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M.Sc. III Semester Degree Examination, April/May - 2023

INDUSTRIAL CHEMISTRY

Paper No. : DSC-10 : Unit Operations

(CBCS)

Time : 3 Hours Maximum Marks : 70

Note : *(i) Answer **any five** questions including **Q.No.1**.*

*(ii) **Q.No. 1** is compulsory.*

1. (a) Outline the general procedure for solving the material balance problem.

(b) Give the material balance equation for distillation operation for binary system with block diagram. **4+3+3+4=14**

(c) A single effect evaporator is fed with 10000 kg/h of weak liquor containing 15% caustic by weight and is concentrated to get a thick liquor containing 40% by weight caustic. Calculate kg/h water evaporated and kg/h of thick liquor obtained.

(d) Write a note on liquid level indicators.

2. (a) Write briefly on theory of extraction. **5+5+4=14**

(b) Describe the theory and working of triple effect evaporator.

(c) Write a note on drying equipments.

3. (a) With a neat diagram explain the flash distillation operation. **5+4+5=14**

(b) Discuss the mechanism of crystal growth.

(c) Write a note on Swenson-walker crystallizer.

4. (a) Discuss the general properties of materials of construction. **5+5+4=14**

(b) Write a note on designing of chemical reactors.

(c) Explain the classification of chemical reactors.

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5. (a) Write a note on Fourier Law of Conduction. **4+5+5=14**

(b) Discuss the working of U tube heat exchangers.

(c) Write a note on heat transfer process by means of convection.

6. (a) For a solute, X, determine [X] and total amounts in each phase if $V_1 = 100.0$ ml $V_2 = 100.0$ ml $D_c = 3.00$ $[X]_0 = 1.00X10^{-2}$ M (in aq. Phase). **4+5+5=14**

(b) Write a note on various types of evaporators used in industries.

(c) Draw and explain the vapour liquid equilibrium for binary system.

7. (a) Write a note on filtration. **4+5+5=14**

(b) Write a note on special materials used for preparation of pharmaceuticals.

(c) Discuss the methods for preventing corrosion in reactors.

8. (a) Write the neat diagram of single effect evaporator. **5+5+4=14**

(b) Write on the working of double pipe heat exchangers.

(c) Describe the Soxhlet extraction.

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