MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :……**

Second Semester B.Sc. Degree Examination, June 2015
First Degree Programme under CBCSS
Complementary Course: Chemistry – II (for Physics)
AUCH231.2d: Principles of Chemistry – II

Time: **3** Hours Max. Marks: **80**

SECTION – A

*Answer **ALL** questions in a word or one or two sentences.*

1. Among the radiations emitted from radioactive substances, which is an electromagnetic ray ?
2. What is Overvoltage ?
3. What is a primary standard ?
4. For a molecule to be microwave active, it should possess _____.
5. Spectroscopy is the study of the interaction of electromagnetic radiation with _____.
6. B – particles are actually _____.
7. Potassium dichromate in acid medium can be used for the estimation of _____.
8. Which indicator is used in permanganometric titrations ?
9. Define normality of a solution.
10. Define the term accuracy in the evaluation of analytical data.

(10 x 1 = 10 Marks)

SECTION – B

*Answer any **EIGHT** questions, not exceeding a paragraph.*

11. Suppose you have a bottle of NH_3. Its strength is 32.0% and its density is 0.89 g/mL. How can you find out the molarity ? (Molar mass of NH_3 is 17.0307 g/mol).

12. What is a concentration cell ?
13. Explain using a graph showing the conductometric titration of a strong acid with a weak base.
14. Explain mutual exclusion principle.
15. Differentiate between molarity and molality.
16. What is zero point energy ? What is the zero point energy of a simple harmonic oscillator if it oscillates with a frequency, $\upsilon = 8.67 \times 10^{13}$s ?
17. The moment of inertia of a diatomic molecule of reduced mass 4×10^{-26} Kg is 2.5×10^{-45} Kgm^2. What is the inter-nuclear distance ?
18. What are chromophores ?
19. Write down the principle of NMR spectroscopy.
20. What are fuel cells ? Give an example.
21. What are redox indicators ? Give one example.
22. What is meant by reference electrode ? Give an example.

(8 x 2 = 16 Marks)

SECTION – C

*Short essay type / Problems : Answer any **SIX** questions.*

23. Derive the Nernst equation for single electrode potential.
24. Define binding energy of the nucleus ? Calculate the binding energy of oxygen atom $^{16}_{8}O$ in MeV which has a mass of 15.994910 a.m.u., mass of neutron = 1.008665 a.m.u., mass of proton = 1.007277 a.m.u. and mass of electron = 0.0005486 a.m.u.
25. Define transport number. Discuss any one method to find out the transport number.
26. An organic compound C_3H_6O contains a carbonyl group > C = O. How will its NMR spectrum decide whether it is an aldehyde or ketone ?
27. What are the major differences between nuclear fission and nuclear fusion ?
28. What is half – life period of a radioactive element ? ^{18}F is found to exhibit 25% radioactive decay in 40 minutes. Find its half – life period.
29. Differentiate between alpha emission and beta emission.
30. What is corrosion ? Suggest some ways for the prevention of corrosion in detail.
31. What are the applications of Kohlrausch's law ?

(6 x 4 = 24 Marks)

SECTION – D

*Long essay type : Answer any **TWO** questions.*

32. Explain the following:
    i). Role of N/P ratio in the stability of nucleus and
    ii). Radio carbon dating.
33. Explain the following:
    i). Sketch the high resolution NMR spectrum of acidified ethanol.
    ii). Describe the types of electronic transitions in organic molecules.
    iii). Determination of bond length using Microwave spectroscopy.
34. What are the different types of errors ? How can we minimize errors in an experiment ? Explain in detail.
35. i). Explain standard deviation, variance and Coefficient of variation.
    ii). The percentage of Carbon in a compound is found to be 48.32, 48.36, 48.23, 48.11 and 48.38. Find out the standard deviation, variance and coefficient of variation in the measurement.

(2 x 15 = 30 Marks)

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