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First/Second Semester B.E./B.Tech.Degree Supplementary 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 Steam tables is permitted.

		Module – 1	M	L	C
Q.1	a.	Discuss the various emerging trends and technologies in manufacturing sector.	8	L2	CO1
	b.	Showing all the components, explain the principle of electric power generation from Hydro Power plants.	8	L2	CO1
	c.	Differentiate between Renewable and Non-Renewable Energy resources. (any four)	4	L2	CO1
		OR			
Q.2	a.	With a neat sketch, explain the working principle of Thermal power plant.	10	L2	CO1
	b.	Define the following : (i) Wet steam. (ii) Super heated steam (iii) Dryness fraction. (iv) Sensible heat. (v) Latent heat	10	L1	CO1
		Module – 2			
Q.3	a.	What are various methods of producing Taper turning method? Explain taper turning by swiveling the compound method.	8	L2	CO2
	b.	With a block diagram, briefly explain the basic components of CNC.	8	L2	CO2
	c.	Mention the advantages and applications of CNC. (any 2 advantages and any 2 applications)	4	L2	CO2
		OR			
Q.4	a.	Explain the following with suitable sketches: (i) Upmilling (ii) Down milling (iii) Plane milling (iv) Slot milling	10	L2	CO2
	b.	Explain the following operation on lathe with suitable sketches : (i) Turning (ii) Knurling (iii) Facing (iv) Thread cutting	10	L2	CO2
		Module – 3			
Q.5	a.	Explain with neat sketch, construction and working principle of 4-stroke diesel engine with the help of P-V diagram.	10	L2	CO2
	b.	With a neat sketch, explain the working principle of vapour compression refrigeration system.	10	L2	CO2

		OR			
Q.6	a.	Explain the Ideal properties of Refrigerant.	6	L2	CO2
	b.	List any four applications of an Internal Combustion Engine.	4	L2	CO2
	c.	With a neat sketch, explain the working principle of Room Air Conditioner.	10	L2	CO2
		Module – 4			
Q.7	a.	Briefly explain the working principle of Electric Arc Welding with a neat sketch.	10	L2	CO4
	b.	Differentiate between Belt drives and Gear drives. (any 4 points)	4	L2	CO3
	c.	A compound gear train consists of 4 gears, P, Q, R, S having 20, 40, 60 and 80 teeth respectively. The gear P is keyed to driving shaft, Q and R are compound gears, Q meshing with P and R meshes S. If P rotates at 150 rpm, what is the speed of gear S? Show gear arrangement.	6	L3	CO4
		OR			
Q.8	a.	With a neat sketch, explain the working principle of Tungsten Inert Gas (TIG) welding.	10	L2	CO4
	b.	A V-belt drive transmits 10 KW power at 200 rpm. The grooved pulley has a mean diameter of 1.2 m and groove angle is $45°$. Taking the co-efficient of friction as 0.25 and the angle of lap as $190°$, determine the tension on each side of the belt.	10	L3	CO4
		Module – 5			
Q.9	a.	With a block diagram, briefly explain the open loop and closed loop mechatronics systems.	10	L2	CO3
	b.	Briefly explain the basic components of Hybrid vehicle with block diagram.	10	L2	CO3
		OR			
Q.10	a.	Explain the advantages and applications of Robots in Industries.	10	L2	CO3
	b.	Define Industrial Robot. With suitable sketches, explain various types of joints which relates to the Robot configuration.	10	L2	CO3

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