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

Autonomous Institute Affiliated to VTU

February / March 2024 Semester End Main 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.

				CO	PO	Marks
			UNIT - I	**CO**	**PO**	**Marks**
1	a)		Differentiate between renewable and non-renewable energy resources (any four).	CO2	PO1	**4**
	b)		Define the following with the help of the Temperature - Enthalpy diagram: (i) Sensible heat, (ii) Latent heat, (iii) Saturation temperature, (iv) Dryness fraction, (v) Enthalpy of wet steam and (vi) Enthalpy of superheated steam.	CO1	PO1	**8**
	c)		Explain the construction and working of horizontal axis wind turbine with a neat sketch.	CO1	PO1	**8**
			UNIT - II			
2	a)		List any four differences between brazing and soldering processes	CO2	PO1	**4**
	b)		With the help of neat sketch explain the construction and working principle of Pelton turbine.	CO1	PO1	**8**
	c)		List the different modes of heat transfer with an example and explain the modes of heat transfer with governing equations.	CO1	PO1	**8**
			OR			
3	a)		With the help of simple sketch explain the principle of heat transfer in automobile radiator.	CO1	PO1	**4**
	b)		Explain the electric arc welding process with a help of neat sketch	CO1	PO1	**8**
	c)		With a neat sketch of explain the working principle of single stage centrifugal pump.	CO1	PO1	**8**
			UNIT - III			
4	a)		The following observations were obtained during a trial on a four-stroke diesel engine: Cylinder diameter is 25 cm, stroke of the piston is 40 cm, crankshaft speed is 250 RPM. The spring balance reading shows 30 kg while the load applied on the brake drum is 100 kg. Brake drum radius is 0.95 m, radius of rope is 0.05 m, area	CO3	PO1	**10**

		of indicator diagram is 3 cm^2, length of indicator diagram is 5 cm, engine indicator spring constant is 100 N/cm^2/cm. Determine: (i) Mean effective pressure acting on piston, ii) Indicated power, (iii) Torque available at crankshaft, (iv) Brake power, (v) Friction power and (vi) Mechanical efficiency.			
	c)	Explain the working principle of vapour compression refrigeration system with a neat sketch.	CO1	PO1	10
		UNIT - IV			
5	a)	A shaft running at 100 rpm is to drive a parallel shaft at 150 rpm. The pulley on the driving shaft is 35 cm in diameter. Find (i) Velocity ratio, (ii) Diameter of the driven pulley and (iii) Linear velocity of the belt.	CO3	PO1	4
	b)	List the different types of gear drives. Explain briefly following types of gear drives with the help of neat sketch. (i) Gear used to convert rotary motion into linear motion. (ii) Gears used when the axes of the two shafts are inclined to one another and intersects each other.	CO1	PO1	8
	c)	Define robot and explain the robot anatomy with the help of neat sketch.	CO1	PO1	8
		OR			
6	a)	Differentiate between open and crossed belt drives (any four).	CO2	PO1	4
	b)	A compound gear train consists of 4 gears, A, B, C and D, and they have 20, 30, 40 and 60 teeth respectively. Gear A is keyed to the driving shaft, and gear D is keyed to the driven shaft, Gear B and C are compound gears, where gear B meshes with gear A, and gear C meshes with gear D. Gear A rotates at 180 rpm in clockwise direction. showing the sketch of gear arrangement, find: (i) Velocity ratio of gear train, (ii) Speed of Gear D, (iii) Direction of rotation of gear D, (iv) Speeds of gears B and C.	CO3	PO1	8
	c)	Explain the following robot configurations with the help of neat sketch. (i) Cartesian robot configuration (ii) Cylindrical robot configuration	CO1	PO1	8
		UNIT - V			
7	a)	List the steps involved in 3D printing	CO1	PO1	4
	b)	Explain the following operations of lathe with the help of neat sketch. (i) Plain turning operation, (ii) Knurling operation.	CO1	PO1	8
	c)	Explain the following with the help of a block diagram. (i) Closed loop control system. (ii) CNC Machine.	CO1	PO1	8

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