Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Sem. – IV - Examination –June- 2011

Subject code: 142501

Subject Name: Heat Power Engineering

Date:06/06/2011 **Time: 10.30 am – 01.00 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)** (1) Define thermodynamic system. Differentiate between open system, closed system and isolated system. **04**

(2) Differentiate homogeneous and heterogeneous system **03**

(b) State the first law of thermodynamics and prove that for a non flow process , it leads to the energy equation $Q=\Delta U + W$. **07**

Q.2 **(a)** Prove that violation of Kelvin-Planck statement is also a violation of clausius statement and vice versa for 2nd law of thermodynamics **07**

(b) Explain limitation of 1st law of thermodynamics in detail **07**

OR

(b) What is entropy? What do you mean by clausius inequality? **07**

Q.3 **(a)** Explain carnot cycle. Derive the equation for efficiency of carnot cycle. What are the limitations for carnot cycle? **07**

(b) Compare Otto, diesel and dual cycle for the following **07**

(i) the same compression ratio and same heat input

(ii) for same maximum pressure and same heat input

(iii) for same maximum pressure and temperature

OR

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**

Q.4 **(a)** What do you understand by compounding in steam turbines ?state different type of compounding .explain any one in detail **07**

(b) Define speed ratio, blade velocity coefficient, diagram of blade efficiency and stage efficiency in connection with steam turbine. explain the importance of each in design of steam turbines **07**

OR

Q.4 **(a)** Explain construction and working of single acting, single stage reciprocating air compressor. **07**

(b) Explain multi stage compression. What are the advantages of intercooler in multistage compression? **07**

Q.5 **(a)** **(1)** State the functions of the following parts of a simper vapour compression system. **04**

(i) compressor (ii) condenser

(iii) expansion valve (iv) evaporator

		(2) state merits and demerits of 'vapour compression system' over 'air refrigeration system'	**03**
	(b)	Describe the working of simple constant pressure open cycle gas turbine with sketches.	**07**

OR

Q.5	**(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)	Classify the heat exchangers according to the flow directions of fluid and give examples of each in actual field of application	**07**

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