

# Supporting Documents- Mechanical Engineering

# Mapping of courses to employability/skill development



# Name of the Department: Mechanical Engineering

#### BTPHXX-18 - Physics & Physics Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	РО 5	РО 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measur Attainment of CO
CO1: To be able to understand the basic principles of Quantum mechanics and to apply these to the complex phenomenon of matter radiation interaction	V		V		V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO 2: To be able to understand the concept of wave packets using Heisenberg's uncertainty principle.			~		V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO 3: To be able to apply Schrodinger's wave equations to study the complex physical phenomenon.			V		V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO 4: To be able to understand the structure of crystalline solids by applying knowledge of crystallography.			V		V		V	V		V		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 5: To be able to understand semiconducting materials by using the concepts of band theory of solids.	V	V	~	V	V	V	V	V	V	V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
BTAMXX-18 - Maths-1	Ē	ide Jepanni K.C. F Jepunt	ent of M T	echanica	<b>al Engin</b> mpus	ecting									

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Course Outcome	PO 1	PO 2	РО 3	PO 4	РО 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1:Students will be able to remember terminologies and formulae in matrices, complex	$\checkmark$		$\checkmark$		V		$\checkmark$	V	V	√	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO2: Students will be able to understand and interpret the concepts of matrices, complex			V		V		V	V	$\checkmark$	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO3:Students will be able to compare and analyze the methods in matrices, complex numbers	$\checkmark$	V	V	V	V	V	V	V	V	V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
TEE101-18 Basic Electrical Engineering															
Course Outcome	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	P01 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and components of low voltage	V	V	V		V		V	√	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 2: Be able to analyze of DC circuits, AC Circuits		V	√		V			V	V	V	V	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 3: Understand the basic magnetic circuits and apply it to the working of electrical machines	-	V	V		$\checkmark$	÷	V	√	V	V	$\checkmark$	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam

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CO 4: Be introduced to types of wiring, batteries, and LT switchgear.		V	V		~	5	~	V		~		√	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
BTEE101-18 Basic Electrical Eng	ineer	ing L	ab			ł.									
Course Outcome	P0 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: The ability to use common electrical measuring instruments and understand the fundamentals of electrical engineering.	V	$\checkmark$	V		V		V	V	V	$\checkmark$	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 2: The ability to make electrical connections, and measure power, power factor using appropriate equipments.		$\checkmark$	V		~		V	V	~	V	V	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 3: Have the knowledge of electrical machines, components and their ratings		V	V		~		V	~	~	~	~	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 4: Understand the operation of transformers and electrical machines		V	V		~		~	~		$\checkmark$		~	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
Paper BTME101-18 Engineering	Grap	hics (	& Des	sign	-		1			1	Departin L.K.G. Kapurt	P.T.U.	Aechanical Engineeting		
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1	PO1 1	l l	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO

CO1: design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety.	V	V	V	V	V	~	V	$\checkmark$	$\checkmark$	V	V	V	Design	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO 2: to prepare to communicate effectively.	√	√	V	V	V	V	V	V	V	V	V	V	Communicate	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO 3: to prepare to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√	V	$\checkmark$	V	V	V	$\checkmark$	V	V	V	V	$\checkmark$	Apply	Yes	Minor Exams, Quiz, Assignments, Term Exams
BMPD101-18 Mentoring and pro	ofessi	onal	Devel	opme	ent	÷				t	Kapur	P.T.U. t Mala	lectuational Engineering		с 2
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
CO1: The student will be able to effectively communicate and present technical material.	V	V	V		V		V	$\checkmark$	V	V	V	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO2: Ability to think critically and creatively to generate innovative and optimum solutions.		V	V		V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO3:The student will be able to identify, evaluate and synthesise information from a range of sources to optimise process engineering design and		V	V		V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO4: Engage in continuous education, training and research, and take control of their own learning and overall development.		V	V		V		V	•√		V		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam

#### BTCH101-18 - Chemistry -1

														Focus on Employabilit	
Course Outcome	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.	~		~		V		V	V	V	$\checkmark$	$\checkmark$	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Rationalise bulk properties and processes using thermodynamic considerations.	-		$\checkmark$		V		√	V	$\checkmark$	$\checkmark$	V	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.			V		V		V	$\checkmark$	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.		*	V		V		V	V		$\checkmark$		$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
List major chemical reactions that are used in the synthesis of molecules.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	V	$\checkmark$	V	V	$\checkmark$	V	V	Applying	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
BTCH102-18 - Chemistry Lab		1	HOX	inent of the providence of the	Mecha Mecha	nical En Camp	gineetin us								
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO

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Estimate rate constants of reactions from concentration of reactants/products as a function of time	V		$\checkmark$		V	5	V	V	V	~	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water. etc			V		V		V	V	$\checkmark$	V	V	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Synthesize a small drug molecule and analyse a salt sample			√		V		V	$\checkmark$	$\checkmark$	$\checkmark$	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
BTAMXX-18 Mathematics II								I.K.G	P.T.U	Mechan Main	Gampi	ineeting IS			
Course Outcome	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	P07	PO8	PO9	PO1 0	P01 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: The mathematical tools needed in evaluating multiple integrals and their usages.	V		V	√	V		V	V	$\checkmark$	~	$\sqrt{2}$	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 2: The effective mathematical tools for the solutions of differential equations that model physical processes.			V	V	V		V	V	V	V	$\checkmark$	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO 3: The tools of differentiation and integration of functions that are used in various techniques dealing engineering problems.			V	V	V		V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam

#### BTPS101-18 Programming for Problem Solving

Course Outcome	P0 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	POS	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
To formulate simple algorithms for arithmetic and logical problems.	V	~	√	V	V	V	√	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To translate the algorithms to programs (in C language).		V	V	V	V	V	V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To test and execute the programs and correct syntax and logical errors.		V	V	$\checkmark$	V	V	V	V	V	$\checkmark$	$\checkmark$	V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To implement conditional branching, iteration and recursion.		V	$\checkmark$		V	V		$\checkmark$		$\checkmark$		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To decompose a problem into functions and synthesize a complete program using divide and conquer approach.		$\checkmark$	$\checkmark$		V	V		$\checkmark$		$\checkmark$		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To use arrays, pointers and structures to formulate algorithms and programs.		V	V			G. P.1		v vanical I in Can	inginee ipus			$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.		V	$\checkmark$		√ Ka	¢urtha √		V		√ ,		~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.		V	$\checkmark$		V	√		$\checkmark$		V		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams

## BTPS102-18 Programming for Problem Solving Lab

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Course Outcome	<b>PO</b> 1	<b>PO</b> 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
To formulate the algorithms for simple problems	V	V	V	V	V	√	~	V	$\checkmark$	$\checkmark$	V	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
To translate given algorithms to a working and correct program	V	√	V	V	√	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	V	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To be able to correct syntax errors as reported by the compilers	V	V	V	V	V	$\checkmark$	~	V	~	$\checkmark$	$\checkmark$	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To be able to identify and correct logical errors encountered at run time	V	V	V	Sep	V	V		V		$\checkmark$		~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To be able to write iterative as well as recursive programs	V	V	V	Depa I.K.C Kap	timent o B. R.T. ! urthale	f Mech	nical En Camp	oneetiu us√	<b>0</b>	$\checkmark$		~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To be able to represent data in arrays, strings and structures and manipulate them through a program	$\checkmark$	V	V		V	V		$\checkmark$		$\checkmark$		$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
To be able to declare pointers of different types and use them in defining self referential structures.	V	$\checkmark$	$\checkmark$		V	$\checkmark$		$\checkmark$		$\checkmark$		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams

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To be able to create, read and write to and from simple text files.	$\checkmark$	√	~		V	√		~		~		~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
Paper BTMP 101-18 Workshop/N	Manu	ıfactu	Iring !	Practi	ices										
Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	P07	7 PO8	PO9	PO1 0	PO1 1	1 PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment roots to Measure Attainment of CO
CO1: gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different	~	~	~	√	√	$\checkmark$	~			~	~	V	Understanding		Minor Exams, Project based learn Assignments,End Term Exams
CO 2: able to fabricate components with their own hands.	5 √	√	V	~	$\checkmark$	V	$\checkmark$			V	$\checkmark$	$\checkmark$	Apply	Yes	Minor Exams, Project based learn Assignments,End Term Exams
CO 3: Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	~	V	V	~	$\checkmark$	V	V			$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams, Project based learr Assignments,End Term Exams
CO 4: By assembling different components, they will be able to produce small devices of their interest.	V	V	V	~	V	$\checkmark$	~			V		$\checkmark$	Apply	Yes	Minor Exams, Project based learr Assignments,End Term Exams
Paper BTHU101-18 English									IKC	C PT	1. A.M	hanical En Jo Gamp	<u>e n</u>		
Course Outcome	PO 1	PO 2		PO 4	PO 5		P07	7 PO8	-	9 PO1 0		1 PO1 2	1 Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO

V	$\checkmark$	V	$\checkmark$	V	√	V			$\checkmark$	$\checkmark$	$\checkmark$	() Understanding	Yes	Minor Exams, Project based learn Assignments,End Term Exams
$\checkmark$	V	~	$\checkmark$	~	V	~			$\checkmark$		$\checkmark$	Apply	Yes	Minor Exams, Project based learn Assignments,End Term Exams
V	V	V	$\checkmark$	$\checkmark$	$\checkmark$	V			$\checkmark$	V	$\checkmark$	Understanding	Yes	Minor Exams, Project based learn Assignments,End Term Exams
V	$\checkmark$	$\checkmark$	V	$\checkmark$	V	V			$\checkmark$		V	Apply	Yes	Minor Exams, Project based learn Assignments,End Term Exams
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17		1		1					9					
PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
1. 1						<b>PO7</b>	PO8	PO9				<b>Skill</b> Understanding	Employabilit y /	
1	2	3	4	5	6		P08	PO9	0	1	2		Employabilit y / Entrepreneu rship	Attainment of CO Minor Exams, Project based learr
	√	$\checkmark$ $\checkmark$			$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

They will be able to converse fluently	$\checkmark$	$\checkmark$	√	√	~	\   ✓	√			~	_	√	Apply	Yes	Minor Exams, Project based learn Assignments,End Term Exams
BMPD101-18 Mentoring and pro	ofessi	onal I	Devel	lopme	ent		<u>                                     </u>		1						
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
CO1: The student will be able to effectively communicate and present technical material.	~	~	~		~		V	V	$\checkmark$	$\checkmark$	√	√	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exams
CO2: Ability to think critically and creatively to generate innovative and optimum solutions.		√	~		~		~	~	~	~	~	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO3:The student will be able to identify, evaluate and synthesise information from a range of sources to optimise process engineering design and		~	~		$\checkmark$		~	~	√	~	~	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO4: Engage in continuous education, training and research, and take control of their own learning and overall development.		~	~		~		V	V		~		$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
Paper BTME301-18 Fluid Mecha	inics							E I.K	0D epartment K.G. P.T (apurtha	mi of Med T.U.	<b>hanical</b>	l Enginee mpus	sting		
Course Outcome	P0 1	P0 2	РО 3	PO 4	PO 5	PO 6	P07	7 PO8	PO9	PO1 0	PO1	1 PO1 2	L Skill	Focus on Employabilit y / Entrepreneu rship	Assessment roots to Meas

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CO1: Understand the concept of fluids and their properties.	,√ ,	√	V		(	V	V		V	V		V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO 2:Apply the concept to solve the problems related to statics, dynamics and kinematics	V	V	√			V	V		√	V		V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO3: Use and apply dimensional analysis and similitude techniques to various physical	√	V	V			V	V		V	V		V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO4: Distinguish various types of flows and learn flow measurement methods.	√	V	V			V	V		V	V		V	Analyse	Yes	Minor Exams, Quiz, Assignments, Term Exams
BTME302-18 Theory of Machine	es -1				teozitan LK.G. I Kapurt		d <b>u i</b> Jain Gr	l Engine Smpus	eting						
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
CO1: Understand constructional and working features of important machine elements.	~	V	√	V	~	V			V		V	V	Understanding	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
CO2: Design belt, rope and chain drives for transmission of motion from one shaft to	√	√	V	V	V	V			V		$\checkmark$	V	Understanding	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
CO3: Identify different Cam and follower pairs for different applications and construct cam	V	√	V	V	V	V			$\checkmark$		V	V	Understanding	Yes	Minor Exams, Assignments, End Exams
							- 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10								

CO4: Understand the function of brakes, dynamometers, flywheel and governors.	~	~	V	V	V	\   √			$\checkmark$		$\checkmark$	$\checkmark$	Understanding, Applying	Yes	Minor Exams, Assignments, End 1 Exams
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#### BTME303-18 : Machine Drawing

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Course Outcome	PO 1	РО 2	РО 3	РО 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Read, draw and interpret the machine drawings and related parameters.	√.	V	$\checkmark$							√	V	V	Understanding	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO2: Use standards used in machine drawings of machine components and assemblies.	$\checkmark$	V	V							$\checkmark$	$\checkmark$		Applying	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO3: Learn the concept of limits, fits and tolerances in various mating parts.	V	V	V							V	$\checkmark$		Understanding	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO4: Visualize and generate different views of a component in the assembly.	V	V	V		V					V	$\checkmark$	V	Applying	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO5: Use CAD tools for making drawings of machine components and assemblies.	$\checkmark$	V	V		V					V	$\checkmark$	V	Applying	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
BTME304-18 STRENGTH OF MAT	TERIA	ALS-I			HOD Departs I.K.G. Kapur	nont of P.T.U. thale	Mechan Saistist	<b>ical Eng</b> Journpu	in <b>eering</b> s	90 B	Ţ.		C65		

PO 1	PO 2	РО 3	<b>PO</b> 4	PO 5	PO 6	РО 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
$\checkmark$	V	$\checkmark$			V			$\checkmark$	$\checkmark$	$\checkmark$	~	Understanding	Yes	Minor Exams, Assignments, End T Exams
V	V	V			V			V	$\checkmark$	$\checkmark$	$\checkmark$	Understanding and Analysing	Yes	Minor Exams, Assignments, End T Exams
V	V	V	6	V	$\checkmark$			V	V	$\checkmark$	$\checkmark$	Analysing	Yes	Minor Exams, Assignments, End T Exams
V	V	~		V	V			V	$\checkmark$	$\checkmark$	V	Analysing	Yes	Minor Exams, Assignments, End T Exams
~	$\checkmark$	~		V	V			V	V	V	$\checkmark$	Analysing	Yes	Minor Exams, Assignments, End T Exams
Ingine	eering	9		1	S. M. march		Mechan Mada	Campi	inectir ( IS	No. of Street,				
PO 1	PO 2	PO 3	<b>PO</b> 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
V	V	V			$\checkmark$			V	V	V	V	Understanding	Yes	Minor Exams, Assignments, End Exams
	1 √ √ √ √ Fingine PO 1	12 $\checkmark$ $\uparrow$ $\downarrow$ $\uparrow$ $\downarrow$	1       2       3         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         √       √       √         PO       PO       PO         1       PO       PO         3       √       √	1       2       3       4 $\checkmark$	1       2       3       4       5 $\checkmark$ $\uparrow$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $=$ PO       PO	1       2       3       4       5       6 $\checkmark$ <b>PO PO PO PO</b>	1       2       3       4       5       6       7 $\checkmark$	1       2       3       4       5       6       7       8 $\checkmark$ <	1       2       3       4       5       6       7       8       9 $\checkmark$ <td< td=""><td>1       2       3       4       5       6       7       8       9       10         <math>\checkmark</math> <math>\checkmark</math></td><td>1       2       3       4       5       6       7       8       9       10       11         <math>\checkmark</math> <math>\checkmark</math></td><td>1       2       3       4       5       6       7       8       9       10       11       12         <math>\checkmark</math> <math>\checkmark</math></td><td>1       2       3       4       5       6       7       8       9       10       11       12       Skill         <math>\checkmark</math> <math>\land</math></td><td>123456789101112Skill<math>\sqrt{y'}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math><math>\sqrt{1}</math>&lt;</td></td<>	1       2       3       4       5       6       7       8       9       10 $\checkmark$	1       2       3       4       5       6       7       8       9       10       11 $\checkmark$	1       2       3       4       5       6       7       8       9       10       11       12 $\checkmark$	1       2       3       4       5       6       7       8       9       10       11       12       Skill $\checkmark$ $\land$	123456789101112Skill $\sqrt{y'}$ $\sqrt{1}$ <

1				 		 							
Appreciate the construction and working bipolar junction transistors and MOSFETs.	$\checkmark$	V	$\checkmark$		√		V	√ *	V	V	Understanding and Analysing	Yes	Minor Exams, Assignments, End T Exams
Design Op-Amp IC based fundamental applications.	$\checkmark$	$\checkmark$	V	$\checkmark$	V		$\checkmark$	V	$\checkmark$	V	Analysing	Yes	Minor Exams, Assignments, End Exams

