Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV • EXAMINATION – WINTER • 2014

Subject Code: 142501 **Date: 22-12-2014**

Subject Name: Heat Power Engineering

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	State the second law of thermodynamics as per (i) Kelvin-Plank and (ii) Clausis, and prove that both statements are equivalent although they appear to be different.	**07**
	(b)	(1) Define thermodynamic system. Differentiate between open system, closed System and isolated system.	**04**
		(2) Differentiate homogeneous and heterogeneous system.	**03**
Q.2	**(a)**	Draw the P-V and T-S Diagram of Otto cycle and find the air standard efficiency of the Otto cycle.	**07**
	(b)	In an ideal Diesel cycle the temperature at the beginning and end of compression are 57° C and 603° C respectively. The temperatures at beginning and end of expansion are 1950° C and 870° C respectively. Determine the ideal efficiency of cycle. If pressure at the beginning of compression is 1 bar. Calculate the maximum pressure in the cycle.	**07**
		OR	
	(b)	Initial volume of 0.18 kg of certain gas was 0.15m^3 at a temperature 15° C and pressure 1 bar. After adiabatic compression to 0.056 m^3, the pressure was found to be 4 bar. Find (1) Gas constant (2) molecular mass (3) γ (4) C_p and C_v (5) change in internal energy.	**07**
Q.3	**(a)**	What are the different forms of steam nozzle? Explain why nozzles are made Convergent-divergent?	**07**
	(b)	Explain in detail the super saturation phenomena in steam nozzle.	**07**
		OR	
Q.3	**(a)**	Differentiate Impulse and Reaction Turbine.	**04**
		Discus the advantages of Steam Turbine over Steam Engine.	**03**
	(b)	What are the different methods of compounding of steam turbine stages? List the advantages and limitation of velocity compounding.	**07**
Q.4	**(a)**	Classify the Gas Turbines.	**07**
	(b)	Explain with neat sketch construction and working of reciprocating air compressor.	**07**
		OR	
Q.4	**(a)**	What are the different modes of heat transfer? Explain following laws of heat transfer: (i)Newton's law (ii)Fourier's law (iii)Stefan Boltzmann's law	**07**
	(b)	What is entropy? What do you mean by clausius inequality?	**07**
Q.5	**(a)**	Write a short note on Logarithmic mean temperature difference (LMTD).	**07**
	(b)	Explain vapor compression refrigeration cycle with neat sketch.	**07**
		OR	
Q.5	**(a)**	Explain the following terms: (1) Refrigerant (3) Split Air Conditioner (2) Unit of Refrigeration (4) COP	**07**
	(b)	Explain Concept of black body And application heat transfer in heat exchanger.	**07**