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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