

22MPC722	REFRIGERATION AND AIR CONDITIONING (Use of Approved Refrigeration And Air Conditioning Data Book is permitted)	SEMESTER VII
----------	---	--------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO'S Mapped
CO1	Identify the refrigeration and air conditioning system.	PO1, PO2, PO4, PO5, PO6. PO12
CO2	Select appropriate refrigerant and components for cooling system.	PO1, PO2, PO4, PO5, PO6. PO12
CO3	Apply the knowledge for refrigeration and air conditioning system needs.	PO1, PO2, PO3, PO4, PO5, PO6. PO12
CO4	Analyze various cooling systems.	PO1, PO2, PO3, PO4, PO5, PO6. PO12
CO5	Estimate the characteristics of the cooling systems.	PO1, PO2, PO3, PO4, PO5, PO6. PO12
CO6	Design the necessary cooling systems for the any application.	PO1, PO2, PO3, PO4, PO5, PO6. PO12

COURSE ARTICULATION MATRIX:

2) CO and PO Mapping

Cos/Pos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C01	1	2		2	1	2						1	1	2	3
C02	1	2		2	1	2						1	1	2	3
C03	1	2		2	1	2	1					1	1	2	3
C04	1	2	3	3	1	2	1					1	1	2	3
C05	1	2	3	3	1	2	2					1	1	2	3
C06	1	2	3	3	1	2	2					1	1	2	3
22MPC722	1	2	1.5	2.5	1	2	1					1	1	2	3

22MPC723	COMPUTER AIDED DESIGN AND MANUFACTURING	SEMESTER VII
----------	---	--------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO's Mapped
CO1	Apply computer graphics principles to perform 2D and 3D geometric transformations and demonstrate their industrial applications through seminar presentations.	PO1, PO2,PO3,PO4,PO5,PO11,PO12
CO2	Develop mathematical models for curves, surfaces, and solid models using geometric modeling techniques and interpret their applications through engineering case studies.	PO1, PO2,PO3,PO4,PO5,PO11,PO12
CO3	Analyze visual realism techniques, CAD standards, and product data exchange methods for effective computer-aided design and manufacturing applications.	PO1, PO2,PO3,PO4,PO5,PO11,PO12
CO4	Apply the concepts of Group Technology, Computer-Aided Process Planning, and Flexible Manufacturing Systems to improve manufacturing productivity by analyzing industrial case studies.	PO1, PO2,PO3,PO4,PO5,PO9,PO11,PO12
CO5	Evaluate production planning and control techniques, including MRP, ERP, inventory management, and lean production, and effectively present solutions and emerging manufacturing practices through seminars and case studies.	PO1, PO2,PO3,PO4,PO5,PO9,PO11,PO12
Bloom's Taxonomy Mapped : Remembering (K1), Understanding (K2), Applying (K3), Analyzing(K4),Evaluating (K5), Creating (K6)		

COURSE ARTICULATION MATRIX:

COs/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	1	3						1	1	2		
CO2	2	2	3	1	3						1	1	2		
CO3	1	2	3	1	3						1	1	2		
CO4	1	2	3	1	2				1		2	2	2		2
CO5	1	2	3	2	2				1		2	2	2		2
22MPC723	1.4	1	3	1.2	2.6	-	-	-	1	-	1.8	1.8	2	-	2

22MPC724	AUTOMATION LABORATORY	SEMESTER VII
-----------------	------------------------------	---------------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO's Mapped
CO1	Apply pneumatic and electro-pneumatic principles to design and implement directional and speed-control circuits for industrial actuators.	PO1, PO2,PO3,PO4,PO5,PO9,PO10, PO11
CO2	Analyze sequential and cascading electro-pneumatic circuits to develop automated industrial operations.	PO1, PO2,PO3,PO4,PO5,PO9,PO10, PO11
CO3	Apply programming and operational techniques to control multi-axis robotic systems for industrial applications.	PO1, PO2,PO3,PO4,PO5,PO9,PO10, PO11
CO4	Apply IoT and LoRaWAN technologies to configure and implement systems for industrial monitoring and automation.	PO1, PO2,PO3,PO4,PO5,PO9,PO10, PO11
CO5	Analyze machine vision systems and implement vision-based solutions for automated inspection and colour-sorting applications.	PO1, PO2,PO3,PO4,PO5,PO9,PO10, PO11
Bloom's Taxonomy Mapped : Applying (K3), Analyzing(K4)		

COURSE ARTICULATION MATRIX:

COs/ POs	PO 1	PO2	PO3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2				1	1	1	3		
CO2	3	3	3	2	2				1	1	1	3		
CO3	2	2	3	2	3				2	1	1	2		
CO4	2	2	2	2	3				2	2	1	2		
CO5	2	3	3	3	3				2	1	1	2		
22MPC724	2.4	2.4	2.8	2.2	2.8	-	-	-	1.6	1.2	1	2.4	-	-

