

Eighth Semester B.Tech. Degree Examination

Branch: Chemical Engineering

13.806.1 PROCESS UTILITIES AND PIPELINE DESIGN (H)

Time: 3 Hours

Max. Marks: 100

PART-A

Answer all questions. Each question carries 2 marks (**10 x 2 = 20 Marks**)

1. Draw a neat-labeled sketch of vapour compression refrigeration systems.
2. Why is it necessary to provide interstage cooling in multistage compression process?
3. List any four factors that affect the performance of cooling towers employed in industries?
4. Write the application of cryogenic temperature in chemical industry.
5. List any two methods by which the steam economy can be improved.
6. What is the principle of 'recuperators'?
7. List any four desirable properties of piping materials.
8. Differentiate between code and standard with respect to piping engineering.
9. Classify Non-Newtonian fluids and give example for each type?
10. List any four desirable properties of a good insulating material?

PART-B

Answer one full question from each module

Module – 1

11. (a) Discuss how the need for cooling arises in process industries? Explain the mechanical draft and the natural draft cooling towers employed in industries and compare their relative merits and demerits? (**12**)
(b) Why do humidification and dehumidification become necessary in air water systems? Bring out the difference between the two. Briefly describe the equipments for these operations? (**8**)

OR

12. (a) Enumerate the classification of refrigerants. What are the desirable properties of refrigerants? Name some common refrigerants generally used in refrigeration systems? What do you understand by CFC free refrigerants? (**12**)

(b) List the various methods of production of cryogenic temperature? Explain any one method of producing cryogenic temperature in detail? (8)

Module - 2

13. (a) Explain the methods employed for detecting and releasing condensate by mechanical, thermostatic and thermodynamic types of steam traps. (10)

(b) What is the best way of pipe drainage? Explain water hammer and why does it occur in steam pipelines? (10)

OR

14. (a) Explain the terms economy and capacity of boilers. What are the piping and accessories used in the transportation of steam? (12)

(b) Bring out the importance of providing exhaust and ventilation and describe how it is achieved? (8)

Module - 3

15. (a) Give a detailed classification of valves in an industry? Write a note on valve characteristics? (12)

(b) Explain different pipe joints with neat diagram? (8)

OR

16. (a) List out the major codes and standards providing engineering bodies in piping? Explain any one in detail. (10)

(b) List the functions and properties of gaskets. Differentiate between flat ring and laminated type gaskets? (10)

Module - 4

17. (a) Why insulation is done on pipelines? Explain the selection of insulating materials with suitable examples? (10)

(b) Explain major and minor energy losses in pipes? (10)

OR

18. (a) Calculate loss of head due to friction in a tapered pipe? (8)

(b) Explain about frictional loss relationship for non-Newtonian fluids? (12)