

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2015

Fourth Semester

Faculty of Science

Branch III : Chemistry—Pure Chemistry

CH4E03—ADVANCED PHYSICAL CHEMISTRY

(2012 Admission onwards—Regular/Supplementary)

Time : Three Hours

Maximum Weight : 30

Section A

Answer any ten questions.
Each question carries a weight of 1.

1. If a crystal plane has intercepts $\frac{1}{2}$ unit in X-direction, $\frac{1}{2}$ unit in Y-direction and 1 unit in Z-direction, express the plane in Miller index.
2. Explain the term Crystallographic point groups.
3. What are the advantages of DME in Polarography ?
4. Write Tafel equation used in electrokinetics and explain its terms.
5. What is meant by migration current ?
6. What are the merits of amperometric titrations ?
7. Give two important reasons for using supporting electrolytes in voltametry ?
8. Describe the conditions that favour kinetic polarization in an electrochemical cell.
9. Write down two examples for pH sensors.
10. What is an atomizer ? Explain its function in AAS.
11. State the assumptions made in Debye-Huckel theory of electrolytes.
12. Explain the terms ;
 - (a) Screw axis ;
 - (b) Glide plane as used in crystallography.
13. Write down the Wierl's equation and explain the terms.

(10 × 1 = 10)

Section B

Answer five questions.
Each question carries a weight of 2.

14. Explain briefly the theory of over voltage.

Turn over

15. Calculate the mean ionic activity coefficient of 0.01 molal CaCl_2 solution. "A" value in Debye-Huckel equation is 0.509.
16. Calculate the RMS, Average and Most probable velocities of sulphur dioxide molecule at 27°C
17. Write a note on photoconductivity of liquid crystals.
18. Briefly explain Novel fluorephores.
19. What are the advantages of Coulometry ?
20. What are the factors for polarization of an electrode ?
21. What is Fourier Synthesis ?

(5 × 2 = 10)

Section C

*Answer any two questions.
Each question carries a weight of 5.*

22. Derive Debye-Huckel-Onsager equation.
23. Write a brief account of polarographic analysis.
24. Give an account of the principle and instrumentation of AAS. What are its applications ?
25. Derive Maxwell's law of distribution of velocities. How this law is verified ? Explain.

(2 × 5 = 10)