Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV EXAMINATION – SUMMER 2016

Subject Code: 142501   **Date:19/11/2016**
Subject Name: Heat Power Engineering
Time:02.30-05.00 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)** Explain thermodynamic equilibrium and state the limitation of first law of **07**
Thermodynamics & write Kelvin - plank statement for the second law of
Thermodynamics

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

Q.2 **(a)** Draw the P-V and T-S Diagram of Otto cycle and find the air standard **07**
efficiency of the Otto cycle.

    (b) What are advantages of multi stage compression in compressor? Explain **07**
working of two stage reciprocating compressor with inter cooling.

OR

    (b) In engine working on Otto cycle, air has a pressure of 1 bar and temperature **07**
30ºC At the entry. Air is compressed with a compression ratio of 6. The heat is
added at constant volume until the temperature rises to 1500º C. Determine (1)
air standard efficiency (2) pressure and temperature at the end of compression
(3) heat supplied (4) mean effective pressure. Take Cv= 0.718 KJ/Kg K , R=
0.287KJ/Kg K.

Q.3 **(a)** Differentiate Impulse and Reaction Turbine. Discuss the advantages of Steam **07**
Turbine over Steam Engine

    (b) What are the different methods of compounding of steam turbine stages? List **07**
the advantages and limitation of velocity compounding.

OR

Q.3 **(a)** Discus advantages and disadvantages of closed cycle over open cycle gas **07**
turbine

    (b) What are the methods for improvement of thermal efficiency of simple open **07**
cycle constant pressure Gas turbine plant?

Q.4 **(a)** What is meant by the term jet propulsion? Describe briefly the working of a **07**
turbo jet engine.

    (b) Explain the following as reffered to air compressor: (1) Isothermal efficiency, **07**
(2) Volumetric Efficiency, (3) free air Delivered and (4) NTP Condition.

OR

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

    (b) Define Speed ratio; blade velocity coefficient; diagram of blade efficiency and **07**
stage efficiency in connection with steam turbine. Explain the importance of

each in design of steam turbines.

Q.5 **(a)** Draw flow diagram for Vapour Compression refrigeration cycle and briefly explain function of each component of cycle. **07**

(b) Define the following terms: (1) Dry bulb temperature (2) Wet bulb temperature (3) Specific Humidity (4) Relative Humidity, (5) Degree of Saturation, (6) Dew point temperature and (7) psychrometry. **07**

OR

Q.5 **(a)** What are the different modes of heat transfer? Explain Fourier's & Newton's law. **07**

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

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