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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 :

$1 \times 5 = 5$

(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 : $1 \times 10 = 10$

- (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