22MPC512	HEAT AND MASS TRANSFER (Use of Approved Heat and Mass Transfer Data Book is permitted)	SEMESTER V
----------	---	-------------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO's Mapped
CO1	Explain the fundamental principles and modes of heat and mass transfer, including conduction, convection, radiation, and diffusion, through theoretical concepts and seminar presentations on industrial applications.	PO1,PO2,PO3, PO4,PO5,PO6 PO9,PO11
CO2	Apply heat and mass transfer principles to determine heat transfer coefficients, temperature distributions, and diffusion characteristics for engineering problems and analyze relevant case studies.	PO1,PO2,PO3, PO4,PO5,PO6 PO9,PO11
CO3	Analyze the performance and operating characteristics of heat transfer equipment such as heat exchangers, condensers, boilers, evaporators, and calandrias using engineering principles and industrial case studies.	PO1,PO2,PO3, PO4,PO5,PO6 PO9,PO11
CO4	Design and evaluate heat and mass transfer equipment by applying energy and mass balance concepts to solve real-world engineering problems.	PO1,PO2,PO3, PO4,PO5,PO6 PO9,PO11
CO5	Evaluate and recommend appropriate mass transfer operations and separation equipment by determining transfer units, stage requirements, and process performance, and effectively communicate findings through technical seminars and case study presentations.	PO1,PO2,PO3, PO4,PO5,PO6 PO9,PO11
Bloom's Taxonomy Mapped: Remembering (K1), Understanding (K2), Applying (K3), Analyzing (K4), Evaluating (K5), Creating (K6).		

COURSE ARTICULATION MATRIX:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	1	2	1	-	-	1	-	1	1	1	2	-
CO2	1	2	2	2	1	1	-	-	1	-	1	1	1	3	-
CO3	1	3	3	2	2	1	-	-	1	-	1	1	1	2	-
CO4	1	3	2	1	1	1	-	-	1	-	1	1	1	3	-
CO5	1	3	3	2	2	1	-	-	1	-	1	1	1	2	-
22MPC512	1	2.6	2.6	1.6	1.6	1	-	-	1	-	1	1	1	2.4	-

22MPC513	DESIGN OF MACHINE ELEMENTS (Use of Approved Design Data Book is permitted)	SEMESTER V
----------	--	-------------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO'S MAPPED
CO1	Evaluate machine elements subjected to complex static, bending, and eccentric axial loads. Apply principal stress equations and static failure theories to select appropriate engineering materials, tolerances, and fits for a given mechanical component, presenting findings via a structured technical seminar.	PO1, PO2, PO3, PO4, PO9, PO10, PO12
CO2	Formulate design solutions for transmission shafts under single and multi-plane fatigue loading. Predict component lifespan using fatigue life relations (Goodman, Soderberg, and Gerber criteria), account for stress concentration and notch sensitivity, and defend design choices through a comparative case study presentation.	PO1, PO2, PO3, PO4, PO6, PO9, PO10, PO12
CO3	Design and optimize energy-storing elements—including helical, torsional, and leaf springs, as well as heavy-duty flywheels for engines and punching presses. Students will demonstrate competency by executing a team project that utilizes analytical modelling or finite element analysis (FEA) software to validate stress limits in rims and arms.	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO10, PO11, PO12
CO4	Analyze the structural integrity of bolted, cotter, knuckle, and riveted, welded, and adhesive joints under both static and variable (eccentric) loading conditions. Evaluate failure modes for pressure vessels and joint assemblies through industrial failure case studies.	PO1, PO2, PO3, PO4, PO6, PO7, PO8, PO9, PO10, PO12
CO5	Design critical IC engine components (connecting rods and crankshafts) and rigid/flexible couplings matching exact power transmission requirements. Select appropriate rolling and sliding contact bearings from manufacturer catalogs using dynamic load ratings and reliability factors to fulfill an end-of-course design project.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

COURSE ARTICULATION MATRIX:

a) CO and PO Mapping															
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	—	—	—	—	1	3	—	2	3	—	3
CO2	3	3	3	2	—	1	—	—	2	3	—	2	3	2	3
CO3	3	3	3	2	3	—	1	—	3	2	2	2	3	3	3
CO4	3	3	3	3	—	2	1	2	2	3	—	2	3	—	3
CO5	3	3	3	2	2	1	1	1	3	3	2	3	3	3	3
22MPC513	3	3	2.8	2.2	2.5	1.3	1	1.5	2.2	2.8	2	2.2	3	2.6	3

22MPC514	DYNAMICS OF MACHINES	SEMESTER V
----------	----------------------	------------

COURSE OUTCOMES: On completion of the course, the students will be able to:		PO's Mapped
CO1	Explain the principles of force analysis, governors, gyroscopic effects, balancing, and vibrations in mechanical systems.	
CO2	Apply the principles of force analysis and controlling mechanism of forces to solve mechanical engineering problems	PO1, PO12
CO3	Analyze the dynamic behavior of mechanical systems involving force analysis, balancing, governors, gyroscopic effects, and vibrations.	PO2, PO12
CO4	Design solutions for mechanical systems with control mechanisms for vibration and process control.	PO3, PO12
CO5	Simulate mechanical problems involving force analysis, balancing, governors, gyroscopic effects, and vibrations with modern tools.	PO4, PO5, PO12
CO6	Communicate technical concepts related to force analysis, balancing, governors, gyroscopic effects, and vibrations through seminar presentations	PO7, PO9, PO11, PO12
Bloom's Taxonomy Mapped: Remembering (K1), Understanding (K2), Applying (K3), Analyzing (K4), Evaluating (K5), Creating (K6).		

COURSE ARTICULATION MATRIX:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	2	3	2	3
CO3	-	3	-	-	-	-	-	-	-	-	-	2	2	1	-
CO4	-	-	3	-	-	-	-	-	-	-	-	2	2	1	-
CO5	-	-	-	3	3	-	-	-	-	-	-	2	2	1	3
CO6	-	-	-	-	-	-	3	-	3	-	3	2	2	2	3
22MPC514	3	3	3	3	3	-	3	-	3	-	3	2	2.2	1.4	3

