

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- 1st / 2nd • EXAMINATION – SUMMER 2013

Subject Code: 110006**Date: 11-06-2013****Subject Name: Elements of Mechanical Engineering****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

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

- Q.1** (a) Explain working of four stroke Diesel Engine with P-V diagram. **05**
 (b) A four cylinder four stroke petrol engine has 100mm bore and stroke is 1.3 times bore. It consumes 4 kg of fuel per hour having calorific value of 40500 kJ/kg. If engine speed is 850 rpm. Find its Indicated thermal efficiency. The mean effective pressure is 0.75 N/mm² **05**
 (c) Define Pressure and explain Absolute Pressure, Gauge Pressure and Atmospheric pressure. **04**
- Q.2** (a) Explain construction and working of Locomotive boiler with neat sketch. **07**
 (b) State the function of the following **03**
 (1) Fusible plug. (2) Economiser (3) Safety valve
 (c) Define : (i) Sensible heat (ii) Latent heat **04**
 (iii) Dryness fraction (iv) Enthalpy of evaporation.
- Q.3** (a) Derive Expression PV/T=constant with the help of Boyle's law and Charle's law. **05**
 (b) A steel cylinder contains O₂ at pressure of 25 bar and temperature of 27⁰C, After using some quantity of the gas the pressure was found to be 5 bar and temperature of 20⁰C. 700 liters of O₂ was originally put in the cylinder at NTP Density of O₂ at NTP is 1.43 gm/liter. Find the mass of O₂ used. **06**
 (c) Define Calorific value and explain Higher and Lower Calorific values. **03**
- Q.4** (a) Explain Separating Calorimeter with neat sketch. **05**
 (b) Find internal energy of 1 kg of steam at a pressure of 15 bar when **05**
 (i) The steam is superheated with temperature of 400⁰C.
 (ii) The steam is wet with dryness fraction =0.9
 Take C_{ps}=2.1 kJ/kg K
 (c) What are different methods of IC engine governing? Explain governing method used in the Petrol engine. **04**
- Q.5** (a) Derive expression for the efficiency of the Carnot cycle. **05**
 (b) In an ideal Diesel cycle the temperature at the beginning and at the end of compression are 57⁰C and 603⁰C. The temperature at the beginning and at the end of expansion are 1950⁰C and 870⁰C. Find the ideal efficiency of the cycle. If the pressure is 1 bar find the maximum pressure in the cycle. **05**
 (c) Explain Oldham's coupling with neat sketch. **04**
- Q. 6** (a) Explain working of main parts of centrifugal pump with neat sketch. **05**
 (b) Explain difference between Reciprocating and Rotodynamic compressor. **05**
 (c) Draw and explain Internal expanding brake. **04**
- Q.7** (a) Explain Vapour absorption Refrigeration system with the neat sketch. **06**
 (b) Define (i) Hardness (ii) Creep (iii) Resilience (iv) Toughness. **04**
 (c) What are Bearings and how they are classified? **04**
