CO 2: Predict the response of structures ((Beams, frames and																		
trusses) in terms of bending moments, shear forces and displacements using classical methods.		V	V		V	V		V	V		V	V		V	V	Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 3: Apply methods for analysis to indeterminate structures i.e. conventional methods and approximate methods to various tructures.	V		V	V		V	V		V	V		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.		V			V			V			V			V		Good	Skill development	Minor Exams, Quiz, End Term Exams
CO 5: Suggest suitable method for analysis of different types of multistoried frames.	V		V	V		V	v		v	v		v	V		v	Good		Minor Exams, Quiz, End Term Exams

BTCE-504: Transportation Engineering-I

	Engineering Knowledge	Problem Analysis	Design/developme nt of solutions	ves	1 07	The engineer and ^o society	Environment and sustainability		Individual and team work	Communication	Project	Life-long Learning	sis a	Research and Innovation	Sustainable	YODING	Depa	rtment of Civil En IKG PTU Main Kapurthala	Head Igineering I Campus a-144603
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	PO h	PO-	PO- j	P O- k	P 0- 1		PS O- n	PS O- o	l oprning	The second second second second second second second second second second second second second second second s	Assessment Tools to Measure Attainment of CO	

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

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CO 4: Understand the importance of drainage, construction	٧	v		v	V		V	v		v	v		V	v		Good	Employability		
methods for various roads, pavement failure and its maintenance.	C. A. L.																	Minor Exams, Quiz, End Term Exams	
CO 5: Compute the transportation cost of highway project and outline the sources of highway financing.	V		V	v		v	v		V	v		v	V		v	Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 6: Interpret the traffic data after conducting traffic survey and describe the traffic	v	V		v	v		V	v		v	v		v	v		Good	Employability	Department of C IKG PTI Kap	Sivil Engin Y Main Ca urthala-10
characteristics, traffic safety and traffic environment nteraction.																		Minor Exams, Quiz, End Term Exams	

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- b	PO- c	PO- d	PO- e	PO-f	PO		PO-		P	Р	PS O- m				Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Understand the different water demands their estimation and forecasting.	V	V	V	V	V	V	v	V	V	v	V	v	v	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Understand sources of water and their development.		V			V			V			V			V		Good	Employability	Department IKG Minor Exams, Quiz, End Term Exams
CO 3: Analyze water quality parameters.	٧		v	٧		٧	٧		٧	٧		v	٧		V	Good	Employability	Minor Exams, Quiz, End Term Exams

CO 4: Understand and design water treatment processes.	V	V		V	v		v	V		v	V		v	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		v	v		٧	V		V	v		v	V		V	Good		Minor Exams, Quiz, End Term Exams

BTCE-506: Transportation Engineering Lab

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	odern too	and	Environment and	2	Individual and team work	Ju I	Project management	-long Lea	2	Research and	Sustainable Outlook		De	partment of Civil I IKG PTU Ma Kapurth	Head Engineering ain Campus ala-144603
Course Outcome	PO-a	PO- b	PO- c	PO- d	POe	PO-f	PO g	PO h	PO- i	PO- j	P O- k	P 0- 1	PS		PS 0- 0	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	

CO 1: Characterize the pavement	V	V	V	V	V	V	V	V	V	V	V	v	V	V	V	Good	Employability	
materials as per the Indian Standard guidelines.	3.74																	Minor Exams, Quiz, End Term Exams
CO 2: Evaluate the strength of subgrade soil by CBR test.	٧	V		v	v		V	V		V	v		v	V		Good	Employability	Minor Éxams, Quiz, End Term Exams
CO 3: Conduct experiments to evaluate aggregate properties.			v			V			٧			٧			v	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Determine properties of bitumen material and mixes	V	V		v	V		v	V		V	v		v	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Evaluate the pavement condition by rough meter and Benkelman beam test.			v			V			٧			V		*	v	Good	Employability	Department of Civil IKG PTU M Kapurti Minor Exams, Quiz, End Term Exams

CO 6: Create a well-organized report and present the results		v	v	V	v	V	v	v	V	V	Good	Employability	Minor Exams, Quiz, End Tern
appropriately													Exams

