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Reg. No:

Name:

Eighth Semester B. Tech Degree Examination, Model Question Paper

(2013 Scheme)

13.805.8 CRYOGENIC ENGINEERING (MPU) (Elective IV)

Time: 3 Hours

Max. Marks: 100

PART-A

Answer **all** questions. Each question carries **2** marks

- 1) What is the use of cryogenic technology in space applications?
- 2) What is Meissner effect?
- 3) Differentiate ortho and para hydrogen? What is heat of conversion?
- 4) Comment on the modifications required in the simple Linde Hampson system for making it suitable for the liquefaction of gases like hydrogen.
- 5) What are the advantages of Cascade system?
- 6) What are the various process involved in Simon helium-liquefaction system?
- 7) What is importance of regenerators in cryogenic refrigeration system?
- 8) What are the various flow level measurement systems used for cryogenic applications.
- 9) What is the significance of cool down of cryogenic transfer lines and associated components?
- 10) What are the criteria for the selection of insulation for a cryogenic application?

(10x2=20 Marks)

PART-B

Answer **any one full** question from each Module. **Each** question carries **20** marks

Module – I

- 11) a) Sketch and explain the p-T diagram for Helium 4. Indicate lambda line, lambda point and critical point, and explain their significance. **10**
- b) Explain the thermal properties of Cryogenic liquids. **10**

OR

- 12) a) How cryogenic technology can be used in food processing and transportation industry? **10**
- b) Explain how cryogenic temperature influence the mechanical properties of materials **10**

PTO

Module – II

- 13) a) Explain with a schematic an ideal gas liquefaction system. **10**
- b) 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. i) Determine the value of high pressure so that the system will have a liquid yield of 0.070. ii) Could the liquid yield be increased to 0.12? If not, state why? iii) If the liquid yield could be increased to this value, determine the high pressure required **10**

OR

- 14) a) Indicate the expansion process of a real gas through a J-T valve from high pressure and temperature to atmospheric conditions on a typical phase diagram **10**
- b) Comment on the modifications required in the simple Linde Hampson system for making it suitable for the liquefaction of gases like hydrogen. **10**

Module – III

- 15) a) With neat sketch and T-s diagram explain the working of a magnetic refrigeration system. **10**
- b) What is cryogenic refrigeration? Explain the working of Vuilleumier refrigerator. **10**

OR

- 16) a) Write a short note on the various heat exchanger configurations used in cryogenic systems. **10**
- b) With neat labeled sketch explain the working of Philips refrigerator. **10**

Module – IV

- 17) a) Discuss the different types of insulations for cryogenic storage vessel. **10**
- b) Describe the two-phase flow in cryogenic transfer lines. **10**

OR

- 18) a) Explain the different types of temperature measuring systems used for cryogenic applications. **10**
- b) With the help of neat labeled sketch explain how cryogenic liquids are stored in a storage vessel. **10**
