Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014**

**Subject code: 733903 Date: 27-11-2014**

**Subject Name: Cryogenics Engineering**

**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)** | Explain the effect of temperature in cryogenic range of 0 to 250 K on Ultimate and Yield strength of following materials.<br>(i) S.S. 304 (ii) Carbon steel and (iii) Teflon | **07** |
| | **(b)** | Explain following phenomenon of superconductivity<br>1. Meissner effect 2.Critical current 3. Critical flux density | **07** |
| **Q.2** | **(a)** | Discuss the importance of critical temperature and critical magnetic field in super conductivity.<br>Write short note on applications of super conductivity. | **07** |
| | **(b)** | Explain the construction and working of super conducting gyroscope and bearing. | **07** |
| | | **OR** | |
| | **(b)** | Explain the applications of cryogenics in blood preservations and bio- cell preservation | **07** |
| **Q.3** | **(a)** | Define Superconductivity. Discuss about the properties which are change either abruptly of gradually when a material makes the transition from the normal to the superconducting state. | **07** |
| | **(b)** | With a neat sketch explain the construction and working of space simulation chamber. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Compare the constant volume gas thermometer and vapour pressure thermometer. State different corrections made for high precision of the thermometers. What are precautions that must considered for use of such thermometers. | **07** |
| | **(b)** | Compare the following insulations with their advantages and disadvantages. 1.Expanded foam 2.Gas-filled powders and fibrous materials 3.Vacuum alone 4.Opacified powders 5. Evacuated powders and fibrous materials 6.Multilayer insulations. | **07** |
| **Q.4** | **(a)** | Discuss about the precautions to be taken during handling of cryogens. | **07** |
| | **(b)** | Discuss briefly about thermal properties of liquid and gaseous hydrogen. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain in detail about Metallic resistance thermometers. | **07** |
| | **(b)** | With a neat sketch explain the construction and working of a chemical rocket engine | **07** |
| **Q.5** | **(a)** | Briefly describe any one cryogenic liquid quality measuring device. | **07** |
| | **(b)** | Prove that the calibration curve of a capacitance type cryogenic liquid-level indicator is a straight line of the type Y= m*x +C | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | With a neat sketch explain the method of cryogenic fluid flow measurement. | **07** |
| | **(b)** | Explain construction and working of Magnetic Thermometer having sensing element of paramagnetic material | **07** |

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