Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- IVth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 142501 **Date: 23/05/2012**

Subject Name: Heat Power Engineering

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)** What is the Physical Significance of Entropy? **07**

(b) Explain the Equivalence of the statements of 2nd law of thermodynamics. **07**

Q.2 **(a)** How Double Stage Reciprocating Air Compressor Works? **07**

(b) Gas is compressed in a reciprocating compressor from 1 bar to 6 bar. The FAD is 0.013 m^3/s. The clearance ratio is 0.05. The expansion part of the cycle follows the law $pV^{1.2}$= C. The crank speed is 360rev/min. Calculate the swept volume and the volumetric efficiency. **07**

OR

(b) Differentiate between the three modes of Heat Transfer. **07**

Q.3 **(a)** Just Mention the types of processes (i.e. adiabatic, isobaric, isentropic, isothermal etc) in Diesel, Auto, Dual, Carnot, Joule, Sterling and Ericsson separately in each cycle. **07**

(b) Why isothermal expansion work done is more than the adiabatic expansion work? **07**

OR

Q.3 **(a)** Provide three examples of each open, closed and isolated system with figures. **07**

(b) Explain Carnot cycle. Derive the equation for efficiency of Carnot cycle. **07**

Q.4 **(a)** Classify the Gas Turbines. **07**

(b) Steam issues from the nozzle of a simple impulse turbine with a velocity of 900m/sec. The angle of nozzle is 20°, the mean diameter of the blades is 25cm and speed of rotation is 20000 r.p.m. The mass flow through the turbine nozzle and blading is 0.18kg of steam per sec. Draw the velocity diagram and derive or calculate the followings : **07**

a) Tangential force on blades,
b) Axial forces on blades,
c) Power developed by the turbine wheel,

Assume that the outlet angles of blades are equal to the inlet angle and frictional losses are negligible.

OR

Q.4 **(a)** Describe with neat sketch working of a closed cycle gas turbine. **07**

(b) What is compounding of steam turbine? Explain any one. **07**

Q.5 **(a)** Explain the following terms **07**

- Refrigerant
- COP
- 1 Tonne of Refrigeration
- Split Air Conditioner

(b) How Air-Conditioning applications are broadly divided? **07**

OR

Q.5 **(a)** Write a short note on Logarithmic mean temperature difference (LMTD). **07**

(b) Explain vapor compression refrigeration cycle with neat sketch. **07**

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