



CAMBRIDGE INSTITUTE OF TECHNOLOGY

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Department of Basic Sciences

Program: B.E. ☒ M.Tech. ☐ Specialization:

Preparatory Examination - Even Semester 2018-19

Sub. Name: Elements of Mechanical Engineering Sub. Code: 18ME25 Semester: II
 Date: 12-06-2019 Time: 1:15 PM Duration: 3 Hours Max. Marks: 100

[Instructions: Answer any five full questions, choosing one from each module, each full question carries maximum 20 marks]

Sl. No.	QUESTIONS	COs	RBT Levels	Marks
Module I				
1.	a) Mention the advantages and disadvantages of renewable and non-renewable energy sources.	CO1	L1	04M
	b) Explain, with neat a diagram, the flat plate collector and parabolic focusing collector.	CO1	L2	08M
	c) Discuss the different types of fossil fuels.	CO1	L3	08M
OR				
2.	a) Define thermodynamics and state laws of thermodynamics.	CO1	L1	04M
	b) Determine the enthalpy of 1 kg of steam at 12 bar when (i) steam is dry saturated, (ii) steam is 22% wet and (iii) superheated to 250 °C. Take the specific heat of superheated steam as 2.25 kJ/kgK.	CO1	L2	08M
	c) A stationary mass of gas is compressed without friction from an initial stage of 0.3 m ³ and 0.105 MPa to a final state of 0.15 m ³ , the pressure remaining constant. There is a transfer of 37.6 kJ of heat from the gas during the process. Determine the change in internal energy.	CO1	L3	08M
Module II				
3.	a) Define boiler and mention the boiler mountings and accessories.	CO2	L1	04M
	b) Compare fire tube boiler and water tube boiler.	CO2	L2	08M
	c) Illustrate the lancashire boiler with a neat diagram.	CO2	L3	08M
OR				
4.	a) Define cavitation and priming.	CO2	L1	04M
	b) Explain, with a neat diagram, the francis turbine.	CO2	L2	08M
	c) Discuss, with a neat diagram, the working principle of pelton wheel turbine.	CO2	L3	08M
Module III				
5.	a) List the parts of IC engine and draw the P-V diagram of Otto and Diesel cycle.	CO2	L1	04M

	b)	Explain, with a neat diagram, the working of a 4-stroke SI engine.	CO2	L2	08M
	c)	Following data are collected from a 4-stroke, single cylinder at full load. Bore = 200 mm, stroke = 280 mm, speed = 300 rpm, indicated mean effective pressure = 5.6 bar, torque on the brake drum = 250 N-m, fuel consumed = 4.2 kg/hour, and calorific value of fuel = 41000 kJ/kg. Determine (i) Brake power, (ii) Mechanical efficiency, (iii) Indicated thermal efficiency and (iv) Brake thermal efficiency.	CO2	L3	08M
		OR			
6.	a)	Define the following: (i) Refrigeration, (ii) Refrigerating effect, (iii) Ton of refrigeration, (iv) Ice making capacity and (v) Refrigeration cycle.	CO2	L1	04M
	b)	Differentiate between vapour absorption refrigeration and vapour compression refrigeration.	CO2	L2	08M
	c)	Discuss, with a neat sketch, the working of split air conditioning system.	CO2	L3	08M
		Module IV			
7.	a)	What are composite materials and smart materials?	CO4	L1	04M
	b)	Identify the differences between welding and brazing.	CO3	L2	08M
	c)	Sketch and discuss TIG welding.	CO3	L3	08M
		OR			
8.	a)	List the differences between thermoplastics and thermosetting polymers.	CO4	L1	04M
	b)	Derive an expression for the ratio of tensions for a flat belt passing over a pulley.	CO3	L2	08M
	c)	A line shaft is driven by an electric motor through an open belt. The speed of motor is 1450 rpm and the line shaft should rotate at 500 rpm. The maximum linear speed at which the belt should run is 1300 m/min. Determine diameter of pulleys when (i) thickness of belt is neglected (ii) thickness of belt is 10 mm.	CO3	L3	08M
		Module V			
9.	a)	Name the different parts of lathe.	CO5	L1	04M
	b)	With a neat diagram, explain, the following milling operations: i) End milling ii) Slot milling iii) Angular milling iv) Form milling.	CO5	L2	08M
	c)	Illustrate with a block diagram CNC milling center and CNC turning center.	CO6	L3	08M
		OR			
10.	a)	How taper turning operation performed on lathe?	CO5	L1	04M
	b)	Differentiate between up milling and down milling operations.	CO5	L2	08M
	c)	Discuss applications of robots in material handling, processing, assembly and inspection.	CO6	L3	08M