MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: **MECHANICAL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Engineering Mechanics	**Subject Code:** BMECE0-001	**Semester: 3rd**
Credit: 4	**L T P 3 1 0**	**Duration: 60 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Students shall be able to understand problems related to Mechanics	1	1					2		1	1			2	1
CO2	Shall be able to apply this knowledge to find solution of engineering problems			2								2		2	1
CO3	This will make student learning life long	3	3	1					2	3	3	1		2	1
CO4	Students can use knowledge in new areas													2	1

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30% 2. Moderate (Medium) – above 30% and upto70% 3. Substantial (High) – above 70%

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COs, POs, PSOs Mapping

Subject: Mechanical Engineering Lab-I (Design-I)	**Subject Code:** BMECS1-304	**Semester: 3rd**
Credit:1	**L T P 002**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Student will be able to measure the various mechanical properties of various materials.	3	2	1	1	2	1	1	1	2	1	1	1	3	1
CO2	Student will be able to measure the bending stress and deflection in beams.	2	2	3	1	2	1	1		1	1	1	1	2	1
CO3	Student will be able to measure the strain energy and spring stiffness of a helical spring.	2	3	2	1	2	1	1		1	1	1	1	3	1
CO4	Student will be able to calculate load carrying capacity of long columns and their buckling strength.	2	2	3	2	2	1	1		1	1	1	1	2	1

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COs, POs, PSOs Mapping

Subject: STRENGTH OF MATERIAL-I	**Subject Code:** BMECS1-301	**Semester: 3rd**
Credit:4	**L T P 310**	**Duration: 60Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the material properties, stress and strain and application Mohr's circle.	3	1	-	-	-	-	-	-	-	-	1	1	2	2
CO2	Understand, apply, analyse and design the beams using the concept of bending moment, shear force and stress in beams.	3	2	2	2	2	2	2	-	-	-	2	2	2	1
CO3	Understand, apply, analyse and design the beams. Column and struts using the concept of slope, deflection of beams and columns.	3	2	2	2	2	2	2	-	-	-	2	2	3	1
CO4	Understand, apply, analyse and design the shafts and frames using the concept of forces and stresses.	3	2	2	2	2	2	2	-	-	-	2	2	2	1

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COs, POs, PSOs Mapping

Subject: THERMODYNAMICS	**Subject Code:** BMECS1-303	**Semester: 3rd**
Credit:4	**L T P 310**	**Duration: 60Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Ability to apply various thermodynamics laws to real system	3	2					2					1	2	2
CO2	Understanding of the entropy of system and ideal gas equations	3		2				2					1	2	1
CO3	An understanding of the interrelationship between thermodynamic cycles		3	3	2			1					1	3	1
CO4	Ability to use Properties of Pure substances in real thermodynamics problems.		3	2	2									2	1

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COs, POs, PSOs Mapping

Subject: Environmental Science	**Subject Code:** BMNCC0-002	**Semester: 3rd**
Credit:1	**L T P 100**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Technologies based on ecological principles and environmental regulations, which in turn helps in sustainable development.	-	-	3	-	-	2	3	-	-	-	-	-	2	2
CO2	Conceptualize the processes and various factors involved in the formation of environment.	1	-	-	3	-	-	-	-	-	-	-	-	2	1
CO3	Recognize the importance of environment and the sustainable natural resources.	-	-	-	-	-	-	3	-	-	-	-	-	3	1
CO4	Use scientific reasoning to identify and understand environment problems and evaluate potential solution.	3	3	3	-	-	-	-	-	-	-	-	-	2	1

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COs, POs, PSOs Mapping

Subject: FLUID MACHINES	**Subject Code: BMECS1-403**	**Semester: 4th**
Credit:4	**L T P 3 1 0**	**Duration: 60 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Students will be able to learn general concepts of fluid and turbo machinery..	3	3	3	-	-	3	-	-	1	-	-	1	2	1
CO2	Can critically analyze the performance of different types of turbines.	3	3	3	-	-	2	-	-	-	1	-	2	2	1
CO3	Can critically analyze the performance of different types of pumps	3	3	3	-	-	-	-	-	1	1	1	2	2	1
CO4	Can critically analyze working of practical hydraulic systems.	3	3	3	-	-	-	1	-	-	-	3	-	2	1

