

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER- III • EXAMINATION – SUMMER 2015**

**Subject Code: 732102**

**Date: 02/05/2015**

**Subject Name: Cryogenic Engineering**

**Time: 2:30 pm to 5:00 pm**

**Total Marks: 70**

**Instructions:**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary**

- Q.1 (a) Define cryogenics. Discuss the importance of cryogenics. 07  
(b) List cryogenic material properties. Explain Superconductivity with its application. 07
- Q.2 (a) Discuss the thermal properties of liquid and gaseous hydrogen. 07  
(b) Explain the importance of refrigerator effectiveness for Phillips refrigerator. 07

**OR**

(b) Enlist several types of insulation that can be used in cryogenic equipments. Also give comparison of Gas filled powders/fibers insulation and expanded foam insulation. 07

- Q.3 (a) Describe Joules ó Thomson refrigeration effect with a neat sketch. 07  
(b) Discuss the change in any three mechanical properties at cryogenic temperature. 07

**OR**

- Q.3 (a) Explain Kapitza liquefaction system with neat sketch. 07  
(b) Describe the analysis to calculate the heat inleak for the double walled vacuum insulated vessel. 07
- Q.4 (a) Explain following phenomenon for He II  
(1) Roll-in-Film, (2) Fountain effect and (3) Second sound 07  
(b) Explain the Magnetic refrigeration cycle with neat sketch. 07

**OR**

- Q.4 (a) Explain pulse tube cryocooler with neat sketch. 07  
(b) Reverse Carnot cycle is not considered as the ideal cycle for liquefaction. Justify the statement with sketches. 07
- Q.5 (a) Describe construction and working of a typical Cryo-probe used

for treatment of warts with necessary figure. 07  
(b) Explain Cascade refrigerating system with neat sketch. 07

**OR**

Q.5 (a) Explain the applications of cryogenics in space simulation.  
Discuss in detail. 07  
(b) Describe thermodynamically ideal liquefaction system. 07

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