

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER-II • EXAMINATION – SUMMER - 2017**

**Subject Code: 2722110****Date:30/05/ 2017****Subject Name: CRYOGENIC ENGINEERING****Time:02:30 pm to 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)** Discuss the variations of the following properties of material at cryogenic temperature. **07**  
 i) Ultimate strength and yield strength  
 ii) Fatigue strength  
 iii) Hardness  
 iv) ductility
- (b)** Explain the following phenomenon for He.II (1) Fountain effect (2) Second sound (3) Roll in film. **07**
- Q.2 (a)** Give Brief Overview of Cryogenic Insulation used in Cryogenic Equipment. **07**  
**(b)** Explain the following phenomenon of superconductivity **07**  
 (1) Meissner effect (2) Critical current (3) Critical flux density
- OR**
- (b)** Compare the following insulations with their advantages and disadvantages. **07**  
 1. Expanded foam 2. Gas-filled powders and fibrous materials  
 3. Opacified powder.
- Q.3 (a)** Explain the importance of refrigerator effectiveness for Phillips refrigerator. **07**  
**(b)** With a neat Sketch explain the construction and working of chemical rocket engine. **07**
- OR**
- Q.3 (a)** Describe Application of Cryogenics in food Preservation. **07**  
**(b)** Explain the Gifford-Mc Mohan Cryocooler with neat sketch. Also explain its merits and Demerits. **07**
- Q.4 (a)** Explain in brief Pulse tube refrigeration system. **07**  
**(b)** Explain with neat sketch Joule Thomson refrigeration system. **07**
- OR**
- Q.4 (a)** Write short note on Cryogenic Vessels. **07**  
**(b)** Explain the thermodynamically ideal system for liquefaction of air and derive an expression for finding liquid yield. **07**
- Q.5 (a)** With neat sketch explain precooled linde-Hampson Gas Liquefaction systems. **07**  
**(b)** Explain claude system for gas liquefaction system with neat sketch and T-S Diagram. **07**
- OR**
- Q.5 (a)** Explain Superconducting motor and gyroscopes. **07**  
**(b)** Explain Kapitza Liquefaction system with neat sketch. **07**

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