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

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E.

Branch: Common to all Branches

Course Code: 22ME2ESEME

Course: Elements of Mechanical Engineering

Semester: II

Duration: 3 hrs.

Max Marks: 100

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

			UNIT - I	CO	PO	Marks
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.	1	a)	Distinguish between conventional and non-conventional sources of energy.	CO1	PO1	04
		b)	Explain with a neat sketch the construction and working of Hydel power plant.	CO1	PO1	10
		c)	Define the following terms (i) Dryness fraction of steam, (ii) Enthalpy of wet steam, (iii) Sensible heat	CO1	PO1	06
			UNIT - II			
	2	a)	Explain with a neat sketch the working of a Pelton wheel.	CO1	PO1	08
		b)	With a neat sketch describe an arc welding process.	CO2	PO1	06
		c)	Define three modes of heat transfer with its governing laws.	CO2	PO1	06
			OR			
	3	a)	Explain with a neat sketch the working of single stage centrifugal pump.	CO1	PO1	10
		b)	With an example, describe active, passive and hybrid cooling of electrical and electronic devices.	CO1	PO1	10
		UNIT - III				
	4	a)	Explain the working of a four stroke petrol engine with neat sketches of each stroke and the PV diagram.	CO1	PO1	10
		b)	A four stroke diesel engine has a bore of 30 mm and stroke length of 60 mm. The mean effective pressure is 3 bar, at a rated speed of 400 rpm. If the torque developed by the engine is 1 N-m, determine (i) Indicated power, (ii) Brake power, (iii) Mechanical efficiency and (iv) Frictional power dissipated in the engine.	CO3	PO1	06
		c)	List any four refrigerants. Mention any four thermodynamic properties of an ideal refrigerant.	CO1	PO1	04

UNIT-IV					
5	a)	Define a gear train. Derive an expression for a train value of a compound gear train.	<i>CO3</i>	<i>PO1</i>	06
	b)	A compound gear train consists of 4 gears, A, B, C and D with 15, 30, 20 and 40 teeth respectively. The gears B and C are keyed to the common shaft. If the gear A rotates at 400 rpm, determine the speed of gear D. Sketch the gear train arrangement if B meshes with A and C meshes with D.	<i>CO3</i>	<i>PO1</i>	08
	c)	An open belt drive consists of two pulleys A and B such that the diameter of pulley A is twice that of pulley B. The sum of the diameters of two pulleys A and B connected by a belt is 900 mm. If pulley A runs at 700 rpm and pulley B at 1400 rpm, determine the diameter of each pulley.	<i>CO3</i>	<i>PO1</i>	06
OR					
6	a)	Explain the common robot configurations with neat sketches. Mention the work volume associated with each configuration.	<i>CO2</i>	<i>PO1</i>	08
	b)	Explain any two joints with sketches.	<i>CO2</i>	<i>PO1</i>	04
	c)	An engine running at 150 rpm drives a line shaft by means of a belt. The diameter of the engine pulley is 750 mm and the pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Determine the speed of the dynamo shaft, if (i) there is no slip, and (ii) there is a slip of 2% at each drive.	<i>CO3</i>	<i>PO1</i>	08
UNIT-V					
7	a)	Define a control system. With block diagram explain open loop and closed loop control systems.	<i>CO2</i>	<i>PO1</i>	10
	b)	Explain facing, taper turning and knurling operations performed on Lathe using suitable sketches.	<i>CO1</i>	<i>PO1</i>	10
