17206

**15162**

**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. Attempt any TEN of the following :** **20**

(a) Define Dalton's law and Amagat's law.

(b) List four methods of expressing the composition of mixtures and solutions.

(c) Define weight % and mole %.

(d) Define temperature and state different temperature scales.

(e) Convert a power of 0.5 HP into J/s.

(f) Define molarity and normality.

(g) Name a product produced with the corresponding reaction.

When (i) phenol is reacted with conc. $HNO_3$.

(ii) benzyl alcohol is oxidized with air.

(h) Write any two properties and uses of nitric acid.

(i) Define hydration with suitable reaction.

(j) Define vapour pressure and boiling point of liquid.

(k) Convert 95 °C into °F and °K.

(l) Write down any two types of chemical industry with examples.

**P.T.O.**

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

(a) How many kilograms of ethane ($C_2H_6$) are there in 210 kmol ?

(b) Sodium chloride weighing 200 kg is mixed with 600 kg Potassium chloride. Find the composition of mixture in (i) weight % (ii) mole %.

(c) Explain briefly redwood viscometer for the determination of viscosity.

(d) Draw the symbol of centrifugal pump and packed column.

(e) Describe distillation and give two industrial examples of distillation.

(f) Explain drying and give the reasons for carrying out drying operation in industry.

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

(a) Define : (i) equivalent weight
(ii) gram mole
(iii) gram equivalent
(iv) molecular weight

(b) The concentration of an aqueous solution of acetic acid is specified as 30% by weight. Find the molality of solution.

(c) 20 grams of caustic soda dissolved in water to prepare 500 ml of solution. Find normality and molarity of the solution.

(d) Describe radiation and conduction mode of heat transfer by suitable examples.

(e) Write the reactions involved in nitric acid manufacture.

(f) Explain in brief esterification.

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

(a) Define fluid and explain in brief handling of fluid.

(b) Convert a pressure of 800 mm Hg to the following units :
(i) atm (ii) bar (iii) kPa

(c) How gases and liquids are stored in chemical industry ?

(d) Define unit operation and give the features of unit operation.

(e) Give any two uses of each
(i) blowers (ii) pumps (iii) fans (iv) compressors

(f) Explain chlorination of methane with suitable reactions.

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

(a) Name a product produced with corresponding reaction

(i) benzene is reacted with conc. nitric acid.

(ii) benzene is reacted with $H_2SO_4$.

(iii) ethyl acetate is reacted with NaOH.

(iv) propylene is reacted with $H_2O$.

(b) Define size reduction and state reasons for carrying out size reduction.

(c) Draw process flowsheet symbols for

(i) mixer (ii) plate column (iii) vaporiser (iv) air cooler

(d) Explain pyrolysis and cracking with reactions.

(e) Draw process flowsheet for manufacture of $H_2SO_4$.

(f) Explain gas absorption and give its two applications.

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

(a) Explain sight glass indicator with sketch.

(b) Name any four personal protective equipments with their specific applications.

(c) Explain construction and working of mercury thermometer.

(d) Describe construction and working of rotameter with neat sketch.

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

(f) Give the difference between corrosion and yield.

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