



**Department of Mechanical Engineering**

**Course Structure for Semester VII**

**B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering  
(2023-24)**

Semester VII										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. of Credits
			L	T	P	CA	MSE	ESE	Total	
PCC15	BTMC701	Mechatronics	3	-	-	20	20	60	100	3
HSSMC4	BTHM702	Industrial Engineering and Management	3	-	-	20	20	60	100	3
PEC5	BTMPE703A-G BTPPE703D	Elective-V	3	-	-	20	20	60	100	3
OEC3	BTMOE704A-C	Open Elective-III	3	-	-	20	20	60	100	3
OEC4	BTMOE705A-C	Open Elective-IV	3	-	-	20	20	60	100	3
PCC16	BTMCL706	Mechanical Engineering Lab – V	-	-	4	60	-	40	100	2
PROJ-6	BTMP 707	Mini Project	-	-	6	30	-	20	50	3
PROJ-7	BTMI609	IT – 3 Evaluation	-	-	-	-	-	100	100	1
<b>Total</b>			<b>15</b>	<b>-</b>	<b>10</b>	<b>190</b>	<b>100</b>	<b>460</b>	<b>750</b>	<b>21</b>

**Course Structure for Semester VIII**

**B. Tech in Mechanical Engineering / B. Tech. in Mechanical Engineering 2023-24**

Semester VIII										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
		Choose any two subjects from ANNEXURE-A#				20	20	60	100	3
						20	20	60	100	3
PROJ-8	BTMP801/ BTMI801	Project OR Internship	-	-	16	60	-	40	100	08
<b>Total</b>			<b>-</b>	<b>-</b>	<b>16</b>	<b>100</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>14</b>

**Vision of the Department**

To be identified as a department with excellence in academics by synergism of teaching- learning, skill development and research.

**Mission of the Department**

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M4: To develop an ability to use techniques, skills, modern software and machine tools necessary in the practice of Mechanical Engineering Profession.



Yashoda Shiksha Prsarak Mandal's

## Yashoda Technical Campus

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NH-4, Wadhe, Satara 415011

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Faculty of Engineering

### Department of Mechanical Engineering

### Semester - VII

### Mechatronics

CO1	Define sensor, transducer and understand the applications of different sensors and transducers
CO2	Explain the signal conditioning and data representation techniques
CO3	Design pneumatic and hydraulic circuits for a given application
CO4	Write a PLC program using Ladder logic for a given application
CO5	Understand applications of microprocessor and micro controller
CO6	Analyse PI, PD and PID controllers for a given application

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	3	2				2	1		1
CO2	3	2			3	3	2				1	3
CO3	1	1		3	3	2	1		3		1	3
CO4	3	3	1	1	3		1	1	1			
CO5	3			1	3	2	3					2
CO6		3	3		3	3	1	1	3			2

### Industrial Engineering and Management

CO1	Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering
CO2	Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
CO3	Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.
CO4	Understand their role as engineers and their impact to society at the national and global context.

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											2	1
CO2									2	2	2	
CO3								2				
CO4								2				2

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#### Elective V

### Design of Air-Conditioning Systems

CO1	Understand the cooling load calculation
CO2	Explain concept of ventilation and its implementation
CO3	Learn duct design applied to real life situation
CO4	Learn and differentiate the various modern air conditioning systems/units

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		2	1	1	1			1	
CO2	3	3				1	2					
CO3	3	3	3	2	2	1	1	1			2	
CO4		1	1	1		1	1	1				

### Biomechanics

CO1	Explain various forces and mechanisms and define Newton's law of motion, work and energy, moment of inertia
CO2	Describe forces and stresses in different human joints
CO3	Discuss bio fluid mechanics in cardiovascular and respiratory system in human body
CO4	Differentiate between hard tissues and soft tissues
CO5	Understand concepts of implants and Identify different techniques used in biomechanics implants

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1			1	1	1	1		1	1
CO2	2	2	2			1	2		1		1	1
CO3	2	2	2			1	1	1	1			1
CO4	1	1	1				1	1	1			1
CO5	1	1	2				1	1			1	1

