Total No. of Questions – [3]

Total No. of Printed Pages: 2

G.R. No.	

PAPER CODE	U212-264(ESE-DSY)

July 2023 (END SEM) EXAM

S.Y. B.Tech (DSY) (Mechanical Engineering) (AY 2022-23 SEMESTER-I)

COURSE NAME: Thermodynamics

COURSE CODE: MEUA21204

(PATTERN 2020)

Time: [1Hr]

[Max. Marks: 30]

(*) Instructions to candidates:

1) Use of scientific calculator is allowed

2) Use of Steam table is allowed

3) Use suitable data where ever required

4) All questions are compulsory

Question No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Explain the Mollier Diagram in brief and relate its application in Rankine cycle analysis.	[4]	[4]	[2]
	b) Evaluate the Enthalpy of 1 kg of steam at a pressure of 12 bar, when the condition of steam is: (i) When its dryness fraction equal to 0.90, (ii) Completely dry and saturated, and (iii) Superheated, with the degree of superheat being 60°C assume specific heat of superheating is 2.1 kJ/kg.K	[6]	[4]	[5]
	OR			
	c) Estimate the dryness fraction of steam in a combined separating and throttling calorimeter which was used to determine the dryness fraction of steam flowing through a steam pipe at a pressure of 12 bar. The pressure and temperature of steam after throttling were 1 bar and 115°C, respectively. The mass of steam condensed after throttling was 3.5 kg and the mass of water collected in the separator was 0.40 kg. Take specific heat for superheated steam as 2.1 kJ/kg.K.	[6]	[4]	[5]
Q.2	a) Explain each one applications for following cycles:) Brayton cycle ii) Vapor compression	[4]	[5]	[2]

	refrigeration cycle iii) Otto Cycle iv) Rankine Cycle			
	b) Evaluate the compression ratio and air-standard efficiency of the engine working on an ideal Otto cycle, the temperatures at the beginning and at the end of compression are 27°C and 327°C.	**[6]**	[5]	[5]
	OR			
	c) Evaluate the air-standard efficiency for a Diesel engine which has a compression ratio of 18 and cut off takes place at 5% of the stroke. Take Υ = 1.4 (C_p/C_v)	**[6]**	[5]	[5]
Q.3	a) Discuss major function of the mountings associated with boiler? Explain in brief any two boiler mountings.	**[4]**	[6]	[2]
	b) Estimate heat balance sheet for the boiler trail for following observations: Steam Produced = 450kg/hr at 10 bar Dryness fraction = 0.92 Fuel used = 45 kg/hr Mass of dry flue gases = 8 kg/kg of fuel Calorific Value = 32000 kJ/kg Temperature of flue gases = 310°C Ambient air temperature = 27°C Feed water temperature = 60°C Mean specific heat of flue gases = 1 kJ/kg.K	**[6]**	[6]	[5]
	OR			
	c) Evaluate the following: i) Equivalent evaporation ii) Thermal efficiency of boiler iii) Heat added in super heater For a boiler trail of 1hr duration following observations were recorded. 700 kg of coal of calorific value 31500 kJ/kg is used to produce 6000 kg of steam at pressure 12 bar. Dryness fraction of steam is 0.90. The temperature of steam after superheating is 300°C & temperature of boiler feed water is 50°C.	**[6]**	[6]	[5]

Note:[BT level-1:Remember 2:Understand 3:Apply 4:Analyze 5: Evaluate 6:Create]