BTCE-507: Geotechnical Engineering 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	tinance Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook				
Course Outcome	PO-a						PO		- PO- i		Р	P 0-	PS	PS	PS	Learning	y/	Measure	
CO 1: Understand the procedure for classifying coarse grained and fine grained soils.	v		v	v		V	V	-	v	٧		V	٧		٧	Good	Employability		'TU Main C apurthala-

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	V		V	V		v	v		v	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Interpret the results of compaction test for relative compaction in the field.	٧	V		V	V		V	V		V	V		v	v		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Apply modern engineering tools effectively and efficiently for geotechnical engineering analysis.			V			V			V			v			v	Good	Employability	Minor Exams, Quiz, End Term Exams

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

BTCE-508: 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- c		PO- e		PO		PO-		P O- k	P 0- 1	PS		PS O- o	Learning Level	y/	Assessment Tools to Measure Attainment of CO
CO 1: Create, dimension and sketch a blot/plan for representation /expression of civil engineering designs.	v	V		v	v		V	V		V	V		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 2: Draft construction/d esign drawings including structural drawings for civil engineering projects.		V	V		V	V		V	V		V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Produce structural drawing of reinforced concrete elements such as beams, slabs and staircases.	V	V		V	V		V	V		V	V		V	V		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	v		V	V		v	.√		v	V		v	Good	Employability	Minor Exams, Quiz, End Term Exams

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

BTCE 601: Design of Concrete Structures-2

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems		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- b	PO- c		POe		PO		PO- i		P	P 0- 1	PS O- m		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Analyze and Design different types of R.C.C Stair Case.	v	٧		v	٧		v	V		V	v		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams

									in the second second				_					and the second second second
CO 2: Analyze and Design different types of R.C.C Foundation Systems.	V		V	V		V	V		V	V		V	V		V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Analyze and Design different types of R.C.C Compression Members.		V	V		V	V		V	V		v	v		v	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Analyze and Design different types of R.C.C Continuous and Curved Beams.	V	v		v	v		v	V		V	v		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Analyze and Design different types of R.C.C Domes.			V			V			V			v			V	Good	Employability	Minor Exams, Quiz, End Term Exams

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

BTCE 602: Elements of Earthquake Engineering

BICE 002: EI	Engineering Knowledge	Problem Analysis	investigations ex problems		The engineer and society			Individual and team work	Communication	Project management	and tinance Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO				PO)- PO- i		P	- 0-	PS		3	Learning	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Understand the phenomenon of occurrence and history of earthquakes and classify their kinds and effects.		V	V	< √		v	V		V	V		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams

CO 2: Recognize source and types of structural vibrations.	V		v	v		v	v		V	v		V	V		v	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	V		V	v		V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Design structure for seismic forces having adequate Lateral Strength, Stiffness, and ductility.	V	V		v	V		V	V		V	V	4	V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 5: Appraise and implement provisions of IS1893- 2002(Part-I), IS 13920 and IS 4326.			v			v			V			v			v	Good	Employability	Minor Exams, Quiz, End Term
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CO 6: Understand and apply the theory of hydraulic jumps and surges.	V	v		V	V		V	v		V	V		V	v		Good	Employability	Exams Minor Exams, Quiz, End Term Exams

BTCE-603: FOUNDATION ENGINEERING

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	1	The engineer and society	Environment and sustainability	Ethics	Individual and team work	unication	Project тападетелт апо finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	PO- h	PO- i	PO- j	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure

CO 1: Apply fundamental concept of mathematics, statics and mechanics to																		
understand the essentials of the methods of soil exploration and stability analysis.	V	V	V	V	V	V	V	v	V	v	V	v	v	V	V	Good	Employability	Minor Exams, Quiz, End Term
CO 2: Analyze and design a variety of geotechnical engineering structures including foundations, piles, retaining walls, slopes and interpret data.		V			v			V			v			v		Good		Exams Minor Exams, Quiz, End Term Exams

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CO 3: Recognize behavior of soils in slopes, behind retaining structures and phenomena affecting foundation capacity and settlement.	v		v		v	V	V	V	V	v		v	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Determine allowable bearing pressures and load carrying capabilities of different foundation systems.	V	V		V	v	v	v	v	v	V	v		Good		Minor Exams, Quiz, End Term Exams

