

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
