F.Y.B.SC. SEM – II (CBCS - 2016 COURSE) : WINTER- 2017

SUBJECT . CHEMISTRY: PHYSICAL AND INORGANIC CHEMISTRY-II

Day : Monday
Date : 23/10/2017

W-2017-0554

Time : 03.00 PM TO 06.00 PM
Max. Marks : 60.

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate full marks.
3) Answers to both the sections should be written in the **SAME** answer book.
4) Use of log table/ non-programmable calculator is allowed.

SECTION-I

Q.1 A) Select the most correct alternative from among those given below: **(06)**

a) The range of wavelength, 4000-75000Å is called --------- range.
(i) IR (ii) UV (iii) Visible (iv) All of these

b) Photochemical reactions are the reactions which are induced by the action of --------- on the system.
(i) Light (ii) Heat (iii) Electricity (iv) None of these

c) The equation $I_t = I_0 10^{-\alpha t}$ represents ---------
(i) Beer's law (ii) Lambert's law (iii) Avogadro's law (iv) None of these

d) The bond in NaCl is a ---------
(i) Ionic bond (ii) Covalent bond (iii) Coordinate bond (iv) Semi-polar bond

e) The pairs of electrons which are not used in bond formation are called -------- electrons.
(i) Valency (ii) Bonded (iii) Unshared (iv) Non-bonding

f) Hybridization takes place when the atom is in ---------
(i) Ground state (ii) Combined state (iii) Excited state (iv) Solid state

B) Answer the following in **ONE** sentence: **(06)**

a) In equation $I_0 = I_a + I_r + I_t$, what is meaning of I_0.

b) The production of light, due to some cause other than temperature is known as .....

c) What is an isotherm?

d) What is significance of 'b' in Van der Waal's equation?

e) Give the units of 'a' in Van der Waal's equation.

f) Einstein's law of photochemical equivalence is also known as .....

Q.2 Attempt any **THREE** of the following: **(12)**

a) Explain the concept of vapour pressure.

b) State and explain Grotthus-Draper law.

c) How viscosity is determined using Ostwald's viscometer?

d) What are the applications of fluorescence?

Q.3 Solve any **FOUR** of the following: **(12)**

a) Van der Waal's constants for CO_2 are:
$a = 3.6 \times 1.013 \times 10^5$ Pa $(dm^3)^2$, $b = 0.0428$ dm^3 mol^{-1}.
$R = 0.082 \times 1.013 \times 10^5$ dm^3 Nm^{-2} k^{-1} mol^{-1}.
Calculate the critical constants of CO_2.

b) The critical temperature and the critical pressure for a gas are 562 k and 48.6×1.013 Nm^{-2} respectively. $R = 0.08205 \times 1.013 \times 10^5$ dm^3 $PaK^{-1}mol^{-1}$.
Find the Van der Waal's constants 'a' and 'b'.

c) A substance absorbs 2×10^{16} quanta of radiation per second and 0.002 moles of it react in 20 minutes. Calculate quantum yield of this reaction
$(N = 6.023 \times 10^{23})$

P.T.O.

d) Calculate the energy in joules per quantum and joules per mole of photon of wavelength 400 nm.
($h = 6.626 \times 10^{-34}$ Js, $C = 3 \times 10^{8}$ ms^{-1}, $N = 6.023 \times 10^{23}$).

e) A solution of $KMnO_4$ shows 0.8 absorbance at wavelength 540 nm. Express the measurement in terms of transmittance units.

Q.4 A) Attempt any **ONE** of the following: **(06)**

a) What do you mean by 'Liquid Crystals'?

b) Explain deviations of real gases from Boyle's law.

SECTION-II

Q.4 B) Attempt any **ONE** of the following: **(06)**

a) Write assumptions of Valence Bond Theory.

b) Explain the formation of O_2 molecule on the basis of V.B.T.

Q.5 Attempt any **TWO** of the following: **(12)**

a) Explain the bonding in BeH_2 molecule using the concept of hybridization.

b) Draw the structures and write the type of hybridization on the basis of VSEPR theory of the following:
(i) XeO_3 (ii) $XeOF_4$ (iii) $TeCl_4$.

c) Explain Metallic bond and Ionic bond with suitable examples.

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