

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. - SEMESTER – III • EXAMINATION – WINTER 2012****Subject code: 132603****Date: 05-01-2013****Subject Name: Thermodynamics of Elastomers & Polymers****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) Answer the following. (14)
- (i) Define the terms: - (1) Heat of neutralization (2) Thermodynamics.
- (ii) Give difference between Extensive properties & Intensive Properties.
- (iii) State the 2nd law of Thermodynamics.
- (iv) Give difference between gasoline fuel & Diesel Fuel.
- (v) What percent of T_1 / T_2 gives heat engine an ideal efficiency of 10%?
- (vi) Write the statement of Le Chatelier's principle.
- (vii) Define heat of polymerization & write the factors affecting it.
- Q.2** (a) Describe in brief about Carnot cycle & derive the expression for it. (07)
- (b) Derive the expression for relation between C_p & C_v for non ideal gas. (07)
- OR**
- (b) 1 mole of an ideal gas ($C_v = 12.471 \text{ J/K/mol}$) is heated from 300 K to 600 K. (07)
- Calculate entropy change when the: a) volume is kept constant & b) pressure is kept constant.
- Q.3** (a) Derive the expression for Maxwell's relation for any three. (07)
- (b) The free energy change accompanying a given process is -85.77 kJ at 25°C & -83.68 at 35°C. Calculate the change in enthalpy for the process at 30°C. (07)
- OR**
- Q.3** (a) The boiling point of water at 50 atm pressure is 265°C. compare the theoretical efficiencies of the system of engine operating between 45°C & the boiling point of water at: (1) 1 atm, & (2) 50 atm. (07)
- (b) The latent heat of vaporization of benzene at its boiling point (80°C) is 7413 cal/mol. What is vapour pressure of benzene at 27°C? (07)
- Q.4** (a) Explain the Concept of Ceiling temperature. (07)
- (b) Describe in brief about Eutectic system. (07)
- OR**
- Q.4** (a) Describe in brief about any seven properties required for choice of refrigerant. (07)
- (b) State the Phase rule & explain in detail about phases & components with example. (07)
- Q.5** (a) Explain in detail about factors to be considered during selection of a Coal. (07)
- (b) Explain in detail about construction & working of Junker's Gas Calorimeter with diagram. (07)
- OR**
- Q.5** (a) Explain in detail about construction, working & calculation of Bomb calorimeter with diagram. (07)
- (b) Calculate the gross & net calorific value of coal having the following compositions carbon = 85% , hydrogen = 8% , sulphur = 1% , nitrogen = 2% , ash = 4% , latent heat of steam = 587 cal/g. (07)