#### Paper Basic Thermodynamics BTME 305-18

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
CO1: Apply energy balance to Systems and Control Volumes in situations involving heat and work interactions.	$\checkmark$	V	V		V		V	V	V	V	V		Applying	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO2: Evaluate changes in thermodynamic properties of substances		V	V	V	V	-			V	-	V	V	Applying	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO3:Evaluate performance of energy conversion devices		V	V	V	V				V		V	V	Applying	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO4:Explain and apply various gas power and vapor power cycles		V	V	V	$\checkmark$	V			$\checkmark$	V	V		Understanding	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
BTME306-18 Strength of Materi	al La	b		(To		nt of Me T.U. Si ala	<mark>chanica</mark> ain Ga	l Engine mpus	ering						

Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PC 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Measure the various mechanical properties such as tensile and compressive strength, impact strength, torsion strength and fatioue strength and hardness	~	~	~	~		~			~	~	~	~	Understanding	Yes	Quiz, Viva
CO 2: Calculate load carrying capacity of long columns and their buckling strength.	$\checkmark$	V	~	~		~			~	~	~	~	Understanding and Analysing	Yes	Quiz, Viva
BTME307-18 Theory of Machines	s Lab	,	14												
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	РО 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Understand constructional and working features of important machine elements.	~	~	~	~	$\checkmark$	V			~		~	$\checkmark$	Understanding	Yes	Minor Exams, Assignments, End Exams
CO2: Design belt, rope and chain drives for transmission of motion from one shaft to															
another	~	~	$\checkmark$	~	~	~			~		~	~	Designing	Yes	Minor Exams, Assignments, End Exams
CO3: Identify different Cam and follower pairs for different													-	AND AND	P a state of the sector of the

Section of the

profile for required follower motion.	V	V	v	V	V	V		$\checkmark$	Ŷ	V	V	Designing	Yes	Minor Exams, Assignments, End Exams
CO4: Understand the function of brakes, dynamometers, flywheel and governors.	V	$\checkmark$	V	V	$\checkmark$	$\checkmark$		V		V	V	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams

#### Paper BTME308-18 Fluid Mechanics Lab

Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	РО 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Distinguish various type of flows and flow measurement methods and concept of															С. м
statics and dynamics of liquids.	V				V		$\checkmark$		V	V		~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 2: Determine discharge and head loss, hydraulic and friction coefficient, for different												<b>a</b> 1		Ŷ	х Х
types of flow in pipe and open channels.							~		V	V	_	$\checkmark$	Analyse	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
BMPD301-18 Mentoring and p	rofessi	onal	Devel	opme	ent	AL.	ioD Deparium .K.Q. 1 Kepun	t of Market	echanica	el Engin Gas	eeting				

Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	P01 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: The student will be able to effectively communicate and present technical material.	V	V	$\checkmark$		$\checkmark$		√	V	V	V	$\checkmark$	~	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO2: Ability to think critically and creatively to generate innovative and optimum solutions.		V	V		V		~	V	V	~	V	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO3:The student will be able to identify, evaluate and synthesise information from a range of sources to optimise process engineering design and		√	V		V		V	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO4: Engage in continuous education, training and research, and take control of their own learning and overall development.		$\sim$	V		$\checkmark$		V	V		$\checkmark$		V	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
BTME401-18 APPLIED THERMO	DYNA	MICS	5	STREETS	eritikan .G. P.1	) N. Mec N. Me	<b>lenied</b> Sa Can	Engined npus	iig ]					5	
Course Outcome	PO 1 (En gine erin		PO 3 (De sign /De	PO 4 (Co ndu	PO 5 (Mo der	PO 6 (Th e	PO 7 (En viro nme		(Ind ivid	PO 10 (Co mm unic		PO 12 (Lif e lona	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Explain the functioning and performance evaluation of reciprocating air compressors.	~		V	V	V	$\checkmark$	V		$\checkmark$	V	¥.	$\checkmark$	Understanding, Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO 2: Analyze the combustion phenomenon in boilers and I.C. engines.	~	$\checkmark$		$\checkmark$	V	V	~	V	~	~	V	V	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams

CO 3: Use of Steam Tables and MollierChart to solve vapour power cycle problems.	V	V	V	V	V	V	V	$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams
CO 4: Demostrate the constructional features and working of steam power plants and to evaluate their performance.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V		V	$\checkmark$	V	V	Understanding, Applying	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams

#### Paper BTME 402-18 Fluid Machines

		r		r			r								
Course Outcome	P0 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Determine discharge and head loss, hydraulic and friction coefficient, for different types of flow in pipe and open channels.	$\checkmark$	V	V			V	V		V	√	~	√	Knowledge	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc.
CO 2:Know about constructional details, working and design aspects of runner/wheel and evaluate the performance of various turbines like Pelton. Kaplan and Francis. CO 3: Know about constructional	$\checkmark$	V	V			V	V		V	V		V	Knowledge	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Numer etc.
details, working and evaluate the performance of centrifugal pump under different vane shape conditions. CO 4: Know about constructional	V	V	V			V	V		V	V		$\checkmark$	Knowledge	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc.
details, working and evaluate the performance of reciprocating pump and evaluate the effect of various deviations from the ideal					Departo		Aechani	al Engi	ie <b>ding</b>						•
CO5: Know about constructional details and working of hydraulic devices like fluid coupling, accumulator and intensifier.					I.K.G. Kapur	r.1.0. Inale	Phan .	⇒n <b>iµu</b>	14				Knowledge	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Numer etc.

#### BTME403-18 STRENGTH OF MATERIALS-II

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				2 2										·	
Course Outcome	PO 1	<b>PO</b> 2	PO 3	РО 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Understand the concepts of stress and strain at a point, in the members subjected to axial, bending,.torsional loads and temperature changes.	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$			V	V	V	V	Understanding	Yes	Minor Exams, Assignments, End T Exams
CO 2: Determine principal stresses, maximum shearing stress and their angles, and the stresses acting on any arbitrary plane within a structural element.	V	V	V			V			$\checkmark$	V	V	V	Understanding and Analysing	Yes	Minor Exams, Assignments, End T Exams
CO 3: Find bending moment and shear force over the span of various beams subjected to different kinds of loads.	V	V	V		V	V			V	V	$\checkmark$	V	Analysing	Yes	Minor Exams, Assignments, End T Exams
CO 4: Calculate load carrying capacity of columns and struts and their buckling strength.	V	V	V		V	V			$\checkmark$	V	$\checkmark$	V	Analysing	Yes	Minor Exams, Assignments, End T Exams
CO 5: Evaluate the slope and deflection of beams subjected to loads.	~	V	V		V	V			V	V	V	V	Analysing	Yes	Minor Exams, Assignments, End 1 Exams
BTME404-18 MATERIALS ENGI	NEER	ING								N	HOU Depart I.K.G Kapu	ment of . P.T.!) rthala	Mechanical Engineering Model Compus	1	
Course Outcome	PO 1 (En gine erin		1.	ndu		e	PO 7 (En viro nme	ics)	(Ind		ject	1 -		Focus on Employabilit y / Entrepreneu rship	Attainment of CO

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CO1: Illustrate the significance of structure-property-correlation for engineering materials including ferrous and nonferrous.	~	V		$\checkmark$	V	V	$\checkmark$		$\checkmark$	$\checkmark$	V	$\checkmark$	Underst ing, Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
CO 2: Explain the use and importance of various heat treatment processes used for engineering materials and their practical applications.	V		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V	V	V	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
CO 3: Identify the various structural changes occurred in metals with respect to time temperature transformations.	V	V	$\checkmark$	$\checkmark$	$\checkmark$	V	V		V	$\checkmark$	V	$\checkmark$	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
CO 4: Interpret the significance of Fe-C and TTT diagram for controlling the desired structure and properties of the materials.	$\checkmark$	V		√	V	√	V	V	V	~	√	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
TME405-18 : Theory of Machines -II Compus															
Course Outcome	PO 1	PO 2	PO 3	PO	РО	РО	P07	PO	PO					Focus on	
		-	3	4	5	6	207	8	9	PO 10	PO 11	PO 12	Skill	Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Understand the basic concepts of inertia forces & couples applied to reciprocating parts of a machine.	V	√	√	<b>4</b> √	5	6							<b>Skill</b> Understanding & Applying	y/	
concepts of inertia forces & couples applied to reciprocating parts of a	√ √				5	6	P07				11	12	Understanding &	y / Entrepreneu rship	Attainment of CO Minor Exams, Assignments, End T
concepts of inertia forces & couples applied to reciprocating parts of a machine. CO2: Understand balancing of rotating and reciprocating parts of	√ √	√	√	V		6					<b>11</b> √	<b>12</b> √	Understanding & Applying Understanding &	y / Entrepreneu rshin Yes	Attainment of CO Minor Exams, Assignments, End T Exams Minor Exams, Assignments, End T

	-		-										
CO4: Understand the concept and application of gyroscopic effect.	V	V	$\checkmark$	V	V	<u>.</u>				V	Understation & Applying	Yes	Minor Exams, Assignments, End T Exams
CO5: Gain knowledge of kinematic synthesis.	$\checkmark$	V	V	$\checkmark$	V		<		$\checkmark$	$\checkmark$	Understanding & Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams

#### **EVS101-18 ENVIRONMENTAL SCIENCE**

								_		_					
Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Students will enable to understand environmental problems at local and national level through literature and general awareness.	$\checkmark$	v v	V	V							V	V	Understanding & Applying		Minor Exams, Assignments, End T Exams
The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various	V	V	$\checkmark$	V	V						V	$\checkmark$	Understanding & Applying	Yes	Minor Exams, Assignments, End T Exams
The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate	$\checkmark$	V	V	V	V				11		V	V	Understanding & Applying	Yes	Minor Exams, Assignments, End T Exams
Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world	V	V	V	V	√ -	Dene	P.T.!	Mecha	nical En	ine <b>din</b> US		V	Understanding & Applying	Yes	Minor Exams, Assignments, End T Exams
							5 K	30							

#### BTME406-18 APPLIED THERMODYNAMICS Lab

Course Outcome CO1: Explain the functioning and performance evaluation of reciprocating air compressors.	PO 1 (En gine erin	ble	PO 3 (De sign /De	ndu	PO 5 (Mo der n √	e	PO 7 (En viro nme	ics)	(Ind ivid	1 .	ject	e	Skill Understanding, Applying and Designing	Focus on Employabilit y / Entrepreneu rshin	Assessment Tools to Measu Attainment of CO Minor Exams, Assignments, End T Exams
CO 2: Analyze the combustion phenomenon in boilers and I.C. engines.	$\checkmark$	$\checkmark$		V	V	V	V	V	~	$\checkmark$	$\checkmark$	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
CO 3: Use of Steam Tables and MollierChart to solve vapour power cycle problems.	√ .	$\checkmark$	$\checkmark$	~	V	V	V	V	V	V	V	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
CO 4: Demostrate the constructional features and working of steam power plants and to evaluate their performance.	$\checkmark$	$\checkmark$	V	V	V	V	V		V	$\checkmark$	$\checkmark$	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams
Paper BTME407-18 Fluid Machin	nes La	ıb		CHR = X	Contractions Contractions Contractions	) Loi Mec LU, Ma	<b>hanisal</b> Sin Cor	Enginee npus	ting						
Course Outcome	PO 1	РО 2	РО 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Conduct experiments on scaled down models or on actual size hydraulic machines and evaluate results in terms of unit or specific quantities for comparison	$\checkmark$	$\checkmark$	$\checkmark$	*	$\checkmark$	$\checkmark$	V		V	V	V	$\checkmark$	Applying	Yes	Case Study, Group Discussions e
CO 2: Understand the working of various hydraulic machines (turbines and pumps) and can suggest remedial solutions for various faults.	V	$\checkmark$	$\checkmark$		V	$\checkmark$	$\checkmark$		V	V	V	$\checkmark$	Understanding	Yes	Case Study, Group Discussions e

#### Paper BTME408-18 Material Engineering Lab

Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	РО 6	P07	7 PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Analyse the microstructure of different ferrous and non-ferrous samples.	√	√	√		√	V	~		~	√	~	√	Applying	Yes	Case Study, Group Discussions of
Explore the effect of heat treatment on various engineering materials by analysing its microstructure and hardness	$\checkmark$	~	~		~	√ 	~		~	~	~	,√	Understanding	Yes	Case Study, Group Discussions e
BMPD401-18 Mentoring and pro	ofessi	onal I	Devel	opme	ent	_	LIKC	iatiment o .G. P.T.! purtinale	U. Mein						· · · · · · · · · · · · · · · · · · ·
Course Outcome	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	P01 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: The student will be able to effectively communicate and present technical material.	√	~	~		V		$\checkmark$	V	$\checkmark$	$\checkmark$	~	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO2: Ability to think critically and creatively to generate innovative and optimum solutions.		V	V		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO3:The student will be able to identify, evaluate and synthesise information from a range of sources to optimise process		~	~		√		√	$\checkmark$		$\checkmark$		$\checkmark$	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam

CO4: Engage in continuous education, training and research, and take control of their own learning and overall development.	$\checkmark$	$\checkmark$	ν	0	~	~		$\checkmark$		V	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
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#### BTME501-18 Heat Transfer

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	РО 9	PO 10	PO 11	PO 12		Focus on Employabilit	Assessment Tools to Measu
	(En gine erin		(De sign /De			(Th e Enai	(En viro nme	(Eth ics)	ivid	-	ject		Skill	y / Entrepreneu rship	Attainment of CO
To teach students the basic		1				Constant and a second						- ALATINA		isuu	
principles of conduction, radiation,	,												Understanding,		
and convection heat transfer.	√		√	√	√	√	√		√	√		√	Applying and	Yes	Minor Exams, Assignments, End
Students will demonstrate an													Designing		Exams
understanding of the basic													5 5		
To extend the basic principle of		×								-					
conservation of energy to systems	,												Understanding,		
that involve conduction, radiation,	√	√		√	√	√	√	√		√	√	√		Yes	Minor Exams, Assignments, End
and heat transfer. Students will											L.		Applying		Exams
demonstrate an understanding of															
To train students to identify,															
formulate, and solve engineering	,	·	,	, <sup> </sup>									Understanding,		Minou France Assis
problems involving conduction heat	√	√	√	√	√	√	√	√	$\checkmark$	√	√	√		Yes	Minor Exams, Assignments, End
transfer. Students will demonstrate			6										Applying		Exams
the ability to formulate practical															
To train students to identify,															
formulate, and solve engineering	,	,	,			, I							Understanding,		Minor Example Assistants E. 1
problems involving forced	√	√	√	√	√	√	√		$\checkmark$	√	√	√		Yes	Minor Exams, Assignments, End
convection heat transfer, natural													Applying		Exams
convection heat transfer, and heat															
To train students to identify,				( I											
formulate, and solve engineering				· ,		,			,				Understanding,		Minor Examp Appignments End
problems involving radiation heat	√	√	√	√	√	√	√		$\checkmark$	√	$\checkmark$	√	Applying	Yes	Minor Exams, Assignments, End
transfer among black surfaces and													Арруну		Exams
among diffuse grav surfaces.			E	5				-							
BTME502-18 : Design of Machin	ie Elei	ment	- 1X	D Lenimen C P 1 Invurthe	of Med	<b>hanical I</b> in Can	Enginee npus	ing					â		
			nd.	121212116	(16.)			-							

Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	РО 6	PO7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Demonstrate recalling and applying knowledge of Basic Sciences, Graphics & Drawing, Basic Manufacturing Processes and Material Science, for design	V	V	V	V	V	$\checkmark$				$\checkmark$	V	V	Understanding, Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO2: Comprehend the effect of different stresses and strains under various loading conditions on the mechanical components and identify the mechanism/mode of	V	V	V	V	V	V				V	$\checkmark$	√	Understanding and Applying	Yes	Minor Exams, Assignments, End Exams
CO3: Examine and solve design problems involving machine elements on the basis of various theories of failure.	V	V	V	√	V	$\checkmark$	-			V	V	V	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO4: Synergize forces, moments and strength information to develop ability to analyze, design and/or select machine elements aiming for safety, reliability, and	V	V	V	V	$\checkmark$	V	V			$\checkmark$	$\checkmark$	V	Understanding, Applying and Designing	Yes	Minor Exams, Assignments, End Exams
Paper BTME 503-18 Manufactur	ing P	roces	ses	W	eD Boatinn K.G. P	) mi of M T.U. i	echanica Jaio Ca	Engine mpus	ecing						
Course Outcome	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Understand the different conventional manufacturing methods employed for making different products.	$\checkmark$	V	V		$\checkmark$	V	$\checkmark$			V	$\checkmark$	V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams
CO 2: Understand the different unconventional manufacturing methods employed for making different products.	$\checkmark$	V	V		V	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams

