PRN:		Course Code :	UME 302

Second Year B. Tech End Semester Examination, Winter 2024

Thermodynamics

000157

Day and Date: Mon 25 NOV 2024 Max Marks: **50**

Time: 10:30AM To 12:30PM Duration: **02**hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt any two from the following**			
	a)	Explain briefly Zeroth law of thermodynamics.	06	1	CO1
	b)	Define a thermodynamic system. Differentiate between open system, closed system and an isolated system.	06	2	CO1
	c)	To a closed system 200 kJ of work is supplied. If the initial volume is 0.6 m^3 & pressure of the system changes as $p = 8 - 3V$, where p is in bar and V is in m^3, determine the final volume and pressure of the system.	06	2	CO1
Q.2		**Attempt any two from the following**			
	a)	Explain first law of thermodynamics for a closed system undergoing a cycle and state change.	06	2	CO2
	b)	Explain second law of thermodynamics.	06	1	CO2
	c)	The gas leaving the turbine of a gas turbine jet engine flows steadily into the engine jet pipe at a temperature of 900°C, a pressure of 2 bar and a velocity of 300 m/s relative to the pipe. Gas leaves the pipe at a temperature of 820°C and a pressure of 1.1 bar. Heat transfer from the gas is negligible. Using the following data evaluate the relative velocity of gas leaving the jet pipe. For the gas at t = 820°C, h = 800 kJ/kg and at 910°C, 915 kJ/kg.	06	2	CO2
Q.3		**Attempt the following**			
	a)	Explain with a neat diagram p-V-T surface.	06	1	CO3
	b)	Describe the thermodynamic properties of steam	07	2	CO3
		or			
	b)	Draw and explain p-T diagram for a pure substance	07	2	CO3
Q.4		**Attempt the following**			
	a)	Explain briefly Otto cycle.	06	2	CO4
	b)	Derive expressions of efficiency in Otto cycle. The efficiency of an Otto cycle is 60% and $\gamma = 1.5$. What is the compression ratio?	07	3	CO4
		or			
	c)	Describe the Rankine cycle with P-V and T-s diagram.	07	2	CO4

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