U.S.N.										

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

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 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)	Define the following and represent the same on temperature enthalpy diagram (i) dryness fraction at x = 0.5, (ii) dry saturated steam, (iii) sensible heat, (iv) enthalpy of wet steam, and (v) enthalpy of superheated steam.	*CO1*	*PO1*	**10**
	b)	Explain with a neat schematic construction and working of concentrated and non-concentrated solar collector. Also list the advantages and disadvantages of solar energy (two each).	*CO1*	*PO1*	**10**
		UNIT - II			
2	a)	Enumerate the classification of hydraulic turbine.	*CO1*	*PO1*	**04**
	b)	You have been given two tasks: (i) connect the integrated circuits (ICs) by mounting onto the surface of the PCB and with the copper traces and (ii) joining copper pipes in a refrigerator to prevent refrigerant leakage. What are the appropriate joining methods for these tasks? Describe the principle of operation of the identified methods with a neat sketch.	*CO1*	*PO1*	**08**
	c)	Draw the neat diagram of a single stage centrifugal pump and explain its construction and working principle.	*CO1*	*PO1*	**08**
		OR			
3	a)	Draw the neat diagram of electric arc welding process and mention its any two disadvantages.	*CO1*	*PO1*	**04**
	b)	With neat sketch explain the working principle of Francis turbine (sketch of any one view is sufficient). Also mention the function of its important components.	*CO1*	*PO1*	**08**
	c)	What is heat transfer? Briefly explain the laws that governs the modes of heat transfer. Also give two real time examples where heat transfer process is taking place.	*CO1*	*PO1*	**08**

			UNIT - III			
	4	a)	Draw the neat block diagram of electric vehicle and electric hybrid vehicle (NO explanation).	*CO1*	*PO1*	**04**
		b)	With a neat labelled diagram explain the different strokes of constant pressure heat addition process-based IC engine.	*CO1*	*PO1*	**08**
		c)	With a neat schematic explain the construction and working of vapor compression refrigeration cycle?	*CO1*	*PO1*	**08**
			UNIT - IV			
	5	a)	The sum of diameter of two pulleys is 1000 mm and the pulleys are connected by a open belt drive. If the pulleys rotate at 600 rpm and 1800 rpm, find the diameter of each pulley (Hint: it is not given which pulley has which speed, get the answer for both cases).	*CO3*	*PO2*	**04**
		b)	With a neat sketch explain the following gear drives (i) spur gear, (ii) bevel gear.	*CO1*	*PO1*	**08**
		c)	Explain with net sketch (i) cartesian and (ii) articulated robot configurations which specifies the possible movement of the robots.	*CO1*	*PO1*	**08**
			OR			
	6	a)	A simple gear train of wheels consists of 4 gears A, B, C and D having 20, 40, 60 and 70 teeth respectively. Gear A is mounted on driving shaft, while gear D on the driven shaft. Gears B and C are idler gears. If gear A rotates at 500 rpm in clockwise direction, calculate (i) speed and direction of gear D, (ii) velocity ratio and train value of the gear train. Also sketch arrangement of the gear train using simple circles.	*CO3*	*PO2*	**04**
		b)	Explain the working principle of open and cross belt drive with a neat sketch. Also enumerate any two differences between them.	*CO2*	*PO1*	**08**
		c)	With a neat diagram, illustrate the anatomy of a robot and describe the function of each part in detail. Also list advantages and disadvantages (two each).	*CO1*	*PO1*	**08**
			UNIT - V			
	7	a)	With a neat flow chart describe the steps involved in an additive manufacturing	*CO1*	*PO1*	**04**
		b)	What is a machine tool? Identify and describe the following operations performed on a machine tool: (i) to enlarge the size of a previously formed hole by a small amount but with a high degree of accuracy to leave smooth sides. (ii) reduce the diameter of given cylindrical rod uniformly all along the length.	*CO1*	*PO1*	**08**
		c)	With a neat block diagram explain the open and closed loop control system. Also list advantages and disadvantages of both control system (two each).	*CO1*	*PO1*	**08**

****