

**F.Y.B.SC. SEM – II (CBCS - 2016 COURSE) : SUMMER -
2018**

SUBJECT : CHEMISTRY: PHYSICAL AND INORGANIC CHEMISTRY-II

Day : **Tuesday**
Date : **10/04/2018**

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

S-2018-0632

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) Joule – Thomson expansion of an ideal gas produces -----
(i) Heating (ii) Cooling
(iii) No change in temperature (iv) Heating above the inversion temperature.
- b) The unit of ‘b’ in Van der Waal’s equation is -----
(i) $\text{dm}^3 \text{mole}^{-1}$ (ii) $(\text{dm}^3)^2 \text{mole}^{-1}$ (iii) $\text{dm}^{-3} \text{mole}$ (iv) $\text{dm}^3 \text{mole}$
- c) The reciprocal of coefficient of viscosity is called -----
(i) Viscosity (ii) Parachor (iii) Fluidity (iv) None of these
- d) Sigma bond is ----- the Pi bond.
(i) Weaker than (ii) Stronger than (iii) Equal in strength to (iv) Same in direction to
- e) The molecule of ClF_3 contains ----- pairs of electrons
(i) Two bonded and three lone (ii) Two lone and three bonded
(iii) Four bonded and one lone (iv) Four bonded and one lone
- f) A covalent bond is formed by ----- of electrons.
(i) Sharing (ii) Transfer (iii) Donation (iv) Accepting.

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

- a) Give definition of optical density.
- b) What is an opacity?
- c) Define the transmittance.
- d) For an ideal gas $PV = \dots\dots\dots$
- e) What are photochemical reactions?
- f) Write Van der Waal’s equation for one mole of a gas.

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

- a) Distinguish between thermal and photochemical reactions.
- b) State and derive Lambert’s law.
- c) Explain experimental measurement of vapour pressure.
- d) Explain in detail the phenomenon of phosphorescence.

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

- a) A certain system absorbs 3×10^{17} quanta of light per second. On irradiation for 30 min; 0.025 moles of the reactant were found to have reacted. Calculate quantum yield of the process. ($N = 6.02 \times 10^{23}$)
- b) Calculate the energy in ergs associated with (i) one quantum and (ii) one Einstein for the radiation of wavelength, $\lambda = 3600 \text{ \AA}$. ($h = 6.63 \times 10^{-23} \text{ erg. sec.}$, $C = 3 \times 10^{10} \text{ cm/sec}$, $1 \text{ \AA} = 10^{-8} \text{ cm}$; $N = 6.023 \times 10^{23}$).
- c) Calculate Van Der Waals constants for ethane. Its critical temperature and critical pressure are 282 K and $51.41 \times 10^5 \text{ Nm}^{-2}$ respectively. ($R = 8.31 \text{ Jk}^{-1} \text{ mole}^{-1}$).

P.T.O.

- d) Calculate ν and $\bar{\nu}$ for a radiation of wavelength, $\lambda = 2000 \text{ \AA}$.
(Given: $N = 6.023 \times 10^{23}$, $h = 6.624 \times 10^{-34}$ joule-sec., $C = 3 \times 10^8$ m/s,
 $1 \text{ \AA} = 10^{-8}$ m).
- e) A solution of Vitamin D₂ shows 80% transmittance at wavelength 264 nm.
Express the measurement in terms of absorbance units.

- Q.4 A)** Attempt any **ONE** of the following: **(06)**
a) Describe the term quantum yield.
b) Describe the effect of temperature on viscosity.

SECTION-II

- Q.4 B)** Attempt any **ONE** of the following: **(06)**
a) Write the assumption of VSEPR theory.
b) Explain the formation of F₂ molecule on the basis of V.B.T.

- Q.5** Attempt any **TWO** of the following: **(12)**
a) What do you mean by hybridization? How would you account for the tetra valency of carbon in CH₄ molecules.
b) Explain Metallic bond and coordinate bond with suitable examples.
c) Draw the structures of (i) PCl₅ (ii) IF₇ (iii) [Ni(CN)₄]⁻².

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