CBCS SCHEME

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BEMEM103

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023
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. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.
4. Use of steam table/Thermodynamic data hand book is permitted.
5. Missing data, if any, may be suitably assumed.

		Module – 1	M	L	C
Q.1	a.	Define the following terms : i) Dryness fraction ii) Saturation pressure iii) Saturation temperature iv) Latent heat v) Degree of superheat.	05	L1	CO1
	b.	With a neat sketch, explain the concept of stream formation along with T-h plot.	07	L2	CO1
	c.	A steam at 10 bar and dryness 0.98 receives 140 kJ/kg at the same pressure. What is the enthalpy and temperature of the final steam? Take C_{ps} = 2.25 kJ/kg°C.	08	L3	CO4
		OR			
Q.2	a.	With a neat sketch, explain the working of thermal power plant.	10	L2	CO1
	b.	What are wind mills? With neat sketch, explain the principle of operation of horizontal axis wind mill.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the following lathe operations with a neat sketch. i) Taper turning ii) Knurling iii) Thread cutting.	10	L2	CO2
	b.	What is drilling? Briefly discuss the following drilling operations : i) Counter boring ii) Counter sinking iii) Tapping.	10	L2	CO2
		OR			
Q.4	a.	Differentiate between upmilling and down milling operations.	7	L2	CO2
	b.	What is Milling? Mention the various milling operations.	3	L2	CO2
	c.	What a block diagram, explain the basic components of CNC machine. Mention its advantages and disadvantages.	10	L2	CO2

		Module – 3			
Q.5	**a.**	Explain the working of 4 – stroke petrol engine with neat sketches.	**10**	**L2**	**CO2**
	b.	A gas engine working on a 4 – stroke cycle has a cylinder of 250mm diameter, stroke 450mm and is running at 180rpm. Its mechanical efficiency is 80% when the mean effective pressure is 0.65MPa. Determine : i) Indicated power ii) Brake power iii) Friction power iv) Brake thermal efficiency Take CV of fuel as 42000kJ/kg and fuel consumption as 3 kg/hour.	**10**	**L3**	**CO4**
		OR			
Q.6	**a.**	What is refrigeration? With a neat sketch, explain Vapour Compression Refrigeration (VCR) system.	**10**	**L2**	**CO2**
	b.	Define air conditioning. Explain the working of window type room air-conditioner with neat sketch.	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Write a note on open and cross belt drives.	**5**	**L2**	**CO3**
	b.	Derive an expression for length of belt for open belt drives.	**8**	**L3**	**CO3**
	c.	A simple gear train is made up of 4 gear A, B, C and D having 20, 40, 60 and 70 teeth respectively. If gear A is the main driver rotating at 500 rpm clockwise, calculate the following : i) Speeds of intermediate gears ii) Speed and direction of the last follower iii) Train value.	**7**	**L3**	**CO4**
		OR			
Q.8	**a.**	What is welding? Explain the principle of Arc welding with a necessary sketch.	**10**	**L2**	**CO3**
	b.	Distinguish between TIG and MIG welding.	**6**	**L2**	**CO3**
	c.	Explain the method of soldering.	**4**	**L1**	**CO3**
		Module – 5			
Q.9	**a.**	Explain the components of electric and hybrid vehicles with neat block diagrams.	**10**	**L2**	**CO3**
	b.	Mention the advantages and disadvantages of electric vehicles and hybrid vehicles.	**10**	**L2**	**CO3**
		OR			
Q.10	**a.**	Write short notes on open loop and closed loop mechatronic systems.	**10**	**L2**	**CO3**
	b.	Explain the applications of Robots in the following domains of a manufacturing industry. i) Material handling ii) Processing iii) Assembly and inspection.	**10**	**L2**	**CO3**

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