DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE							
Regular/Supplementary Winter Examination – 2024							
Course: B. Tech Branch : Mechanical Engineering /Mechanical						Semester : III	
Engineering (Sandwich) /Mechanical and Automation							
Subject Code & Name: BTMC303 Thermodynamics (O							
Max Marks: 60 Date:10/02/2025				Duration: 3 Hr.			
Instructions to the Students:							
(1) Each question carries 12 marks.						0	
12.	Question No. 1 wi	ll be compulsory a	nd include objecti	ve-type questions.	- 2 +- 0		
-37	Canalaates are rei 6.	quirea to attempt	any jour question	s from Question N	o. 2 to Questi	on no.	
4.	The level of questi	ion/expected answ	ver as per OBE or t	he Course Outcom	ne (CO) on wh	ich the	
	question is based	is mentioned in ()	in front of the que	estion.			
5.0	Use of non-progra Assume suitable d	immable scientific lata wherever nec	calculators is allo essary and mentio	wea. n it clearly			
017					(Level/CO)	Marks	
Q. 1	Objective type o	questions. (Compu	ulsory Question)			12	
Ģ	A system in whi	ch energy can cro	sses the boundary	of the system	1/0-1	O 1	
94	but the mass cannot is known as					94	
Š	a. open	b. Closed	c. Isolated	d. None of		Ś	
C C C	system	system	System	These		e C C	
12	Which of the fo	llowing is an inter	sive property of a	3	2/CO-1		
L()	thermodynamic	system?	L().	I		L()	
	a. mass	1/CO-1	c. enthalpy	d. density			
3	When two bodi	es are in thermal	equilibrium with a	a third body,	2/CO- 1	1	
	they are also in statement is cal	er. This					
	a. Zeroth Law	b. First law	c. second law	d. third law			
4	First law of ther	modynamics deal	s with		2/CO- 2	1	
0	a Conservation	1/00-1	c Conservation	d Conservation		()	
)4(of mass	1,00-1	of energy	of pressure)4(
20	An increase in enthalpy leads to an increase in				1/CO- 2		
O O	a. Increase in	b. Increase in	c. Increase in	d. Increase in		33	
10	pressure	internal	volume	mass		10	
LO 6	SI unit of enthal	energy	10		2/0-3		
0						- -	
	a. Jouie/kg	1/00-1	c. Jouie/K	а. к/кg			
7	In Carnot cycle t	2/CO- 3	1				
	a. Lower	1/CO-1	c. constant	d. None of the			
				above			

8	Gases of the same volume contain the same number of molecules. This is the description of				2/CO- 4	1
	a. Boyle's law	b. Dalton's	c. Charles' law	d. Avogadro's law		
9	The throttling p	rocess is	process.		2/CO- 3	1
	a. reversible	b. irreversible	c. reversible or irreversible	d. None of these		.0
10	Which of the fol	Which of the following is not true about ideal gas molecules?				1
10329	a. They have negligible size	b. They do not have attractive forces	C .They do not apply pressure	d. They move in random motion		10329
11	The value of pre	ssure of water at	a critical point is	in bar	4/CO- 5	1
	a. 223.5 bar	b. 212.25 bar	c. 235.5 bar	d. 221.2 bar		
12	With the decrea	se in pressure the	e latent heat of st	eam is	2/CO- 5	1
	a. Decreases	b. increases	c. Constant	d. Increases or decreases		
Q. 2	Solve the following.					0 ¹²
	Explain Intensive and Extensive properties with suitable examples.			2/CO-1	⁷ 6	
BE(Explain 'Thermodynamic equilibrium' of a system and state its significance.			2/CO-1	6	
10						10
Q.3	Solve the following.					L() 12
A)	Explain the first law of thermodynamics for (i) closed system undergoing a cycle (ii) closed system a change of state.			2/CO-2	6	
B)	A gas undergoes processes: (i) Proc	ess 1-2: Constant	ic cycle consisting pressure p = 1.4 b y ₁₋₂ = 10.5 KJ.	g of the following ar, $V_1 = 0.028 \text{ m}^3$,		6
51032946	 (ii) Process 2-3: Compression with pV= constant, U₃ = U₂ (iii) Process 3-1: Constant volume U₁-U₃ == -26.4KJ. There are no significant changes in KE and PE. (a) Sketch the cycle on p-V diagram. (b) Calculate the net work for the cycle in KJ. (c) Calculate the net heat transfer for the process 1-2 (d) Show that ∑ Q = ∑ W Cycle cycle 			3/CO-2	51032946	
0.4	Solve Any Two o	of the following				12
Q. 4 A)	Define the term	COP as applied	to a refrigerator	and heat pump.	4/CO-3	6
	Show:			and near pump.	.,	
		COP _{HP} =	COP _{REF} + 1			

В)	A cyclic heat engine operates between a source temperature of 1000°C and sink temp of 40°C. Find the least rate of heat rejection per KW net output of the engine?	4/CO-3	6
C)	Show that Entropy changes in reversible process is Zero	4/CO-3	6
Q.5	Solve Any Two of the following.		12
A 76	State 'Avagadro's Hypothesis' and from it determine the value of Universal gas constant.	1/CO-4	946
B	Define specific heats. Derive relationship between C_P and C_V .	2/CO-4	e Singer
<u>e</u>	Derive expression for work done during polytropic process for a non-flow system	4/CO-4	100
Ŋ	21		5
Q. 6	Solve Any Two of the following.		12
A)	What is pure substance? Give suitable example. What is saturation pressure and saturation temperature? Explain it on T-S diagram.	2/CO-5	6
в) 97(A vessel having a capacity of 0.04 m ³ contains a mixture of saturated water and saturated steam at a temperature of 250° C. The mass of steam present is 9 kg. Find the following i. The Pressure ii. The mass iii. The specific enthalpy iv. the specific volume v. the specific entropy vi. The specific internal volume	4/CO-5	946
Ŕ	Draw a P-T (Pressure-Temperature) diagram of Pure substance (Water) and explain sublimation curve and Fusion curve	4/CO-5	6
Ó	*** End ***		Ó
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