

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-IV Examination June- 2010****Subject code: 142501****Subject Name: Heat Power Engineering****Date: 17 / 06 /2010****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) Explain thermodynamic equilibrium. **03**
 (b) State the limitation of 1st law of thermodynamics and write kelvin-plank statement for the 2nd law of thermodynamics. **04**
 (c) Steam at a 6.87 bar, 205°C having enthalpy 2850 kJ/kg enters in an insulated nozzle with a velocity of 50 m/s it leaves at a pressure of 1.37 bar and a velocity of 500 m/s determine the final enthalpy of steam. **07**
- 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) The stroke and cylinder diameter of a compression ignition engine are 250mm and 150mm respectively. If the clearance volume is 0.0004m³ and fuel injection takes place at constant pressure for 5% of the stroke Determine the efficiency of the engine. Assume the engine working on a diesel cycle. **07**
- OR**
- (b) In a constant volume Otto cycle the pressure at the end of compression is 15 times that at the start, the temperature of air at the beginning of compressor is 38 °C and maximum temperature attained in the cycle is 1950°C Determine, (i) Compression Ratio (ii) Thermal efficiency (iii) Workdone. **07**
- Q.3** (a) Differentiate Impulse and Reaction Turbine. **03**
 (b) Discuss the advantages of Steam Turbine over Steam Engine **04**
 (c) What are the different methods of compounding of steam turbine stages. List the advantages and limitation of velocity compounding. **07**
- OR**
- Q.3** (a) Discuss advantages and disadvantages of closed cycle over open cycle gas turbine **05**
 (b) What do you mean by jet propulsion **02**
 (c) What are the methods for improvement of thermal efficiency of simple open cycle constant pressure Gas turbine plant. **07**
- Q.4** (a) Explain with sketch construction and working of reciprocating air compressor. **07**
 (b) Mention the important application of compressed air. **04**
 (c) Classify the various types of air compressor **03**
- OR**
- Q.4** (a) Explain Clausius inequality. **05**
 (b) Write 3rd law of thermodynamics. **02**
 (c) Derive Expression for entropy changes for an open system. **07**
- Q.5** (a) Define the following terms (i) Refrigeration (ii) C.O.P. (iii) 1 ton of Refrigeration (iv) Air Conditioning **04**
 (b) Explain briefly simple vapour absorption system **06**
 (c) Write short note on “Refrigerant” **04**
- OR**
- Q.5** (a) Explain modes of heat transfer **06**
 (b) Write short note on black body **06**
 (c) Define Logarithmic mean temperature difference (LMTD) **02**