### Paper BTME 503-18 Management & Engineering Economics

Course Outcome	P0 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	P01 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Meası Attainment of CO
CO1: Explain the development of management and the role it plays at different levels in an organization.	V						V	V	V	V	V	~	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO 2: Comprehend the process and role of effective planning, organizing and staffing for the development of an organization.							V	V	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO 3: Understand the necessity of good leadership, communication and coordination for establishing effective control in an organization.							V	V	V	V	√	V	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO 4: Understand engineering economics demand supply and its importance in economics decision making and problem solving.							V	V		V		V	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO 5: Calculate present worth, annual worth and IRR for different alternatives in economic decision making.	V	V	V	V	V	V	V	V	V	V	V	V	Applying	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
CO 6: Understand the procedure involved in estimation of cost for a simple component, product costing and depreciation, its methods.	V	V	V	V	V	V	V	~	V	V	V	V	Understanding	Yes	Minor Exams, Buisness Quiz Assignments,End Term Exam
Paper BTME 503-18 Heat Transf	fer La	ıb		-	IKS	vinneni ( 3. P.T.) urthala	1. Main	anical Er r Georg	ngine <b>rin</b> Nus	ng			1		

Course Outcome	PO 1	PO 2	РО 3	PO 4	PO 5	-0 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Design and fabricate the experimental setups related to heat transfer phenomena.	V	V	V		√	V	~			V	V	V	Understanding	Yes	Minor Exams, Quiz, Assignments Term Exams
Measure and analyse different heat transfer parameters.	V	V	V		V	V	V			$\checkmark$	$\checkmark$	~	Understanding	Yes	Minor Exams, Quiz, Assignments Term Exams
Paper BTME 506-18 Manufactur	ing P	roces	ses L	abora	itory		1								
Course Outcome	PO 1	PO 2	РО 3	РО 4	РО 5	РО 6	P07	PO8	PO9	PO1 0	P01 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
CO1: Determine/calculate the clay content, moisture content, hardness, permeability and grain fineness number of moulding sand sample.	V	$\checkmark$	V	V	$\checkmark$	V	V			$\checkmark$	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
CO 2: Use oxy-acetylene gas welding, manual arc welding, MIG, TIG and spot-welding processes to make various joints.	V	V	V	V	V	~	V			V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
CO 3: Use machine tools such as lathe, shaper and milling machine for machining/cutting various profiles on work pieces.	$\checkmark$	V	V	V	M.K	) LG-VP.1 purtha	$\cup$	hanical I In Con	ingine <b>d</b> ipus	<b>ing</b> √	$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
CO 4: Learn about the constructional features and working of grinding machines, hydraulic press, draw bench, rolling mills, drawing and extrusion equipment.	V	V	$\checkmark$	V	$\checkmark$	V	V			V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams

#### Paper BTME 507-18 Numerical Methods Lab

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Understand different implementation modes of numerical methods.	V	√	√	√	V	√	√	=		V	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Use the numerical methods with the understanding of limitations of these methods for solving problems.	V	V	V	V	V	V	V			$\checkmark$	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Develop and implement their own computer programs.	V	V	V	V	$\checkmark$	V	$\checkmark$			$\checkmark$	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Solve problems more accurately and efficiently in low computational time.	V	V	$\checkmark$	$\checkmark$	$\checkmark$	V	~			$\checkmark$	$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Handle the problems conveniently which are difficult to deal with manually	$\checkmark$	$\checkmark$	V	$\checkmark$	V	$\checkmark$	$\checkmark$			~	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Paper BTMC102-18 ESSENCE OF	IND	IAN K	NOW	'LEDG	ie TR/	ADITI	ION	3	A STRACT		<b>t of Mec</b> 19. Maria	hanical l dei Can	Engineeting		
Course Outcome	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO

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Understand the Philosophy of Indian Knowledge system and and its Basic Structure.	√	~	~	V	~	<	~			~	$\checkmark$	~	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Understand the Ancient India Culture, Society and Religion.	√	√	$\checkmark$	V	~	~	~			V	$\checkmark$	$\sqrt{2}$	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Examine the areas of Indian Linguistic Tradition.	V	~	$\checkmark$	$\checkmark$	~	~	~			V	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Know the contrubtion of scientists of different eras.	~	√	V	√	$\checkmark$	$\checkmark$	~			~	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, En Exams
Handle the problems conveniently which are difficult to deal with manually	~	~	$\checkmark$	~	$\checkmark$	V	V			V	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, En Exams
Paper BTME 409-18 4 weeks ind	lustri	al tra	ining	1	WE DE X	G. P.1	to <b>i Meck</b>	in Gen		ing ]					
Course Outcome	PO 1	PO 2	РО 3	РО 4	-	PO 6		PO8		DO1	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Capability to acquire and apply fundamental principles of engineering.	~	~	√	V	$\checkmark$	~	~			~	V	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, Er Exams
Become master in one's specialized technology	√	~	V	V	$\checkmark$	~	~			V	$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, E Exams
						<u> </u>	·	<u> </u>	·				1		<u> </u>

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Become updated with all the latest changes in technological world.	V	V	V	V	V	~	V			V	$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
Ability to communicate efficiently.	√	V	V	V	V	V	$\checkmark$			$\checkmark$	$\checkmark$	~	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
Knack to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.	V	V	ta √	V	V	V	~			V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
Ability to identify, formulate and model problems and find engineering solution based on a systems approach.	V	$\checkmark$	$\checkmark$	V	V	V	V			V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
Capability and enthusiasm for self- improvement through continuous professional development and life- long learning	V	$\checkmark$	$\checkmark$	V	$\checkmark$	V	V			V	$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
Awareness of the social, cultural, global and environmental responsibility as an engineer.	V	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V			V	V	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
BTME601-18 REFREGERATION	AND A	AIR CO	ONDI	TION	ING	LIKE	rimani o 3. P.T.L urthala	. spen	nical En Comp	gine <b>stin</b> us	1				<i>x</i>
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Understand the fundamental principles and applications of refrigeration and air conditioning system	V	V	V	V	V		V	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams, Assignments, End T Exams

CO2: The students will be able to obtain cooling capacity and coefficient of performance by conducting test on refrigeration systems	V	$\checkmark$	$\checkmark$	$\checkmark$	V	2	~		~		V	~	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO3: The students will develop ability to calculate the energy requirements of cooling and heat equipment for air conditioning applications.	~		$\checkmark$	$\checkmark$	~	~	$\checkmark$		$\checkmark$	V	V	V	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO4: The students will be able to Explain the properties, applications and enironmental issues of different refrigerants.	V	V		~	~	$\checkmark$		V	~	V		~	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO5: The students can demonstrate an ability to analysis psychrometric processes and cycles of air conditioning systems.	~	~	$\checkmark$	~	$\checkmark$		$\checkmark$		~	V	V	~	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
Paper BTME602-18 Mechanical	Мазс						Ě	S		Hachani	-I Engl	ineering			
				s Met	rolog	y 	1	I.K.G.	PT.U.	Medit) (	Campu	S			
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO		LKG.	<b>e.1.</b> 0. <b>Mal</b> e	Refering &	iempu	PO1 2		Focus on Employabilit y / Entrepreneu rship	Attainment of CO
	РО	РО	РО	РО	PO	PO		I.K.G. Kaput	<b>e.1.</b> 0. <b>Mal</b> e	PO1	PO1	PO1		Employabilit y / Entrepreneu	Assessment Tools to Mease Attainment of CO Lectures, Tutorials, Assignmer
Course Outcome CO1: To provide a knowledge about measurement systems and	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6		I.K.G. Kaput	PO9	PO1 0	PO1 1	PO1 2	Skill	Employabilit y / Entrepreneu rship	Assessment roots to Meas Attainment of CO Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc. Lectures, Tutorials, Assignmen
Course Outcome CO1: To provide a knowledge about measurement systems and their components CO 2: To learn about various sensors and transducers used for measurement of mechanical	<b>PO</b> 1 √	<b>PO</b> 2 √	PO 3	<b>PO</b> 4 √	PO 5 √	<b>PO</b> 6		I.K.G. Kaput	PO9 √	PO1 0 √	<b>PO1</b> 1	PO1 2 √	<b>Skill</b> Knowledge	Employabilit y / Entrepreneu rship Yes	Assessment Tools to Measu Attainment of CO Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc. Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume

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   | Lectures, Tutorials, Assignmen<br>Powerpoint Presentations, Numer<br>etc.   |
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   | √   | Understanding,<br>Applying and<br>Designing   | Yes   
   | Minor Exams, Assignments, End T<br>Exams  |
| V   |   | V  | V   | V  | V  
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   | V   
 V   | V   
   | $\checkmark$  | Understanding,<br>Applying  | Yes   
   | Minor Exams, Assignments, End<br>Exams  |
| V   | V   | $\checkmark$   | $\checkmark$  | $\checkmark$   | V  
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 $\checkmark$  | V   
   | $\checkmark$  | Understanding,<br>Applying  | Yes   
   | Minor Exams, Assignments, End<br>Exams  |
| Paper BTME 604-18 Introduction to Industrial Management |   |  |   |  |  
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| PO<br>1   | PO<br>2   | PO<br>3  | PO<br>4   | PO<br>5  | PO<br>6  
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   | PO1<br>2  | Skill   | Focus on<br>Employabilit<br>y /<br>Entrepreneu  
   | Assessment Tools to Measu<br>Attainment of CO   |
| V   | V   | $\checkmark$   |   | $\checkmark$   | $\checkmark$   
   | V   
   | $\checkmark$  
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 $\checkmark$  | V   
   | V   | Understanding   | Yes   
   | Minor Exams, Buisness Quiz,<br>Assignments,End Term Exam  |
|   | INEE<br>PO<br>1<br>(En<br>gine<br>erin<br>√<br>√<br>√ | INEERING<br>PO PO<br>1 2<br>(En (Pro<br>gine ble<br>erin m<br>√<br>√<br>√<br>√<br>n to Indus<br>PO 1<br>2<br>PO 2<br>PO 2<br>N<br>PO 2<br>PO 2 | PO       PO       PO         1       2       3         (En       (Pro       (De         gine       ble       sign         v       v       v         v       v       v         v       v       v         v       v       v         v       v       v         v       v       v         v       v       v         v       v       v         v       v       v         v       v       sign         v       v       v         v       v       v         v       v       sign         v       v       v         v       v       sign         v       v       v         v       v       sign         sign       sign       s | PO       PO       PO       PO       PO       PO       PO       Image: state of the state of | PO     PO     PO     PO     PO       1     2     3     4     5       (En     (Pro     (De     (Co     (Mo       gine     ble     sign     ndu     der $$ <tr< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></tr<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""><td>PO       PO       <t< td=""></t<></td></t<></td></t<> | PO       PO <t< td=""><td>PO       PO       <t< td=""></t<></td></t<> | PO       PO <t< td=""></t<> |

CO 2: 2.Demonstrate the roles, skills and functions of management.	V	V	V		V	V	V	V	$\checkmark$	V	$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam
CO 3: 3.Understand the concepts related to industrial management.	V	V	V	V		V	V	$\checkmark$	V	V	V	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, Assignments,End Term Exam

#### BTME605-18 REFREGERATION AND AIR CONDITIONING LAB

BTME605-18 REFREGERATION	AIR C	ONDI	TION	INGI	A REAL	IKG. PTU. Main Campus									
Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	<b>PO</b> 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu
CO1: Understand the fundamental principles and applications of refrigeration and air conditioning system	$\checkmark$	$\checkmark$	~	√	√		√	V	V	$\checkmark$	√	√	Understanding	Yes	Minor Exams, Assignments, End T Exams
CO2: The students will be able to obtain cooling capacity and coefficient of performance by conducting test on refrigeration systems	√	V	V	V	V		√		~		V	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO3: The students will develop ability to calculate the energy requirements of cooling and heat equipment for air conditioning applications.	V		$\checkmark$	V	V	.√	$\checkmark$		V	V	V	V	Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
CO4: The students will be able to Explain the properties, applications and enironmental issues of different refrigerants.	V	V	0	V	~	√		V	V	V		~	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO5: The students can demonstrate an ability to analysis psychrometric processes and cycles of air conditioning systems.	V	V	V	V	V		V		$\checkmark$	V	V	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams

## Paper BTME606-18 Mechanical Measurements & Metrology Lab

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Course Outcome	PO 1	PO 2	PO 3	РО 4	РО 5	PO 6	P07	PO8	PO9	PO1 0	P01 1	P01 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Demonstrate the use of instruments for measuring linear (internal and external), angular dimensions and surface roughness.	√	V	V	$\checkmark$	√	$\checkmark$			V	V	V	~	Understanding	Yes	Case Study, Group Discussions,
CO 2: Identify proper measuring instrument and know requirement of calibration, errors in measurement etc.	~	V	V	$\checkmark$	V	V			$\checkmark$	$\checkmark$	V	V	Knowledge	Yes	Case Study, Group Discussions,
CO 3: Apply analytical and experimental methods to make measurements and to find and correct defects in measurement systems.	V	V	$\checkmark$	$\checkmark$	~	*			V	√	V	~	Applying	Yes	Case Study, Group Discussions,
BTME603-18 AUTOMOBILE ENG	TME603-18 AUTOMOBILE ENGINEERING LAB														
Course Outcome	PO 1 (En gine erin		PO 3 (De sign /De	PO 4 (Co ndu ct)	PO 5 (Mo der n	PO 6 (Th e Enai	viro	PO8 (Eth ics)	-	mm	ject		Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Identify the different parts of the automobile.	V		V	V	V	V	$\checkmark$		-1	$\checkmark$	V	~	Understanding, Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
CO 2: Demostrate the working of various parts like engine, transmission, clutch, brakes, steering and the suspension systems.	$\checkmark$		$\checkmark$	V	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	Understanding, Applying	Yes	Minor Exams, Assignments, End T Exams

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CO 3: Explain the need of vehicle safety systems and future developments in the automobile industry.	V	√	√	V	~	5   √	~	V	~	V	~	$\checkmark$	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams
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## BTME-608-18 : Minor Project

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Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment roots to measu
CO1:Identify an open ended problem in area of mechanical engineering which requires further investigation.	V		V		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	√	Understanding	Yes	Reports, Project Presentations and Viva
CO2: Identify the methods and materials required for the project work.	V	V	V	V	$\checkmark$	V	V	V	V	V	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO3: Manage the work with team members.	V		V	V	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V	$\checkmark$	√	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO4: . Formulate and implement innovative ideas for social and environmental benefits.	V	V	V	V	~	V	$\checkmark$	V	V	V	V	~	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO5: Write technical report of the project apart from developing a presentation.	V	V	V	V	• √	V	V	-	V	V	V	V	Applying and Designing	Yes	Reports, Project Presentations and Viva
Paper: Internal Combustion Eng	gines	609-	18					Deperio L.K.C. Kapur	PT	Mechan	ical Eng Dampu	ine <b>ering</b> s			1

Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PG 5	P06	<b>PO7</b>	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measi
CO1:Knowledge about the basics of IC engines	√	√	√	V			V		√	√		√	Understanding	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO2:Ability to evaluate operational characteristics of IC Engines	~	~	~	~		~	V		~	~	√	~	Understanding	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO3:Ability to ascertain the effects of fuel/supply systems on emission from an engine.		~	$\checkmark$	$\checkmark$	~		$\checkmark$				~	~	Understanding	Yes	Minor Exams, Quiz, demonstrat through videos/ lab, End Term E
CO4:Ability to test engine performance		V	V	~	~		~	$\checkmark$		$\checkmark$		√	Applying		
BTME-610-18 Mechatronics Syst	cems		T	HOL Bopatine I.K.G. P Kapurth	nont of M P.T.U.	Mechanica Maio Ga	<b>al Engi</b> n Smpus	eeting		1	I	L		]	
Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	РО 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Design mux, demux, flip- flops, and shift registers.		$\checkmark$	√	√	V		~	$\checkmark$	√	$\checkmark$	$\checkmark$		Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO2:Describe the block diagram, registers, ALU, bus systems, timing & control signals, instruction cycles, and interrupts of 8085 microprocessors.	$\checkmark$	~			$\checkmark$		$\checkmark$	~	~	~	√ .	√	Applying and Designing	Yes	Minor Exams, Assignments, End Exams