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Faculty of Engineering

### Department of Mechanical Engineering

## Non-conventional Machining

CO1	Classify Non-conventional machining processes.
CO2	Understand working principle and mechanism of material removal in various non-conventional machining processes.
CO3	Identify process parameters their effect and applications of different processes.
CO4	Summarized merits and demerits of non-conventional machining processes.
CO5	Explain the mechanism to design hybrid processes such as ELID grinding, EDCG, EDCM, etc.
CO6	Understand mechanism and working principle of micro machining using non-conventional processes.

### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1				1		1
CO2	2	2	1		2	1	1			1		1
CO3	2	2	1	1	2	1	1			1		1
CO4	2	2	1		2	1	1			1		1
CO5	3	2	1	1	2	2	1			1		1
CO6	2	2	1	1	1	2	1			1		1

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Faculty of Engineering

## Department of Mechanical Engineering

### Advanced IC Engines

CO1	Define and Distinguish between Spark ignition and Compression ignition system. Describe Air- fuel supply systems in ic engines.
CO2	Identify and Demonstrate normal and abnormal combustion in combustion chambers of IC engines. According to which able to analyse and Design combustion chambers.
CO3	Recognize and discuss engine emissions formation, effects and various methods to reduce emissions and their measuring equipment's.
CO4	Understand combustion and emission characteristics of an alternative energy sources and suggest appropriate applications of alternative fuels such as bio diesels, natural gas, LPG, hydrogen, etc. and their Engine modifications for using these fuels.
CO5	Apply and interpret with the recent trends IC engine techniques such as HCCI, CRDI, GDI, etc. with latest measuring equipments.

### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		1		1							
CO2		2	3									
CO3		1				2	2					
CO4		1		2	1		1					
CO5					2	2	1					

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### Department of Mechanical Engineering

### Additive Manufacturing

CO1	Understand the importance of Additive Manufacturing
CO2	Classify the different AM processes
CO3	Design for AM processes
CO4	Understand the applications of AM
CO5	Differentiate the post processing processes

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2					1
CO2	2	2	3	3	3	3	1					1
CO3	2	2	3	3	3		2					1
CO4	3	3	3	2	2	2	2					1
CO5	2	3	3	2	2	2	2					1

### Surface Engineering

CO1	Learn the importance and need of surface engineering
CO2	Describe various surface cleaning and modification techniques
CO3	Understand the concepts of surface integrity
CO4	Compare various surface coating technologies
CO5	Select appropriate method of coating for a given application
CO6	Apply measurement techniques and carry out characterization of coated surfaces.

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		1							1		1
CO2	2				2							
CO3	2	2	1	2						1		
CO4	2				1	1		1		1		
CO5	2	2	1		1		1	1	1	1	1	
CO6	2	2	1	2	2			1	1	1		

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### Department of Mechanical Engineering

## Stress Analysis

CO1	Explain the concept of stress, strain & their relationships & will also be able to choose suitable coordinate system for problems of stress analysis.
CO2	Explain the concept of Plane stress, plane strain, Stress & Strain at a point & will be able to derive the differential equation of equilibrium, Compatibility equation.
CO3	Apply the concept of stress function to solve the stress analysis problems involving simple components in Cartesian & Polar coordinate systems.
CO4	Explain basic principles of optics, describe polariscope & explain the effect of stressed model on behaviour of light vector in polariscope, compensation technique, separation techniques & Stress Freezing in photoelasticity
CO5	Describe various types of strain gage. Will be also able to describe & apply the theory of Wheatstone bridge for strain measurement using strain gages & to explain the technique for measurement of strain & stresses in rotary components.
CO6	Describe other techniques like Grid technique & Brittle coating method

### Mapping of Course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										1
CO2	2	2										1
CO3	2	3	3	2								1
CO4	2	1										1
CO5	1	2	1	1								1
CO6	1	2										1

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## **Department of Mechanical Engineering**

