

I B.Tech Supplementary Examinations, Aug/Sep 2008

INTRODUCTION TO CHEMICAL ENGINEERING

(Chemical Engineering)

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Describe the chemical engineering applications for the essential needs of mankind.
(b) Define unit operation in a chemical process. [12+4]
2. (a) State the steps to follow in energy balance made across in equipment.
(b) Write the energy balance expressions for a non flow and flow process. [10+6]
3. (a) What is priming? How can it be overcome.
(b) Give a detailed account of centrifugal pumps. [8+8]
4. (a) Write short notes on applications of heat exchangers.
(b) Explain various applications of evaporation. [8+8]
5. (a) Explain the inter phase mass transfer and mass transfer coefficient.
(b) Describe the overall mass transfer coefficient in terms of individual film coefficient. [8+8]
6. (a) What is distillation? Explain briefly.
(b) Describe flash distillation with neat diagram? By making material balance for the volatile component in a binary mixture, obtain the expression for the fractions of feed vaporized.
(c) Explain how the composition of the Vapour-liquid leaving the flash distillation operation can be calculated. [4+8+4]
7. (a) Write about the construction and working of a rotating disc contractor. Where it is used and what are its advantages.
(b) Write short notes on triangular diagram. [10+6]
8. (a) Explain circulating magma vacuum crystallizer with neat sketch.
(b) Write short notes on chemisorption. [10+6]

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1. Explain:

- (a) Electrostatic Separation
- (b) Electro dialysis. [10+6]

2. (a) Explain solubility.

- (b) Define distribution coefficient.
- (c) Explain absorption coefficient.
- (d) Write short notes on vapour pressure of solution. [4+4+4+4]

3. (a) What is priming? How can it be overcome.

- (b) Give a detailed account of centrifugal pumps. [8+8]

4. (a) Explain heat conduction through a composite plane wall with a neat figure. Also, derive the equation for the rate of heat transfer.

- (b) The mean area for heat transfer depends on the shape of the solid. State the different ways in which it can be expressed for different shapes of solids. [10+6]

5. (a) State the diffusion between mass transfer operations with examples.

- (b) Give the similarities between various mass transfer operations.
- (c) Name at least four different ways by which mass transfer occurs. [8+4+4]

6. (a) Write short notes on function of down comers and weirs.

- (b) Distinguish between random packing and regular packing.
- (c) Distinguish between tray towers and packed towers. [6+4+6]

7. (a) Write about the selection of dispersion phase for liquid-liquid extraction.

- (b) Describe rotating disk and centrifugal extractors. [8+8]

8. (a) Define order and rate of reaction.

- (b) Explain slurry phase reactors.
- (c) Write short notes on batch reactor. [6+4+6]

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1. (a) What is the role of the chemical engineer for protection of environment?
(b) Explain briefly Tyler standard screen.
(c) What are the filter aids? Explain with examples? [6+5+5]
2. (a) Define Y_r and Y_p .
(b) Explain the dew point and molar humidity.
(c) Obtain relation between Y_r and Y_p . When are both equal. [6+5+5]
3. (a) Describe the construction, working and uses of centrifugal pump.
(b) Explain the characteristic curves of centrifugal pump. [8+8]
4. (a) Write short notes on applications of heat exchangers.
(b) Explain various applications of evaporation. [8+8]
5. (a) Enlist the mass transfer operations along with the phases in contact.
(b) Describe inter phase mass transfer with a suitable figure. [8+8]
6. (a) Define reflux ratio and write its importance in distillation.
(b) Write short notes on steam distillation. [8+8]
7. Describe the following:
(a) Rotating disk
(b) Extraction schemes
(c) Spray column
(d) Selection of liquid-liquid contactors. [4×4]
8. (a) Explain rotary drier with neat sketch.
(b) Explain process of humidification and dehumidification with suitable example. [10+6]

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1. (a) Describe the chemical engineering applications for the essential needs of mankind.
(b) Define unit operation in a chemical process. [12+4]
2. (a) How do you classify energy associated with mass.
(b) Derive Kirchoff's equation for effect of temperature on heat of reaction. [6+10]
3. Explain the physical significance of Reynold's number and describe Reynold's experiment. [16]
4. (a) Explain conduction with help of fundamental equation.
(b) Write typical values of thermal conductivities for different materials.
(c) Explain briefly conduction through resistance in parallel. [6+4+6]
5. (a) What is diffusivity and explain how diffusivity varies with temperature and pressure.
(b) Give the general range of diffusivities for solids, liquids and gases.
(c) Discuss about diffusion in different phases and give the approximate values of the rate of diffusion in these phases. [6+3+7]
6. (a) Define reflux ratio and write its importance in distillation.
(b) Write short notes on steam distillation. [8+8]
7. (a) Write short notes on:
 i. Cross current
 ii. Counter current.
(b) Explain the terms "extract" and raffinate. [10+6]
8. (a) Explain the process of humidification and dehumidification with suitable examples.
(b) Define humid volume and humid heat. [8+8]
