C09-CH-406/C09-PET-404

3437

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—2016

DCHE—FOURTH SEMESTER EXAMINATION

MASS TRANSFER

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. State and explain Fick's first law of diffusion.
2. Define optimum reflux ratio.
3. Define relative volatility and mention its significance.
4. What do you understand by the term 'flooding'?
5. What for adsorption operation is used?
6. Apply phase rule to extraction and leaching operations.
7. What do you understand by reverse osmosis?

8. Define relative humidity.

9. What are constant drying conditions?

10. Define crystal geometry.

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. In an oxygen(*A*)-nitrogen(*B*) mixture at 10 atm. and 25 °C, the concentrations of O_2 at two places of 0·2 cm apart, are 10% and 20% volume respectively. Calculate the rate of diffusion of O_2 expressed as gm/cm^2hr for N_2 non-diffusing.

[Take, $D_{AB} = 0 \cdot 181 \times 10^{-2}$ cm^2/sec]

12. *(a)* Differentiate between absorption and stripped operation. 5

(b) Write about the feed line location in distillation for different feed conditions. 5

13. *(a)* Write about forced draught cooling towers. 5

(b) Write about membrane separations. 5

14. 5000 kg/hr of SO_2 air mixture containing 5% by volume of SO_2 is to be scrubbed with 200000 kg/hr of water in a packed tower. The exit concentration of SO_2 is reduced to 0·15%. The tower operates at 1 atm. The equilibrium relation is given by $Y = 30\,X$, where Y moles of SO_2 in gas phase and X moles of SO_2 in water. If the packed height of the tower is 420 cm, estimate the height of transfer unit.

15. Explain in detail the binodal diagram (curve).

16. Explain *(a)* air-conditioning and *(b)* natural draught cooling towers.

17. *(a)* Explain the rate of drying curve.

    (b) Write about tray driers.

18. *(a)* Describe the classification of crystallisers.

    (b) Explain psychometric chart.

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