

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013****Subject code: 733903****Date: 15-05-2013****Subject Name: Cryogenics Engineering****Time: 10.30 am – 01.00 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) Explain different methods of production of low temperature. **07**
(b) Explain the use of cryogenics in blood and bio-cell preservations. **07**

- Q.2** (a) Explain following phenomenon of superconductivity **07**
1. Meissner effect 2. Critical current 3. Critical flux density
(b) Explain the concept of ortho-hydrogen and para-hydrogen. **07**
Also Explain difference between ortho-hydrogen and para-hydrogen.

OR

- (b) Write short note on criteria of selection of cryogenic fluids. **07**

- Q.3** (a) Linde-Hampson cycle cannot be used as it is for Neon, Hydrogen and Helium. Explain. **07**
(b) Determine the liquid yield, the amount of nitrogen boiled away per unit mass of hydrogen liquefied, and the work requirement per unit mass of hydrogen liquefied for a precooled Linde-Hampson system operating from 101.3 kPa (1 atm) and 300 K (80 °F) to 5.066 Mpa (50atm). The nitrogen bath is at a temperature of 70 K (-334 °F), corresponding to a saturation pressure of 38.5 kPa (0.380 atm or 5.58 psia) **07**

OR

- Q.3** (a) Explain Heylandt system and its thermodynamic analysis. **07**
(b) Explain Gifford McMahon cryocooler system. **07**

- Q.4** (a) Explain in detail about Turbine flow meters with neat sketch. **07**
(b) Discuss behavior of alloys and non-metals at cryogenic temperature **07**

OR

- Q.4** (a) Explain Claude system . **07**
(b) Briefly describe any one cryogenic liquid level measuring device. **07**

- Q.5** (a) Explain briefly the significance of cryogenics applications for space technology. **07**
(b) Explain Eye surgery Probe **07**

OR

- Q.5** (a) Explain the applications of cryogenics in space simulation. Discuss in detail. **07**
(b) What are the various Safety criteria to be considered for handling of cryogens? Discuss in detail. **07**

.....