### **Open Elective-III**

### **Sustainable Development**

CO1	Explain the difference between development and sustainable development
CO2	Explain challenges of sustainable development and climate change
CO3	Explain sustainable development indicators
CO4	Analyze sustainable energy options
CO5	Understand social and economic aspects of sustainable development

### **Mapping of course outcomes with program outcomes**

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3		2	3	3	3	2	2		2
CO2	1	1	3	1	2	3	3	3	2	2		2
CO3	2	1	1				3	2		1		2
CO4	3	3			2	3	3	2				1
CO5			3			2	3	2				1

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## Department of Mechanical Engineering

### Entrepreneurship Development

CO1	enlarge the supply of entrepreneurs for rapid industrial development
CO2	Develop small and medium enterprises sector which is necessary for generation of employment
CO3	Industrialize rural and backward regions
CO4	Provide gainful self-employment to educated young men and women
CO5	Diversify the sources of entrepreneurship.

### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									2			
CO2									2			
CO3											2	
CO4											2	3
CO5												3

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Faculty of Engineering

### Department of Mechanical Engineering Plant Maintenance

CO1	Recognize and enlist probable failures in mechanical elements.
CO2	Dismantle, assemble and align mechanisms in sequential order for given assembly.
CO3	Compare maintenance practices like on-line, shut down, corrosion, productive and preventive maintenance.
CO4	Analyze economics of plants and list factors affecting the maintenance of a plant.
CO5	Correlate the linkages between different maintenance aspects and how they impact on overall maintenance effectiveness.
CO6	Analyze different maintenance techniques and select an appropriate technique for a particular plant.

#### Mapping of course outcomes with program outcomes:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		PO11	PO12
CO1		2	2		1	2	1	1	2			2
CO2	2			1	1	2	2					2
CO3	2	2	1	1	1		1	1	1			
CO4	1	1		2	1	2	1		2		1	2
CO5	2	2			1	2	2				1	2
CO6	1					1					1	1

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## Open Elective-IV Engineering Economics

CO1	Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, Benefit-cost ratio.
CO2	Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
CO3	Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
CO4	Compute the depreciation of an asset using standard Depreciation techniques to assess its impact on present or future value.
CO5	Apply all mathematical approach models covered in solving engineering economics problems: mathematical formulas, interest factors from tables, Excel functions and graphs. Estimate reasonableness of the results.
CO6	Examine and evaluate probabilistic risk assessment methods.
CO7	Compare the differences in economic analysis between the private and public sectors. Recognize the limits of mathematical models for factors hard to quantify.
CO8	Develop and demonstrate teamwork, project management, and professional communications skills

### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											3	
CO2											3	
CO3											3	
CO4											3	
CO5					3						3	
CO6											3	
CO7											3	
CO8									2		3	

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### Biology for Engineers

CO1	Explain origin of life and Evolution, Cells, Biomolecules-Lipids
CO2	Understand Biomolecules
CO3	Understand Cell structure and function and cell cycle
CO4	Explain Mendelian genetics
CO5	Understand and Explain DNA structure, DNA replication, Transcription, Translation

### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3		1		1			1		1
CO2	1	2	3		1		1			1		1
CO3	1	2	3		1		1			1		1
CO4	1	2	3		1		1			1		1
CO5	1	2	3		1		1			1		1

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### Department of Mechanical Engineering

### Intellectual Property Rights

CO1	State the basic fundamental terms such as copyrights, Patents, Trademarks etc.,
CO2	Interpret Laws of copy-rights, Patents, Trademarks and various IP registration Processes.
CO3	Exhibit the enhance capability to do economic analysis of IP rights, technology and innovation related policy issues and firms commercial strategies.
CO4	Create awareness at all levels (research and innovation) to develop patentable technologies.
CO5	Apply trade mark law, copy right law, patent law and also carry out intellectual property audits.
CO6	Manage and safeguard the intellectual property and protect it against unauthorized use.

#### Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											
CO2								1				
CO3		1						1				
CO4										1		
CO5	1							1				
CO6								2				

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