# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE SEM-III Examination May 2012
## Subject code: 132603
## Subject Name: Thermodynamics of Elastomers & Polymers

Date: 10/05/2012                                    Time: 02.30 pm – 05.00 pm
                                                   Total Marks: 70

## Instructions:
1. **Attempt all questions.**
2. **All notations used have conventional meaning.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

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|---|---|---|---|
| **Q.1** | **(a)** | Define the following terms: State of system, State and Path functions, Isochoric, Isobaric and Isentropic process. | **07** |
| | **(b)** | Write the mathematical form and limitations of First law of thermodynamics. | **07** |
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| **Q.2** | **(a)** | Show that $PV^\gamma$ = constant for an ideal gas undergoing adiabatic process. | **07** |
| | **(b)** | Explain Joule-Thomson effect. | **07** |
| | | **OR** | |
| | **(b)** | Discuss on Carnot's Theorem. | **07** |
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| **Q.3** | **(a)** | Derive the formula for entropy change of an ideal gas. | **07** |
| | **(b)** | Derive Maxwell thermodynamic relations. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | 30 g of water at 35 $^0$C is converted into steam at 200 $^0$C. Calculate the entropy change. Data: Heat capacity of superheated steam = 1.98 J/g K, Heat capacity of water = 4.2 J/g K, Latent heat of vaporization at 100 $^0$C = 2260 J/g | **07** |
| | **(b)** | Derive Clapeyron-Classius equation and discuss its application in detail. | **07** |
| | | | |
| **Q.4** | **(a)** | Write different statements of second law of thermodynamics. | **07** |
| | **(b)** | Explain the concept of ceiling temperature. List four important possibilities of polymerization. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Derive the expression for Van't Hoff Isotherm. | **07** |
| | **(b)** | List the characteristics of good fuel. | **07** |
| | | | |
| **Q.5** | **(a)** | Write the Phase rule equation. Give the merits and demerits of Phase rule. | **07** |
| | **(b)** | Explain homogeneous, heterogeneous and physical equilibrium with the help of example. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain the Law of Mass Action. Also give the relation between $K_p$ and $K_c$. | **07** |
| | **(b)** | Discuss on Water system. | **07** |

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