

This question paper contains 4 printed pages]

AO—53—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/CGPA)

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ + Theory)

(Friday, 23-3-2018)

Time : 2.00 p.m. to 4.00 p.m.

Time—Two Hours

Maximum Marks—40

N.B. :— (i) Attempt All questions.

(ii) All questions carry equal marks.

(iii) Use of logarithmic table and calculator is allowed.

(iv) Use separate answer sheet (OMR sheet) for MCQ (Q. No. 1).

MCQ

10

1. Select the *correct* answer for each of the following multiple choice questions :

(1) The uncertainty of measurements is practically nil, in case of :

(A) Large object

(B) Electron

(C) Small particle

(D) Microscopic object

(2) is a second degree differential equation.

(A) Albert Einstein equation

(B) Planck's equation

(C) Heisenberg's uncertainty equation

(D) Schrödinger's wave equation

P.T.O.

- (3) A mixture of three gases O_2 , N_2 , CO_2 is
- (A) 1-phase, 1-component system
(B) 2-phase, 3-component system
(C) 3-phase, 3-component system
(D) 1-phase, 3-component system
- (4) The number of components present in the system
 $KCl + \text{Water} \rightleftharpoons KCl \text{ Hydrate}$
is :
- (A) One (B) Two
(C) Three (D) Four
- (5) The efficiency of a heat engine operating between 400 K and 300 K is :
- (A) 0.25 (B) 0.50
(C) 0.75 (D) 1.00
- (6) The increase in entropy is maximum in :
- (A) $H_{2(g)} + I_{2(g)} \longrightarrow 2HI_{(g)}$
(B) $CO_{(g)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)}$
(C) $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$
(D) $CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$
- (7) "It is impossible to take heat from a hotter reservoir and convert it completely into work by a cyclic process without transferring a part of heat to a cooler reservoir." It is the statement of :
- (A) First law of thermodynamics
(B) Second law of thermodynamics
(C) Third law of thermodynamics
(D) Carnot heat theorem

- (8) Which of the following elements having odd number of neutrons and protons is stable ?
- (A) ${}_3\text{Li}^6$ (B) ${}_5\text{B}^{10}$
(C) ${}_7\text{N}^{14}$ (D) All of these
- (9) Highest penetrating power is shown by :
- (A) α -Particle (B) β -Particle
(C) γ -Rays (D) None of these
- (10) $\text{Fe}(\text{OH})_3$ is an example of :
- (A) Crystalline Precipitate
(B) Gelatinous Precipitate
(C) Curdy Precipitate
(D) None of the above

Theory

Section A : Physical Chemistry

2. Attempt any *two* of the following :
- (a) State and discuss Heisenberg's uncertainty principle.
(b) Describe KI-H₂O system on the basis of phase rule.
(c) Define entropy. Give mathematical expression and unit. Explain physical significance of entropy.
(d) A tennis ball weighing 25 g is to be located within 0.02Å. What is the uncertainty in its velocity ? Comment on your result.

$$(h = 6.626 \times 10^{-34}\text{Js})$$

3. Attempt any *two* of the following :
- (a) (i) Write a note on Compton effect.
(ii) Define critical solution temperature. What is the effect of impurities on critical solution temperature ?

P.T.O.

- (b) Draw a well labelled phase diagram of water system and discuss its salient features.
- (c) Describe Carnot's cycle.
- (d) (i) Calculate the entropy change involved in the thermodynamic expansion of 2.5 moles of a gas from a volume of 9 litres to a 90 litres at 301 K. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)
- (ii) Calculate the entropy change, when one mole of ethanol is evaporated at 78°C . The molar heat of vaporisation of ethanol is $38.76 \text{ kJ mol}^{-1}$.

Section B : Inorganic Chemistry

4. Attempt any *two* of the following :

- (a) (i) Define Isotopes and Isobars with suitable examples.
- (ii) Explain the effect of Temperature on Precipitation.
- (b) Explain the conditions for completeness of Precipitation.
- (c) What is Nuclear Fission reaction ? Explain Plutonium bomb.
- (d) Define Binding energy. Calculate the binding energy per nucleon of ${}^4_2\text{He}$ which has Isotopic mass 4.00260 amu.

Given : Mass of neutron = 1.008665 amu

Mass of proton = 1.007277 amu

Mass of electron = 0.0005486 amu.