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CO 5: Evaluate appropriate bearing capacity correction													
factors and apply related equations in design. Evaluate effects of water and layered soil systems on foundation performance.		V		V		V		V		V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Specify pile material types for single and group for various load capacity by calculating side, tip capacity of driven piles in clay and sands.	v	V	V		v	V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

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CO 7: Identify he ppropriate leep vell/Cassion oundation ype for lifferent soil profiles.	V		V		V		V		V		V		v		V	Good	Employability	Minor Exams, Quiz, End Term Exams
BTCE-604: N	Engineering Knowledge		Design/development of Z solutions	investigations of problems		I society	Environment and sustainability		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- c				PO		PO- i		D	Р	PS O- m		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Demonstrate the concept of approximation s and errors in the implementatio n and development of numerical methods.	v	v	V	V	V	V	V	V	V	V	V	V	v	v	V	Good	Skill Development	Department of C IKG PT Kap Minor Exams, Quiz, End Term Exams

CO 2: Select an appropriate solution to an engineering						1		V	V		V	V		V	V	Good	Skill	
problems dealing with the roots of equations through numerical methods.		V	V		V	V		V	V		V				•		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	V	v	V	V	V	V	v	V	v	V	V	v	v	v	V	Good	Skill Development	Minor Exams,

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CO 4: Apply the techniques to fit curves to data and be capable of choosing the preferred method for any particular problem.		V			V			V			V			V		Good	Skill Development	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 differential equations and eigen value problems through various techniques.	V		V	V		V	V		V	V		V	v		V	Good	Skill Development Depa	t artment of Civil Enginee IKG PTU Main Cam Kapurthala-144 Minor Exams, Quiz, End Term Exams

CO 6: Able to use New Marks Method for civil engineering problems.	V	V	v	V	v	V	V	V		v	V	Good	Skill Development	Minor Exams, Quiz, End Tern 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		PO- d	PO- e		PO	and a	PO-		D	P 0- 1	PS O- m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: On completion of the course, the students will be able to:	V	v	v	v	v	V	v	V	V	V	V	V	V	v	V	Good	Employability	Minor Exams, Quiz, End Term Exams	ß
CO 2: Apply different types of estimates in order to estimate any type of structure.		v			v			v			V			V		Good	Employability		of Civil PTU M Kapur

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		V	V		v	v		V	V		V	V		v	v	Good	Employability	Minor Exams, Quiz, End Term Exams	
project. CO 4: Carry out the analysis of rates and bill preparation for different materials and components of the project.	V	V		V	v		v	v		v	V		v	V		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 5: Develop a detailed quantity survey reports and abstract summary of the project.			v			v			v			v			v	Good	Employability	Department of IKG P Ka Minor Exams, Quiz, End Term Exams	Civil Eng TU Main apurthala

CO 6: Prepare a bid analysis and invite contractors	٧	v	V	V	V	V	V	V	v	v	V	v	V	V	v	Good	Minor Exams,
through tender notices.			taile	in or		14/201		2.	¥v.				100	(in	2	10.50	Quiz, End Term Exams

BTCE-606: ENVIRONMENTAL ENGINEERING – 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	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO		PO- d	PO- e	PO-f	PO- g	PO h	PO- i	PO- j	P O- k	P 0- 1	PS O- m	PS O- n		Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Demonstrate a firm understanding of various sanitation systems and their suitability.	V	v	V	v	v	v	V	v	V	v	V	v	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Design sewer and drainage systems layout for communities.		v			V			V			v			v		Good	Employability	Department of C IKG PT Ka Minor Exams, Quiz, End Term Exams

	1						_	-			-	- 1	-	1	- 1				
CO 3: Evaluate the waste water characteristics to determine the degree of treatment required.		V	V	Sector and the	V	V		V	V		V	V		V	V	Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 4: Explain the physical, chemical and biological techniques of wastewater treatment.	V	v		٧	V		V	V		V	V		V	v		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	V		v	V		v	V		V	v		V	V		V	Good	Employability	Minor Exams, Quiz, End Term Exams	Nain Can Thala-144

