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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, May 2013
(2008 Scheme)
08.805.13 : CRYOGENIC ENGINEERING (MPU)

Time : 3 Hours Max. Marks : 100

Instructions : 1) *Answer **all** questions in Part **A**, **each** carries **4** marks.*
2) *Answer **one full** question from **each** module in Part **B**, **each** carries **20** marks.*
3) ***Use** of approved charts and tables are **permitted**.*

PART – A

1. Mention five applications of cryogenic engineering.
2. Explain the significance of maximum inversion temperature on the liquefaction of hydrogen gas.
3. How is Joule-Thompson coefficient related to gas liquefaction ?
4. Explain Silsbee hypothesis.
5. Explain the necessity of a catalyst in hydrogen gas liquefaction.
6. Explain the different types of cryogenic fluid transfer systems.
7. Sketch the phase diagram for Helium 4.
8. With a neat sketch, explain the fountain effect in liquid helium – II.
9. Explain super conductivity.
10. Draw the schematic of a cascade refrigeration system.

PART – B

Module – I

11. a) Describe in detail the variation of thermal properties of materials at cryogenic temperatures.

    b) Briefly explain Meissner effect.

OR

P.T.O.

12. a) Describe in detail the variation of magnetic properties of materials at cryogenic temperatures.

    b) Prove that +ve or – ve μ_{JT} of a real gas arises from its departure from ideal gas behaviour.

Module – II

13. a) Sketch and explain the working of a precooled Linde Hampson system for the liquefaction of hydrogen gas.

    b) With neat sketches explain the different types of heat exchangers used for cryogenic applications.

OR

14. a) In a reversible Linde Hampson system for Nitrogen, the gaseous nitrogen enters the isothermal compressor at 290 K and 101.3 kPa and is compressed to a high pressure. Determine the value of high pressure so that the system will have a liquid yield of 0.070. Could the liquid yield be increased to 0.12 ? If not state why ? If the liquid yield could be increased to this value, determine the high pressure required.

    b) Explain a system for Neon gas liquefaction.

Module – III

15. a) Explain the working of a dilution refrigeration system.

    b) Describe the two-phase flow in cryogenic transfer lines.

OR

16. a) With neat sketches and T-s diagram, explain the working of a magnetic refrigeration system.

    b) What is cryopumping ? Explain the working of a cryopump.
