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MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…………………   Name :……………….

Third Semester B.Sc. Degree Examination, November 2015
First Degree Programme under CBCSS
Complementary Course: Chemistry – III (for Botany)
AUCH331.2a: Physical & Inorganic Chemistry

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

SECTION – A

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

1. Define: order of a reaction.
2. What is the importance of Arrhenius equation ?
3. State the Arrhenius concept of acids and bases.
4. What are azeotropes ?
5. What is retention time in chromatography ?
6. Give one example for artificial transmutation.
7. What is binding energy ?
8. What is blue shift ?
9. NMR happens in _____ region of EM radiation.
10. How many peaks will be there in the NMR spectrum of benzene ?

$(10 \times 1 = 10$ **Marks**$)$

SECTION – B

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

11. The rate constant of a first order reaction is $3 \times 10^{-2}\,\text{s}^{-1}$. Calculate the half – life period.
12. What is homogeneous catalysis ? Give one example.
13. Give the Lowry – Bronstead concept of acids and bases.
14. Explain the theory of solvent extraction.
15. Draw and explain the miscibility behavior of nicotine – water system.

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16. Briefly explain the biological effects of nuclear radiation.
17. Using examples differentiate between chromophores and auxochromes.
18. State and explain Frank Condon principle.
19. State and explain Beer Lamberts law.
20. Draw the low resolution NMR spectrum of ethanol.
21. What is Larmor precession ?
22. Derive the units of zero order, first order and second order reactions.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Explain the collision theory of chemical reactions.
24. Explain the application of nuclear radiation in agriculture and medicine.
25. Write a note on the interaction of electromagnetic radiation and matter.
26. Explain the use of Geiger Muller counter in the detection of radioactivity.
27. Explain the buffer action of a mixture of a weak acid and its salt.
28. Explain the theory and application of steam distillation.
29. Explain the terms: stability of nucleus, mass defect.
30. Explain the theory and application of HPLC.
31. Explain the principle of MRI.

(6 × 4 = 24 Marks)

SECTION – D

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

32. i). Derive an expression for rate constant of a first order reaction. Explain the influence of temperature on reaction rates.
    ii). Give an account of the colorimetric estimation of iron and glucose.
33. i). What are non – ideal solutions ? How can they be classified ?
    ii). Explain the principle of thin layer chromatography.
34. Explain the basic principle of NMR spectroscopy with special mention on chemical shift and spin – spin coupling.
35. i). Explain the theory and application of ion exchange chromatography.
    ii). Explain the application of UV visible spectroscopy.

(2 × 15 = 30 Marks)

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