			1-12			-	8							
CO 7: Ability to make decisions regarding the														
treatment plant site selection, operation and maintenance and the need of advanced treatment.	V	V	V	V	√.		V	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE -607: ENVIRONMENTAL ENGINEERING LABORATORY

BICE -007. E	Engineering Knowledge		Design/development of solutions	investigations ex 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-	- PO- c				PO	Contraction of the second	PO-		Р	P 0-	PS		PS 0- 0	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Conduct experiments as per standard methods of sampling and analysis.	V	V	v	V	V	V	v	v	v	v	V	V	v	V	V	Good	Employability	Department of IKG P Ka Minor Exams, Quiz, End Term Exams

CO 2: Demonstrate he expertise o characterize water and wastewater samples.	V	V		V	V		V	V		V	V		٧	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Understand the importance of laboratory analysis as a controlling factor in the treatment of water and wastewater.		v	V		V	V		v	V		V	V		√	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 4: Record the experimental observations and interpret the analysis results.	V	V		v	V		V	v		V	V		V	v		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.			v			v			V			V			v	Good	D Employability	epartment of Civil E IKG PTU Ma Kapurth Minor Exams, Quiz, End Term Exams

		125		2010		3.12											
CO 6: Evaluate and compare different techniques of	٧	V	V	V	V	V	v	v	v	v	v	V	V	V	v	Good	Minor Exams,
experimental analysis		14-	i and		3013		1000	1		100							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- c		POe		PO		PO- i	PO j	P O- k	P 0- 1	PS		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.	V	V	v	V	v	V	V	v	V	V	V	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

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CO 2: Draft construction/d esign drawings including structural drawings for civil		V			V			v			~			v		Good	Employability	Minor Exams, Quiz, End Term
engineering projects.																		Exams
CO 3: Produce structural drawing of reinforced concrete elements such as beams, slabs and staircases.	V	V	v	V	v	V	v	V	V	v	V	V	V	V	V	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			v			~			V		Good	Employability	Department of Civil E IKG PTU Ma Kapurth Minor Exams, Quiz, End Term Exams

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

BTCE 801: Design of Steel Structures - II

BICE BOIL	Engineering Knowledge	Problem Analysis	Design/development of solutions	investigations of problems	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	PO-a	PO-				PO		PO-		P	P	PS	PS O- n		Learning Level	Employabilit	Assessment Tools to Measure Attainment of CO

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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	V		V	V		V	V		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams	
CO 2: Identify importance of various elements of a plate girder and their design.		V	V		V	V		٧	v		V	V		V	V	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		V	V		V	V		V	V		V	v		V	Good	Employability	Department of Cir IKG PTU Kapi Minor Exams, Quiz, End Term Exams	Main C urthala-1

		-	- 1			1		1		T	T	Т		T	1			
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.		V			V			V			v			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 code.			v			V			V			V			V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 6: Design various elements of a railway bridge for given design data.	V	V	V	v	V	V	v	V	V	V	V	√.	V	v	V	Good	Employability	Department of Ci IKG PTU Kape Minor Exams, Quiz, End Term Exams

BTCE 802 DISASTER MANAGEMENT

	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			Assessment
Course Outcome	PO-a	PO					PO		PO- i	PO- j	P 0- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	
CO 1: Identify various types of disasters, their causes, effects & mitigation measures.	V	V		V	V		V	V		v	v		V	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		V	v	L.	V	V		V	V		V	V		v	V	Good	Employability	Minor Exams, Quiz, End Term Exams

			Care and							_		 					
CO 3: Understand the use of emergency management system to tackle the problems.	V	V	v		V	v		V	V		V	V	V	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			V		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.	1	V	V		v	V		V	V		V	V	V	Good	Employability	y Minor Exams, Quiz, End Term Exams	G PTU Ma Kapurth

CO 6: Compare different models for disaster management and plan &	v	V	V	v	٧	V	V	V	V	Good	Employability	
design of infrastructure for effective disaster management.												Minor Exams, Quiz, End Tern Exams