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COs, POs, PSOs Mapping

Subject: Applied Thermodynamics	**Subject Code:** BMECS1-404	**Semester:** 4th
Credit:4	**L T P 3 1 0**	**Duration: 60 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	The students will get a good understanding of various practical power cycles and heat pump cycles.	3	2	---	---	2	2	2	2	3	--	3	3	3	1
CO2	The students will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors.	3	3	3	3	3	2	3	3	3	---	3	3	2	1
CO3	The students will be able to understand phenomena occurring in high speed compressible flows	3	2	2	3	3	3	2	2	3	--	3	3	3	1

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COs, POs, PSOs Mapping

Subject: MECHANICAL ENGINEERING LABORATORY (THERMAL-I)	**Subject Code:** BMECS1-406	**Semester: 4th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	The students will be able to measure various properties of fluids.	3	3			1				2				2	2
CO2	The students will be able to characterize the performance of fluid/thermal machinery	3	3			2		1		2				2	1

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COs, POs, PSOs Mapping

Subject: Industrial Automation & Robotics (Elective-1	**Subject Code:** BMECS1-E 1.3	**Semester: 4th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the necessity of automation.	3	2	---	---	2	2	2	2	3	--	3	3	2	2
CO2	Implementation of fluid power control elements in modern industry.	3	3	3	3	3	2	3	3	3	---	3	3	2	1
CO3	Design automatic Material handling systems	3	2	2	3	3	3	2	2	3	--	3	3	3	1
CO4	Design and control of robotic manipulators.	3	3	3	3	3	3	2	2	2	--	3	2	2	1

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COs, POs, PSOs Mapping

Subject: Machine Drawing using CAD	**Subject Code:** BMECS1-405	**Semester:** 4th
Credit: 3	**L T P** 1 0 4	**Duration:** 45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To make students understand the principles and requirements of production drawings.	3	-	1	-	-	-	-	-	-	-	1	-	3	2
CO2	To understand how to assemble and disassemble important parts used in major mechanical engineering applications.	3	-	-	-	-	-	-	-	-	1	-	-	1	3
CO3	To understand the better utilization of software like AutoCAD	1	-	-	1	-	1	-	-	1	-	-	2	2	2
CO4	Student gets aware about the free hand drawings of the different joints.	3	1	1	-	-	-	-	-	1	2	-	3	1	2

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COs, POs, PSOs Mapping

Subject: Materials Engineering	**Subject Code:** BMECS1-401	**Semester:** 4th
Credit: 3	**L T P 3 0 0**	**Duration: 45 hrs**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Student will be able to identify crystal structures for various materials and understand the defects in such structures.	3	3	2	3	3	1	1	---	---	--	2	3	1	3
CO2	Understand how to tailor material properties of ferrous and non-ferrous alloys.	3	3	3	1	3	1	2	---	---	---	3	3	2	2

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COs, POs, PSOs Mapping

Subject: STRENGTH OF MATERIAL-II	**Subject Code:** BMECS1-402	**Semester:** 4th
Credit: 4	**L T P** 3 1 0	**Duration:** 60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the concept of strain energy and various theories of failure.	3	1	-	-	-	-	-	-	-	-	1	1	2	1
CO2	Understand, apply, analyse and design the thin and thick cylinders, rotational discs through the concept of stress calculation.	3	2	2	2	2	2	2	-	-	-	2	2	2	2
CO3	Understand, apply, analyse and design the curved beams and beams through the concept of stress calculation in curved beams and shear stress in beams.	3	2	2	2	2	2	2	-	-	-	2	2	3	2
CO4	Understand, apply, analyse and design of open and closed helical spring, leaf spring, flat spiral spring through the concept of calculation of strain energy and stresses.	3	2	2	2	2	2	2	-	-	-	2	2	2	2

