

(6 pages)

Reg. No. :

Code No. : 8400

Sub. Code : HCHM 33

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2016.

Third Semester

Chemistry

PHYSICAL CHEMISTRY — III

(For those who joined in July 2012 – 2015)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Order of C_2V point group is _____
(a) 4 (b) 6
(c) 2 (d) 12.
2. $[PtCl_4]^{2-}$ belongs to which of the following point group
(a) C_4V (b) D_4h
(c) Oh (d) Td.

3. Which of the electric dipole transitions in C_3V molecule is forbidden?
(a) $A_1 \rightarrow A_2$ (b) $A_2 \rightarrow B_1$
(c) $A_1 \rightarrow E_2$ (d) $A_1 \rightarrow B_1$.
4. Staggered form of ferrocene belongs to _____ point group
(a) D_5h (b) C_5V
(c) C_4V (d) D_5d .
5. Debye Huckel limiting law equation relating _____
(a) ionic strength with activity co-efficient
(b) mean ionic activity coefficient to ionic strength of the solvent
(c) molar conductance to ionic strength of the solution
(d) mean ionic activity coefficient to ionic strength of the solution.
6. Counter currents slow down the ions in the same way as counter currents in a stream, slow down swimmer this effect is known as _____
(a) Doppler effect
(b) Electro phoretic effect
(c) Inter ionic effect
(d) Wein effect.

Page 2

Code No. : 8400



7. Electro chemical corrosion can occur only if _____

- (a) oxygen is present in contact with metal
- (b) liquid medium is in contact with metal
- (c) air is present in contact with metal
- (d) none of the above are present.

8. Plot of current density Vs over potential is _____ equation

- (a) Tafel equation
- (b) Gouy Chapman equation
- (c) Butler Volmer equation
- (d) Lippman equation.

9. Relationship between magnitude of adsorption and pressure is expressed by _____ adsorption isotherm

- (a) Freundlich (b) Langmuir
- (c) BET (d) Temkin.

10. _____ of temperature and _____ of pressure tend to cause increase in magnitude to adsorption of gas on solid

- (a) Decrease, increase (b) Increase, decrease
- (c) Increase, increase (d) Decrease, decrease.

Page 3

Code No. : 8400

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) How will you construct table for C_{2v} point group?

Or

(b) What are the properties of group? Explain with suitable example.

12. (a) Discuss the representation of vibrational modes in trans N_2F_2 molecule.

Or

(b) Write about the electronic spectra of ethylene molecule.

13. (a) Derive Debye Huckel Onsager equation.

Or

(b) Discuss the quantitative and qualitative verification of Debye Huckel limiting law.

14. (a) Derive Tafel equation. What is its significance?

Or

(b) What are fuel cells? Discuss its types with an example.

Page 4

Code No. : 8400

[P.T.O.]



15. (a) Derive an expression of Langmuir adsorption isotherm.

Or

- (b) Write notes on uses of surfactant in recovery of oil.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) State G.O.T and list the properties of irreducible representation.

Or

- (b) Explain the complete character table of C_{3v} point group.

17. (a) Discuss about hybrid orbital of CH_4 molecule.

Or

- (b) How will you calculate the energy of delocalization of 1, 3 - butadiene?

18. (a) Derive Lippmann equation.

Or

- (b) (i) Write notes on electrical double layer.
(ii) Debye-Huckel theory of interionic attraction.

Page 5

Code No. : 8400

19. (a) Derive Butler Volmer equation from one step and multistep electron transfer reactions.

Or

- (b) (i) Write notes on mechanism of hydrogen and oxygen evolution reaction.

- (ii) Discuss about Evan's diagram.

20. (a) Derive thermodynamically the Gibb's adsorption isotherm for adsorption of solute on surface of liquid. What are its significance?

Or

- (b) Discuss about ESCA and Auger spectroscopy to study about the surfaces.

Page 6

Code No. : 8400

