(6 pages) **Reg. No. :** .....

Code No. : 41103 E **Sub. Code : JMCH 52**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2018.

Fifth Semester

Chemistry — Main

PHYSICAL CHEMISTRY - III

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Residual entropy is due to
   (a) atomic size
   (b) molecular mass
   (c) arrangement of molecule
   (d) none of the above

2. Chemical potential is
   (a) Free energy change
   (b) Partial molar free energy
   (c) Partial molar entropy
   (d) Partial molar temperature

3. Electrode potential of standard hydrogen electrode is
   (a) 1V (b) 0V
   (c) $\frac{RT}{nF}$ V (d) 1.10V

4. LJP is zero for
   (a) $t_- - t_+ = 0$ (b) $t_- + t_+ = 1$
   (c) $t_- = \frac{t_+}{2}$ (d) $t_+ = \frac{t_-}{2}$

5. Chemisorption is
   (a) Limtied to one monolayer
   (b) Multilayeral
   (c) Decreases with increase of temperature
   (d) None of the above

6. Phase transfer catalyst is useful in

(a) Electro chemistry (b) Green chemistry

(c) Acid base reaction (d) Organic catalysis

7. Symbol for centre of inversion is

(a) E (b) S_n

(c) σ (d) i

8. Point group of H_2O

(a) C_3V (b) S_2

(c) C_2V (d) C_2

9. _____ is an example for spherical tops molecule

(a) H_2O (b) CH_4

(c) BCl_3 (d) CH_3F

10. For non-Linear molecule _____ number of fundamental vibrations are allowed

(a) 3N – 3 (b) 3N – 5

(c) 3N (d) 3N – 6

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive the Clausius – Clapeyron equation.

Or

(b) What are the exceptions to third law of thermodynamics?

12. (a) How can we measure the EMF of the cell?

Or

(b) What are the different types of reversible single electrodes?

13. (a) What are the difference between chemisorption and physisorption?

Or

(b) Write short note on phase transfer catalyst.

14. (a) Write a note on abeliand and cyclic groups.

Or

(b) Explain the improper rotational axis and identity.

15. (a) Write note on Born-Oppenheimer approximationi.

Or

(b) Explain the effect of isotopic substitution in rotational spectra.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) What are the applications of Clapeyron – Clausius equations?

(ii) Derive the Van't Hott isotherm equation.

Or

(b) What is chemical potential? Derive Gibbs Duhem equation.

17. (a) Explain the Applications of EMF measurement.

Or

(b) Explain the Derive the concentration cell with transference.

18. (a) Derive the Langmiur adsorption isotherm.

Or

(b) What is enzyme catalysis? Derive the Michalismenten equation.

19. (a) Explain the symmetry operations and symmetry elements with suitable diagram.

Or

(b) Draw the symmetry operations and group multiplication table for H_2O molecule.

20. (a) What are the factors affecting absorption maximum and intensity of UV-Vis spectra.

Or

(b) Explain how can we characterize the functional group in organic molecule using IR spectra.

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