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COs, POs, PSOs Mapping

Subject: Automobile Engineering	**Subject Code:** BMECS1 - 503	**Semester:** 5th
Credit: 3	**L T P** 3 0 0	**Duration:** 45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Know the layout, constructional and working of power unit and fuel supply system of an automobile.	3	3	3	1	1	2	2	2	3	2	1	2	1	1
CO2	Know the functioning of lubrication, cooling and suspension system of an automobile.	3	3	3	1	1	2	-	1	3	1	1	2	2	1
CO3	Know construction and working of transmission, steering and braking system of an automobile.	3	3	2	2	1	1	-	2	3	2	1	2	2	1
CO4	Know working of starting and electrical systems of an automobile. Also get knowledge of recent developments in the automobile field.	3	3	3	2	2	2	2	2	3	3	3	3	1	1

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COs, POs, PSOs Mapping

Subject: HEAT TRANSFER	**Subject Code:** BMECS1-501	**Semester: 5th**
Credit: 4	**L T P 3 1 0**	**Duration: 60 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Formulate and analyze a heat transfer problem involving any of the three modes of heat transfer	3	3	2	1	1	2	2	1	2	1	2	2	2	1
CO2	Obtain exact/approximate solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer.	3	3	3	3	2	2	2	1	2	1	2	2	1	1
CO3	Design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.	3	3	3	3	3	2	3	1	2	1	1	2	2	1
CO4	Apply the boiling and condensation heat transfer principles to engineering problems.	2	2	3	3	2	2	3	1	2	1	1	2	1	1

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COs, POs, PSOs Mapping

Subject: Industrial Training	**Subject Code:** BMECS1-507	**Semester:** 5th
Credit: 3	**L T P** 0 0 0	**Duration:** 06 weeks

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Ability to use knowledge to solve industrial problems.	3	3	3	3	2	-	1	-	3	1	-	1	1	2
CO2	Understand general and specific working procedures in the field of engineering.	3	3	3	3	3	2	2	-	2	1	-	1	2	2
CO3	An understanding of the impact of engineering solutions and industrial safety.	2	3	3	3	3	3	3	-	-	1	-	-	2	1
CO4	Ability to communicate effectively in the working environment.	2	2	3	2	2	3	3	1	1	3	1	-	1	1

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Subject: KINEMATICS AND THEORY OF MACHINES	**Subject Code:** BMECS1-504	**Semester:** 5th
Credit: 4	**L T P** 3 1 0	**Duration:** 60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	The primary object of the course is to make the student understand the concept of: displacement, velocity and acceleration of simple mechanisms, cams and cam profiles of various cams, using different followers and motions.	3	2	-	-	1	-	-	-	1	-	-	2	1	2
CO2	The students will able to understand constructional and working features of important machine elements.	3	1	2	1	1	-	-	-	1	-	-	2	2	2
CO3	The students should be able to understand various parts involved in kinematics of machines including balancing of single and multiple rotating masses Gyroscopic motion and couples.	3	2	3	1	3	-	1	-	-	-	-	2	1	1
CO4	The students should be able to understand gear trains, belt rope and chains, and governors	3	2	2	2	2	1	1	-	-	-	-	3	2	1

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COs, POs, PSOs Mapping

Subject: MECHANICAL ENGINEERING LABORATORY-III (MMM & HT)	**Subject Code:** BMECS1-505	**Semester: 5th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 hrs**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Define metrology and apply concept of metrology to engineering applications	3	2	2	3	3	2	2	1	1	2	2	3	3	2
CO2	Understand the basic measurement units and able to calibrate various measuring devices.	3	1	2	3	3	2	1	1	2	3	1	3	1	1
CO3	Use measuring tools such as Sine bar, surface roughness tester, profile projector, Tool Maker Microscope, stroboscope, Micrometer, etc.	3	2	1	3	3	1	1	1	3	3	2	3	2	2
CO4	Perform steady state conduction experiments to estimate temperature distribution and thermal conductivity of different materials	3	3	3	3	3	2	3	1	3	2	2	3	1	2
CO5	Perform transient heat conduction experiments	3	3	3	3	3	2	2	1	3	2	2	3	2	1
CO6	Estimate heat transfer coefficient in natural, forced convection and condensation and boiling process also.	3	3	3	3	3	2	2	1	3	2	2	3	2	1
CO7	Determine surface emissivity of different surfaces and Stefan Boltzmann's constant	3	3	3	3	3	2	2	1	3	2	2	3	2	1

