Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (FT)/SEM-3/PGFT-302D/2012-13

2012
CRYOGENICS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions 5 × 14 = 70

1. What are cryogens ? Name few cryogenic fluids. Discuss the physical & thermo physical properties of liquid hydrogen and liquid helium.
2. Discuss the design and functioning of an air separation plant.
3. Discuss the Brin oxygen process. What are the major difficulties in this process for commercial use ?
4. What is adiabatic Joule-Thomson effect ? How is it used for liquefaction of air in Linde cycle ?
5. Discuss the principle of fractional distillation of liquid air in a simple rectification column.
6. Discuss the principle and operation of linde double column for air separation in to its components.

7. Discuss the construction of vacuum insulated storage and vacuum insulated transport tank for cryogenic fluid.

8. With a neat diagram, discuss the operation of continuous liquid nitrogen tunnel freezer for freezing of food. Discuss the Polar stream in transit refrigeration system for transportation of frozen food.

9. Write short notes on any *two* of the following :

   a) Production of inert gases from liquid air

   b) Uses of a helium

   c) Significance of the temperature "absolute zero"

   d) Superconductors for Magnetic Resonance Imaging (MRI)

   e) Linde cycle

   f) Vapour-liquid equilibrium diagram at constant pressure for a two component mixture

   g) Heylandt cycle.