

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) Define hardness of water and state the two types of it.
(b) Describe the water softening methods. [4+12]
2. (a) Explain a combined detailed flow diagram of a process.
(b) State the different forms of energy associated with mass.
(c) Write the general energy balance equation for a flow system. [4+4+8]
3. Explain in detail suction lift and cavitations? [16]
4. Describe the phenomenon of thermal radiation in general? [16]
5. (a) Explain the relative volatility of a component.
(b) Explain the various types of distillation operations. [4+12]
6. (a) With a neat sketch briefly explain the construction and working principle of Bubble - Cap plate column.
(b) Give some industrially important packing materials used in packed column. [12+4]
7. (a) Write in detail about centrifugal extractors. What are its uses and advantages?
(b) Write about the construction and operation of mixer-settlers with neat diagrams. Mention their uses and advantages. [6+10]
8. (a) Write about the drying characteristics of wet solids with the help of the drying rate curves for constant drying conditions.
(b) Write in detail about the drum dryer with a neat diagram. [8+8]

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1. (a) Explain how we can estimate the ratio of masses of two immiscible liquids using their vapour pressures.
(b) Explain the applications of Cox chart and Duhring. [8+8]
2. (a) Describe the boundary layer formation on a flat plate for a fluid stream.
(b) State and explain the equation of continuity. [12+4]
3. Distinguish between laminar and turbulent flow. Explain each flow in detail? [16]
4. Discuss about condensing vapors when condensed on metal surfaces. [16]
5. (a) Name the various types of distillation.
(b) Explain about absorption in packed towers with a neat diagram. [6+10]
6. (a) Explain the Valve plate column with neat sketch and discuss the advantages and disadvantages for the same.
(b) Distinguish between Plate and Packed column in operation. [10+6]
7. (a) What do you know about multistage extraction process for separation of a liquid mixture consisting of two components A and B? Discuss.
(b) Discuss about the interdispersion of liquids and separation of phases in a centrifugal extractor? Mention the uses and advantages of a centrifugal extractor. [10+6]
8. (a) Define the following terms pertaining to drying:
 - i. Bound moisture
 - ii. Unbound moisture
 - iii. Wet basis
 - iv. Dry basis
(b) Write about the construction and operation of tray dryers with a neat diagram. Mention its uses and advantages. [8+8]

Code No: RR10803

Set No. 3

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1. (a) Describe the Chemical Engineering applications for the essential needs of mankind?
(b) Define unit operations in a chemical process. [12+4]
2. Explain the energy balance in general for a reacting system and describe the effect of Temperature on heat of reaction. [16]
3. Derive the Fannings equation and write its significance? [16]
4. Write about countercurrent and parallel flows in an heat exchanger? [16]
5. (a) What is azeotropic distillation?
(b) Explain briefly the characteristics of minimum and maximum boiling azeotropes.
(c) Discuss the principles of simple batch distillation. [4+4+8]
6. (a) With a neat sketch briefly explain the construction and working principle of Bubble - Cap plate column.
(b) Give some industrially important packing materials used in packed column. [12+4]
7. (a) What are the two main categories into which industrial liquid-liquid contactors are classified? Discuss about each category.
(b) Describe the construction and working of a rotating disc contactor. Where is it used and what are its advantages? [6+10]
8. (a) Differentiate between physical and chemical adsorption.
(b) What are the characteristics that an adsorbent should possess? Give two examples of adsorbents widely used.
(c) Mention the common industrial methods of removing adsorbed material from an adsorbent. [6+6+4]

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1. Define a mass transfer operation and enlist the mass transfer units with their applications. [16]
2. (a) Define fluid and classify the fluids by giving suitable examples.
(b) State the Bernoulli's theorem. Explain the mechanical energy balance equation for steady flow. [8+8]
3. Write a note on transportation of liquids through pipes and channels. [16]
4. Describe in detail the performance of tubular evaporators. [16]
5. (a) Describe diffusion, diffusivity and diffusion gradient.
(b) Describe the interphase mass transfer and the overall mass transfer coefficient in terms of individual film coefficients. [6+10]
6. (a) Write short notes on:
 - i. Cross current extraction.
 - ii. Counter current extraction.
 - iii. Fractional extraction.
(b) Define the terms "Extract" and "Raffinate". [12+4]
7. (a) What is distribution coefficient? Explain with respect to liquid-liquid extraction, for both dilute solutions and concentrated solutions.
(b) Discuss the construction and operation of mixer-settlers with neat diagrams. Mention their uses and advantages. [6+10]
8. (a) Distinguish between physical and chemical adsorption.
(b) Define and explain the process of adsorption. [8+8]