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(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: **MECHANICAL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: MECHANICAL ENGINEERING LABORATORY-IV (AE & TOM)	**Subject Code: BMECS1-506**	**Semester: 5th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 hrs**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To deliver basic knowledge of different components of automobiles	3	3	2	2	2	2	1	-	2	-	2	3	1	1
CO2	To understand functioning of different systems of automobile.	3	2	1	-	1	-	1	-	-	-	-	2	2	2
CO3	To enhance knowledge of fault diagnosis and troubleshooting capabilities of different systems of an automobile.	3	3	3	1	1	1	1	-	-	-	-	2	2	2
CO4	The main objective of the course is to make the student understand regarding link pair and chains, motorized gyroscope, gear and gear trains and Cams, also knowledge of gyroscopic effect, gyroscope active and reactive couple for ships.	3	3	3	3	1	1	1	-	1	1	-	3	2	1

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Department: **MECHANICAL ENGINEERING**
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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Mechanical Measurement & Metrology	**Subject Code:** BMECS1-502	**Semester: 5th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the classification of measurements and measurement standards used in industrial applications. To introduce concepts of linear, angular, roughness thread, gear measurements, limits, fits and tolerances.	3	3	3	2	3	2	2	---	2	--	3	3	2	1
CO2	Understand about various errors in measuring systems and evaluate the errors by statistical methods.	3	3	2	2	3	1	1	---	---	---	3	3	2	1
CO3	Know about functions and types of sensors and transducers and their utility in instrumentation.	3	3	3	---	3	---	---	---	---	---	2	3	1	2
CO4	Use various instruments for measurements like pressure, flow, temperature etc. In process industry manufacturing.	3	3	3	2	3	1	---	---	---	---	2	3	2	1

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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Automation in Manufacturing	**Subject Code:** BMECD1-623	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understanding operating principles and constructional features of hydraulic and pneumatic systems.	3	2	---	---	2	2	2	2	3	--	3	3	1	2
CO2	Choose appropriate PLC and explain the architecture, installation procedures and trouble shooting and can develop PLC programs using various functions of PLCs for a given application.	3	3	3	3	3	2	3	3	3	---	3	3	2	1
CO3	Explain the application development procedures in SCADA and manage data, alarm, storage and can explain the architecture of DCS.	3	2	2	3	3	3	2	2	3	--	3	3	1	2
CO4	Describe the advanced controller elements and program methods.	3	3	3	3	3	3	2	2	2	--	3	2	1	1

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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Design of Machine Elements	**Subject Code:** BMECS1-602	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Concept of machine design and procedure for selection of materials	3	3	3	2	--	--	--	--	--	--	--	3	2	2
CO2	An overview of the design methodologies employed for the design of various machine components	3	3	3	2	--	--	--	--	--	--	--	3	2	1
CO3	Understand the relationship between component level design and overall machine design	3	3	3	3	--	--	--	--	--	--	--	3	1	1
CO4	Understand the concept of design software and their utility/ application for designing of different machine components	3	2	3	--	3	--	--	--	--	--	--	3	2	2

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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Gas Dynamics and Jet Propulsion	**Subject Code:** BMECD1-612	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To apply the concepts of compressible flow.	3	2	---	---	2	2	2	2	3	--	3	3	2	1
CO2	To understand the phenomenon of Shock Waves.	3	3	3	3	3	2	3	3	3	---	3	3	2	2
CO3	To apply gas dynamics principles to jet propulsion.	3	2	2	3	3	3	2	2	3	--	3	3	2	1
CO4	To understand the working of rocket engine and propellants.	3	3	3	3	3	3	2	2	2	--	3	2	1	2

