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**END SEMESTER EXAMINATION - 2019**

Semester : 4th

Subject Code : Ch-405

**PUO - II**

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

**Instructions :**

1. *All* questions of PART-A are compulsory.
2. Answer any *five* questions from PART-B.

**PART – A**

Marks – 25

1. Choose the correct answer from the following :

1×5=5

(a) The transport of molecules from a higher concentration to a lower concentration in a stagnant medium occurs by a mechanism called

(i) Absorption

(ii) Molecular diffusion

[Turn over

(iii) Evaporation

(iv) None of these

(b) Raoult's law is applied for

(i) Non-ideal solution

(ii) Ideal solution

(iii) Saturated solution

(iv) None of the above

(c) When difference in boiling point of the components are very large like 25-30°C, we use

(i) Fractional distillation

(ii) Steam distillation

(iii) Simple distillation

(iv) None of the above

(d) The process where a solid material in a mixture is separated out by dissolving it in a suitable solvent is called

(i) Leaching

(ii) Extraction

(iii) Absorption

(iv) None of these



(e) Refractory bricks are dried by

- (i) Rotary dryer                      (ii) Tunnel dryer  
(iii) Tray dryer                      (iv) None of these

2. Fill in the blanks : 1×10=10

(i) A packed bed should have \_\_\_\_\_ voidage.

(ii) Absorption carried out at \_\_\_\_\_ temperature.

(iii) In distillation, components have \_\_\_\_\_ volatility.

(iv) \_\_\_\_\_ is the temperature at which the saturated vapour starts to condense.

(v) \_\_\_\_\_ is a mixture of two or more liquid in such a ratio that its composition can not be changed by simple distillation.

(vi) Leaching occurs via \_\_\_\_\_ for soluble component.

(vii) For acetic acid recovery, \_\_\_\_\_ extractor column is used.

(viii) \_\_\_\_\_ is usually done in final products as last operation.

(ix) \_\_\_\_\_ is the temperature of air measured by thermometer freely exposed to the air, but shielded from radiation and moisture.

(x) \_\_\_\_\_ dryer is used when the production rate is small.

3. Write true or false :

$1 \times 10 = 10$

- (i) The insoluble component present in the gas which is not absorbed is called carrier gas.
- (ii) In flooding, sharp decrease in pressure drop occurs.
- (iii) Reflux maintains the bottom temperature of the column.
- (iv) Bubble cap columns are used primarily where large turn down ratios are required.
- (v) The minimum reflux ratio will require a finite number of trays.
- (vi) A solution behaves ideally when both the solute and solvents are not pure liquid.
- (vii) The extraction solvent must be immiscible with the solution to be extracted.
- (viii) In extraction, extract is undesirable and raffinate is desirable.



- (ix) The main use of Rotary dryer is in mineral industry.
- (x) Relative humidity is the ratio of equilibrium vapour pressure of water to partial pressure of water vapour at a given temperature.

### PART – B

Marks – 45

4. (a) What are the characteristics of packing material ? 4
- (b) Compare bubble cap, sieve and valve trays. 5
5. (a) State Henry's law ? What are the characteristics of an ideal solution ? 2+3=5
- (b) What do you mean by fractional distillation ? Draw boiling point diagram. 2+2=4
6. (a) Write material balance equation in a single stage distillation column. 4
- (b) What do you mean by rectification and stripping in a distillation column ? What are the factors that affecting the operation in a distillation column. 2+3=5

7. (a) What are the factors that influence the rate of extraction ? 5
- (b) Draw the diagram of a Bollman extractor. 4
8. (a) What are the processes involve in leaching ? 4
- (b) Draw the diagram of a bubble cap distillation column. 5
9. (a) What do you mean by free and bound moisture content, dew point ? 3
- (b) What are the main objectives of drying ? 3
- (c) Distinguish between drying and evaporation. 3
10. (a) Draw the diagram of a Rotary dryer. 3
- (b) What are the applications of liquid-liquid extraction ? 3
- (c) What do you mean by total reflux and optimum reflux ratio ? 3