

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2014****Subject code: 733903****Date: 05-06-2014****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.

- Q.1** (a) List and describe different methods of production of low temperature. **07**
(b) Discuss the following properties that change either abruptly or gradually when a material makes the transition from the normal to the superconducting state. **07**
1. Specific heat 2. Thermoelectric effects 3. Thermal conductivity
4. Electric resistance 5. Magnetic permeability
- Q.2** (a) Explain following phenomenon of superconductivity **07**
1. Meissner effect 2. Critical current 3. Critical flux density
(b) What is super fluidity? List consideration for selection of cryogenic fluid. **07**
OR
(b) Determine the yield, work requirement per unit mass compressed in the high-pressure compressor and work requirement per unit mass liquefied for a Linde dual-pressure system operating with nitrogen as the working fluid between 101.3 KPa (1 atm) and 300 K(80° F) and 20.3 MPa (200 atm). The intermediate pressure is 5.07 MPa (50 atm) and the intermediate pressure flow rate ratio is 0.80. **07**
- Q.3** (a) Derive an expression for yield and figure of Merit of a simple Linde Hampson system **07**
(b) Explain the applications of cryogenics in blood preservations and biocell preservation. **07**
OR
- Q.3** (a) Describe Heylandt system and derive equation for thermal analysis. **07**
(b) With the help of neat sketch explain the construction of a Dewar vessel for storing cryogens. **07**
- Q.4** (a) Explain Gifford McMahon cryocooler. **07**
(b) Explain construction and working of Vapour Pressure Thermometer with neat figure. Also state its limitations. **07**
OR
- Q.4** (a) Describe cryostats in detail. **07**
(b) Explain construction and working of Magnetic Thermometer having sensing element of paramagnetic material **07**
- Q.5** (a) What are the various types of Hazards relevant to the cryogenic industries? Discuss in brief. **07**
(b) Explain in detail about Capacitance quality meter with neat sketch. **07**
OR
- Q.5** (a) Discuss thermal, electrical and magnetic properties of metals, alloys and non-metals at cryogenic temperature **07**
(b) Explain Eye cryogenic Probe and its application. **07**
