Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER– 1st EXAMINATION – SUMMER-2015

Subject Code: X11902 **Date:28/05/2015**

Subject Name: Engineering Thermodynamics

Time: 02.30pm-05.00pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Derive an expression for air standard efficiency for diesel cycle.	**07**
	(b	A reversible engine is supplied with heat from two constant temperature sources at 900 K and 600 K and reject to a sink at 300 K. assuming the engine to execute a number of complete cycles while developing 70 KW and rejecting 3200 kj/min. calculate the heat supplied by each source and efficiency of engine.	**07**
Q.2	**(a)**	Define thermodynamic system, surrounding, system boundary, extensive properties, intensive properties, isolated system and homogeneous system.	**07**
	(b	An engine working of ideal otto cycle has a clearance volume of 0.03 m^3 and swept volume of 0.12 m^3 the temperature and pressure at the beginning of compression are 100^0c and 1bar respectively. If pressure at the end of heat addition is 25 bar, calculate: 1. Ideal efficiency of cycle. 2. Temperature at key points of the cycle.	**07**
Q.3	**(a)**	State and prove carnot theorem.	**07**
	(b	A stream of gases at 7.5bar, 750^0c and 140m/s is passed through a turbine of a jet engine. The stream comes out of the turbine at 2 bar, 550^0c and 280 m/s. the process may be assumed adiabatic. The enthalpies of gas at the entry and exit of the turbine are 950 kj/kg and 650 kj/kg of gas respectively. Determine the capacity of the turbine if the gas flow is 5 kg/s.	**07**
Q.4	**(a)**	Derive claperyon's equation. What is its use?	**07**
	(b	A system at 500 k receives 7200 kj/min heat from a source at 1000 K. the temperature of atmosphere is 300 K. assuming that the temperature of system and source remain constant during heat transfer, find out (1) entropy produced during heat transfer. (2) Decrease in available energy after heat transfer.	**07**
Q.5	**(a)**	Give statements of first, second and third law of thermodynamics. Explain entropy of formation and entropy of reaction.	**07**
	(b	A steam power plant works between 40 bar and 0.05 bar. If steam supplied is dry saturated and cycle of operation is Rankine. Find (1) cycle efficiency, and (2) specific steam consumption.	**07**
Q.6	**(a)**	Explain in brief following. (1) Available energy (2) Lost of work (3) Joul Thomson coefficient (4) Excess air (5) Adiabatic flame temperature (6) Heat source (7) Heat sink	**07**
	(b	How fuels are classified. Give comparison of solid fuel and liquid fuel.	**07**
Q.7	**(a)**	Explain the method of determining calorific value of fuel by bomb calorimeter.	**07**
	(b	State and prove clausius theorem.	**07**