

I B.Tech Supplementary Examinations, November/December 2005
INTRODUCTION TO CHEMICAL ENGINEERING
(Chemical Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the graphical integration and differentiation of a function.
(b) Explain the 'method of least squares' to fit a linear function. [8+8]
2. (a) Explain the different fluid heads in a flow.
(b) Write about conservation of mass and energy. [12+4]
3. Explain how pressure drops can be calculated for isothermal viscous flow? [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) How are industrial liquid-liquid contactors classified? Discuss about each category.
(b) Describe 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. Explain the Rayleigh and Buckingham methods of dimensional analysis. [16]
2. Obtain Bernoulli's equation from mechanical energy balance for steady flow. [16]
3. Write about centrifugal pump theory and its functioning. [16]
4. Explain temperature gradient in forced convection through a metal wall? [16]
5. (a) Name few mass transfer operations.
(b) Write the units for diffusivity.
(c) Write on any two of the following: [4+2+10]
 - i. Flash distillation
 - ii. Steam distillation
 - iii. Azeotropic distillation.
6. Describe any Four of the following:
 - (a) Sieve plate column
 - (b) Rotating disc contactor
 - (c) Extraction schemes
 - (d) Spray column
 - (e) Selection of liquid-liquid extraction columns. [4+4+4+4]
7. (a) Write about the distribution coefficient with respect to liquid-liquid extraction, for both dilute solutions and concentrated solutions.
(b) Discuss the construction and working of a rotating disc contactor. Where is it used and what are its advantages? [6+10]
8. (a) Discuss 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 spray dryer with a neat diagram. [8+8]

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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. (a) Explain shear stress versus shear rate plot for different fluids.
(b) Define stream line and a stream tube. [12+4]
3. What is terminal velocity and Explain the minimum fluidization velocity. [16]
4. Write about heat flow through a thick-walled cylinder? [16]
5. (a) Enumerate the application of molecular diffusion with suitable examples.
(b) Describe simple batch distillation. [8+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. Write in detail about the following with neat diagrams:
(a) Spray dryer
(b) Drum dryer [8+8]

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1. Write on the following:
 - (a) Avogadro's hypothesis
 - (b) Dalton's law
 - (c) Amagat's law
 - (d) Ideal solutions. [4+4+4+4]
2.
 - (a) What is fluid? Describe the nature of a fluid.
 - (b) Distinguish between laminar and turbulent-flow. Draw the velocity profiles in pipes for various types of flows. [8+8]
3. Write about the losses in fittings? [16]
4. Write about countercurrent and parallel flows in an heat exchanger? [16]
5.
 - (a) Define mass transfer coefficient and give the units.
 - (b) Derive an expression for rate of mass transfer for equimolar diffusing gaseous molecules A and B. [4+12]
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 the term distribution coefficient with respect to liquid-liquid extraction? Explain with reference to dilute solutions and concentrated solutions.
 - (b) Mention the various considerations in the selection of the phase to be dispersed.
 - (c) Describe how inter dispersion of liquids and separation of phases is achieved in a centrifugal extractor? Mention the uses and advantages of a centrifugal extractor. [6+4+6]
8. (a) Define the following:
 - i. Humid heat
 - ii. Humid volume
 - iii. Total enthalpy

- (b) What are the Freundlich and Langmuir equations? Discuss briefly about them.
Mention the applications of Langmuir equation.
- (c) Differentiate between an isotherm and a polytherm. [6+8+2]

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