CO3: Apply the concept of 8085	1	1		r	1	1	· · · ·								
microprocessor instruction sets and addressing modes in writing assembly language program for a given problem.	~	√	V		~	√	√	√	V	√	$\checkmark$		Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
CO4: Describe the interfacing of memory, 8255 PPI, ADC, DAC, 7- segment LED system, stepper motor, 8251 and 8253 ICs with 8085 microprocessor	V		√	V	V		V			V		√	Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
BTME-611-18 Microprocessor in	auto	matio	on	-		CTRIX.	G. P. T	nt of Me T.U. Ma Na	<mark>chanical</mark> edu Ger	Engined mpus	ning				
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
Student is able to describe the architecture and different modes of operations of a typical microprocessor.		V	$\checkmark$	√	~		~	V	V	V	V		Applying and Designing	Yes	Minor Exams, Assignments, End 1 Exams
Student is able to understand different addressing modes and instructions of 8086 design and develop assembly language programs using software interrupts.	√.	$\checkmark$			V		$\checkmark$	V	~	V	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, End 1 Exams
Student is able to interface memory, I/O devises and interrupt controller with 8086 microprocessors.	V	V	V		$\checkmark$	V	$\checkmark$	√	V	$\checkmark$	V		Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
Student is able to describe the internal architecture and different modes of operations of a typical microcontroller	V		$\checkmark$	√.	$\checkmark$		$\checkmark$			√		$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
Student is able to design and develop assembly language programs using 8051 microcontroller	V		V	V	V		$\checkmark$			$\checkmark$		√	Applying and Designing	Yes	Minor Exams, Assignments, End T Exams

CS 305.6 Student is able to analyze and compare the features of microprocessors and microcontrollers.	~		V	V	V		V			$\checkmark$		V	Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
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## BTME612-18 COMPOSITE MATERIALS

√ √ √	√ √	√	<ul> <li>✓</li> <li>✓</li> </ul>	Understanding, Applying and Designing Understanding, Applying	Yes	Minor Exams, Assignments, End Exams Minor Exams, Assignments, End Exams
	V	√	~		Yes	
-/						
V		√	V	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams
<mark>hanical l</mark> Jo Co <b>n</b>	Engine mpus	eting				
10	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Meas Attainment of CO
	$\checkmark$	$\checkmark$	-	Applying and Designing	Yes	Minor Exams, Assignments, Enc Exams
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	V		~	V	5	V	V	V		V	V	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
V		V	$\checkmark$	V		~	V	V	$\checkmark$	V		Applying and Designing	Yes	Minor Exams, Assignments, End Exams
V	V	V		V	V	V		V	V		V	Applying and Designing	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
sign 8	k Dev	elopn	nent			1	Separate I.K.G.	P.T.U.	Wechani talaidi (	<b>cal Eng</b> Dempu	ne <b>ering</b> S			
PO 1	РО 2	PO 3	PO 4	PO 5	<b>PO</b> 6	P07		(* ) *)	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu	Assessment Tools to Measu Attainment of CO
V	V	V	V	$\checkmark$	$\checkmark$	V	V	V	V	V	V	Understanding	Yes	Minor Exams, Quiz, Assignments, Term Exams
$\checkmark$	V	V	V	V	V	V	V	V	V	√	√	Applying	Yes	Minor Exams, Quiz, Assignments, Term Exams
		н												Minor Exams, Quiz, Assignments,
V	V	V	√	V	√	√	√	V	V	V	V	Applying	Yes	Term Exams
	v v v v	√       √       √       √       √       ×       PO       1       2       √       √	$\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ sign & Developm       PO     PO       1     2 $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$	$\checkmark$ sign & DevelopmentPOPOPO12PO4 $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$	$\checkmark$ sign & Development $\checkmark$ $\checkmark$ $\checkmark$ POPO2POPO123 $4$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$	$\checkmark$ PO 1 2 PO 2 PO 4 PO 6 $\checkmark$	$\checkmark$ sign & DevelopmentPO 1PO 2PO 3PO 4PO 5PO 6 $\checkmark$	$\checkmark$ sign & Development $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ POPOPOPOPOPOPOPO123456PO7PO8 $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		VVVVVVVPolyingTes $\vee$ Applying and DesigningYes $\vee$ Applying and DesigningYes $\vee$ Applying and DesigningYessign & Development $\vee$ Applying and DesigningYesPO 1PO 2PO 3PO 4PO 5PO 6PO7 6PO8 7PO9 9PO1 1PO1 1PO1 2SkillFocus on Employability $\vee$ $\vee$

# BTME 615-18 : Non Conventional Energy Resources

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Course Outcome	PO 1	P0 2	PO3	РО 4	PO 5	PO 6	P07	РО 8	РО 9	PO 10	<b>PO</b> 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Attainment of CO
CO1: To Explain renewable energy sources & systems.	$\checkmark$	V				√			-	*		√	Understanding	Yes	Minor Exams, Buisness Quiz, End Exams
CO2: To Apply engineering techniques to build solar, wind, tidal, geothermal, biofuel, fuel cell, Hydrogen and sterling engine	$\checkmark$	V	V		V		Designing	Yes	Minor Exams, Buisness Quiz, End						
CO3: To Analyze and evaluate the implication of renewable energy. Concepts in solving numerical problems pertaining to solar radiation geometry and wind	$\checkmark$	$\checkmark$	V	V	~	V	~				$\checkmark$		Applying	Yes	Minor Exams, Buisness Quiz, End Exams
CO4: To Demonstrate self -learning capability to design & establish renewable energy systems.	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	Applying	Yes	Minor Exams, Buisness Quiz, End Exams
CO5: To Conduct experiments to assess the performance of solar PV, solar thermal and biodiesel systems	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	V	$\checkmark$		$\checkmark$	V	Applying	Yes	Minor Exams, Buisness Quiz, End <sup>-</sup> Exams
BTME616-18 : OPERATION RESE	ARCI	1			1	IKC	> ment of l P.T.1	Mechan	ical Eng	ine <b>ering</b> IS	and the second				
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO

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CO1: Explain various mathematical deterministic operation research models.	V	~	V	V	V			V	V	V	√	V	Understanding, Applying	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO2: Describe the problems of probabilistic and simulation models.	V	~	V	V	$\checkmark$			V	V	V	V	V	Understanding, Applying	Yes	Minor Exams, Class and Hom Assignments, End Term Exam
CO3: Demonstrate the queuing, inventory and replacement models etc.	V	V	V	V	~		÷:	V	V	V	V	V	Applying and Designing	Yes	Minor Exams, Class and Home Assignments, End Term Exam
CO4: Formulate and analyze the network models.	V	√	V	V	$\checkmark$			√	V	V	V	V	Applying and Designing	Yes	Minor Exams, Class and Home Assignments, End Term Exam
BTME617-18: MAINTENANCE &	RELI	ABIL	ITY		A STATE	LG. P.	) ni of Mex 1.U. Mi ala	hanical do Gan	Enginee npus	ting					
Course Outcome	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	P07	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: Understand the concepts of reliability and maintainability	V	√	V	V	$\checkmark$	V	√	$\checkmark$	V	V	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams, Assignments, End T Exams
CO2: The students will be able to use statistical tools to characterise the reliability of an item and determine the reliability of a system, and will also understand	V	√	$\checkmark$	V	$\checkmark$	V	V	V	V	V	√.	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
CO3: The students will develop ability in formulating suitable maintenance strategies to enhance system reliability of a manufacturing system	V	V	$\checkmark$	V	$\checkmark$	V	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	√	Applying and Designing	Yes	Minor Exams, Assignments, End T Exams
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### Paper BTME701-18 Mechanical Vibrations

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   | PO1<br>1  | PO1<br>2  
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  | Understanding  | Yes   | Lectures, Tutorials, Assignmen<br>Powerpoint Presentations, Nume<br>etc.  
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  |  | V  | V  
   
   | $\checkmark$  | $\checkmark$  
  | Understanding  | Yes   | Lectures, Tutorials, Assignmen<br>Powerpoint Presentations, Numer<br>etc.   
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   | $\checkmark$  | √<br>√  
  | Applying   | Yes   | Lectures, Tutorials, Assignmen<br>Powerpoint Presentations, Numer<br>etc.   
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   | $\checkmark$  | $\checkmark$  
  | Applying   | Yes   | Lectures, Tutorials, Assignment<br>Powerpoint Presentations, Numer<br>etc.  
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Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	-00 6	P07	PO8	PO9	PO1 0	PO1 1	PO1 2	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
Illustrate the basic concepts of automation in machine tools.															
Analyze various automated flow lines, Explain assembly systems and line balancing methods.	V	V	V	~	V	V	$\checkmark$		$\checkmark$	V	$\checkmark$	V	Applying	Yes	Lectures, Tutorials, Assignmer Powerpoint Presentations, Nume etc.
Describe the importance of automated material handling and storage systems.	V	V	V	V	$\checkmark$	V	V		$\checkmark$	$\checkmark$	$\checkmark$	V	Understanding	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc.
Interpret the importance of adaptive control systems, automated inspection systems.	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	V	~		V	$\checkmark$	V	V	Applying	Yes	Lectures, Tutorials, Assignmen Powerpoint Presentations, Nume etc.
BTME703-18 Fundamentals of M	lanag	emer	nt for	Engir	neers	IKC	riment of 5. P.T.U urtinale	Mechal Mechal	n <mark>ical Eng</mark> Compl	jine <b>etin</b> IS					۰ _
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P07	PO 8	<b>PO</b> 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu Attainment of CO
CO1: The students understand the significance of Management in their Profession	$\checkmark$					V		$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams, Assignments, End Exams
CO2: The various Management Functions like Planning, Organizing, Staffing, Leading, aspects are learnt in this course	$\checkmark$			V	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	Understanding, Applying	Yes	Minor Exams, Assignments, End Exams

CO3: Understand the complexities	1	1	T	T	T	1			<del></del>	<b>—</b>	<del></del>				
associated with management in the organizations and integrate the learning in handling these complexities.	√	√	√	√	V	V		V	V	V	V	V	Understanding, Applying	Y Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
CO4: Demonstrate the roles, skills and functions of management.	√			V	V	V		√	V	~	~	V	Applying	Yes	Minor Exams, Assignments, End <sup>-</sup> Exams
BTME-704-18 : Project-II						LKS BES	G. P.T.U.	Mechar L. Markat	<b>nical En</b> Camp	<b>gineeritar</b> ius		I		. 51	
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	<u> </u>		DO	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment Tools to Measu
CO1: To create an Industrial environment and culture within the institution.	~		√		V	$\checkmark$	√	V	V	√	~	$\checkmark$	Understanding	Yes	Reports, Project Presentations and Viva
CO2: To set up production lab utilizing the infrastructure of the institution.	√	V	$\checkmark$		$\checkmark$	~	$\checkmark$	V	V	$\checkmark$	V	~	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO3: To standardize laboratories to industrial standard, thereby giving exposure to industrial housekeeping standards.	$\checkmark$	$\checkmark$	$\checkmark$		~	~	V	$\checkmark$	$\checkmark$	~	~	~	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO4: Demonstrate an ability to present and defend their research work to a panel of experts.	$\checkmark$		$\checkmark$	$\checkmark$	~	V	~	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	~	Applying and Designing	Yes	Reports, Project Presentations and Viva
CO5: Demonstrate knowledge of contemporary issues in their chosen field of research.	$\checkmark$	$\checkmark$	$\checkmark$	<b>√</b>	~	√	$\checkmark$		~	~	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Reports, Project Presentations and Viva
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# BTME-801 Software/Industrial Training

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Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	РО 5	PO 6	P07	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employabilit y / Entrepreneu rship	Assessment 100Is to Measu
Capability to acquire and apply fundamental principles of engineering.	√ -		~		V	~	~	V	V	$\checkmark$	$\checkmark$	V	Understanding	Yes	Reports, Project Presentations and Viva
Become master in one's specialized technology	V	V	V		V	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	Applying and Designing	Yes	Reports, Project Presentations and Viva
Become updated with all the latest changes in technological world.	$\checkmark$	V	V		V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	Applying and Designing	Yes	Reports, Project Presentations and Viva
Ability to communicate efficiently.	V		$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\sim$	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Reports, Project Presentations and Viva
Knack to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.	$\checkmark$	$\checkmark$	$\checkmark$	√	V	$\checkmark$	V		$\checkmark$	$\checkmark$	V	~	Applying and Designing	Yes	Reports, Project Presentations and Viva
Ability to identify, formulate and model problems and find engineering solution based on a systems approach.	$\checkmark$	V	V	C AN	P.T.	of Mech	aničal Er i Comp	<b>iqineeri</b> lus		$\checkmark$	V	√	Applying and Designing	Yes	Reports, Project Presentations and Viva
Capability and enthusiasm for self- improvement through continuous professional development and life- long learning	$\checkmark$	V	V	V	V	V	$\checkmark$		~	V	√	$\checkmark$	Applying and Designing	Yes	Reports, Project Presentations and Viva

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Awareness of the social, cultural, global and environmental responsibility as an engineer	V	V	V	$\checkmark$	~	√	V	~	~	√	~	Applying and Designing	Yes	Reports, Project Presentations an Viva



Paper: Advanced Engineering Materials METHE	of D	)ep	art	me	nt:	Me	ech	ani	ical	De	nz	tm	ent		
raper: Advanced Engineering Materials MIME-101-18	-								Cul		P		ent		
Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	PO 7	P0 8	9 PO			PO 12		Focus on Employability / Entrepreneurs hip	Assessment To Measure Attair of CO
CO1: Identify and describe different types of material processing techniques for advanced materials		V	√	V		V	V		V	V	V		Understanding	Yes	Minor Exams, demonstrations t videos/ lab, Enc
CO2: Ability to select suitable material for specific applications	V	V	V	√		V		V	V	V		V	Understanding	Yes	Exams Minor Exams, ( demonstrations th videos/ lab, End
Finite Element Method												-			Exams
Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8			PO 11	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
CO1: Explain the principles of vibrations;	V			V		V	V	-		V	V	V	Understanding	Yes	Minor Exams, Bui Quiz, End Term E
CO2: Define and describe the concepts of vibration modes and natural frequencies and their measurement and estimation for multi-degree-of-freedom systems:	V	V		$\checkmark$		V			1			V	Understanding	Yes	Minor Exams, Bui Quiz, End Term E
CO3: Explain System Modelling via use of Energy Analysis and its application to complex vibrating systems;	V	V	V	$\bigvee$	$\bigvee$	V	$\checkmark$				V		Applying	Yes	Minor Exams, Bui Quiz, End Term E
CO4: solve linear 2D structural beams and frames problems; 1Dheat conduction and convection heat transfer problems.	V	V		$\checkmark$		V							Applying	Yes	Minor Exams, Bui Quiz, End Term E
CO5:Recognise the use of different numerical techniques and its application to vibration design;	V	V	$\checkmark$	V	V	$\checkmark$			V		$\checkmark$	$\checkmark$	Designing	Yes	Minor Exams, Bui Quiz, End Term E
MTME-103 :Advanced Design of Mechanical Systems															
Course Outcome	PO 1	2	3	4	5	PO 6	PO 7	PO 8			PO 11		Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
CO1: Learn integrating CAE, CAD, CAM tools.	V	V	V	V	V	V				$\checkmark$	V	V	Understanding	Yes	Minor Exams Assignments, End Exams

