

I B.Tech. Regular Examinations, June -2005
INTRODUCTION TO CHEMICAL ENGINEERING
(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the Rayleigh and Buckingham methods of dimensional analysis.
2. Define heat of reaction and how the standard heat of reaction can be calculated from heat of formation and heat of combustion of substances.
3. Write a note on transportation of liquids through pipes and channels.
4. Explain steady-state conduction of heat flow into and to out side of tank?
5. (a) Write the relation between individual and overall mass transfer coefficients and also mention units of each.
(b) Briefly explain design of packed adsorption column.
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.
7. (a) Discuss about the various factors for the selection of liquid-liquid extraction contactors.
(b) Mention the various techniques adopted for the production of phase inter-dispersion and counter flow in liquid-liquid contactors.
(c) Give at least two examples each for differential and stage-wise contactors.
8. (a) Define drying. How is it different from evaporation, dehydration, freeze-drying and gas drying?
(b) Explain how heat and mass transfer occur simultaneously during drying. Mention the uses of drying operation.

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1. Write on the following:
 - (a) Avogadro's hypothesis
 - (b) Dalton's law
 - (c) Amagat's law
 - (d) Ideal solutions.
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.
3. Explain in detail suction lift and cavitations?
4. Write about absorption of radiation by opaque solids and kirchhoff's law?
5.
 - (a) Name few mass transfer operations.
 - (b) Write the units for diffusivity.
 - (c) Write on any two of the following:
 - i. Flash distillation
 - ii. Steam distillation
 - iii. Azeotropic distillation.
6.
 - (a) Write briefly about the types of packing, packing supports, packing restrainers and entrainment eliminators.
 - (b) Define "selectivity of a solvent" in a liquid-liquid extraction.
 - (c) State some common problems in packed columns.
7.
 - (a) Explain single stage equilibrium extraction with an example.
 - (b) Write about the construction and working of a rotating disc contactor. Where is it used and what are its advantages?
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.

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1. (a) Explain the function of Galvanic (or voltaic) cell.
(b) Explain electrolysis process and state the electromotive series of metals.
2. Define heat of reaction and how the standard heat of reaction can be calculated from heat of formation and heat of combustion of substances.
3. What is terminal velocity and Explain the minimum fluidization velocity.
4. Describe the phenomenon of thermal radiation in general?
5. (a) Prove that for a binary gas mixture, the diffusivity of A in B equals the diffusivity of B in A.
(b) Why is it suggested that sulphur trioxide be absorbed in concentrated sulphuric acid rather than in water.
6. (a) Write briefly about the selection of equipment for gas-liquid operations.
(b) Write briefly about the selection of solvent in liquid-liquid extraction.
7. (a) Discuss the multistage extraction process for separation of a liquid mixture consisting of two components A and B.
(b) Explain the use of triangular diagram in liquid-liquid systems with a neat figure.
8. (a) What do you understand by the following terms pertaining to drying?
 - i. Capillary flow
 - ii. Internal diffusion
 - iii. Funicular state
 - iv. Pendular state.
(b) Describe the construction and operation of rotary dryers with a neat diagram. Mention its uses and advantages.

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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.
2. (a) State and explain the equation of continuity for one dimensional flow.
(b) Explain total energy balance for steady flow and describe each fluid head.
3. Write about enlargement and contraction losses in closed pipe lines?
4. Write about Nucleation phenomenon for crystal.
5. (a) Describe the interphase mass transfer.
(b) Describe the salient features of design of packed absorption column.
6. Describe the technology for gas-liquid mass transfer operations.
7. (a) Discuss about single stage equilibrium extraction with an example.
(b) Explain the multistage extraction process for separation of a liquid mixture consisting of two components A and B.
8. Discuss in detail about the various types of adsorption equipment.