BTCE-803 IRRIGATION ENGINEERING-II

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	Environment and sustainability	Individual and team work		roject management	D	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome		PO	• PO- c		PO e	PO	PO-	PO	P O- k	P 0- 1	PS		PS	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO

Department of Civil Engine IKG PTU Main Ca Kapurthala-14

R

CO 1: Understand the functioning and design consideration of various components of Diversion Head		V	v	V	V	V	V	V	V	V	V	v	v	v	V	Good		Minor Exams, Quiz, End Term Exams
Work. CO 2: Analyze the various parameters of hydraulic structures for seepage and uplift pressure.	V	V		V	V		√	v		v	V		V	V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Recognize the concept and principles of silt control devices.		v	v		V	V		V	v		V	V		V	v	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		v	v		V	V		V	V		V	V		Good	Employability	partment of Civil Eng IKG PTU Main (Kapurthala Minor Exams, Quiz, End Term Exams

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

BTCE-804 Transportation Engineering – II

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	Environment and sustainability	Ethics	Individual and team work	unication	Project management and finance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		Department of C IKG PTL Kap	Head ivil Engineering J Main Cameus urthala-1446
Course Outcome		PO	• PO- c			PO		PO-i		P	P 0- 1	PS	PS O- n		Learning Level	Employabilit	Assessment Tools to Measure Attainment of CO

5

CO 1: Understand the importance of railway infrastructure planning and design.	V	V	V	V	V	V	V	V	V	V	v	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams
CO 2: Identify the functions of different component of railway track.		V			v			V			v			V		Good	Employability	Minor Exams, Quiz, End Term Exams
CO 3: Apply existing technology to design, construction and maintenance of railway track.		V	V		V	V		V	V		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			V			V			v			V			Good	Employability	y Department of Civil E IKG PTU Ma Kapurth Minor Exams, Quiz, End Term Exams

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	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	Good	Employability	Minor Exams, Quiz, End Term Exams

BTCE-805 PROJECT

Course Outcome		PO-	PO- c						PO- i	PO.	P	P 0- 1			PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	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	ance	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			

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

CO 6: Applying modern engineering tools for the	v	V	٧	V	v	V	v	v	v	v	٧	٧	٧	v	v	Good	Employability	
system design, simulation and analysis							demonstration of the			d or all							and the second se	Minor Exams, Quiz, End Term Exams

BTCE-806 DYNAMICS OF 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	tinance Life-long Learning	Analysis and Design Skill	Research and Innovation					
Course Outcome	PO-a	PO	PO- c			PO-f	PO		PO-	POj	Р	P 0-	PS		PS	Learning	Focus on Employabilit y / Entrepreneu rship	Measure	
CO 1: Demonstrate the fundamental theory of dynamic equation of motion for dynamic systems.	v	v	V	V	v	V	V	V	v	V	v	v	V	V	V	Good	Skill Development		Vil Engine Main Ca urthala-14

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 response.	V	v		V	V		V	V		v	V		V	√		Good	Skill Development	Minor Exams, Quiz, End Term Exams	
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	V		V	V		V	V		V	V	Good	Skill Development D	Department of Civi IKG PTU M	Main Ca Inthala-1

CO 4: Understand the response spectrum concept.	V	v		V	V		v	V		v	V		V	v		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.	V		V	V		V	V		V	V		V	V		v	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Analyze dynamic analysis of various structures using Numerical Methods.	v		٧	V		v	V		V	V		v	v		V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 7: Analyze dynamic analysis of various structures using Numerical Methods.	V	V	V	°. √	v	v	v	v	V	v	V	V	V	V	V	Good	Skill Development	t T T T T T T T T T T T T T T T T T T T

BTCE-807 FINITE ELEMENT METHODS

	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- J	Р	Р	PS O- m	PS O- n	PS O- o		y/	Measure
CO 1: Demonstrate the knowledge of theory of elasticity, solution of simultaneous equations by different techniques.	v	V	V	V	V	V	v	V	v	v	V	V	√	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			v			V			V		Good	Skill Development	Department of O IKG PT Ka Minor Exams, Quiz, End Term Exams

CO 3: Apply different methods, such as Stationary principles, Rayleigh-Ritz, weighted residual method in the analysis.		V	V		V	V		V	V		V	V		v	V	Good		Minor Exams, Quiz, End Term Exams
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.	V	V		v	V		V	V		V	V		V	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams

