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

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 18ME1ESEME / 18ME2ESEME **Max Marks: 100**
Course: Elements of Mechanical Engineering **Date: 18.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Calculator is permitted for numerical calculations.

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

1	a)	Explain the steam formation at constant pressure with its temperature-enthalpy diagram showing the various stages of steam formation with a neat sketch.	**10**
	b)	Explain the working of a hydro-electric power plant with a neat labelled sketch.	**10**

OR

2	a)	Explain the working of open cycle and closed cycle gas turbines with the schematic.	**10**
	b)	Sketch and explain the flat plate and parabolic focusing collectors.	**10**

UNIT - II

3	a)	Explain with a neat labelled sketch, the vapour compression refrigerator.	**10**
	b)	The following observations were obtained during a trial run on a four stroke petrol engine: (a) bore is 25 cm, (b) stroke of the piston is 40 cm, (c) crank shaft speed is 250 rpm, (d) mean effective pressure is 6 bar, (e) petrol consumption rate is 0.1 m^3/min, (f) brake drum diameter is 2 m, (g) brake load is 72 kg, (h) spring load is 2 kg (h) density of petrol is 750 kg/m^3 and (i) the radius of the brake drum rope is 0.02 m. Determine the (i) brake torque, (ii) brake power, (iii) indicated power, (iv) frictional power, (v) mechanical efficiency and (vi) brake thermal efficiency, if the calorific value of the petrol is 43400 kJ/kg.	**10**

UNIT - III

4	a)	With the neat sketch indicate important lathe specifications.	**04**
	b)	With the neat sketch explain boring, counter boring, and counter sinking operations associated with the drilling machine.	**12**
	c)	Draw a simple diagram of surface grinding machine.	**04**

OR

5	a)	Explain arc welding operation with a neat sketch.	**08**
	b)	Explain with neat sketch, the taper turning, thread cutting and knurling operations associated with the lathe.	**12**

UNIT - IV

6	a)	Explain with neat sketches, the ball and roller bearings used to support radial load.	**10**
	b)	A simple gear train is made up of 4 gears, A, B, C and D with the number of teeth as 20, 40, 60 and 70 respectively. If gear A is the main driver rotating at 500 rpm in clockwise direction. Determine the following: (a) the speeds of the intermediate gears, (b) speed and direction of the last follower, and (c) the train value. Show the direction of the follower using the schematic of a simple gear train.	**10**

UNIT - V

7	a)	Define the term, additive manufacturing. Describe the eight-steps involved in additive manufacturing process.	**10**
	b)	With the help of a block diagram explain the basic elements of a closed loop control system. Write any four differences between the open loop and closed loop control systems.	**10**

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