

SECTION—II

Chemistry

(Maximum marks : 50)

PART—A

(Answer the questions in one or two sentences. Each carries 2 marks)

- I (a) Write down the molecular formula of potassium dichromate and ferric sulphate.
 (b) Define degree of hardness of water. (2×2=4) Marks

PART—B

(Answer any two full questions. Each carries 8 marks)

- II (a) The equivalent mass of a monobasic acid is 63. Its salt with a very weak base is used as an explosive and as a fertilizer. Enlist the acid and base and give the chemical reaction. 4
 (b) Classify the following as Lewis acids and as Lewis bases :
 NH_3 , Ni^{2+} , Ag^+ , H_2O , Co^{2+} , CN^- , BF_3 , Cl^- 4
- III (a) What is an acid-base indicator? What type of indicators are used in the following set of titrations :
 (i) $\text{NaOH} \times \text{HCl}$ (iii) $\text{K}_2\text{CO}_3 \times \text{H}_2\text{SO}_4$
 (ii) $\text{NaOH} \times \text{acetic acid}$ 4
 (b) Relate the diameter range of nano particles and enumerate three other particles coming in the nano size range. 4
- IV (a) A plywood factory constantly uses deep borewell water directly for running the plant as well as boilers. One day the boiler plant met with an explosion and caused casualties due to superheated steam burns. Examine the reasons for the explosion and suggest a safer method for future. 4
 (b) Enumerate the disadvantages of hard water. 4
- (2×8=16)

PART—C

(Answer one full question from each unit. Each carries 15 marks)

UNIT—I

- V (a) 3.15 g of oxalic acid is dissolved in 100 ml water, calculate its normality and molarity. 3
 (b) Define p^{H} and mention its three uses. 3
 (c) Applying the following equation compute the equivalent mass of NH_4OH .
 $\text{NH}_4\text{OH} + \text{HCl} \rightarrow \text{NH}_4\text{Cl} + \text{H}_2\text{O}$. 3

- (d) Write down the balanced equation of combustion of methane in air. Calculate the mass of methane required to produce 55 g of CO_2 gas at STP by burning in air. 3
- (e) Write down three chemical equations which involve reduction process. 3

OR

- VI (a) Calculate the weight of zinc required to produce 2 gram moles of hydrogen gas at STP conditions from dil. hydrochloric acid. (At wt. of Zn 65.5). 3
- (b) Silver nitrate solution is taken in a beaker and a copper metal rod is dipped in it. The following reaction occurs :

$$\text{Cu(s)} + 2 \text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2 \text{Ag(s)}$$
 What type of reaction is this? What all changes you can observe during the reaction? 3
- (c) What is a buffer solution? Give one example each for acid buffer and basic buffer. 3
- (d) 40 ml of 0.5 normal hydrochloric acid exactly combines with 0.42 g. of a chemical substance. Calculate the equivalent mass of the compound. 3
- (e) Give the electronic concept of oxidation and reduction, give one example each for those reactions. 3

UNIT—II

- VII (a) Mention three uses of nano particles in medicine. 3
- (b) Propose and comment on the structure of carbon nanotubes. 3
- (c) Give reasons of hardness of water and how we can remove temporary hardness. 3
- (d) Propose a suitable method for the purification of a water sample containing dissolved salts in small quantities. 3
- (e) What is sterilization of water? Mention the different methods of sterilization of water. 3

OR

- VIII (a) Propose the chemical vapour deposition method of carbon nanotube synthesis. 3
- (b) Suggest the peculiar properties and applications of carbon nano particles in near future. 3
- (c) Give two advantages of hard and soft water. 3
- (d) Write down the EDTA titration method of hardness estimation of water. 3
- (e) Give the use of alum in flocculation process of water purification. 3

(2×15=30)