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COs, POs, PSOs Mapping

Subject: Internal Combustion Engines	**Subject Code:** BMECD1-611	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	The basics of IC engines	3	2	---	---	2	2	2	2	3	--	3	3	1	1
CO2	Fuel supply and combustion in IC Engine	3	3	3	3	3	2	3	3	3	---	3	3	2	2
CO3	Engine cooling and lubrication	3	2	2	3	3	3	2	2	3	--	3	3	2	1
CO4	Testing and control of engine emissions.	3	3	3	3	3	3	2	2	2	--	3	2	1	1

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COs, POs, PSOs Mapping

Subject: Major Project	**Subject Code:** BMECS1-605	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Ability to plan and implement an investigative or developmental project given general objectives and guidelines.	3	3	3	2	1	1	1	2	1	1	2	1	1	1
CO2	In-depth skill to use some laboratory, modern tools and techniques.	1	1	1	1	3	2			1		1	2	2	2
CO3	Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.	1	1	3	3	1		1		2	1	2	1	2	1
CO4	Facilitate significant individualized interactions between faculty members and students through a multi-term research experience.	1	1		1		2			3	2	1	1	1	1
CO5	Ability to communicate results, concepts, analyses and ideas in written and oral form.	1	1	1	1		1		2		3	2	1	2	1

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COs, POs, PSOs Mapping

Subject: Manufacturing Technology & Processes	**Subject Code:** BMECS1-601	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Able to apply knowledge of manufacturing processes and the skills to develop and manipulate the operating parameters for a given process.	3	3	3	2	2	2	1	---	---	--	2	3	2	1
CO2	Able to understand processing of plastic and ceramic materials.	3	2	1	2	2	1	2	---	---	---	2	3	2	1
CO3	Ability to understand the latest technologies in casting and welding processes will get increased.	3	3	1	2	3	1	2	---	---	---	3	3	2	2
CO4	Students will be able to come up with innovative conceptual idea about latest manufacturing processes and their industrial applications.	3	3	3	3	2	2	1	---	---	---	2	3	1	1

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COs, POs, PSOs Mapping

Subject: Mechanical Lab- V(MP)	**Subject Code:** BMECS1-603	**Semester: 6th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the different manufacturing and fabrication processes which are commonly employed in the industry, to fabricate components using different materials.	3	3	3	3	2	2	1	---	1	--	2	3	1	1
CO2	Fabricate components with their own hands.	3	3	3	1	3	1	1	---	2	---	2	3	2	1
CO3	Acquire the practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	3	3	1	1	3	1	1	---	---	---	1	3	1	1

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COs, POs, PSOs Mapping

Subject: Mechanical Lab- VI (MSM)	**Subject Code:** BMECS1-604	**Semester: 6th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Analyse the microstructure of different ferrous and non-ferrous samples.	3	3	1	3	3	1	2	2	3	1	1	3	2	1
CO2	Explore the effect of heat treatment on various engineering materials by analysing its microstructure and hardness.	3	3	1	3	3	1	2	2	3	1	1	3	2	1

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COs, POs, PSOs Mapping

Subject: MICROPROCESSORS IN AUTOMATION	**Subject Code:** BMECD1-622	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Define Microprocessor and Microcontroller family and working of 8085 Microcontroller Architecture and Programming model.	3	3	1	3	3	1	2	2	3	1	1	3	2	1
CO2	Understand the programming of 8085 and 8255 microprocessors.	3	3	1	3	3	1	2	2	3	1	1	3	2	1
CO3	Understand the concept of Timer, Interrupt, I/O Port interfacing with 8251/8253 microcontroller and advanced features of 8086/8088.	3	3	1	3	3	1	2	2	3	1	1	3	1	2
CO4	Understand the concept of digital control interfacing with Real time system.	3	3	1	3	3	1	2	2	3	1	1	3	2	1

