Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–III • EXAMINATION – SUMMER 2013**

**Subject Code: 132603** **Date: 29-05-2013**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | **Answer the following.** | **(10)** |
| | **(i)** | Define the terms: - (i). Higher or gross calorific value (ii) Lower or net calorific value | |
| | **(ii)** | State the first law of thermodynamics and give mathematical expression for it. | |
| | **(iii)** | Give comparison between extensive properties and intensive properties. | |
| | **(iv)** | Define Heat of polymerization. | |
| | **(v)** | Write any two applications of Clapeyorn-clausius equation. | |
| | **(b)** | What do you mean by (i) Heat of reaction (ii) Heat of combustion (iii)Heat of neutralization (iv) Heat of formation ? Explain all. | **(04)** |
| **Q.2** | **(a)** | Give the classification of fuels. | **(07)** |
| | **(b)** | Explain in detail about Junker's Gas Calorimeter with calculation. | **(07)** |
| | | OR | |
| | **(b)** | List the selection criteria of coal and explain all in detail. | **(07)** |
| **Q.3** | **(a)** | Derive an expression for Reversible Isothermal expansion of an Ideal Gas. | **(07)** |
| | **(b)** | Explain in detail about flame temperature and explosion temperature. | **(07)** |
| | | OR | |
| **Q.3** | **(a)** | Derive an expression for adiabatic expansion of an Ideal Gas. | **(07)** |
| | **(b)** | State the Carnot's theorem and derive an expression for it. | **(07)** |
| **Q.4** | **(a)** | Derive any three expressions of Maxwell's thermodynamic relations. | **(07)** |
| | **(b)** | Explain in detail about concept of ceiling temperature. | **(07)** |
| | | OR | |
| **Q.4** | **(a)** | The efficiency of an engine is 0.42.Calculate the heat that must be withdrawn from the reservoir at higher temperature to produce 203cal of work. | **(07)** |
| | **(b)** | List the requirements for the choice of refrigerant. | **(07)** |

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| **Q.5** | **(a)** | State the phase rule and calculate the total number of independent variables and derive an expression for it. | **(07)** |
| | **(b)** | Define chemical equilibrium and list the characteristics of a chemical equilibrium. | **(07)** |
| | | OR | |
| **Q.5** | **(a)** | Discuss in detail about phase rule for two component alloy systems. | **(07)** |

**(b)** Explain in detail about (i)Homogeneous Equilibrium (ii)Heterogeneous Equilibrium (iii) Physical Equilibrium **(07)**