

D 70958

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Name.....

Reg. No.....

04

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(UG-CCSS)

Core Course—Chemistry

CH 5B 11—PHYSICAL CHEMISTRY—II

Time : Three Hours

Maximum : 30 Weightage

- I. Answer all the *twelve* questions. Each question carries a weightage of $\frac{1}{4}$.
- Which among the following will show anisotropy ?
(a) Glass. (b) BaCl_2 .
(c) Wood. (d) Paper.
 - In hcp arrangement the co-ordination number is _____.
(a) 6. (b) 12.
(c) 8. (d) 10.
 - Which of the following is microwave active ?
(a) H_2 . (b) N_2 .
(c) HCl . (d) Br_2 .
 - ESR spectra are observed in _____ region.
(a) Microwave. (b) Radiofrequency.
(c) UV-visible. (d) X-ray.
 - Identify the molecule that does not possess a centre of symmetry ?
(a) C_6H_6 . (b) N_2 .
(c) NH_3 . (d) C_2H_4 .
 - Identify the compound which is not having C_3 axis :
(a) SO_3 . (b) NH_4^+ .
(c) H_3O^+ . (d) ClF_3 .
 - Among the following, molarity (M), molality (m), normality (N) and mole fraction (x), identify those quantities which are independent of temperature :
(a) M, m. (b) N, x.
(c) m, x. (d) M, x.

Turn over

- 8 A glucose solution is injected to the blood stream. It must have the same _____ as blood stream.
- (a) Molarity. (b) Vapour pressure.
(c) Osmotic pressure. (d) Viscosity.
- 9 How many phases are there in a system containing H_2 , N_2 and O_2 at ordinary temperature and pressure :
- (a) 1. (b) 2.
(c) 3. (d) None of these.
- 10 The occurrence of the same substance in more than one crystalline form is known as :
- (a) Isomerism. (b) Racemisation.
(c) Polymorphism. (d) Isomorphism.
- 11 A catalyst will _____.
- (a) decrease activation energy.
(b) increase activation energy.
(c) brings about equilibrium.
(d) not affect the activation energy.
- 12 Freundlich isotherm is not applicable at _____.
- (a) high pressure. (b) low pressure.
(c) 273K. (d) room temperature.

(12 × ¼ = 3 weightage)

II. Answer all the *nine* questions. Each question carries 1 weightage :

- 13 Define Unit cell.
- 14 Write the symmetry elements in $CH_2=CH_2$.
- 15 Define point group.
- 16 What is meant by the term chemical shift ?
- 17 List all the electronic transitions possible for $CH_2 = O$.
- 18 What do you mean by congruent melting point ?
- 19 Define miscibility temperature.
- 20 What is Zeta Potential ?
- 21 The density of liquid methane is $0.466 \times 10^3 \text{ kg m}^{-3}$. Calculate the approximate cross-sectional area of a methane molecule.

(9 × 1 = 9 weightage)

III. Answer any *five* questions. Each question carries 2 weightage :

- 22 Differentiate between Frenkel defect and Schottky defect.
- 23 With the help of phase diagram explain desilverisation of lead.
- 24 Construct the multiplication table for NH_3 molecule.
- 25 The far infra red spectrum of HI molecule consists of a series of equally spaced lines with spacing equal to 12.8 cm^{-1} . Calculate the moment of inertia.
- 26 Explain the hyper fine splitting of methyl radical in esr spectra.
- 27 State and explain Raoult's law and Henry's law.
- 28 0.5% aqueous solution of potassium chloride was found to freeze at -0.24°C . Calculate the Van't Hoff factor. ($K_f = 1.86 \text{ K kg mol}^{-1}$)

(5 × 2 = 10 weightage)

IV. Answer any *two* questions. Each question carries 4 weightage :

- 29 (a) Derive Bragg equation for X-ray crystallography.
(b) Find the inter planar distance in a crystal in which a series of planes produce a first order reflection from a copper X- ray tube ($\lambda = 1.539 \text{ \AA}$) at an angle of 22.5° .
- 30 Discuss the quantum theory of Raman spectroscopy and explain how stokes and antistokes lines appear in the Raman spectra of a molecule.
- 31 Discuss the application of phase rule in solid gas equilibria taking into consideration of dehydration of copper sulphate pentahydrate.

(2 × 4 = 8 weightage)