

C 83712

(Pages : 2)

Name.....

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Reg. No.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2015

(CUCSS)

Chemistry

CH 2C 05—PHYSICAL CHEMISTRY—I

Time : Three Hours

Maximum : 36 Weightage

Section A

Answer all questions.

Each question carries a weightage of 1.

1. Define mean ionic activity-coefficient. Write equation for the activity of an electrolyte 'MX₂' in terms of molal concentration and mean ionic activity coefficient.
2. How does the thickness of the ion atmosphere vary with :
 - (a) Increase in ionic strength of the medium.
 - (b) Increase in dielectric constant of the medium. Justify your answer.
3. Explain the term 'activation over potential'.
4. How is migration current minimised in polarography ? Explain.
5. Explain the term systematic absence in crystallography.
6. Write Hermann-Mauguin symbol for :
 - (a) D_{2d}.
 - (b) C_{4h}.
7. Define Fermi level. Explain its significance.
8. What is 'birefringence' ?
9. Distinguish between STO and GTO.
10. Write Z-matrix for NH₃.
11. Account for the high quantum yield for the photochemical reaction between H₂ and Cl₂.
12. Account for the high reaction cross-section for slow neutrons.
13. What are the mechanisms of interaction of gamma rays with matter ?
14. Name the detector in pulsed NMR. Explain its working.

(14 × 1 = 14 weightage)

Turn over

Section B

*Answer any seven questions.
Each question carries a weightage of 2.*

15. Calculate the mean ionic activity coefficient of 0.01 molal LaCl_3 in water at 25°C . $A = 0.509$.
16. How do you verify Debye-Hückel limiting law? Discuss.
17. Briefly discuss one of the theories of Hydrogen overvoltage.
18. Draw stereographic projection for point groups under monoclinic system.
19. Briefly discuss Cooper theory of superconduction.
20. Discuss briefly the structure of a Gaussian input file.
21. With the help of Jablonski diagram discuss the various photophysical processes.
22. Discuss briefly the working of a GM counter.
23. What is radiation dosimetry? Discuss.
24. What are the drawbacks of dispersive IR? How are they overcome in FTIR? Discuss.

(7 × 2 = 14 weightage)

Section C

*Answer any two questions.
Each question carries a weightage of 4.*

25. Discuss the theory and applications of polarography.
26. What is band theory of solids? Discuss.
27. Discuss theory and applications of neutron activation analysis.
28. Write mechanism of photochemical dimerization of anthracene. Derive the rate law.

(2 × 4 = 8 weightage)