

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013****Subject code: 732102****Date: 28-11-2013****Subject Name: Cryogenic 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) List cryogenic material properties. Explain Superconductivity with its application. **07**
(b) Explain the concept of super-fluidity for cryogenic fluids. **07**
- Q.2** (a) Describe Joules – Thomson refrigeration effect with a neat sketch. **07**
(b) (i) Define following terms: **07**
1. Refrigerator effectiveness
2. Coefficient of performance
3. Figure of merit
(ii) Determine the ideal COP for an isobaric source refrigerator operating between a sink temperature of 300 K and minimum and maximum source temperature of 110 K and 180 K. The working fluid is gaseous nitrogen and source pressure is 1.013 MPa.
- OR**
- (b) Explain the importance of refrigerator effectiveness for Phillips refrigerator. **07**
- Q.3** (a) Explain simple Linde-Hampson liquefaction system with neat sketch. **07**
(b) Explain Claude liquefaction system with neat sketch. **07**
- OR**
- Q.3** (a) Explain Kapitza liquefaction system with neat sketch. **07**
(b) Explain the concept of Thermal Valve and Magnetic Cooling in refrigerators. **07**
- Q.4** (a) Explain pulse tube cryocooler with neat sketch. **07**
(b) Explain Cascade refrigerating system with neat sketch. **07**
- OR**
- Q.4** (a) Distinguish between cryonics and cryo-preservation. **07**
(b) Explain the benefits and drawback of using cryogenic propellants in rockets. **07**
- Q.5** (a) Explain vacuum insulation and opacified powder insulation. **07**
(b) Explain filled powders and fibre insulation. **07**
- OR**
- Q.5** (a) Explain Dual pressure Linde-Hampson liquefaction system. **07**
(b) Describe thermodynamically ideal liquefaction system. **07**
