D 70958 **(Pages : 3)** **Name.....**

Reg. No.....

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

Answer all the *twelve* questions. Each question carries a weightage of ¼.

1 Which among the following will show anisotropy ?

(a) Glass. (b) $BaCl_2$.

(c) Wood. (d) Paper.

2 In hcp arrangement the co-ordination number is _____

(a) 6. (b) 12.

(c) 8. (d) 10.

3 Which of the following is microwave active ?

(a) I_2. (b) N_2.

(c) HCl. (d) Br_2.

4 ESR spectra are observed in _____ region.

(a) Microwave. (b) Radiofrequency.

(c) UV-visible. (d) X-ray.

5 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.

6 Identify the compound which is not having C_3 axis :

(a) SO_3. (b) NH_4^+.

(c) H_3O^+ (d) ClF_3.

7 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 the blood stream.

(a) Molarity. (b) Vapour pressure.

(c) Osmotic pressure. (d) Viscosity.

9 How many phases are there in a system containing 11_2, N_2 and 0_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 x 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 x 10^3 kg m $^{\wedge}$. Calculate the approximate cross-sectional area of a methane molecule.

(9 x 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 K kg mol^{-1})

(5 x 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 (k = 1.539 A°) at an angle of 22.5°C.

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 x 4 = 8 weightage)