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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Power Plant Engineering	**Subject Code:** BMECD1-613	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Describe sources of energy and types of power plants.	2	1	1	1	1	2	3	1	1	2	1	2	2	1
CO2	Analyze different types of steam cycles and it's efficiencies in a steam power plant,	3	3	3	3	2	2	2	1	2	3	1	3	2	1
CO3	Describe basic working principles of gas turbine and diesel engine power plants.	2	1	1	1	1	2	3	1	3	2	1	3	1	2
CO4	Define the performance characteristics and components of such power plants.	3	3	3	3	2	2	1	1	3	2	1	3	2	1
CO5	List the principal components and types of nuclear reactors.	2	1	1	1	1	1	1	1	2	2	2	3	2	
CO6	List types, principles of operations, components and applications of steam turbines, Steam generators, condensers, feed water and circulating water systems.	2	2	2	2	2	2	2	1	2	2	2	3	2	
CO7	Estimate different efficiencies associated with power plant systems.	3	3	3	3	2	2	3	1	3	2	2	3	1	1

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COs, POs, PSOs Mapping

Subject: Mechatronic Systems	**Subject Code:** BMECD1-621	**Semester: 6th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the basics and key elements of Mechatronics design process	3	1	1	1	2	2	1	1	2	1	1	3	2	1
CO2	Familiar with basic system modelling	3	1	1	1	3	2	1	1	2	1	1	3	2	1
CO3	Understand the concepts of engineering system and dynamic response of the system	3	2	1	1	3	2	1	1	2	1	1	3	1	2
CO4	Realize the concepts of real time interfacing and data acquisition	3	2	1	1	3	2	1	1	2	1	1	3	2	1

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Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Advanced Fluid Mechanics	**Subject Code:** BMECD1-724	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To develop the solutions of ideal fluid flows	2	2	3	3	1	1			1	1	1	2	2	1
CO2	To apply the knowledge of fluid mechanics governing equation	1	2	3	3	1	1	1	1	1			1	2	1
CO3	To develop solutions for near wall flows	1	3	3	3	2	1	1			1	1	1	2	1
CO4	Apply the mathematical modeling techniques for fluid mechanics problems		3	3		2	2	1					1	2	1

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COs, POs, PSOs Mapping

Subject: Additive Manufacturing	**Subject Code:** BMECD1-713	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the importance of RP technology in view of product development and innovation in various fields.	3	2	---	---	2	2	2	2	3	--	3	3	3	1
CO2	Implement the knowledge, techniques, skills of Product Prototyping and modern tools like CAD.	3	3	3	3	3	2	3	3	3	---	3	3	2	1
CO3	Understand the various RP techniques and manufacturing methods that enable student to provide solution to Rapid prototyping problems.	3	2	2	3	3	3	2	2	3	--	3	3	3	1
CO4	Demonstrate comprehensive knowledge of the broad range of RP tooling, application area of RP and indirect methods of RP tooling production.	3	3	3	3	3	3	2	2	2	--	3	2	2	1

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COs, POs, PSOs Mapping

Subject: Composite Materials	**Subject Code:** BMECD1-722	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Learn various composite materials and their applications.	3	-	2	-	3	2	2	-	-	-	3	3	2	2
CO2	Understand PMC and their processes.	3	-	3	2	3	1	2	-	-	-	3	2	2	1
CO3	Learn about Metal matrix Composites and their processes.	3	1	3	2	1	-	-	-	-	-	2	2	3	1
CO4	Understand to develop Ceramic Matrix Composites.	3	1	2	1	3	-	-	-	-	-	3	3	2	1

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COs, POs, PSOs Mapping

Subject: Computer Aided Design	**Subject Code:** BMECD1-711	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To apply the basics of design software and hardware requirements for designing of mechanical component using computer.	3		3	2	3						3	3	2	2
CO2	Make the representation of curves, surfaces and solids.	3	2	3	1	3						2	2	2	1
CO3	Understand the concepts of visual realism of models and assembly of components.	3	3	3	1	3						3	3	3	1
CO4	Describe CAD Standards and concepts of design of components using FEM.	3	3	1		3						3	3	2	1

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Department: **MECHANICAL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: B Tech Mechanical Engineering