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

BTCE-808 ADVANCED REINFORCED CONCRETE DESIGN

DICE 000 1	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems		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		D	epartment of Civil Engi IKG PTU Main C Kapurthala-
Course Outcome	PO-a			-				PO-		Ρ	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 the fundamental theory design of RC elements.	v	V	v	v	V	v	V	V	V	V	V	V	v	V	V	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.		V			V			V			V			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Analyze the behaviour of slabs for different loading and boundary conditions.	v	V	V	v	V	٧	٧	v	v	٧	V	٧	V	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 4: Design the components of chimney.	v	v		v	V		V	v		V	V		V	V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Analyze and design the different type of retaining systems as per requirements.	V	V		V	V		V	v		V	v		v	V		Good	Skill Development	Department of Civil Engine IKG PTU Main Ca Kapurthala-14 Minor Exams, Quiz, End Term Exams

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

	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		PO- d	PO- e		PO		PO-i		Р	р 0-	PS		PS	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Understand the material characteristics of structural materials, such as high strength concrete and high strength steel, etc.	v	v	V	V	V	V	V	V	v	v	V	V	V	V	V	Good	Skill Development	Department of IKG PT Ka Minor Exams, Quiz, End Term Exams

CO 2: Understand and apply the concept and terminology related to the prestressed concrete.		V			V			V			v			V		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.		V	V		V	V		V	V		V	V		V	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.	V	V		v	V		v	V		V	v		V	V		Good	Skill Development	Department of Civil Engi IKG PTU Main (Kapurthala- Minor Exams, Quiz, End Term Exams

CO 5: Design prestressed concrete beams and slabs for		٧	٧		v	v		v	٧		v	V		v	v	Good	Skill Development	Minor Exams, Quiz, End Term
flexure, shear and torsion.	en ta		1	-			132										(Areastranian	Exams
CO 6: Apply various provisions prescribed by IS 1343 to the design of prestressed concrete members	V	V	V	v	v	V	v	V	V	V	v	V	V	V	V	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		PO-		PO- d					PO- i	PO-	P	P 0- 1	PS		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO

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

Exams He Department of Civil Engineer IKG PTU Main Camp Kapurthala-144

CO 6: Apply the selected ground improvement methods at site.	v	v	v	v	v	v	v	V	v	v	V	v	v	v	V	Good	Skill Development	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	S	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	o de Design/d solutions		PO e				PO- i		Р	Life-I	PS		o O Susta	Learning Level		Measure Attainment of
CO 1: Design of earthen dams considering seepage analysis and seepage control.	v	V		V	V		V	V		V	v		V	V		Good	Skill Development	CO Minor Exams, Quiz, End Term Exams

CO 2: Analysis of earth retaining structures for their stability against earth pressure.		V	V	V	V		V	V			V			V	tere a	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Prediction of lateral earth pressures associated with different earth systems.	v	v	V	V	V	V	V	v	v	v	V	v	v	V	V	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.	V	V		V	v		v	v					V	V		Good	Skill Development	Minor Exams, Quiz, End Tern Exams

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

BTCE-813 REINFORCED EARTH AND GEOTEXTILES

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sis	pmen	tigatic	sage	and	and			I team	-	deme		Desig	D		Outlook
Analy	levelo	inves lex pro	tool u	ineer	ment a	ability		al anc	itooti	mana	ance -	g Lea	ch an	tion	
blem	sign/c	nduct	dern	The eng	vironi	staina	lics	lividu	×	DIBCL	d fins	e-lon nalysi	kill	novat	Sustainable
	Problem Analysis	Problem Analysis Design/development of solutions	ent atior	ent atior ems	ent ation ge	ent ems ge	ent ation d	ation d	am d d d attion	am d d ge ent					

