CBCS SCHEME

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BEMEM103/203

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2024
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of thermodynamic data handbook is permitted.

		Module – 1	M	L	C
Q.1	a.	Discuss the Emerging trends in manufacturing and automotive sector.	8	L2	CO1
	b.	With neat sketch, explain the working of thermal power plant.	6	L2	CO1
	c.	Discuss the difference between renewable and non-renewable energy sources.	6	L2	CO1
		OR			
Q.2	a.	Explain the formation of steam at constant pressure with suitable sketches.	8	L2	CO1
	b.	Define the following terms with respect to steam : (i) Sensible heat (ii) Latent heat (iii) Internal energy	6	L1	CO1
	c.	Find the specific volume and enthalpy of 1 kg of steam at 0.8 MPa, with $T_S = 170.4^\circ C$, $V_S = 0.2403\ m^3/K$, $h_f = 720.94$ kJ/kg, $h_{fg} = 2046.5$ kJ/kg : (i) When the dryness fraction is 0.9 (ii) When the steam is super heated to temperature of $300^\circ C$. The specific heat of superheated steam is 2.25 kJ/kgK.	6	L3	CO4
		Module – 2			
Q.3	a.	With neat sketch, explain taper turning by swiveling of compound rest method.	8	L2	CO2
	b.	Explain the following operations performed on drilling machine with neat sketch : (i) Reaming (ii) Tapping (iii) Counter boring	6	L2	CO2
	c.	Discuss plane milling, end milling and slot milling operation performed on milling machine.	6	L2	CO2
		OR			
Q.4	a.	Define 3D printing also explain the steps involved in 3D printing with a flow chart.	7	L1	CO2
	b.	Discuss the components of CNC machine with a neat sketch.	7	L2	CO2
	c.	Discuss the advantages of CNC machine also write any three applications of 3D printing.	6	L2	CO2

		Module – 3			
Q.5	**a.**	With neat sketch, explain the parts of IC engine.	**7**	**L2**	**CO2**
	b.	Explain the working of 4-stroke petrol engine with neat sketch.	**8**	**L2**	**CO2**
	c.	A gas engine working on four-stroke cycle has a cylinder of 250 mm diameter, length of stroke 450 mm and is running at 180 rpm. Its mechanical efficiency is 80% when the mean effective pressure is 0.65 MPa. Find (i) Indicated power (ii) Brake power (iii) Friction power.	**5**	**L3**	**CO4**
		OR			
Q.6	**a.**	With neat sketch, explain the working of room air condition.	**7**	**L2**	**CO2**
	b.	Discuss the properties of good refrigerant.	**6**	**L2**	**CO2**
	c.	Explain with neat sketch, the working of Vapour Compression Refrigerator (VCR).	**7**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	With a neat sketch, derive an expression for velocity ratio in Compound Gear Train.	**8**	**L3**	**CO3**
	b.	Discuss Open and Cross belt driver.	**6**	**L2**	**CO3**
	c.	The velocity ratio of a belt drive is 3 : 2. If the diameter of the driven pulley is 120 cm, which runs at 180 rpm. Find the diameter and speed of the driver pulley and linear velocity of the belt.	**6**	**L3**	**CO3**
		OR			
Q.8	**a.**	With neat sketch discuss different types of flames in oxy-acetylene gas welding, also state application of each flame.	**8**	**L2**	**CO3**
	b.	Explain TIG welding process.	**6**	**L2**	**CO3**
	c.	Differentiate between Welding, Soldering and Brazing.	**6**	**L1**	**CO3**
		Module – 5			
Q.9	**a.**	With neat sketch, explain the parts of electric vehicles.	**8**	**L2**	**CO3**
	b.	State the advantages and disadvantages of hybrid vehicles.	**6**	**L2**	**CO3**
	c.	Write the difference between electric and hybrid vehicles.	**6**	**L1**	**CO3**
		OR			
Q.10	**a.**	List different types of Robots configuration and discuss any two configuration in detail with sketch.	**8**	**L2**	**CO3**
	b.	Explain open and closed loop mechatronic system with an example for each.	**6**	**L2**	**CO3**
	c.	Explain the elements of a Robotic system with neat sketch.	**6**	**L2**	**CO3**

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