CO2: Learn about proper material selection and know about		$ $ $\vee$		$\vee$	$ $ $\vee$						$\checkmark$	V	Understanding	Yes	Minor Exams
influence of materials on form design of welded members,	÷2. –	1.1									10	2.	and Designing		Assignments, End
forgings and castings.								I							Exams
CO3: Understand general design principles for manufacturability.	$\checkmark$	√	√	$\checkmark$							$\checkmark$	V	Understanding	Yes	Minor Exams
							1	-			, ®	<i>.</i>	and Designing		Assignments, End
	_														
CO4: Design to minimize material usage, design for recyclability	$\vee$	V		$\vee$	$\vee$						$\checkmark$	V	Understanding	Yes	Exams Minor Exams
& energy efficiency and design to regulations and standards.					× .	1.00					1.000		and Designing	103	
															Assignments, End
MTME-104 : Operations Management										-		-			Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment Too
	1	2	3	4	5	6	7	8	9	10			U.M.	Employability /	
	-			1		1	11	<sup>-</sup>	-						Measure Attain
						1								Entrepreneurs	of CO
														hip	
CO1: Understand the concepts of operations management and			$\checkmark$	√			1	V	$\checkmark$	V	.√		Understanding	Yes	Minton Frances
various types of manufacturing systems & plant layouts with			<u> </u>					1			v	V I	,	Tes	Minor Exams
their characteristics, merits and demerits											1		and Applying		Assignments, End
CO2: Learn about different types of planning and concepts of			V	$\checkmark$	$\checkmark$	-	-			√		1	Understanding	Vaa	Exams
MACRO & MICRO process design.	1.2	1	'		×				V V	V I	v	√		Yes	Minor Exams,
													and Applying		Assignments, End
CO3: Know about the concepts of demand forecasting, various	V	V	V		$\vee$		-				1		l la danata a din a		Exams
demand patterns and qualitative and quantitative techniques of	ľ	ľ	ľ	v	V.			V	V	V	$\checkmark$	√	Understanding	Yes	Minor Exams,
demand forecasting			1.5										and Applying		Assignments, End
CO4: Understand the concept of aggregate production planning,			$\checkmark$				-		$\checkmark$		1				Exams
different scheduling criteria and mutli-stage manufacturing	V.	ľ	V	v	V			V	V	$\checkmark$	$\checkmark$	$\vee$	Understanding	Yes	Minor Exams,
systems.												P .	and Applying		Assignments, End
CO5: Learn about various types of material flow and concepts of	V		$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$			1				Exams
MRP, MRP-II, JIT and ERP along with their characteristics.	V	v	v	v	V			V	$\checkmark$	$ $ $\vee$	$\checkmark$	$ $ $\vee$	Understanding	Yes	Minor Exams,
, appendix and along when their characteristics.													and Applying	2	Assignments, End
MTME-105 ADVANCED THERMODYNAMICS		I						N							Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	DO	DO	DO	01.11	_	(
	1	2	3	4	5	6							Skill	Focus on	Assessment Too
Department of Mechanical Engineeting	] <b>-</b> ∘	<b>Z</b>	3	4	Э	0	7	8	9	10	11	12		Employability /	Measure Attainr
I.K.G. P.T.U. 11 Compus					, i	1								Entrepreneurs	of CO
Kapurthala											1			hip	
CO1: Describe the various laws of thermodynamics and their	V	$\checkmark$	$\checkmark$	1	-1	1	./		-1	- /			I for the state		
applications.		v	v	V	V	√	$\vee$		$\checkmark$	$\vee$	$\checkmark$	V	Understanding,	Yes	Minor Exams,
									1				Applying and		Assignments, End
CO 2: Explain the concepts of availability and irreversibility with		V	$\checkmark$		1	1	1	-1	_/	1	1		Desianina		Exams
respect to reacting and nonreacting systems.	V	v	V	V	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	Understanding,	Yes	Minor Exams,
, second g and non cacing systems,													Applying		Assignments, End
CO 3: Describe methods in using equations of potentials,		$\checkmark$	$\checkmark$	1	-1	-/		1			,	- /			Exams
availability, and exergy for thermodynamic analysis.	V	V	V	$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	Understanding,	Yes	Minor Exams,
				- 3									Applying		Assignments, End
	<u> </u>							()				-			Exams

CO 4: Analyse the direct energy conversion methods and their applications.	<b>∱</b> *.	V			V	V	$ $ $\vee$	V	V	V	′   √		7	/ Understanding, Applying	), Yes	Minor Exam Assignments, En
MTME 201 RESEARCH METHODOLOGY	_						<u> </u>		<u> </u>		4	<u> </u>				Exams
Course Outcome	PO	D PO	D PO	D PO	0 P(	Jo.	PO	PO	PO	PO	PC	) PO		0 Skill	T Facult an	
	1					5	6		8			0 11			Focus on Employability / Entrepreneurs hip	
CO1: Formulate a research problem	V	V	V	∕ √	V	√	$\checkmark$	$\checkmark$	V	V		V	⁄ √	Applying and	, Yes	Minor Exams Assignments, End
CO 2: Explain the different experimental designs and their analysis.	1	V	V	′ <b>√</b>	ν	V	V	<b>v</b>	<b>√</b>	V	√		√ √	Designing / Understanding, Applying	, Yes	Exams Minor Exams Assignments, End
CO 3: Apply different statistical tools for the research analysis	√	V	V	V	v	√	V	√	V	V	√	V	′ √	/ Understanding, Applying	, Yes	Exams Minor Exams Assignments, End
CO 4: Apply the research ethics	V		V	V	V	V	V	V	V	$\checkmark$	√	1	′ √	Understanding, Applying	, Yes	Exams Minor Exams Assignments, End
MTME-202 Tribology		1	1		_	-	-	<u> </u>	<u> </u>	<u> </u>	<u> </u>	1			1′	Exams
Course Outcome LK.G. P.T.U. Mein Compus Kapurthala	PO 1						PO 6	PO 7	PO 8			) PO ) 11			Focus on Employability / Entrepreneurs hip	
CO1: The student will be able to study research papers for understanding of a new field and summarise them.	√	$\checkmark$	√		V	个	-+	V	$\checkmark$	V	√		V	Understand	Yes	Final Viva
CO2: Ability to identify promising new directions of various cutting edge technologies.	$\Box$	V				V		V	$\checkmark$	V		$\checkmark$	<i>′</i> √	Applying and Designing	Yes	Final Viva
CO3:The student will be able to effectively communicate by making an oral presentation. MTME-203: Modern Manufacturing Processes	V		$\checkmark$	$\checkmark$	/ √		$\checkmark$	V	$\checkmark$		V	$\checkmark$		Applying and Designing	Yes	Final Viva
Course Outcome	PO	100	IDC	The	-1-	ता		1-0	1.70	1-0	1-0	1-0				
*	1	2		4				PO 7			9 PO 10				Focus on Employability / Entrepreneurs hip	Assessment To Measure Attain of CO
CO1: Understand the importance and applications of advanced manufacturing processes	$\checkmark$	$\checkmark$	$\checkmark$					V		V	V	V	V	Understanding		Minor Exam Assignments, End
CO 2: Understand the working principle and theory of material	17	<b></b>	-			T	$\rightarrow$	-	-	$ \square$	-		-	Understanding	Yes	Exams Minor Exam

machining processes	$\vee$	$\checkmark$	$\checkmark$				$\checkmark$		V	′ √	V	$\nabla$	Understanding	Yes	Minor Exar Assignments, Er
CO 3: Determine the material removal rate and surface finish	-			-		+	+				-				Exams
achieved by various advanced						1									
machining processes	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	-	1	+		/ V	$\downarrow$	√ √	Analysing	Yes	Minon Evo
	1		7						1	1			Analysing	165	Minor Exar
			1'												Assignments, Er
CO 4: Understand the different techniques to form the miniature	$\checkmark$	$ $ $\vee$	$\vee$	$\checkmark$			$\checkmark$		$\checkmark$	√ √	$\vee$	′ √	Understanding	Yes	Exams Minor Exar
product from metal powder			1 '										0.140.111.0	1.00	Assignments, Er
CO 5: Loorn shout Additive manufacturing such as 3 D minut		<u> </u> '	4'												Exams
CO 5: Learn about Additive manufacturing such as 3-D printing	$\vee$	√	$\checkmark$	$\checkmark$			$\checkmark$	T	$\checkmark$	<b>√</b>	$\checkmark$	$\vee$	Understanding	Yes	Minor Exams
,		/	1 '										_		Assignments, Er
Paper MTME204 Computational Fluid Dynamics		<u> </u>	1'	<u> </u>						1			_		Exams
Course Outcome	00	100	100	100	120	120	120	1.7.6	1.0.0	1.1.0		_		101	- And Aberry Children
	PO									) PO				Focus on	Assessment T
	1	2	3	4	5	6	7	8	9	10	11	12	4	Employability /	/ Measure Attai
		1 /	1 '											Entrepreneurs	
	( )	1 /	1 '	1			1	4				4		hip	
CO1: Provide the student with a significant level of experience in	$\square$			<u> </u>	+'	-		-							
the use of modern CFD software for the analysis of complex fluid-	1 /	1 2	( )	1											
ITIOW Systems	(	( )	( )	1′											
CO 2: Improve the student's understanding of the basic	$\checkmark$	$\checkmark$	$\checkmark$	$\overline{\mathbf{v}}$	$\overline{\mathbf{v}}$						1	-1			
principles of fluid mechanics.	( ' '	[ ]	( ' '	[ ] /	v	1 1	V		V	V	√	$\vee$	Understanding	Yes	Lectures, Tut
	[ ]	( )	1 2	1 /	1	1 /									Assignmer
	[ ]	( )	1 1	1 ?	/	1 /			1						Powerpoi
		$\square$	1/	1?	/	( )'									Presentatio
CO 3: Improve the student's research and communication skills	$\checkmark$	$\checkmark$	$\overline{\mathbf{v}}$	$\checkmark$	$\checkmark$			-				$\vee$	Applying		
using a self-directed, detailed study of a complex fluid-flow	[ ]	( )	( )	( )		(	1.20		× '		Y	v	Abbining	Yes	Lectures, Tu
problem and to communicate the results in written form.	1 1	( )	1 1	1 /	1	1 /				1			1		Assignme
	( )	( )	1 1	1 /	/	1 /		ľ	1	/			1		Powerpoi
	$\square'$			1'	1	('			1	/			1		Presentati
MTME –205: Advanced Welding Technology										1			1	1	Numericals
Course Outcome	PO	PO	PO	PO'	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment 7
	1	2	3	4	5	6	7						1	Employability /	
	( )	( )		( )'	1	1 7	1 /	1 /	[ '		'	'	1 /	Entrepreneurs	
	1	( )		1 7	1	( )	1 /	$'$	1 '	1	1 /	[ ]	1 '	hip	of CO
CO1: Loorn shout the classification of various welding as		<u> </u>	$\square$	<u> </u>	<u> </u> '	<u> </u>	1'	$\square'$	$\square'$	1'	<u> </u>	1′	1′	in P	1
CO1: Learn about the classification of various welding processes, welding defects and their	$\checkmark$	$ $ $\vee$	$\checkmark$	$\vee$	$ $ $\vee$	$\checkmark$	$ $ $\vee$	$\square$	$\checkmark$	$\vee$	$\vee$	$\checkmark$	Understanding	Yes	Lectures, Tu
weiding defects and their	, )		1	( )	1. 7	1	[ ]	( )	/ /	[ ]	/ /	[ ]	- ,		Assignme
			( )	( )	( )	( )	1 '	( )'	1 '	1	( )'	1 /	1 /	1	Powerpo
1 Ste		( )	6 1	( )	( )	1 7	1 2	14	[]	( )	( )'	(  )	1	1	Presentati
Department of Mechanical Engineering				<u> </u>			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	1'	l!		Numericals
NULL 200 Caterine										1					
Kapunha															

CO 2: Understand the terms woldshills and a line	1.7	1 1	1 /	T	1	-									
CO 2: Understand the terms weldability, soldering, brazing, welding symbols and safety and	1	$\vee$	√	√		$\vee$	$ $ $\vee$		$\checkmark$	$\vee$	V		Understanding	Yes	Lectures, Tutori
											16	2			Assignments
															Powerpoint
							e -								Presentations
CO 3: Understand the concept of various terms of welding arc		$\downarrow$	V	V	-/	1			-						Numericals et
such as arc efficiency, arc forces,	V	l v	l v	V V	√	$\checkmark$	√		$ $ $\vee$	√	$\vee$	$ $ $\vee$	Understanding	Yes	Lectures, Tutori
					Y										Assignments,
															Powerpoint
															Presentations
CO 4: Learn about the various types of welding electrodes,	V	V	$\vee$			$\checkmark$						V	Understanding	Var	Numericals etc
welding fluxes, shielding gases, AC and			1.02				*		ľ	ľ	v	ľ		Yes	Lectures, Tutoria
			1												Assignments,
															Powerpoint
CO Fe leave also have a second															Presentations
CO 5: Learn about various advanced welding processes along	$ $ $\vee$	$\vee$	$ $ $\vee$	$\vee$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	V	Understanding	Yes	Numericals etc Lectures, Tutoria
with their advantages, limitations and														105	Assignments,
															Powerpoint
														· · · ·	Presentations
Advanced Material Characterization MTME-207-18		L													Numericals etc
Course Outcome	Ino											r			
	PO				PO						PO		Skill	Focus on	Assessment Too
Percentinent of Machanical Environment	1	2	3	4	5	6	7	8	9	10	11	12		Employability /	Measure Attainn
															I Picasule Allanin
LKG PTH Main Compute														Entrepreneurs	of CO
LK.G. P.T.U. Main Compus															
CO:1 apply appropriate characterization techniques for		V	V	V	V		7	7	7/	2/			Lindovetan din a	Entrepreneurs hip	of CO
CO:1 apply appropriate characterization techniques for	V	V	V	V	V		√	√	V	<b>√</b>	$\checkmark$		Understanding	Entrepreneurs hip Yes	of CO Minor Exams, Qi
CO:1 apply appropriate characterization techniques for	√	V	V	V	√		~	~	√	~	~		Understanding	Entrepreneurs hip Yes	of CO Minor Exams, Qi demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various	V	V	V	$\checkmark$	√		V	~	√	~	$\checkmark$		Understanding	Entrepreneurs hip Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials			50	V	V		V	√	$\checkmark$	V	V		Understanding	Entrepreneurs hip Yes	of CO Minor Exams, Qi demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to	√ √	√ √	V	V	√ √	√	V	V	V	√ √	√ √			Entrepreneurs hip Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure			50			✓		<b>√</b>				√	Understanding Understanding	Entrepreneurs hip Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to			50			V		~				√		Entrepreneurs hip Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution	V	V	V	V	$\checkmark$	V		~				√		Entrepreneurs hip Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its			V			√		√				<ul> <li>✓</li> <li>✓</li> </ul>	Understanding	Entrepreneurs hip Yes Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution	V	V	V	V	$\checkmark$	~	V	~	V	V	V			Entrepreneurs hip Yes Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1 <u>Exams</u> Minor Exams, Qi
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its	V	V	V	V	$\checkmark$	~	V	~	V	V	V		Understanding	Entrepreneurs hip Yes Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its crystallite size and stress	√ √	√	√ √	$\checkmark$	<ul> <li>✓</li> <li>✓</li> </ul>		√ √	√	√ √	√	<ul> <li>✓</li> </ul>		Understanding	Entrepreneurs hip Yes Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its crystallite size and stress CO:4 apply thermal analysis techniques to determine thermal	V	V	V	V	$\checkmark$	<ul> <li>✓</li> </ul>	V	√ 	V	V	V		Understanding	Entrepreneurs hip Yes Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its crystallite size and stress	√ √	√	√ √	$\checkmark$	<ul> <li>✓</li> <li>✓</li> </ul>		√ √	~	√ √	√	<ul> <li>✓</li> </ul>		Understanding	Entrepreneurs hip Yes Yes Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its crystallite size and stress CO:4 apply thermal analysis techniques to determine thermal stability of and thermodynamic transitions of the specimen	√ √	√	√ √	$\checkmark$	<ul> <li>✓</li> <li>✓</li> </ul>		√ √	√	√ √	√	<ul> <li>✓</li> </ul>		Understanding	Entrepreneurs hip Yes Yes Yes	of CO Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qi demonstrations thr
CO:1 apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials CO:2 choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution CO:3 determine crystal structure of specimen and estimate its crystallite size and stress CO:4 apply thermal analysis techniques to determine thermal	√ √	√	√ √	$\checkmark$	<ul> <li>✓</li> <li>✓</li> </ul>		√ √	√	√ √	√	<ul> <li>✓</li> </ul>		Understanding	Entrepreneurs hip Yes Yes Yes	of CO Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu demonstrations thr videos/ lab, End 1 Exams Minor Exams, Qu

PO  1	PO 2	PO 3	РО 4	PO 5	PO 6	РО 7	PO 8	РО 9			PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment To Measure Attain of CO
V	V		V	V		V	V	V	V	V		Understanding	Yes	Minor Exams, C demonstrations th videos/ lab, End Exams
				V	V	V		V	V	√		Understanding	Yes	Minor Exams, C demonstrations th videos/ lab, End
V	V		V	~		V	V	V	V	V	V	Understanding	Yes	Exams Minor Exams, Q demonstrations th videos/ lab, End
V	V	V	V	V	$\checkmark$	V		V	V			Understanding	Yes	Exams Minor Exams, Q demonstrations th videos/ lab, End Exams
1	2	РО 3	РО 4	PO 5	PO 6	РО 7	РО 8	РО 9				Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
V	V	$\checkmark$			$\checkmark$	V		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams Assignments, End
V	V	V			V	V		$\checkmark$	V	$\checkmark$	$\checkmark$	Understanding	Yes	Exams Minor Exams, Assignments, End
V	V	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$	~	V	Understanding and Analysing	Yes	Exams Minor Exams, Assignments, End
									$\checkmark$	$\checkmark$		Understanding	Yes	Exams Minor Examp
			•					v	v	Č.	Ì	and Analysing	165	Minor Exams, Assignments, End Exams
	1   √   √   √   √   √   √	1       2         √       √         √       √         √       √         PO       PO         1       2         √       √         √       √         √       √         √       √         √       √         √       √         √       √         √       √         √       √         √       √         √       √	123 $\checkmark$	1       2       3       4 $$ <	1       2       3       4       5 $$	1       2       3       4       5       6 $\vee$	1       2       3       4       5       6       7 $\vee$ $PO$ PO       PO	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	123456789 $\vee$	1       2       3       4       5       6       7       8       9       10 $\vee$	1       2       3       4       5       6       7       8       9       10       1. $\vee$	1       2       3       4       5       6       7       8       9       10       1.       12 $\vee$	123456789101.12 $\overrightarrow{V}$ <	123456789101.12SkillFocus on Employability / Entrepreneurs hip $\checkmark$

