DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Mid Semester Examination – Oct 2018

Course: B. Tech in MECHANICAL ENGINEERING Sem: III

Subject Name: Thermodynamics Subject Code: BT-MEC 305

Max Marks: 20 Date:-12/10/2018 Time:- 2.30 pm to 3.30 pm

Instructions to the Students:

1. Assumptions made should be clearly mentioned
2. Use of steam tables and Moiller's Chart is permitted.
3. Use of non-programmable scientific calculator is allowed.
4. All the questions are compulsory.
5. Q.1 does not have any option.

		(Level /CO)	Marks
Q. 1	Select the CORRECT answers from the options given below the questions		1X6
1	Thermodynamic properties are macroscopic coordinates significant only for systems existing in states of? 1) Thermal Equilibrium 2) Mechanical Equilibrium 3) Chemical Equilibrium 4) Thermodynamic Equilibrium	CO1	
2	If the value of "n" is infinitely large for the Polytropic process PV^n=Constant, the process is, 1) Constant volume 2) Constant pressure 3) Constant temperature 4) Constant volume	CO1	
3	Which of the following is valid only for reversible processes undergone by a pure substance (neglect changes in kinetic and potential energy)? 1) $\delta Q = dU + \delta W$ 2) $TdS = dU + \delta W$ 3) $TdS = dU + PdV$ 4) $\delta Q = dE + PdV$	CO2	
4	The cyclic integral of (δQ−δW) for a process is: 1) positive 2) negative 3) zero 4) unpredictable	CO1	
5	For a pure substance having three phases, the numbers independent intensive properties are, a) 4 b) 2 c) 1 d) 0	CO1	
6	Which of the following systems is the CLOSED system? 1) Tree 2) Printer 3) Fan 4) Baking of bread in an oven	CO1	

Q.2	**Solve Any <u>TWO</u> of the following.**		**3 X 2**
(A)	**Represent the Carnot cycle on P-V and T-S diagrams. And discuss the processes involved in it.**	**CO2**	
(B)	**Define the term "absolute thermodynamic temperature scale" and derive its equation.**	**CO1**	
(C)	**Prove that Kelvin Plank's statement and Clausius statement of second law are equivalent.**	**CO1**	
Q. 3	**Solve Any <u>ONE</u> of the following.**		**8X1**
(A)	**Derive the steady flow energy equation (SFEE) and apply it to the following devices:** **1) Turbine 2) Condenser 3) Nozzle 4) Boiler**	**CO2**	
(B)	**State and prove Carnot's theorem.** **A reversible heat engine receives heat from two thermal reservoirs maintained at constant temperatures of 800 ^{0}K and 600 ^{0}K. The engine develops 100KW and rejects 3600KJ/min of heat to heat sink at 300 ^{0}K.Determine the heat supplied by each thermal reservoir and thermal efficiency of engine.**	**CO2**	

***** End *****