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C14-CH-406/C14-CHST-406

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BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL—2017
DCHE—FOURTH SEMESTER EXAMINATION
MASS TRANSFER OPERATIONS—I

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define unit operation and unit process.
2. Classify the mass transfer operations.
3. Define equilibrium between different phases.
- * 4. Write the names of unit operations that depend upon diffusion.
5. Differentiate between ideal stage and actual stage.
6. Write the relation between individual and overall mass transfer coefficient.
7. Define distillation.
8. Define relative volatility.
9. State channelling in an absorption tower.
10. Define HTU and HETP in an absorption tower.

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PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
(2) Each question carries **ten** marks.
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Ammonia gas (A) diffuses at steady state through nitrogen gas (B). At point 1 partial pressure of A is 15000 Pa and at point 2 it is 5000 Pa. The points 1 and 2 are 0.15 m apart. The total pressure is 101325 Pa and temperature is 298 K. Calculate flux of methane at steady state for equimolar counter diffusion. Diffusivity is $2.75 \times 10^{-5} \text{ m}^2/\text{sec}$.
12. (a) Differentiate between molecular and eddy diffusion. 4
(b) State the equations of diffusion in gases and liquids for equimolar counter diffusion and A through non-diffusing B. 6
13. Explain two film theory in interphase mass transfer.
14. Explain the boiling point diagrams.
15. A liquid mixture has a relative volatility of 2.5. And it is fed to a distillation column for separation process. Feed is a liquid at its bubble point with 50 mol% of more volatile component. The distillate is to contain 95 mol% of more volatile component and residue contains 10 mol% of more volatile component. Reflux ratio is 2.5. Calculate the number of theoretical plates required and position of feed plate.
16. Explain azeotropic distillation and write its applications.
17. Differentiate between absorption and distillation operations.
18. (a) Write the characteristics of tower packing material. 5
(b) Explain various types of tower packing and list the names of packing materials. 5

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