Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER–I - EXAMINATION – SUMMER 2017

Subject Code: X11902 **Date:03/06/2017**

Subject Name: ENGINEERING THERMODYNAMICS

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of Standard Steam Table is allowed.**

Q.1	**(a)**	Explain the terms: Enthalpy of formation, Enthalpy of reaction, Adiabatic flame temperature.	**07**
	(b)	Explain in brief the Vander Waal's equation and derive the reduced properties.	**07**
Q.2	**(a)**	Draw air standard Diesel cycle on p-V and T-s diagram. Derive the expression for air standard efficiency of Diesel cycle with usual notations.	**07**
	(b)	Discuss the variables affecting efficiency of the Rankine cycle.	**07**
Q.3	**(a)**	What do you mean by PMM? Explain with diagram PMM-I and PMM-II.	**07**
	(b)	Describe with suitable examples different types of thermodynamic systems.	**07**
Q.4	**(a)**	Write the S.F.E.E. Apply the same to : (i) Pump (2) Condenser	**07**
	(b)	Air flows steadily at the rate of 0.4 kg/s through an air compressor, entering at 6 m/s with a pressure of 1 bar and a specific volume of 0.85 m3/kg, and leaving at 4.5 m/s with a pressure of 6.9bar and a specific volume of 0.16 m3/kg. The internal energy of the air leaving is 88 kJ/ K greater than that of the air entering. Cooling water in a jacket surrounding the cylinder absorbs heat from the air at the rate of 59 W. Calculate the power required to drive the compressor.	**07**
Q.5	**(a)**	Describe with neat diagram: p-V-T surface.	**07**
	(b)	In an air standard Otto cycle, the compression ratio is 7 and the compression begins at 35°C and 0.1 MPa. The maximum temperature of the cycle is 1100°C. Find (a) the temperature and the pressure at various points in the cycle, (b) the heat supplied per kg of air, (c) work done per kg of air, (d) the cycle efficiency.	**07**
Q.6	**(a)**	Write a short note on: (1) Entropy and disorder (2) Exergy	**07**
	(b)	A refrigeration plant for a food store operates as a reversed Carnot heat engine cycle. The store is to be maintained at a temperature of – 5°C and the heat transfer from the store to the cycle is at the rate of 5 kW. If heat is transferred from the cycle to the atmosphere at a temperature of 25°C, calculate the power required to drive the plant.	**07**
Q.7	**(a)**	Write a short note on: (1) Thermodynamic Equilibrium (2) Reversibility and Irreversibility.	**07**
	(b)	In a steam power cycle, the dry and saturated steam is supplied at 15 bar.The condenser pressure is 0.4 bar. Calculate the Carnot and Rankine cycle efficiencies by Neglecting the pump work.	**07**

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