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PA—13—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

Paper–II

(Physical and Inorganic Chemistry)

(Wednesday, 10-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Use of calculator and logarithmic table is allowed.

1. Answer any *three* of the following : 15

(*a*) Explain the basic strength of Hydroxides of alkali and alkaline earth metals.

(*b*) Write a note on formation of complexes of alkali metal with Salicylaldehyde and Acetyl cetone.

P.T.O.

(*c*) Discuss in brief the formation of carbonate and bicarbonate of s-block elements.

(*d*) Define oxidation, reduction, oxidizing agent and reducing agent according to oxidation number concept.

(*e*) Balance the following equation by Ion-electron method :

$$Fe^{2+} + MnO_4^- + H^+ \rightarrow Mn^{2+} + Fe^{3+} + H_2O$$

2. Answer any *three* of the following : 15

(*a*) Prove that, pH + pOH = 14.

Calculate the pH of 0.025 M. HCl solution.

(*b*) Derive an expression for critical constants in terms of van der Waals constants '*a*' and '*b*'.

(*c*) Discuss the factors affecting adsorption.

(*d*) State and explain the law of rational indices and write a note on 'Miller Indices'.

(*e*) Explain the deviation of real gases from ideal behaviour.

3. Answer any *two* of the following : 10

(*a*) State and explain the term 'Permutation'. Evaluate $^{16}P_2$.

(*b*) Explain the determination of crystal structure of Potassium chloride (KCl) by Bragg's X-ray diffraction method.

(*c*) What is adsorption isotherm ? Explain Freundlich adsorption isotherm.

(*d*) Calculate the Root Mean Square (RMS) velocity of N_2 and CO_2 molecules at 300 K. (Given : R = 8.314 $JK^{-1}mol^{-1}$)