Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - III[rd] SEMESTER– EXAMINATION – WINTER 2014**

**Subject Code: 2132502 Date:18/12/ 2014**

**Subject Name: Engineering Thermodynamics & Heat Transfer**

**Time: 2.30 p.m. – 5.00 p.m. 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)** | What are different types of Thermodynamic Systems? Explain with the example. | **07** |
| | **(b)** | State the first law of thermodynamics. Mention its success and limitations? | **07** |
| **Q.2** | **(a)** | Derive general steady flow energy equation. | **07** |
| | **(b)** | Define following terms: state, path, process, perfect gas. | **07** |
| | | **OR** | |
| | **(b)** | Prove that violation of Kelvin-Plank statement leads to violation of Clausius statement. | **07** |
| **Q.3** | **(a)** | What is a cyclic process? Describe Carnot's cycle for establishing the maximum convertibility of heat into work? | **07** |
| | **(b)** | Explain the concept of Energy & Exergy with the example. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain Entropy. The change in entropy of a system, in a process is positive. Could the process be a spontaneous one? Explain. | **07** |
| | **(b)** | Write a short note on phase rule. | **07** |
| **Q.4** | **(a)** | Explain different modes of heat transfer along with their basic laws. | **07** |
| | **(b)** | Explain conduction and flow of heat through a composite wall when resistances are in series. | **07** |
| | | OR | |
| **Q.4** | **(a)** | What are various Types of Convection? | **07** |
| | **(b)** | Discuss natural convection in vertical and horizontal cylinders. | **07** |
| **Q.5** | **(a)** | Derive the equation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. | **07** |
| | **(b)** | Draw the pool boiling curve and write the highlight of each segment in brief. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain any two laws of Radiation. | **07** |
| | **(b)** | Derive the relation $A_1F_{12}=A_2F_{21}$ in relation to view factor. | **07** |

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