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Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	РО 6	РО 7	PO 8	РО 9	PO 10	11.	PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment To Measure Attain of CO
CO1: Analyze and access the use of casting processes in manufacturing .	V	V	$\checkmark$	$\checkmark$	V	V	V			V	V	$\checkmark$	Understanding	Yes	Minor Exams, Q Assignments, End
CO 2: Understand the working of various casting processes.	V	V	V	V	$\checkmark$	V	V			$\checkmark$	√	V	Understanding	Yes	Exams Minor Exams, Q Assignments, End
CO 3: To inculcate the principle, thermal and metallurgical aspects during solidification of metals & alloys.	V	V	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$			V	V	$\checkmark$	Applying	Yes	Exams Minor Exams, Q Assignments, End
CO 4: To impart knowledge about the principles/methods of casting with detailed design of gating/riser system needed for casting.	V	V	V	$\checkmark$	$\checkmark$	V	$\checkmark$			√	√	V	Applying	Yes	Exams Minor Exams, Q Assignments, End
CO 5: To impart knowledge about defects in casting objects and requirements for achieving sound casting.	V	√	$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$			V	V	$\checkmark$	Applying	Yes	Exams Minor Exams, Q Assignments, End
MTME-211 :Maintenance and Reliability Engineering Course Outcome															Exams
Course Outcome	PO 1	PO 2	РО 3	РО 4	PO 5	PO 6	РО 7	PO 8	PO 9		PO 11		Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
CO1: Understand the concepts of Maintenance, Reliability and Availability.	V	$\checkmark$	$\checkmark$	V	$\checkmark$	V	1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	Understanding	Yes	Minor Exams Assignments, End
CO2: Establish maintenance strategies according to system characteristics and design transition	V	$\checkmark$	V	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Exams Minor Exams Assignments, End
programs to implement these study size				1	1	1	1					$\checkmark$	Applying and	Yes	Exams Minor Exams
	V	v	v	V	$\checkmark$	V	V	×		Ĭ			Designing	163	Assignments, End
CO3: Develop fault trees for a system and apply various reliability models on fault analysis.	V	V	V	v √	√ √	v √	V	v √	V		$\checkmark$	V		Yes	Assignments, End Exams Minor Exams Assignments, End
CO3: Develop fault trees for a system and apply various reliability models on fault analysis. CO4: Develop hazard rate models to know the behaviour of components.											$\checkmark$	- 59	Designing Applying and		Assignments, End Exams Minor Exams Assignments, End Exams Minor Exams Assignments, End
programs to implement these strategies. CO3: Develop fault trees for a system and apply various reliability models on fault analysis. CO4: Develop hazard rate models to know the behaviour of components. CO5: Manage the manufacturing organisation with highest possible availability. MTME–212 : Supply Chain Management	V	√ √ √_	√ √ √	V	$\checkmark$	~	V	$\checkmark$	V	V		$\checkmark$	Designing Applying and Designing Applying and	Yes	Assignments, End Exams Minor Exams Assignments, End

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Course Outcome	PO			PO		) PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment To
	/1	2	3	4	5	6	7	8	9	10	1.	12		Employability / Entrepreneurs hip	Measure Attain of CO
CO1: Understand the supply chain performance and supply chain drivers	V		V		$\checkmark$	$\checkmark$	V	V	V	V	V	V	Understanding	Yes	Minor Exams Assignments, End
CO2: Apply the concept of managing economies of scale in a supply chain and importance of															Exams
transportation in a supply chain.	V	V	V	V	V	V	V	V	V	V	V	V	Understanding, Applying	Yes	Minor Exams Assignments, End
CO3: Learn about the logistics and competitive strategy and measuring logistics costs for its															Exams
performance.	V	V	V	v v	V	V	V	V	V	V	V	V	Understanding, Applying	Yes	Minor Exams Assignments, End
CO4: Apply the concepts of benchmarking in supply chain and coordination in a supply Chain.	V		√	V	V			V	V	V	V		Understanding, Applying	Yes	Exams Minor Exams Assignments, End Exams
CO5: Identify the malfunctions in rotating machinery using vibration measurements.	V	V	V	V	V	V	V	$\checkmark$	V	V	V	$\checkmark$	Understanding, Applying	Yes	Assignments, End Exams
MTME-214: Engineering Design Optimization Course Outcome			<u> </u> '												LAGULS
Department of Mechanical Engineering	PO 1	2	PO 3	РО 4	9 PO 5	9 PO 6	PO 7	PO 8	PO 9		PO 11		Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
CO1: Describe different methods of optimization	√	V							V	V	$\checkmark$	$\checkmark$	Understanding	Yes	Minor Exams Assignments, End
CO 2: Model and formulate optimization problems in standard form and assess the optimality of a solution.	$\checkmark$	V	$\checkmark$	V	V				$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understanding and Analysing	Yes	Exams Minor Exams Assignments, End
CO 3: Determine the optimal solution for unconstrained and constrained problems of multiple															Exams
variables.		V	$\bigvee$	V	V				V	V	V	V	Understanding and Analysing	Yes	Minor Exams Assignments, End
CO 4: Analyse the sensitivity of a solution to different variables.	$\checkmark$	V	$\checkmark$	$\checkmark$	V				V	$\checkmark$	V	V	Understanding and Analysing	Yes	Exams Minor Exams Assignments, End
CO 5: Determine the advantages and disadvantages of applying different optimization									320						Exams

techniques for a specific problem.	<b>V</b>	$\checkmark$	√	√					$\checkmark$	$\vee$	V	\ √	Understanding	Yes	Minor Exam
	r <sup>2</sup> -										1	2			Assignments, Er
MTME-217 : Dynamics of Rotating Machines				1		<u> </u>				- N					Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	DO	PO	DO			
	1	2	3	4	5	6	7	8	9	10		12	Skill	Focus on Employability / Entrepreneurs hip	Assessment To Measure Attain of CO
CO1: Model the Rotor bearing systems and formulate the governing equations.	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	Understanding,	Yes	Minor Exam
CO2: Compute the critical speeds and stability limits.	, ·												Applying and Designing		Assignments, End Exams
	V	Ý	V	V	√		V			V	V	V	Understanding, Applying	Yes	Minor Exam Assignments, End
CO3: Compute the transient response of rotors.	$\bigvee$	V	V	V	V		$\checkmark$			V	V	$\checkmark$	Understanding, Applying	Yes	Exams Minor Exam Assignments, End
CO4: Predict the response of a rotor bearing system through analytical models.	V	V	V	V	V		V			V	$\checkmark$	V	Understanding, Applying	Yes	Exams Minor Exam Assignments, End
CO5: Identify the malfunctions in rotating machinery using vibration measurements.	V	V	$\checkmark$	$\checkmark$	$\checkmark$		V			$\checkmark$	$\checkmark$	V	Understanding, Applying	Yes	Exams Minor Exams Assignments, Enc
MTME-219 : Sustainable Design and Manufacturing						-		_							Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Factor and	
Department of Mechanical Engineering	1	2	3	4	5	6	7	8	9	10			SKIII	Focus on Employability / Entrepreneurs hip	Assessment To Measure Attain of CO
CO1: Understand the concepts of sustainability, sustainable development and linkages between													a.		
echnology and sustainability.	V	8	$\checkmark$		$\checkmark$	V	<b>√</b> .	√	V	$\checkmark$	$\checkmark$	V	Understanding	Yes	Minor Exams Assignments, Enc
CO2: Understand the concept and different tools & techniques of sustainable manufacturing.	$\checkmark$	V	V		V	1	V	V	$\checkmark$	V	V	$\checkmark$	Understanding, Applying	Yes	Exams Minor Exams Assignments, Enc
CO3: Learn about different environmental standards and their equirement for sustainable															Exams
levelopment.	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	√	$\checkmark$	V	$\checkmark$	V	$\checkmark$	Understanding, Applying	Yes	Minor Exams Assignments, Enc
CO4: Learn about various eco-friendly product design methods and multi-criteria decision															Exams

making in sustainability.	51	V	$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$	V		V	51	Understanding, Applying	, Yes	Minor Exams Assignments, End
CO5: Understand the environmental, economic, societal and		-	-	-							-	-			Exams
business indicators of															
sustainability.			$\checkmark$	$\checkmark$		√	V				1.7	+	Lis devetors din a		
				Y	ľ	V	V	v	v	V	$\vee$	$ $ $\vee$	Understanding,	, Yes	Minor Exams
			1/										Applying		Assignments, End
MTME-220 Vibration and Noise Control					-	-	1				1				Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment To
	1	2	3	4	5	6		8			) 11			Employability / Entrepreneurs hip	Measure Attain of CO
CO1: Understand the multi-degree freedom system and concept of free and forced vibrations		V	$\checkmark$		V		$\checkmark$	V		V	$\checkmark$		Understand	Yes	Minor Exams Assignments, End
CO2: Understand the implementation of different numerical methods of multi-degree system.		V		V	V		V	V	V		V	V	Understand	Yes	Exams Minor Exams Assignments, End
CO3: Learn about the concepts regarding vibration of strings, bars, shafts and beams.	<b>√</b>		V	V	V		V	$\checkmark$	V	V	V		Understand	Yes	Exams Minor Exams Assignments, End
CO4: Understand the concept of vibration control and measurement, vibration isolation, vibration exciters and vibration absorbers.	$\checkmark$	V	V		V	V	V		V	V		V	Understand	Yes	Exams Minor Exams Assignments, End
CO5: Learn about fundamentals of noise measurement and noise control.	V	V	V		V	V	V		V	V	2	V	Applying and Designing	Yes	Exams Minor Exams Assignments, End
MTME-221 COMPOSITE MATERIALS		-						-				l	I		Exams
Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment To
Department of Mechanical Engineeting I.K.G. P.T.U. Alder Compus Kapurthale	1	2	3	4	5	6	7	8	9		11			Employability / Entrepreneurs hip	Measure Attain of CO
CO1: Describe the concept, need and applications of composite materials.	$\checkmark$	V		V	$\checkmark$	V	V		V	1	V	V	Understanding, Applying and	Yes	Minor Exams Assignments, Enc
CO 2: Solve the problem of effects of influencing factors on the strength of composite materials	V	V	V	V	V	V	$\checkmark$	V	V		V	V	Designing Understanding, Applying	Yes	Exams Minor Exam Assignments, End
CO3: Demostrate the various manufacturing processes of the composites	V	V		V	V	V	V		√	V	V	V	Understanding, Applying	Yes	Exams Minor Exam Assignments, End Exams

Course Outcome       PO       PO <th>Matrix/Reinforcement for various engineering applications.</th> <th>21</th> <th></th> <th>V</th> <th>V</th> <th>V</th> <th>V</th> <th>V</th> <th>  √  </th> <th><math>\checkmark</math></th> <th></th> <th>X</th> <th><math>\frac{1}{2}</math></th> <th>Understanding, Applying</th> <th>Yes</th> <th>Minor Exam Assignments, End</th>	Matrix/Reinforcement for various engineering applications.	21		V	V	V	V	V	√	$\checkmark$		X	$\frac{1}{2}$	Understanding, Applying	Yes	Minor Exam Assignments, End
Course Outcome       PO       PO <th>Design of Steam Turbines MTME-224</th> <th></th> <th><u> </u></th> <th></th> <th></th> <th>1</th> <th><u> </u></th> <th></th> <th></th> <th><u> </u></th> <th></th> <th></th> <th><u> </u></th> <th></th> <th></th> <th>Exams</th>	Design of Steam Turbines MTME-224		<u> </u>			1	<u> </u>			<u> </u>			<u> </u>			Exams
1       2       3       4       5       6       7       8       9       10       11       12       Assessment T         CO:1 Students will be able to practice the basic concepts and working cycles for steam engines.       V	Course Outcome	PO	PO	RO	BO	BO	Ino	no	DO	20	100	100	120		1	
CO:12 Students will be able to practice the basic concepts and working cycles for steam engines.       V      V       V	н т														Employability / Entrepreneurs	Assessment To Measure Attain of CO
working cycles for steam engines.       Image: Standard Image: Standar				1			1 7	[]	( )	[ ]'	1 1				hip	
working cycles for steam engines.       Image: Standard Image: Standar	CO:1 Students will be able to practice the basic concepts and	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V	V	V	V	V		Understanding	Vec	Alizar Evenes (
CO:2 Student will be able to design the blades and impeller for impulse and reaction turbines. CO:2 Student will be able to identify and make different types of condensers, cooling water calculations etc. CO:3 Student will be able to identify and make different types of condensers, cooling water calculations etc.	working cycles for steam engines.					[ ' '		[ ]	( )	( * P					res	
C0:2 Student will be able to design the blades and impeller for impulse and reaction turbines.       V				1 /		1 /	( )	( )	( )	( - )'	[ ]	$( \_ )$			1 /	
Impulse and reaction turbines.       Implementation for the solution of the displacement, momentum, conduction and energy equations, for variable free stream velocities over curved surface and for solutions for constant heat flux and constant facts. For the displacement, and signification of the displacement, momentum and energy boundary layers in pipe for energy differential equations for constant heat flux and constant heat flux and constant constant heat flux and constant constant constan				<u> </u>		<u> </u> '	$\square'$	[ ]'		$\square$		[ ]			[ ]	
Impulse and reaction turbines.       Impulse and reacticlos and reaction turbines.       Impulse and reaction t	CO:2 Student will be able to design the blades and impeller for	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\square$	$\checkmark$	V	$\checkmark$	$\checkmark$	V	V	Annlying	Yes	
CO:3 Student will be able to identify and make different types of Condensers, cooling water calculations etc. MTME-225 Convective Heat Transfer Course Outcome Course Outcome Course Outcome CO1: Development of 30-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, Solutions for constant heat flux and CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of the displacement, momentum and energy boundary layers in pipe flows, identification of constant heat flux and constant mark flows, solution of energy differential equations for constant heat flux and constant mark flows and internal natural convective flows CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of the displacement, momentum and energy boundary layers in pipe flows, identification of constant heat flux and constant and energy differential equations for constant heat flux and constant and internal and internal natural convective flows CO3: Analysis of momentum and internal antural convective flows CO4: Modeling of external and inter	impulse and reaction turbines.	/	/	1		1 7	( )	1 1			$\left[ \right]$			פיייניקקיי		
CO:3 Student will be able to identify and make different types of condensers, cooling water calculations etc.       V </td <td></td> <td>1 /</td> <td>1</td> <td>1 /</td> <td> </td> <td>[ _ ]</td> <td>( )</td> <td>( )</td> <td></td> <td>1</td> <td>( )</td> <td>[ ]</td> <td></td> <td>1</td> <td>[</td> <td></td>		1 /	1	1 /		[ _ ]	( )	( )		1	( )	[ ]		1	[	
Condensers, cooling water calculations etc.       Minor Exams, demonstrations videos/lab, Entropy of the status, demonstrations videos/lab, Entropy of the status videos/lab, Entropy of the s		<u> </u>			<u> </u>	<u> </u>	$\square$					$\square$			1 /	
Condensers, cooling water calculations etc.       PO	CO:3 Student will be able to identify and make different types of		$\checkmark$	$\checkmark$	$\mathbf{V}$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	[	$\checkmark$	Applying	Yes	Minor Exams
MTME-225 Convective Heat TransferVideos/ lab, En Exams.Course OutcomeDestinant of Mechanical Engineeing (KG, P.11). Kein CompusPO I<	condensers, cooling water calculations etc.	1 /	$  \rangle$	[ ]	1 /	( )	( )	1		1	$\left[ \right]$	1 /				
MTME-225 Convective Heat Transfer       PO       PO </td <td></td> <td>1. 1</td> <td>1 /</td> <td><math>\left[ \right]</math></td> <td>1!</td> <td>()</td> <td>( )</td> <td></td> <td></td> <td>. ]</td> <td><math>\left[ \right]</math></td> <td>1 7</td> <td>1</td> <td>1</td> <td>( )</td> <td></td>		1. 1	1 /	$\left[ \right]$	1!	()	( )			. ]	$\left[ \right]$	1 7	1	1	( )	
Course OutcomePO DescriptionPO IPO PO IIIPO IIIIPO IIIIIIIIIPO 	MTME 23E Convective Heat Transfer		<u> </u>		<u> </u>				$\square$					L/	1	
ProdPr		170							-							E EXclus
123456789101112Employability / Entrepreneurs hipC01: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems.VV <td>course outcome</td> <td>1 1</td> <td>1 1</td> <td></td> <td>Skill</td> <td>Focus on</td> <td>Assessment To</td>	course outcome	1 1	1 1											Skill	Focus on	Assessment To
CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. $\sqrt{4}$ $$	Financial of Machanical Engineering	11	2	31	(4)	( <b>5</b> P	6 1	(7)	8	Q I	(10)	(11)	112			
KourtiskKourti	A DESCRIPTION OF A DESC						1 × 1	1 1			101				· LINDIOVADINLY / )	measure Attain
CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. $\sqrt{1}$ $$	LIVO OTILASSA Compute	T I									10		12			
energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary chance CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer. $\sqrt[4]{ v v v v v v v v v v v v v v v v v v v$	I.K.G. PT.U. Made Compus									-			12		Entrepreneurs	
CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for four outra body of arbitrary chang. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions. CO4: Modelling of external and internal natural convective flows and estimates of heat transfer.	LK.G. PT.U. Mean Compus							3							Entrepreneurs	
and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrany change CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer. Exams entrance and subject of actions for constant heat flux and constant wall temperature conditions flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions flows in the flows of the transfer. Exams in the flows in the flow of the transfer. Exams in the flow of the transfer. Exams	CO1: Development of 3D-unsteady (generalized) momentum,		√	$\checkmark$				3							Entrepreneurs hip	
CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ $\sqrt{14}$ Applying and and estimates of heat transfer.	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer		V	$\checkmark$				3							Entrepreneurs hip Yes	of CO Minor Exam
and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrany chang. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer. $V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V$ $V \vee V \vee V$ $V \vee V$ $V \vee V \vee V$ $V \vee V$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor		V	$\checkmark$				3							Entrepreneurs hip Yes	of CO Minor Exam Assignments, End
and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrany chang. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer. $V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V \vee V \vee V \vee V \vee V$ $V \vee V$ $V \vee V \vee V$ $V \vee V$ $V \vee V \vee V$ $V \vee V$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer		V	V				3		-					Entrepreneurs hip Yes	of CO Minor Exam Assignments, End
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems.	-/		V		V		V	V			V	V	Understand	Entrepreneurs hip Yes	of CO Minor Exam Assignments, En Exams
enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrany chape. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer.	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum			V	√	V		V	V			V	V	Understand	Entrepreneurs hip Yes	of CO Minor Exam Assignments, En
solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary chang. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer.	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations,	V		V	√	V		V	V			V	V	Understand	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams
$\frac{1}{2} \frac{1}{2} \frac{1}$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and			√ 	√	V		V	V			V	V	Understand	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En
CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows and estimates of heat transfer. $$ <th< td=""><td>CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses,</td><td>V</td><td></td><td>V</td><td>√</td><td>V</td><td></td><td>V</td><td>V</td><td></td><td></td><td>V</td><td>V</td><td>Understand</td><td>Entrepreneurs hip Yes Yes</td><td>of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En</td></th<>	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses,	V		V	√	V		V	V			V	V	Understand	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En
flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary shape.	V		~	$\checkmark$	V		V	V			V	V	Understand	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En
entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and $CO4:$ Modelling of external and internal natural convective flows $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ $\sqrt{10}$ Applying and Yes Minor Examples and estimates of heat transfer.	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary shape.					V		$\checkmark$	V	V	V	V	V	Understand	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams
of energy differential equations for constant heat flux and constant wall temperature conditions CO4: Modelling of external and internal natural convective flows $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of	V				V		$\checkmark$	V	V	V	V	V	Understand Understand Applying and	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams
$\frac{1}{2} = \frac{1}{2} + \frac{1}$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of	V				V		$\checkmark$	V	V	V	V	V	Understand Understand Applying and	Entrepreneurs hip Yes Yes	of CO Minor Exan Assignments, Er Exams Minor Exam Assignments, En Exams
CO4: Modelling of external and internal natural convective flows $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{$	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution	V				V		$\checkmark$	V	V	V	V	V	Understand Understand Applying and	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams Minor Exam Assignments, En
and estimates of heat transfer.	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions	V				V		$\checkmark$	V	V	V	V	V	Understand Understand Applying and	Entrepreneurs hip Yes Yes	of CO Minor Exan Assignments, Er Exams Minor Exan Assignments, Er Exams Minor Exan Assignments, Er
	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and constant wall temperature conditions	V	V	V		√ √ √		√ √ √	V	√ √	<ul> <li>✓</li> <li>✓</li> </ul>	V	<ul> <li>✓</li> <li>✓</li> </ul>	Understand Understand Applying and Designing	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams
	CO1: Development of 3D-unsteady (generalized) momentum, energy and mass transfer equations in the Cartesian system, representing them in tensor and vector notations, expandable to other coordinate systems. CO2: Development of generalized Integral form of Momentum and energy equations, identification of the displacement, momentum, conduction and enthalpy thicknesses, solutions for variable free stream velocities over curved surface and for flow over a body of arbitrary change. CO3: Analysis of momentum and energy boundary layers in pipe flows, identification of entrance and fully developed region during laminar flow, solution of energy differential equations for constant heat flux and	V	V	V		√ √ √		√ √ √	V	√ √	<ul> <li>✓</li> <li>✓</li> </ul>	V	<ul> <li>✓</li> <li>✓</li> </ul>	Understand Understand Applying and Designing	Entrepreneurs hip Yes Yes	of CO Minor Exam Assignments, En Exams Minor Exam Assignments, En Exams Minor Exam Assignments, En