COs, POs, PSOs Mapping

Subject: Heat exchanger Design	**Subject Code:** BMECD1-714	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the basic concept and design methodology of heat exchangers.	3	2	3	1	1		2					2	3	2
CO2	Predict the thermal performance important heat-exchanger design parameters due to fouling.	1	3	2	2	2		1						1	3
CO3	Determine general design requirements for different types of heat exchangers.	2	2	3	2	1		1				2	1	2	2
CO4	Analyze performance evaluation of different heat exchanger and phase change heat exchangers	1	2	2	2	1		1		1		1	1	1	2

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COs, POs, PSOs Mapping

Subject: Industrial Training	**Subject Code:** BMECS1-704	**Semester: 7th**
Credit: 3	**L T P 0 0 0**	**Duration: Six Weeks**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To enable students to implement Project Planning in their Industrial In-plant Training Project work.	2	3	3	3	3	1	1	-	1	1	-	-	1	3
CO2	To understand the concept of Facility, Location & Layout & implement in Industry.	1	1	-	-	-	3	3	-	2	1	1	1	2	2
CO3	Develop the ability to work as an individual and in group with the capacity to be a leader or manager as well as an effective team member.	1	-	1	1	1	3	3	3	3	2	2	2	1	2
CO4	Master the professional and ethical responsibilities of an engineer.	-	-	-	1	-	3	2	3	3	3	2	1	2	3

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COs, POs, PSOs Mapping

Subject: MECHANICAL ENGINEERING LABORATORY-VII	**Subject Code:** BMECS1-702	**Semester: 7th**
Credit: 1	**L T P 0 0 0 2**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To model machine parts, its assembly and design analysis using software.	3	3	2	1	2	-	-	-	-	-	-	2	2	1
CO2	To learn the modeling of geometrical transformations, curves, surfaces and solids.	3	2	3	2	2	1	1	-	-	1	-	2	2	2
CO3	To understand the part programming for CNC Machines.	3	3	2	1	3	-	-	-	-	-	-	3	3	2
CO4	To learn the programming of robots	3	3	1	1	1	-	-	-	-	-	-	2	2	2

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COs, POs, PSOs Mapping

Subject: Mechanical Vibrations	**Subject Code:** BMECD1-723	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	The student will be able to understand fundamental principles, types and applications of mechanical vibrations and their measuring instruments.	3	2											2	1
CO2	The student will be able to understand and solve for natural frequency of single degree of freedom system with free, damped and forced vibrations.	3	3	1	1		1							2	2
CO3	The student will be able to understand and solve for natural frequency of two degree and multi-degree of freedom systems.	3	3	1	1		1							3	2
CO4	The student will be able to understand vibrations in continuous systems such as string, bars, beams and circular shafts.	3	2											2	1

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COs, POs, PSOs Mapping

Subject: Non-Destructive Testing	**Subject Code:** BMECD1-721	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Explore Basic principles, scope and applications of Non-Destructive Testing technique.	3	2	2	1	3	3	3	---	---	--	2	3	2	2
CO2	Apply fundamental concepts of Non-Destructive Testing to select the appropriate technique for a given application.	3	3	2	3	3	1	2	---	1	---	2	3	3	2
CO3	Detect any defects in ferrous and nonferrous metals, plastics by utilizing underling principle of Ultrasonic testing.	3	3	2	3	3	2	1	---	1	---	2	3	3	2
CO4	Distinguish various nondestructive techniques, advantages and disadvantages of individual technique. Even more, will be able to interpret the concept of radiography.	3	2	3	2	3	2	1	---	---	---	2	3	2	2

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COs, POs, PSOs Mapping

Subject: Mechanical Engineering Laboratory-VIII	**Subject Code:** BMECS1-703	**Semester: 7th**
Credit: 1	**L T P 0 0 2**	**Duration: 30 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the fundamental principles of refrigeration and air conditioning system.	3	2	2	1	1	-	-	-	-	-	-	2	2	2
CO2	Compute the cooling capacity and coefficient of performance by conducting test on vapour compression and vapour absorption refrigeration systems.	3	3	3	2	1	-	-	-	1	-	-	2	2	2
CO3	Calculate cooling load for air conditioning systems used in large buildings.	3	3	3	3	2	2	1	-	1	-	-	2	2	1
CO4	Will explore the psychometric concept during visit to a central Air conditioning plant and further apply this concept in performance testing of window type room air conditioner.	3	2	2	2	2	2	-	-	-	-	-	2	2	2

