17206

21415

3 Hours / 100 Marks **Seat No.** | | | | | | | | |

Instructions : (1) All Questions are *compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-Programmable Electronic Pocket Calculator is permissible.

Marks

1. Answer any TEN of the following : **20**

(a) List the four methods of expressing the concentration of solution.

(b) Draw the symbol of packed column and ball mill.

(c) Write chemical reaction for

(i) Esterification

(ii) Hydrogenation

(d) Explain : why yield is more important than conversion ?

(e) Convert 180 °C into °F and K.

(f) Suggest suitable personnel protective equipments in following situation :

(i) working on a height

(ii) protection in high decibel noise in industry.

(g) Name any two fertilizer industries.

(h) Draw the neat labelled sketch of rotameter.

(i) Pressure indicated is 2 $kg/cm^2.g$.

Find the absolute pressure in atmosphere.

(j) Calculate the average molecular weight of air.

(k) Define unit operation. Give suitable example.

(l) State Dalton's law. Write mathematical expression.

2. Answer any FOUR of the following : 16

(a) Explain the mole concept. How many grams of NaOH will be required to prepare 2N 5 litre solution.

(b) NaC*l* weighing 200 gm is mixed with 600 KC*l*. Find the composition of mixture in (i) wt % (ii) mole % (At. wt. Na = 23, C*l* = 35.5, K = 39)

(c) What are different modes of heat transfer ? Explain one with suitable example.

(d) Define size reduction. State the various methods to size reduction.

(e) Explain :

(i) Absorption

(ii) Drying with suitable example.

(f) Draw the characteristics of block diagram. What are its advantages ?

3. Solve any FOUR of the following : 16

(a) Explain in brief process flow diagram with suitable example.

(b) Draw the neat sketch of manometer. Write the formula to calculate pressure using manometer.

(c) List the various method of level measurement. Explain level measurement using bob & tape method.

(d) Explain with suitable example pyrolysis and saponification.

(e) Find normality of a 15% solution of sulphuric acid (δ = 1.10 g/ml)

(f) Define partial pressure and vapour pressure.

4. Attempt any FOUR of the following : **16**

(a) Draw the flow sheet of manufacturing of H_2SO_4.

(b) State the working principle of filtration and sedimentation. Give one application of each operation.

(c) Explain the procedure for measuring viscosity using Redwood viscometer.

(d) Explain :

(i) Nitration

(ii) Reduction with suitable example

(e) Explain in brief distillation with its application.

(f) Define selectivity. How selectivity of a process is increased ?

5. Answer any FOUR of the following : **16**

(a) Draw the neat labelled sketch of Rotameter.

(b) Explain general steps in manufacturing of any chemical.

(c) 80 moles of ethanol is oxidised to give 60 moles of acetaldehyde and 20 moles of acetic acid. If desired product is acetaldehyde, find % conversion and % yield.

(d) Explain manufacturing process of nitric acid.

(e) Explain in brief size separation and fluid transportation and its necessity.

(f) List the various mechanical operation used in water treatment plant and stone crushing unit.

6. Attempt any FOUR of the following : **16**

(a) Explain the method of measuring density using specific gravity bottle.

Find the density of liquid, if its specific gravity is 1.84.

(b) What is mixing ? State its necessity in process industries.

(c) Explain :

(i) Oxidation

(ii) Hydration

(d) List various types of chemical process industry. Give one example of each.

(e) Value of ideal gas constant R is $0.08206 \frac{\text{atm. lit}}{\text{mol. K}}$

Find its value in $\frac{\text{Cal}}{\text{mol. K}}$

(f) Draw the neat sketch of self contained breathing apparatus. When it is used ?

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