7470

BOARD DIPLOMA EXAMINATION, (C-20)

OCTOBER/NOVEMBER—2023

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. What is the difference between unit operation and unit process?

2. Define Raoult's law.

3. Define reflux ratio.

4. Explain absorption with example.

5. List out any three examples of adsorbents.

6. Apply phase rule to extraction operation.

7. Write the examples for leaching.

8. Explain the wetbulb temperature.

9. Define humidity.

10. Define nucleation and crystal growth.

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* Define mass transfer operation with two examples.

(b) Differentiate between molecular and eddy diffusions.

(OR)

Oxygen (A) is diffusing into Carbon Monoxide (B) under steady conditions with the carbon monoxide non-diffusing. The total pressure is 1×10^5 N/m^2 and temperature 0 °C. The partial pressure of O_2 at two planes 2 mm apart is 10000 N/m^2 and 7000 N/m^2 respectively. D_{AB} = 1.87 × 10^{-5} m^2/s. Calculate the rate of diffusion of O_2 in kmoles/m^{2}s.

12. Explain the azeotropic distillation and its applications.

(OR)

Describe the working of bubble cap and sieve tray towers with a neat sketch.

13. Explain the working of an absorption tower with a neat sketch.

(OR)

Explain about minimum liquid to gas flow rate ratio and their limitations in absorption.

14. Describe any two types of cooling towers with neat sketches.

(OR)

Describe reverse osmosis and electrodialysis process.

15. Explain the construction and working of drum dryer with a neat sketch.

(OR)

Explain the construction and working of a flash dryer with a neat sketch.

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. A rectification tower is fed with 100 kmol/h of mixture containing 50 mole % of hexane and 50 mole % of octane at 101.325 kPa absolute pressure. The feed is at its boiling point. The distillate is to contain 90 mole % of hexane and the bottoms 10 mole % of hexane. The reflux ratio is 3 : 1. Calculate the kmol/h of distillate and kmol/h of bottoms and the number of theoretical trays needed for this separation. The value of relative volatility (α) is 2.7.

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