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Course Outcome	PO-a	PO- b	PO- c	PO- d	PO- e	PO-f	PO- g	- PO- h	PO-	PO- j	P O- k	0-		PS O- n	PS O- o	li earning	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO
CO 1: Understand the principle of reinforced earth and different types of reinforcement techniques.	V	v		V	V		v	V		V	V		V	v		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Identify the types and functions of geosynthetics.		v			V			V			V			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 3: Compare the different geosynthetics products for different construction		V	V	V	V	v	v	v	v	V	v	vv	/ V	v	V	/ Good	Skill Developmen	t Minor Exams, Quiz, End Term Exams
CO 4: Identify the testing methods for geosynthetics.	V	v		v	V	,	V	/ /	,	v		V	1	/ \	/	Good	Skill Developmen	Department of Civil IKG PTU N Kapurt Minor Exams, Quiz, End Term Exams

CO 5: Compare natural and artificial geosynthetics.	v	V	V	V	V	V	V	v	V	V	V	V	V	V	V	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	V		√.	V		v	v		v	V		V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE-814 ENVIRONMENTAL IMPACT ASSESSMENT

BICE-014 F	Engineering Knowledge	Problem Analysis	Design/development of solutions	investigations of problems	ool usage	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- c						PO-i	PO	D	P 0- 1	PS O- m		PS O- o	li earning	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measure Attainment of CO	

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

CO 5: Design an environmental proposal and evaluate the available alternatives.		V			v			V			v			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Demonstrate knowledge of professional and ethical responsibilities	v	V	V	V	٧	٧	V	V	۷.	V	v	V	V	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE 815 ADVANCED ENVIRONMENTAL ENGG.

	Engineering Knowledge	Problem Analysis	Design/development of solutions			The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management	ig Lea	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO- b	PO- c	PO- d	PO	PO-f	PO- g	PO h	PO- i	PO j	P O- k	P 0- 1	PS	PS O- n	PS O- o	Learning Level	the state of the second second second second second	Assessment Tools to Measure Attainment of CO

He Department of Civil Engineeri IKG PTU Main Camp Kapurthala-1446

CO 1: Understand the basic concepts of inter- relationship between different ecosystems with environment.	V	V	V	V	V	V	V	V	V	v	V	V	V	V	V	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).		V	V		V	V		V	V		V	V		V	v	Good	Skill Development	Minor Exams, Quiz, End Tern Exams

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			Г		П							П		П					
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	V		V	V		V	V		V	V		V	V	Good		Minor Exams, Quiz, End Term Exams	
CO 4: Prepare the life cycle assessment of Solid waste from its generation to disposal.	V	V		V	V		V	V		V	V		v	v	2	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.	v	V	V	v	V	V	V	V	v	V	v	V	V	V	V	Good	Skill Development	Department of G IKG PT Ka Minor Exams, Quiz, End Term Exams	Civil I TU Ma apurth

CO 6: Explain different types of hazardous waste and correspondingl y appropriate	V	V	a for ser	v	V	v	v	v	V	v	V	Good	Skill Development	Minor Exams,
method for its treatment and														Quiz, End Tern Exams

BTCE 816 FLOOD CONTROL & RIVER ENGINEERING

DICEOIO		nalysis	Design/development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability		Individual and team work	Communication	Project management	ong Learning	sis and Design	Research and Innovation	Sustainable Outlook			
Course Outcome	Bering Bering Knowledge	PO-		P O Conduct investiga	PO e		PO		. PO- i work	3	Р		PS			Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure
CO 1: Appropriate the importance of river engineering and its social and environmental impacts.	V	V		V	V		V	V		v	V		V	V		Good	Skill Development	Department of O IKG PT Ka Minor Exams, Quiz, End Term Exams

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

BTCE - 817 HYDROLOGY AND DAMS

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	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		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	P O- k	P 0- 1	PS O- m	PS O- n	PS O- o	Learning Level	Employabilit y /	
CO 1: Understand the importance of hydrological data in water resources planning.	v	V	V	V	V	V	V	V	V	V	V	V	V	V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Design of rain gauge network according to requirement.		V	v		v	V		V	V		V	V		v	V	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.		V	v		v	V		v	′ √		V	v v	1	v	V	Good	Skill Development	Department p IKG Minor Exams, Quiz, End Term Exams