CO5: Knowledge of turbulent heat convection, rules to modify		Ī√	$\bigvee$	Γ	11/		1.1	1		1 7	1			1	1
the laminar momentum and energy equations and develop	Υ.	ľ	v		V	V	V V		V	V	Č	Ϋ́	Applying and	Yes	Minor Exams
equations for the turbulent flows	1Ê –										1	Ť.	Designing		Assignments, End
CO6: Analyze heat exchanger performance by using the method	$\vee$	$\vee$	$\checkmark$		V	$\checkmark$	V		V	V	-		Applying and	Yes	Exams Minor From
of heat exchanger effectiveness.							1 ·		<b>`</b>	'		1	Designing	Tes	Minor Exams
Combustine F. 1. 1. Second			I										Designing		Assignments, End
Combustion Engineering MTME-226 Course Outcome															Exams
course outcome	PO		PO	PO		PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Assessment Too
	1	2	3	4	5	6	7	8	9	10	11	12		Employability /	Measure Attain
														Entrepreneurs	of CO
														hip	
CO: 1 Understand precisely a difference between premixed	$\checkmark$	V	V	$\checkmark$	V		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Updovetandine		
combustion and diffusion combustion.		·			1 . C		•		v	V V	N.	V	Understanding	Yes	Minor Exams, Q
			1											1	demonstrations th
															videos/ lab, End
CO:2 Learn combustion mechanisms of gaseous, liquid and solid	$\vee$	$\checkmark$	$\checkmark$	V	V	-	$\checkmark$		$\checkmark$	V	$\checkmark$	$\checkmark$	Understanding	Yes	Exams
fuels	1000	1.25	<u> </u>		· ·							v	onderstanding	res	Minor Exams, Q
															demonstrations th
															videos/ lab, End
CO: 3 Learn chemiluminescence phenomena of flame and the	$\vee$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	V	V	Understanding	Yes	Exams Minor Exams, Q
prevention method of air pollutant													l source and an ing	105	demonstrations th
		1					( i							-	videos/ lab, End
MTME-227 Conductive & Radiative Heat Transfer	L								,						Fxams
Course Outcome	100														i kauis
HOR	PO		PO			PO							Skill	Focus on	Assessment Too
Demonipant of Machanical Contin	1	2	3	4	5	6	7	8	9	10	11	12		Employability /	Measure Attain
Examinant of Mechanical Engineering														Entrepreneurs	of CO
P TODA MI LA CITC														hip	
CO1: Calculate emission of thermal radiation from a black body													Applying and		
or grey body.		2	, i				×	v		v	V	V	Applying and	Yes	Minor Exams,
													Designing		Assignments, End
CO2: Calculation of view factor between two objects.		$\checkmark$							$\checkmark$			$\checkmark$	Applying and	Yes	Exams
							,				v	28	Designing	res	Minor Exams,
						I							Designing		Assignments, End
									· · · · · · · · · · · · · · · · · · ·	-					1 <b></b>
CO3: Analyse simple radiation interchange between diffuse	√	-	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$					Applying and	Yes	Exams
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with	√	-	V	$\checkmark$	V		$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$		Applying and Designing	Yes	Exams Minor Exams,
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction.				$\checkmark$	V		V	$\checkmark$	$\checkmark$	V	$\checkmark$		Applying and Designing	Yes	Exams Minor Exams Assignments, End
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction. CO4: Understand the fundamentals of convective heat transfer	√ √	√	√ √	√	<ul><li>✓</li><li>✓</li></ul>	√	√ √	V	√ √	√ √	√	√	Designing		Exams Minor Exams, Assignments, End Exams
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction.		√		√		√		V			~	√		Yes	Exams Minor Exams Assignments, End Exams Minor Exams
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction. CO4: Understand the fundamentals of convective heat transfer process.	V		V	√	V		V	V			V	~	Designing	Yes	Exams Minor Exams Assignments, End Exams Minor Exams Assignments, End
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction. CO4: Understand the fundamentals of convective heat transfer process. CO5: Analyze heat exchanger performance by using the method	V	√ √		√	V	√ √		V			V	√ √	Designing	Yes	Exams Minor Exams, Assignments, End Exams Minor Exams, Assignments, End Exams
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction. CO4: Understand the fundamentals of convective heat transfer process.	V		√	√	V		V	~	$\checkmark$	√	~		Designing Understand Applying and	Yes	Exams Minor Exams, Assignments, End Exams Minor Exams, Assignments, End Exams Minor Exams,
CO3: Analyse simple radiation interchange between diffuse surfaces, radiation from a volume to a surface and an object with radiation. convection and conduction. CO4: Understand the fundamentals of convective heat transfer process. CO5: Analyze heat exchanger performance by using the method	V		√	<ul> <li>✓</li> </ul>	V		V	V	$\checkmark$	√	~		Designing Understand	Yes	Exams Minor Exams, Assignments, End Exams Minor Exams, Assignments, End

Course Outcome	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus on	Accesses
CO1: Describe the requirement on sifesting for its house	)1	2	3	4	5	6	7	8	9		1.			Employability / Entrepreneurs hip	Assessment Too Measure Attain of CO
CO1: Describe the requirement specifications for indoor air quality, energy supply and energy use.	V	V	V		√		V	V		V	V		Applying and Designing	Yes	Minor Exams Assignments, End Exams
CO2: Describe system solutions for renewable energy production and heat storage		V		$\checkmark$	V		V	V	V		V	V	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO3: Describe system solutions for ventilation and tempering of rooms	V		V	V	V		V	V	$\bigvee$	$\bigvee$	V		Applying and Designing	Yes	Minor Exams, Assignments, End
CO4: Describe solutions for domestic hot water supply, sewerage and preparation of domestic hot water methods	V	V	V		V	V	V		V	V		V	Understand	Yes	Exams Minor Exams, Assignments, End Exams
CO5: Describe the components of HVAC system,	V	V	√		V	V	$\checkmark$		V	$\bigvee$		V	Applying and Designing	Yes	Minor Exams, Assignments, End Exams
CO6: Describe the content of solutions for monitoring and control of air conditioning plants		V	$\checkmark$		√	~	$\checkmark$		V	V	V	V	Applying and Designing	Yes	Minor Exams, Assignments, End
Design and optimization of Thermal Systems MTME-230															Exams
Course Outcome	PO 1	РО 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	РО 9	PO 10		PO 12	Skill	Focus on Employability / Entrepreneurs hip	Assessment Too Measure Attainr of CO
CO:1 Integrate thermal component models and simulate a thermal system	<b>√</b>	~	V	V	~		~		V	V	V	V	Understanding	Yes	Minor Exams, Q demonstrations the videos/ lab, End
CO:2 Perform an economic analysis of a thermal system.	V	V	V	V	V		√		V	V	V	V	Applying	Yes	Exams Minor Exams, Q demonstrations the videos/ lab, End
CO:3 Use the computer to solve thermal system models	V	~	√	V	V		V		V	~	V	V	Applying	Yes	Exams Minor Exams, Q demonstrations thr videos/ lab, End
CO:4 Communicate thermal system designs both orally and in writing	V	V	V	√	V		V		V	V	V	√	Understanding	Yes	Exams Minor Exams, Q demonstrations thr videos/ lab, End T
Beperiment of Mechanical Environming					,				IC .				a.		Fxams

CO:5 Apply optimization procedures and design optimized thermal	21	V	V	$\vee$	V		$\checkmark$		$\checkmark$	<b>√</b>	V	V	Applying	Yes	Minor Exams,
systems												1			demonstrations to videos/ lab, End
MTME-301 :Project	-	-	-	1	<u> </u>	1	-		_						Exams
Course Outcome	PO	D PO	PO	PO	PO	PC	PO	TPC	PO	DO	PO	DO			
	1							8				_		Focus on Employability / Entrepreneurs hip	Assessment To Measure Attai of CO
CO1: Identify an engineering problem, devise a means of solving and exhibit the ability to execute the solution.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\vee$	$\checkmark$	V	$\checkmark$			√	Understanding		Reports, Pro
															Presentations ar
CO2:Demonstrate knowledge of professional and ethical responsibilities	V		V	V	V	V	V	V	$\checkmark$	V	$\checkmark$	V	Applying and Designing	Yes	Viva Reports, Pro Presentations ar
CO3:Formulate and implement innovative ideas for social and environmental benefits.	V	$\checkmark$	V	V	V	V	$\checkmark$	1	V	V	V	V	Applying and Designing	Yes	Viva Reports, Pro Presentations a
CO4:Write technical report of the project apart from developing a presentation.	V	$\checkmark$	V	V	V	V	V	V	V	$\checkmark$	V	V	Applying and Designing	Yes	Viva Reports, Pro Presentations a
CO5: Demonstrate an ability to present and defend their research work to a panel of experts.	$\checkmark$		√ r		V	V	$\checkmark$		V	$\checkmark$	V	V	Applying and Designing	Yes	Viva Reports, Pr Presentations a
Paper MTME404 Dissertation		<u> </u>		L/		<u> </u>		<u> </u>			<u> </u>		()	<u>                                     </u>	Viva
Course Outcome	PO	PO	PO	PO	DO	100	100	20	100	120	1.2.0		1		
Congrimment of Mechanical Engineeting L.K.G. P.T.U. Media Compus Kopurticala	1	2	3	РО 4	PO 5	PO 6	PO 7	PO 8	9 9					1 1	Assessment 1 Measure Atta of CO
CO1: Demonstrate a depth of knowledge of Mechanical Engineering.	V	V	V	V	V	V	V	V	V	V	V	V	Understanding	Yes	Field Project, Making a
CO 2: Complete an independent research project, resulting in at least a thesis publication, and research outputs in terms of publications in high impact factor journals, conference proceedings, and patents	V		V	$\checkmark$	V	V	V	V	V	V	V	V	Applying	Yes	Presental Field Project, Making a Presentat
CO 3: Demonstrate knowledge of contemporary issues in their chosen field of research.	V	V	V	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	V	V	Understanding	Yes	Field Project, Making a
CO4: Demonstrate an ability to present and defend their research work to a panel of experts.	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	V	$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	Understanding	Yes	Presental Field Project, Making a

Course Outcome	PO 1	<b>PO</b> 2	РО 3	РО 4	PO 5	РО 6	РО 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Mease Attainment of CO
CO1: Formulate a research problem	√	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	√	$\checkmark$	√	$\checkmark$		$\checkmark$	$\checkmark$	Understand	Yes	Minor Exams, Assignments, E Term Exams
CO 2: Explain the different experimental designs and their analysis.	V	$\checkmark$	√	V	√	√	V	V	$\checkmark$	V	$\checkmark$	$\checkmark$	Understand	Yes	Minor Exams, Assignments, El Term Exams
CO 3: Apply different statistical tools for the research analysis	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, En Term Exams
CO 4: Apply the research ethics Non Conventional Machining (PhD Court	√	l l -	√	$\checkmark$	$\checkmark$	√	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Applying and Designing	Yes	Assignments, Presentations an Final Viva
non conventional Machining (PhD Cour	se v	/ork	)		-					_	r				
Course Outcome	PO 1	PO 2	PO 3	РО 4	РО 5	РО 6	РО 7	PO 8	РО 9	PO 10	PO 11	11-2-22	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Understand the need of Non Conventional Machining Processes and able to Classify various processes.	$\checkmark$	$\checkmark$	$\checkmark$		V		$\checkmark$	$\checkmark$	$\checkmark$	√		$\checkmark$	Understand	Yes	Minor Exams, Assignments, Er Term Exams
CO2: Recognize the role of mechanical energy in non-Conventional machining processes.		$\checkmark$		$\checkmark$			V	V	$\checkmark$		V	$\checkmark$	Understand	Yes	Minor Exams, Assignments, Er Term Exams
CO3: Apply the knowledge on machining electrically conductive material through electrical energy in non-Conventional machining processes.	$\checkmark$		$\checkmark$	$\checkmark$		V	√	$\checkmark$		~	~		Applying and Designing	Yes	Minor Exams, Assignments, Er Term Exams
CO4: Understand the concept of machining the hard material using chemical energy andelectrochemical energy.		$\checkmark$	$\checkmark$				$\checkmark$	√	$\checkmark$	$\checkmark$		$\checkmark$	Applying and Designing	Yes	Assignments, Presentations ar Final Viva
CO5: Apply the knowledge on machining electrically conductive material through electrical energy in non-Conventional machining processes.		C M Do K X	D Derking C. P	nt of M	e <b>v</b> ia Viciti	iical E Gemp	ngi¥ea nus	ring	$\checkmark$	$\checkmark$	-	$\checkmark$	Applying and Designing	Yes	Minor Exams, Assignments, Er Term Exams

