Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – WINTER • 2014

Subject Code: 132603 Date: 30-12-2014

Subject Name: Thermodynamics of Elastomers & polymers

Time: 02.30 pm - 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 Answer the following. **(14)**

(i) Define the terms:- (i) System (ii) Surroundings

(ii) Give difference between state function & path function.

(iii) State zeroth law of thermodynamics.

(iv) Give units of heat.

(v) List the difference between homogeneous process & heterogeneous process.

(vi) State first law of thermodynamic & its mathematical form.

(vii) Give any two differences between low temperature & high temperature Carbonization.

Q. 2 (a) Derive any three Maxwell's thermodynamic relations by using thermodynamic quantity. **(07)**

Q. 2 (b) Derive expression for Adiabatic expansion of an ideal gas. **(07)**

OR

(b) Derive relationship between Cp & Cv for ideal gas. **(07)**

Q. 3 (a) Write merits & demerits of Solid fuels over Liquid & Gaseous fuels. **(07)**

(b) Short note on: " Metallurgical coke". **(07)**

OR

Q. 3 (a) Explain the working principle, construction & calculation of Bomb calorimeter with sketch. **(07)**

(b) Define the term: "Calorific value". Explain types of it in detail. **(07)**

Q. 4 (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 and the boiling point of water at: (i) 1 atm,and (ii) 50 atm. **(07)**

(b) Derive the expression for Helmholtz or work function & prove that Net or useful work = Decrease in free energy. **(07)**

OR

Q. 4 (a) 1 mole of an Ideal gas(Cv = 12.471J/K*mol) is heated from 300 K to 600 K. Calculate entropy change when the:(a) volume is kept constant, and (b) pressure is kept constant. **(07)**

(b) Derive expression for Gibbs –Helmholtz equation. **(07)**

Q. 5 (a) Define the term Heat of polymerization & explain in brief about it. **(07)**

(b) Derive expression of phase rule. **(07)**

OR

Q. 5 (a) List the requirements for the choice of refrigerant. **(07)**

(b) Short note on Polymorphism. **(07)**

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