CO 4: Design peak flow and fix design floods.	V	V		V	V		V	V		v	V		V	v		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 5: Compare suitable type of dams according to site requirements.	V	V	V	V	V	V	V	V	V	V	v	v	V	V	V	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.	V	V	V	v	V	٧	V	V	V	v	v	v	V	v	v	Good	Skill Development	Minor Exams, Quiz, End Term Exams

BTCE-818 PAVEMENT DESIGN

	Engineering Knowledge	roblem Analysis	Design/development of solutions	Conduct investigations of complex problems	The engineer and society	Environment and sustainability	Ethics	Individual and team work	m	roject management	-ife-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		(Department of Civil En IKG PTU Mai Kapurtha
Course Outcome		PO- b	PO- c			PO		PO-		P O- k	P 0- 1	PS		PS O- o	Learning Level	Focus on Employabilit y / Entrepreneu rship	Measure

Contraction of the					- 1		1								-				
CO 1: Identify the different types of pavement and factors affecting their design.	V	V	V	V	V	V	V	V	V	V	~	V	V	V	v	Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 2: Design the flexible pavement using different methods and as per latest Indian Standard.		V			V			V			v			V		Good	Skill Development	Minor Exams, Quiz, End Term Exams	
CO 3: Understand the factors affecting Bitumen mix design and design procedure of bitumen mix	V	v	V	V	V	V	V	V	V	V	V	V	V	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.		V	v		V	v		V	V		V	V		V	V	Good	Skill Development		FTU N Kapurt

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

BTCE-819 TRAFFIC ENGINEERING

	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	Environment and sustainability	Ethics	Individual and team work	inication	roject management and	ife-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook		
Course Outcome		PO	PO- c		PO- e			PO-		P	P	PS O- m	1.75	PS O- o	Learning Level	Assessment Tools to Measure Attainment of CO

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

CO 5: Outline the procedure to assess the road safety audit.	٧	V	V	V	v	V	v	v	V	V	v	V	٧	V	v	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 6: Access the need of modernization in traffic engineering.	v	v	v		v		v		V		v	V	V	v	V	Good	llavolonmont	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		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		PO- i		D	P 0- 1	PS O- m		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.	V	V	v	v	V	v	V	V	v	v	v	v	v	~	v	Good	Skill Development	Dispartment o IKG F Minor Exams, Quiz, End Term Exams	f Civ TU apu

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

BTCE-821 INFRASTRUCTURE DEVELOPMENT &

X Head Department of Civil Engineering IKG PTU Main Campus 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	Life-long Learning	Analysis and Design Skill	Research and Innovation	Sustainable Outlook			
Course Outcome	PO-a	PO		PO- d	PO- e				PO-		P	P	PS	PS O- n		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.	V	V	v	V	V	V	V	V	V	v	V	v	V	v	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 2: Strategies the policy process for infrastructure development.		v	V		v	v		V	٧		V	V		V	V	Good	Skill Development	Minor Exams, Quiz, End Term Exams

CO 3: Identify and compare the best tools for effective project		v	V		V	V		v	v		v	V		v	v	Good	Skill Development	
evaluation, management and control.			0.00															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.	V	V		v	V		. √	~		v	V		v	V		Good		Minor Exams, Quiz, End Term Exams

CO 5: Remember the necessary conceptual insights, perspectives		V	v		V	v		V	V		V	V		V	V	Good	Skill Development	
and the tools required for effective infrastructure management. CO 6: Choose																		Minor Exams, Quiz, End Term Exams
the best financing option for a project.	٧	V		٧	V		v	v		v	v		٧	v		Good	Skill Development	Minor Exams, Quiz, End Term Exams
CO 7: Develop a skill to etrieve essons from ase studies in nternational/ lational roject nanagement.	V		V	V		V	V		v	v		v	V		v	Good		Minor Exams, Quiz, End Term Exams

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CO 8: Document the different phases in the life cycle of an		v			V			v			V			v		Good	Skill Development	
infrastructure project.				-		5-04		10.01		-					-			Minor Exams, Quiz, End Term
CO 9: Gather background information and research regarding various infrastructure sectors and describe its impact on the project.	V	v	V	v	v	V	v	v	v	V	v	v	V	v	v	Good		Exams Minor Exams, Quiz, End Term Exams