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COs, POs, PSOs Mapping

Subject: Refrigeration and Air conditioning	**Subject Code:** BMECS1-701	**Semester: 7th**
Credit: 3	**L T P 3 2 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the fundamental principles, operate, and analyze the refrigeration and air conditioning systems.	3	3	2	-	1	-	-	-	2	-	-	-	3	2
CO2	Compute cooling capacity and coefficient of performance of various refrigeration systems.	3	3	3	2	1	-	-	-	2	-	-	-	2	2
CO3	Present the properties, applications, environmental issues of different refrigerants	3	1	-	-	2	2	3	-	1	-	-	-	2	1
CO4	Calculate cooling load for air conditioning systems used for various applications.	3	3	3	2	2	-	-	-	1	-	-	-	2	2

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COs, POs, PSOs Mapping

Subject: PROCESS PLANNING AND COST ESTIMATION	**Subject Code:** BMECD1-812	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand various contributing factors in process planning.	3	1	1	1	1	3	-	-	1	1	3	3	2	2
CO2	Estimate various cost elements.	3	3	3	2	3	2	-	-	2	1	3	3	2	2
CO3	Estimate machining time.	3	3	3	2	3	2	-	-	2	1	3	3	2	2
CO4	Estimate the production cost.	3	3	3	2	3	2	-	-	2	1	3	3	2	2

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COs, POs, PSOs Mapping

Subject: Energy Conservation and Management	**Subject Code:** BMECD1-815	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Analyse the energy and power scenario prevalent to the world.	3	3	3	3	3	3	3	-	3	1	3	3	2	2
CO2	Understand the concept of HT & LT supply and the concept of lighting.	3	3	3	2	3	2	3	-	2	1	3	3	2	2
CO3	Learn the consumption pattern of power in thermal systems.	3	3	3	2	3	2	3	-	2	1	3	3	2	2
CO4	Understand the power consumption pattern in major utilities.	3	3	3	2	3	2	3	-	2	1	3	3	2	2

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COs, POs, PSOs Mapping

Subject: Operations Management	**Subject Code:** BMECD1-822	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the fundamental theory of operation management and various stages of product design and development.	1										2	2	2	3
CO2	Make forecasts in the manufacturing and service sectors using selected quantitative and Qualitative techniques.	1	2	2		2				1		2	2	2	2
CO3	Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.	1	2	3	3	3	2			1		2	2	2	2
CO4	Understand the role of information system in quality control.	1									2			1	2

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COs, POs, PSOs Mapping

Subject: Operations Research	**Subject Code:** BMECD1-821	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the concept of linear programming.	3	2		2	2								2	3
CO2	Solve Transportation and Assignment Problems.	3	2		2	2								2	2
CO3	Apply the concept of queuing and network modeling.	3	2		2	1								2	2
CO4	Employ non-linear programming model, inventory model and game theory.	3	1		1									1	1

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COs, POs, PSOs Mapping

Subject: Sustainable Manufacturing	**Subject Code:** BMECD1-823	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand concept of sustainability and sustainable manufacturing.	2					2	3						2	2
CO2	Learn the concept of Green Manufacturing and Environmental impact assessment.	2				2		3						2	2
CO3	Apply the concept of lean principles and implementation.	2	2					3						2	2
CO4	Understand the concept of product recovery management.	2						3						1	1

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COs, POs, PSOs Mapping

Subject: Total Quality Management	**Subject Code:** BMECD1-813	**Semester: 7th**
Credit: 3	**L T P 3 0 0**	**Duration: 45 Hrs.**

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the concept of Quality and the implication of Quality on Business.	1		2		2	2			3		2	2	2	2
CO2	Apply total quality management principles and processes.	1	2	2	1	3				3		1	3	2	2
CO3	Apply TQM tools and techniques and performance measures.	1	2	3	2	3				2		2	2	2	2
CO4	Get the knowledge of new developments in ISO 9000 and overview of other sector specific quality standards.	1	2				1					2	3	1	2

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