17325

21819

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.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Answer the following (any TEN) : **20**

(a) Define Heat. State SI unit of heat.

(b) List the unit of Energy. Write the formula of power.

(c) How chemical industries are classified ? Give one example of each.

(d) Define equivalent weight. Write the formula for it.

(e) State the Dalton's law.

(f) List the type of mode of heat transfer with example.

(g) Draw symbol of Filter press and Ball mill.

(h) Define sedimentation process. Write any one application.

(i) Why drying operation is necessary ? Name any two industry where drying operation is carried out.

(j) Define conversion in chemical reaction with example.

(k) What is block diagram ? Why it used ?

(l) Name the different temperature scale used in chemical industry.

(m) Draw labelled figure of U-tube manometer.

(n) Why personal protective equipment is used in chemical industry ? Name any two equipments.

2. Answer the following (any FOUR) : **16**

(a) 98 gram of sulphuric acid (H_2SO_4) dissolved in water to prepare one lit. of solution. Find normality and molality of solution.

(b) Calculate the equivalent weight of following compound :

(i) $CaCl_2$ (ii) $FeCl_3$

(iii) $KMnO_4$ (iv) H_3PO_4

(At.wt : K = 39, Ca = 40, P = 31, H = 1, O = 16, Cl = 35.5, Fe = 56, Mn = 55)

(c) Differentiate between unit operation and unit process.

(d) Define unit process and explain oxidation with example.

(e) State and explain yield of chemical reaction with example.

(f) List the instruments used to measure the level of fluid and explain working of any one instrument.

3. Answer the following (any FOUR) : **16**

(a) Sodium chloride weight 200 kg is mixed with 600 kg Potassium chloride. Find the composition of mixture in (i) Weight % (ii) Mole %.

(b) A natural gas has the following composition by volume

$CH_4 = 82\%$, $C_2H_6 = 12\%$ and $N_2 = 6\%$

Calculate the composition in weight percentage.

(c) State & explain Bond's law and Kick's law used for size reduction.

(d) Discuss the hydrogenation reaction with an example.

(e) Draw neat label block diagram of manufacturing 98% Sulphuric Acid.

(f) State & explain principle & working of red wood viscometer used to measure viscosity.

4. Answer the following (any FOUR) : **16**

(a) Define :

(i) Mole (ii) Normality

(iii) Molality (iv) Molarity

(b) At 298 K the solubility of methyl bromide in methanol is 44 kg per 100 kg. Find the weight fraction and mole fraction of methanol in saturated solution.

(c) Define distillation. List the types of distillation. Write application of distillation. Draw sketch of distillation column.

(d) Describe the saponification reaction with example.

(e) Write the properties and uses of Nitric Acid.

(f) Describe the pressure measurement using manometer.

P.T.O.

5. Answer the following (any FOUR) : **16**

(a) Find out grams of HCl needed to prepare one litre 2N HCl solution.

(b) A mixture contains 80 grams of NaOH and 120 grams of KOH. Find weight % and mole % composition of the mixture.

[At. Wt. : Na = 23, O = 16, H = 1, K = 39]

(c) Explain with example reduction reaction. Write the name of any one reducing agent.

(d) Write the properties and uses of Sulphuric Acid.

(e) List the size reduction equipments. State & explain principle of any one size reduction equipment.

(f) Explain in brief principle and working of Mercury in glass thermometer.

6. Answer the following (any FOUR) : **16**

(a) Find the molecular weight of following :

(i) HCl (ii) NaOH

(iii) Na_2CO_3 (iv) H_2SO_4

(At wt : H = 1, Cl = 35.5, Na = 23, O = 16, C = 12, S = 32)

(b) Draw symbol of

(i) Jaw Crusher (ii) Screen

(iii) Packed column (iv) ribbon blends

(c) What is fluid handling ? Why it is difficult to handle solid than fluid ? What precaution should take while handling solid ? Name any one equipment used to handle solid.

(d) Define pyrolysis and cracking Write down the chemical reaction involved in it.

(e) Draw process flow sheet of manufacturing nitric acid.

(f) Explain the principle and working of rotameter with neat label sketch.
