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B—59—2019

FACULTY OF SCIENCE

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

MARCH/APRIL, 2019

(CBCS/CGPA)

CHEMISTRY

(Physical and Inorganic Chemistry—II)

(MCQ+Theory)

(Tuesday, 26-3-2019)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours   *Maximum Marks*—40

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

      (*ii*) *All* questions carry equal marks.

      (*iii*) Use OMR sheet for Q. No. **1**.

      (*iv*) Calculator and logarithmic table is allowed.

      (*v*) Only one answer sheet should be used for Sections A and B.

(MCQ)

1. Select the correct answer for each of the following Multiple Choice Questions :

   (*i*) The pH of 1×10^{-3} M NaOH solution is :

      (A) 3   (B) 11

      (C) 12   (D) 13

   (*ii*) $\log_{10}(100 \times 100)$ is equal to :

      (A) 2   (B) 3

      (C) 4   (D) 6

   (*iii*) Physisorption is :

      (A) Reversible

      (B) Decreases with temperature

      (C) Both (A) and (B)

      (D) None of the above

P.T.O.

(*iv*) The real gases show nearly ideal behaviour at ....

    (A) low pressure and high temperature

    (B) low pressure and low temperature

    (C) high pressure and low temperature

    (D) high pressure and high temperature

(*v*) Which of the following gases would have highest RMS velocity at 298 K ?

    (A) CO_2 (B) NO_2

    (C) O_2 (D) CO

(*vi*) The relative spacings for the unit cell of a face-centred cubic lattice are :

    (A) $a : \dfrac{a}{\sqrt{2}} : \dfrac{a}{\sqrt{3}}$ (B) $\dfrac{a}{2} : \dfrac{a}{2\sqrt{2}} : \dfrac{a}{\sqrt{3}}$

    (C) $\dfrac{a}{2} : \dfrac{a}{\sqrt{2}} : \dfrac{a}{\sqrt{3}}$ (D) $\dfrac{a}{2} : \dfrac{a}{\sqrt{2}} : a$

(*vii*) Which of the following is not a crystalline solid ?

    (A) Plastic   (B) Rubber

    (C) Glass   (D) All of these

(*viii*) The best reducing agent amongst the following alkaline earth metals is ....

    (A) Ca   (B) Mg

    (C) Ba   (D) Sr

(*ix*) Alkali metal which forms superoxide is ....

    (A) K   (B) Rb

    (C) Cs   (D) All of these

(*x*) In neutral molecules, the sum of oxidation number is :

    (A) Zero   (B) +1

    (C) –1   (D) None of these

(Theory)

(Section A)

(Physical Chemistry)

2. Answer any *two* of the following :

   (*a*) Derive an expression for critical constants in terms of van der Waal's constants.

   (*b*) Discuss the factors affecting adsorption.

   (*c*) State and explain the law of rational indices :

      Determine the Miller indices for a plane when intercepts along the axes are :

      (*i*) $(a, 3b, 2c)$

      (*ii*) $(2a, b, 3c)$.

   (*d*) What is S.I. unit of 'Pressure' and 'Force' ?

      Calculate pH of 0.002 M NaOH solution.

3. Answer any *two* of the following :

   (*a*) Derive van der Waals' equation of state.

   (*b*) Define (*i*) plane of symmetry, (*ii*) centre of symmetry. Derive Bragg's equation, $n\lambda = 2d \sin \theta$.

   (*c*) (*i*) Explain Langmuir's adsorption isotherm.

      (*ii*) Calculate the RMS velocity of CO_2 molecule at 273 K (R = 8.314 JK^{-1} mol^{-1}).

   (*d*) (*i*) Define the terms 'Permutation' and 'Combination'.

      (*ii*) Find the equation of straight line passing through two points (2, 4) and (3, 8).

P.T.O.

Section B

(Inorganic Chemistry)

4. Answer any *two* of the following :

   (*a*) Discuss the basic strength of hydroxides of alkali and alkaline earth metals.

   (*b*) Explain the anomalous behaviour of Lithium.

   (*c*) (*i*) Write a note on Wrap around complexes.

   (*ii*) Define oxidation and reduction according to electronic concept.

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

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