CO6: Familiarity and application of various thermal energy based non-conventional	2.			C	5								0		
machining processes.	√		√	<b>√</b>	√	√	√	√	√	√		√	Applying and Designing	Yes	Minor Exams, Assignments, En Term Exams
PhD Paper Presentation/Seminar								I							
Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	РО 6	PO 7	P0 8	PO 9	P0 10		PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measur Attainment of CO
CO1: Deal with nerves and think more positively about public speaking.	$\checkmark$	√	√		V	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V	$\checkmark$	Thinking	Yes	Field based assignments, Repor making, presentations etc.
CO 2: Consider ways of grabbing the listener's attention, holding their interest, and concluding strongly.	~		V			V	V	$\checkmark$	V	√	√	√	Thinking	Yes	Field based assignments, Repor making, presentations etc.
CO3: Use body language and tone of voice to enhance their presentations.			$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V	$\checkmark$	Applying	Yes	Field based assignments, Repor making, presentations etc.
CO4: Use slides and visual aids effectively.	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	Applying	Yes	Field based assignments, Repor making, presentations etc.							
CO5: Deliver an enthusiastic and well- practised presentation.	√	√	$\checkmark$		√	V	√	$\checkmark$	V	$\checkmark$	√	$\checkmark$	Applying	Yes	Field based assignments, Repor making, presentations etc.
Advanced Heat Transfer											-				making, presentations etc.
Course Outcome much of Mechanical Engineering I.K.G. P.T.U. Micin Compus Kepurchalo	P0 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10		PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measur Attainment of CO
CO1: Understand the principles of heat transfer through conduction, convection and radiation modes.	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		V	V	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Repor making, presentations etc.
CO2: Understand the heat transfer during phase-change processes, such as boiling and condensation.	$\checkmark$	$\checkmark$	√.			$\checkmark$		$\checkmark$	V	V	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Report making, presentations etc.
CO3: Understand the practical aspects of the theories of heat transfer, such as design of heat exchangers.	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		√	√	Applying	Yes	Field based assignments, Report making, presentations etc.
CO4: Understand the concept related to mass transfer and its connection with heat transfer.		$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	√.	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	Applying	Yes	Field based assignments, Repor making, presentations etc.

CO5: Carry out laboratory tests verifying the various principles of heat transfer.		V	V	C	V	V	V	√	V	√		√	Applyin_	Yes	Field based assignments, Repo making, presentations etc.
Advanced Fluid Mechanics and CFD								I				I			
Course Outcome	PO 1	PO 2	PO 3	РО 4	<b>PO</b> 5	РО 6	PO 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Understand the concept of computational fluid dynamics, modeling and simulation.	√	$\checkmark$	V		V	$\checkmark$	V		V		√	V	Understanding	Yes	Field based assignments, Repo making, presentations etc.
CO2: Learn about the different governing equations of fluid dynamics.	$\checkmark$		$\checkmark$					$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	√	Thinking	Yes	Field based assignments, Repo making, presentations etc.
CO3: Understand the concept of parabolic, elliptic and hyperbolic equations and various			$\checkmark$		V	V	V	V	V		$\checkmark$	V	Applying	Yes	Field based assignments, Repo making, presentations etc.
methods of finite differencing and stability.		$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	√	Understanding	Yes	Field based assignments, Repo making, presentations etc.
CO4: Understand the concept of turbulence, error and uncertainty & different turbulent	√	√	$\checkmark$		√	$\checkmark$	V		√	√			Applying	Yes	Field based assignments, Repo making, presentations etc.
Finite Elements Methods															
Course Outcome	P0 1	РО 2	PO 3	РО 4	РО 5	PO 6	РО 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: To obtain an understanding of the fundamental theory of the FEA method;	$\checkmark$		V	$\checkmark$	$\checkmark$	$\checkmark$	V		$\checkmark$	$\checkmark$	$\checkmark$	V	Thinking	Yes	Field based assignments, Repo making, presentations etc.
CO2: To develop the knowledge of mathematics and engineering in solving the problems related to structural and heat transfer.	$\checkmark$		~			$\checkmark$		V	V	√	√	V	Designing	Yes	Field based assignments, Repo making, presentations etc.
CO3: To identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements		$\checkmark$	$\checkmark$	√	V	$\checkmark$	√	√	√			√	Applying	Yes	Field based assignments, Repo making, presentations etc.
		-											-		Separation of Mechanical Engineering K.C. P.T.

CO4: To understand the application and use of the FE method for heat transfer problems		$\checkmark$	V	V	∫√	$\checkmark$	$\checkmark$	$\checkmark$		V	V	$\checkmark$	Understanding	Yes	Field based assignments, Repo making, presentations etc.
CO5: Use the commercial FEA packages like ANSYS and modern CAD/CAE tools for solving real life structural problems.	V	V	V		V	V	V	√	V	$\checkmark$		$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
Composite Materials															
Course Outcome	P0 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Describe the concept, need and applications of composite materials.			V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Repo making, presentations etc.
CO 2: Solve the problem of effects of influencing factors on the strength of composite materials	~		V			$\checkmark$	÷.	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Designing	Yes	Field based assignments, Repo making, presentations etc.
CO3: Demonstrate the various manufacturing processes of the Metal/ ceramic/polymer-based composites.	V	V	V	$\checkmark$	V	V	$\checkmark$	V	$\checkmark$		V	$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
CO 4: Test and characterize the composite and suggest secondary processing as per application.	V	$\checkmark$	V		$\checkmark$	V	$\checkmark$	V		$\checkmark$	V	$\checkmark$	Understanding	Yes	Field based assignments, Repo making, presentations etc.
Optimization Techniques	r		r												
Course Outcome	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	РО 7	PO 8	РО 9	PO 10	PO 11		Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Ability to apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems	V		$\checkmark$	$\checkmark$	V	V	√		$\checkmark$	V	V	V	Thinking	Yes	Field based assignments, Repo making, presentations etc.
CO2: Ability to go in research by applying optimization techniques in problems of Engineering and Technology		√	$\checkmark$			•√		$\checkmark$	~	√	√	$\checkmark$	Designing	Yes	Field based assignments, Repo making, presentations etc.

Department of Mechanical Engineering LK.G. P.T.U. Mein Campus

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CO3: Ability to solve the mathematical results and numerical techniques of optimization theory to concrete Engineering problems by using computer software.	V	V	V	<ul><li></li><li>✓</li></ul>	√	V	V	V	V		~	~	Applying	Yes	Field based assignments, Repo making, presentations etc.
Computer Aided Design and Manufactu	ring	(CA	D/C	AM)	I		I								
Course Outcome	РО 1	PO 2	PO 3	<b>PO</b> 4	РО 5	РО 6	PO 7	PO 8	PO 9	PO 10		P0 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Apply/develop solutions or to do research in the areas of Design and simulation in Mechanical Engineering.	$\checkmark$	$\checkmark$	$\checkmark$	V	V	V	V		V	V	V	V	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO2: Have abilities and capabilities in developing and applying computer software and hardware to mechanical design and manufacturing fields.	V	V	V			V		V	V	V	V	V	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO3: Review and document the knowledge developed by scholarly predecessors and critically assess the relevant technological issues.			$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	V		~	~	Applying and Designing	Yes	Field based assignments, Repo making, presentations etc.
CO4: Formulate relevant research problems; conduct experimental and/or analytical study and analyzing results with modern mathematical/scientific methods and use of software tools.		V	V	V	V	V	V	V		V	V	V	Applying	Yes	Field based assignments, Repo making, presentations etc.
Advanced Theory of Vibrations															
Course Outcome	PO 1	PO 2	PO 3	<b>PO</b> 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Recognize the need and measurement of vibration in mechanical systems	$\checkmark$		V	$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$	V	$\checkmark$	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO2: Suggest suitable methods of vibration reduction and absorption	$\checkmark$	√	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
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CO3: Calculate natural frequencies of vibrations		$\checkmark$	$\checkmark$	v	5	$\checkmark$	V	$\checkmark$	√		√	V	Applying and Designi	Yes	Field based assignments, Repo
CO4: Distinguish between systems with different degrees of vibration	$\checkmark$	√	$\checkmark$	V		$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		Yes	making, presentations etc.           Field based assignments, Report
Tribology	'														making, presentations etc.
Course Outcome	PO 1	РО 2	PO 3	PO 4		PO 6	PO 7	PO 8	PO 9	S		PO 12	CLU	Focus on Employability / Entrepreneurship	Assessment Tools to Measur Attainment of CO
CO1: Be able to know the field of tribology.	$\checkmark$	$\checkmark$	√	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	√	$\checkmark$	Understand	Yes	Field based assignments, Repor
CO2: Be able to know the surface, properties of surface and related instruments	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	V		√	$\checkmark$	$\checkmark$	V	V	Understand	Yes	<ul> <li>making, presentations etc.</li> <li>Field based assignments, Repormaking, presentations etc.</li> </ul>
CO3: Be able to understand the friction, friction theory and behaviour of metals and non-metals			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		• √	~		~	~	Applying and Designing	Yes	Field based assignments, Repor making, presentations etc.
CO4: Be able to understand wear processes, wear theory, behaviour of metals and non-metals and different instruments	; √	$\checkmark$	V	~		$\checkmark$	~	$\checkmark$		~	~	$\checkmark$	Applying	Yes	Field based assignments, Repor making, presentations etc.
Thermo Economics and Power Plants								<u> </u>	('						
Course Outcome	PO 1	<b>PO</b> 2	PO 3	РО 4	PO 5	PO 6	PO 7	PO 8	РО 9			1	CLIII	Focus on Employability / Entrepreneurship	Assessment Tools to Measur Attainment of CO
CO1: Understand and know the requirements for a Thermal Power Plant and Nuclear Power Plant, from sources to consumption and economics of power plants	√		V	V	$\checkmark$	V	V	$\checkmark$	V	$\checkmark$	V	~	Thiņking	Yes	Field based assignments, Repor making, presentations etc.
CO2: Study and learn the processes and cycles followed in Thermal Power Plants and nuclear power plants and components used in the power plants.	V	V	$\checkmark$		V	V		V	V	$\checkmark$	V	V	Thinking	Yes	Field based assignments, Repo making, presentations etc.

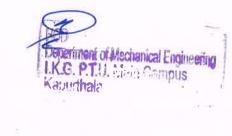


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	√	V	<ul> <li></li> <li>✓</li> </ul>	√	V		~	V		V	V	Applying	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$	√	$\checkmark$	√		$\checkmark$	$\checkmark$	V		V	$\checkmark$	√	Applying	Yes	Field based assignments, Repo making, presentations etc.
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PO 1	PO 2	PO 3	<b>PO</b> 4	РО 5	PO 6	РО 7	PO 8	РО 9	PO 10	P0 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
$\checkmark$	V		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		1 √	$\checkmark$	$\checkmark$	V	Understand	Yes	Field based assignments, Repo making, presentations etc.
				$\checkmark$	V			V	$\checkmark$	V	√	Understand	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$	V		V	V	$\checkmark$			V		V	$\checkmark$	Applying and Designing	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$	V	√	Applying	Yes	Field based assignments, Repo making, presentations etc.
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PO 1	P0 2	PO 3	<b>РО</b> 4	РО 5	PO 6	РО 7	PO 8	РО 9	PO 10	PO 11	_	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
	V	$\checkmark$	$\checkmark$	V	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$				$\checkmark$	V			V	V	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Report making, presentations etc.
$\checkmark$	$\checkmark$	√	√	√	$\checkmark$			√		√	$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
	✓ PO 1 ✓ ✓ PO 1 ✓ I ✓ ✓ I ✓ ✓	✓     ✓       ✓     ✓       PO     PO       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓       ✓     ✓	い       い       い         い       い       い         PO       PO       PO         I       PO       PO         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1         い       い       1	Image: light with with with with with with with wi	Image: line system       Image: line system       Image: line system       Image: line system $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ <b>PO PO PO PO PO PO</b> $\checkmark$ $\uparrow$ $\checkmark$	Image: state structure       Image: state structure       Image: state structure       Image: state structure $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ PO $2$ PO $3$ PO $5$ PO $\checkmark$ <	Image: Normal system       Image: Normal system       Image: Normal system       Image: Normal system $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ PO       PO       PO       PO       PO       PO       PO       PO $\checkmark$ PO       PO       PO       PO       PO       PO       PO $\checkmark$ $\checkmark$ Image: Normal system       Im	$\checkmark$ PO       <			$             \sqrt         $ $             \ell         $ $             \ell         $ <th< td=""><td></td><td></td><td>VVV<th< td=""></th<></td></th<>			VVV <th< td=""></th<>

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CO4: Use slides and visual aids effectively.	√	√	√	Y	5	√	√			√	√	√	Applyin	Yes	Field based assignments, Repo
Production Engineering	r												· · · · · · · · · · · · · · · · · · ·		making, presentations etc.
Course Outcome	PO 1	РО 2	PO 3	PO 4	PO 5	P0 6	P0 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Understand the various Conventional and Non-Conventional machining processes	V		√	V	$\checkmark$		V		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO2: Learn about measuring equipment, error types and their evaluation	√	$\checkmark$	V	V	n√				V	V	V	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO3: Learn about process capability and six sigma		√	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$		$\checkmark$	$\checkmark$	Applying and Designing	Yes	Field based assignments, Repo making, presentations etc.
CO4: Learn about quality control and quality assurance systems	√	V	V	√			$\checkmark$			V	V	$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
Advanced Mechanics of Solids										1					
Course Outcome	PO 1	РО 2	PO 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability / Entrepreneurship	Assessment Tools to Measu Attainment of CO
CO1: Understand concepts of stress and strain in solids and associated theories of failure.	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	-	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO2: Derive governing equations to solve engineering problem.	V	$\checkmark$			$\checkmark$				$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Understand	Yes	Field based assignments, Repo making, presentations etc.
CO3: Apply analysis techniques to determine stress in components such as shafts, beams, shells and rotating discs under different loading conditions.	-	V	$\checkmark$	V	$\checkmark$				V		~	$\checkmark$	Applying and Designing	Yes	Field based assignments, Repo making, presentations etc.
CO4: Analyze deformations in beam and locate shear centre in thin-walled beams.	$\checkmark$	$\checkmark$	V	$\checkmark$			$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
Mechatronics								I			L				
Course Outcome	P0 1	P0 2	РО 3	РО 4	PO 5	PO 6	РО 7	PO 8	РО 9	PO 10	PO 11	PO 12	Skill	Focus on Employability /	Assessment Tools to Measu

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$\checkmark$	V	$\checkmark$	5	\ \		$\checkmark$	V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Thinkir	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$	V			√			V	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	Thinking	Yes	Field based assignments, Repo making, presentations etc.
	$\checkmark$	$\checkmark$	$\checkmark$	V						$\checkmark$	$\checkmark$	Applying	Yes	Field based assignments, Repo making, presentations etc.
$\checkmark$		$\checkmark$	V			$\checkmark$	$\checkmark$	$\checkmark$	√	$\checkmark$	√	Applying	Yes	Field based assignments, Repo making, presentations etc.
_														making, presentations etc.
P0 1	PO 2	PO 3		РО 5	PO 6	PO 7						Skill	Focus on	Assessment Tools to Measu
-				5	0	-	8	9	10	11	12	JKII	Entrepreneurship	Attainment of CO
	$\checkmark$	√	√	√	√	~	8 √	y √	<b>10</b> √	<b>11</b> √	<b>12</b> √	Understand		Attainment of CO Field based assignments, Report making, presentations etc.
√	√ √												Entrepreneurship	Field based assignments, Repo
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