U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2025 Semester End Main Examinations

Programme: B.E. **Semester: II**

Branch: Common to all Branches **Duration: 3 hrs.**

Course Code: 23ME2ESEME / 22ME2ESEME **Max Marks: 100**

Course: Elements of Mechanical Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Describe the any five thermodynamic properties of a steam.	*CO1*	*PO1*	**10**
	b)		Explain the flat plate solar collector with the help of neat sketch.	*CO1*	*PO1*	**10**
			OR			
2	a)		With neat sketch describe the hydel power plant.	*CO1*	*PO1* *PO7*	**10**
	b)		With neat sketch describe the wind power plant.	*CO1*	*PO1* *PO7*	**10**
			UNIT - II			
3	a)		Describe the construction and working of Francis turbine with neat sketch.	*CO2*	*PO1* *PO7*	**10**
	b)		With neat sketch explain the construction and working of single stage centrifugal pump.	*CO2*	*PO1* *PO7*	**10**
			OR			
4	a)		With a neat sketch explain the electric arc welding.	*CO2*	*PO1* *PO7*	**10**
	b)		Explain briefly different modes of heat transfer. Write any three differences between active cooling and passive cooling.	*CO2*	*PO1* *PO7*	**10**
			UNIT - III			
5	a)		With neat sketch describe the 4-stroke Petrol engine. Also show the cycle on the *P-V* diagram.	*CO2*	*PO1* *PO7*	**10**
	b)		A four stroke I.C. engine with a mechanical efficiency of 67% at 450 rpm has a bore diameter of 100 mm and stroke length of 120 mm. The indicator diagram details are: area of the diagram 4cm^2,	*CO2*	*PO1* *PO7*	**10**

			length of indicator diagram 6.5 cm the spring value of the spring used is 10 bar/cm. calculate: (i) Mean effective pressure (MEP), (ii) Indicated power and (iii) Brake power of the engine.			
			OR			
	6	a)	Describe the core components of hybrid vehicle with sketch.	*CO2*	*PO1*	**10**
		b)	With neat sketch describe the vapour absorption refrigeration system.	*CO2*	*PO1*	**10**
			UNIT - IV			
	7	a)	An engine shaft running at 120 rpm is required to drive a machine shaft by means of belt. The pulley on the engine shaft is 0.8m diameter and that of the machine shaft is 0.4m diameter. Determine the speed of the machine shaft when (i) Thickness of the belt is negligible, (ii) Considering the thickness of the belt as 5mm. (iii) Considering the thickness of the belt as 5mm and a slip of 3%.	*CO3*	*PO1*	**10**
		b)	With a neat sketch explain compound gear train. List any five advantages and disadvantages of gear drives.	*CO3*	*PO1*	**10**
			OR			
	8	a)	A simple gear train is made up of 4 gears A, B, C & D having 20, 40, 60 & 70 teeth respectively. If gear A is the main driver rotating at 500 rpm clockwise, sketch the gear arrangement and calculate the following: (i) Speeds of intermediate gears, (ii) speed and direction of the last follower and (iii) train value.	*CO3*	*PO1*	**10**
		b)	With a neat sketch describe the anatomy of robot.	*CO3*	*PO1*	**10**
			UNIT - V			
	9	a)	Describe the following lathe operations: (i) Turning, (ii) Facing (iii) Taper turning and (iv) Knurling.	*CO4*	*PO3*	**10**
		b)	Explain the components of the CNC with a block diagram and list any three advantages of CNC.	*CO4*	*PO3*	**10**
			OR			
	10	a)	What is 3D printing? Explain the steps involved in 3D printing.	*CO4*	*PO3*	**10**
		b)	With the help of neat sketch explain the open loop and closed loop control systems.	*CO4*	*PO3*	**10**

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