Reg. No.: 22BME1062

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VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act 1956)

Continuous Assessment Test – I March 2023

Programme	:	B.Tech (Mechanical Engineering)	Semester	:	Winter 2022-23
Course	:	Engineering Thermodynamics	Code	:	BMEE203L
Faculty	:	Dr K Karunamurthy, Dr Pritam Das, Dr Sanjeev Jakhar, Dr Saurabh Yadav	Class Nbr	:	CH2022232300301 CH2022232300298 CH2022232300303 CH2022232300304
			Slot	:	A1+TA1
Time	:	1 hour 30 Minutes	Max. Marks	:	50

Answer any Five the Questions (5 X 10 = 50)

USE OF STEAM TABLES AND COMPRESSIBILITY CHARTS ARE PERMITTED

Note:

(i) The answers should be concise, don't elaborate,

(ii) Provide diagrams and highlights, no story please.

Q.No.			Marks
1.	a	Appraise on different types of thermodynamic systems, with examples and sketch.	3
1.	b	Define the following; Fixed and Moving Boundaries, Intensive & Extensive properties, Point function & Path function, Process and Quasi-static process.	7
2		0.336 m^3 of an ideal gas at a pressure of 10 bar and 150°C expands adiabatically, until its pressure is 4 bar. It is then compressed isothermally to its original volume. (i) Find the final temperature and pressure of the gas. Assume c_p=0.996 kJ/kg K and c_v=0.703 kJ/kg K. (ii) determine the total work done. (iii) Represent the processes in a p-v. (iv) If the gas has to undergo a third process to come back to its original state, then which process it has to undergo.	10
3	a	Determine the specific enthalpy, specific entropy and specific volume of wet steam at 45 bar and dryness fraction of 0.8.	5
	b	Compute the following properties of steam at 4.4 MPa and 325°C. (i) Specific Enthalpy (ii) Specific Entropy (iii) Specific volume (iv) saturation temperature and (v) degree of superheat.	5
4		A vessel of volume 0.04 m^3 contains a mixture of saturated water and vapour at a pressure of 40 bar. The mass of the liquid present is 9 kg. Find the (i) saturation temperature,	10

(ii) total mass of the mixture,
(iii) specific volume,
(iv) enthalpy and
(v) entropy of steam.

5 The volume of a high altitude chamber is 40 m^3. It is put into operation by reducing the pressure from 1 bar to 0.4 bar and temperature from 25°C to 5°C. How many kg of air must be removed from the chamber during the process. Also express the mass removed as volume measured at 1 bar and 25°C. **10**

6 A fluid in a piston cylinder arrangement executes 220 cycles/min with four processes. The net heat transfer during a cycle is -300 kJ. Complete the following table showing the method for each process and complete the network output in kW. **10**

Process	Q (kJ/min)	W (kJ/min)	ΔE (kJ/min)
1 - 2	0	4350	?
2-3	42000	0	?
3-4	-4200	?	-73500
4-1	?	?	?