

(03 Hours)

[Total Marks:80

N.B: (1) **Question No.1 is Compulsory** and attempt **any three** from **Q-2 to Q-6**.

(2) Assume suitable data ,if necessary.

(3) Use of **T-S charts** of gases are **permitted**.

1.
 - a) Simple Linde-Hampson system would not work for liquefaction of gases like Neon,Hydrogen,and Helium.State the reasons. 5
 - b) Explain gas purification methods in cryogenics. 5
 - c) Why liquid hydrogen storage is different other liquid gases? 5
 - d) Dewar Vessels are not designed for completely filled with cryogen .Give reasons. 5

2.
 - (a) Describe Dewar vessel used in storage of cryogen incorporating safety devices with a neat sketch. 10
 - (b) With the help of schematic and T-S diagram, explain "Philips refrigerator".Calculate the percentage loss of refrigerating effect for 1% ineffectiveness of regenerator for stirling cycle operating between 300K and 78K.Working fluid is Helium. And volume expansion ratio 1.5.[for Helium, $\gamma = 1.67$] 10

3.
 - (a) Explain briefly Simon Helium liquefaction system with schematic diagram. 10
 - (b) Enlist various thermometers used for measurement of cryogenic temperature.Explain any one with neat sketch. 10

4.
 - (a) Discuss insulations used at cryogenic temperature and arrange them in order of performance and cost. 10
 - (b) Explain heat exchangers configurations used in cryogenics with neat sketches. 10

5.
 - (a) Explain importance of vacuum technology in cryogenics.Discuss flow regimes in vacuum systems. 10
 - (b) Enlist various types of liquid level measurement gauges used in cryogenic fluid storage vessel.Explain any two with neat sketches. 10

6. Write short notes on **Any Four** of the following- 20
 - i) Adiabatic Demagnetization.
 - ii) Cryogenic application in eye surgery.
 - iii) Ortho-para-hydrogen conversion in the liquefier.
 - iv) Superconductors.
 - v) Space simulation chamber.
