MAR IVANIOS COLLEGE (AUTONOMOUS) THIRUVANANTHAPURAM

Reg. No. :…………………   Name :…………………

Second Semester B.Sc. Degree Examination, June 2016
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. How is binding energy per nucleon related to the stability of the nucleus ?
2. Mention any two units used to express dose ?
3. What is the essential condition for a molecule to give rotational spectrum ?
4. Arrange the different electromagnetic radiations in the order of increasing wavelength.
5. State the mutual exclusion principle.
6. The EMF of a cell is 1.30 V and the positive electrode has a potential of 0.50V. Calculate the potential of the negative electrode ?
7. What is meant by standard electrode potential ?
8. Which indicator can be used in the titration of a weak base *vs* strong acid ?
9. Define the term molarity.
10. Differentiate between accuracy and precision.

$$(10 \times 1 = 10 \text{ Marks})$$

SECTION – B

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

11. What is the principle of neutron activation analysis ?
12. Explain the term artificial transmutation with a suitable example.

P.T.O.

13. Explain the term radioactive equilibrium.

14. The reduced mass of a diatomic molecule is 2.5×10^{-26} Kg and its vibrational frequency is 2900 cm^{-1}. Calculate its force constant.

15. Which among the following molecules give microwave spectrum ? Why ?

    O_2, HCl, NH_3, CO_2,

16. Distinguish between stokes and antistokes lines with regard to Raman spectra.

17. Explain electrolyte concentration cell without transference with an example.

18. Sketch and explain the conductometric titration curve for the strong acid vs strong base titration.

19. Discuss the electrochemical theory of corrosion.

20. Discuss the principle involved in volumetric analysis.

21. Explain the theory of redox indicators.

22. What are the essential conditions for a substance to be a primary standard ?

(8 × 2 = 16 Marks)

SECTION – C

Short essay type / Problems : Answer any SIX questions.

23. Explain the term nuclear fusion with suitable examples. Why fusion reactions are called thermonuclear reactions.

24. How is radioactivity detected using Wilson's cloud chamber method ?

25. Describe the radiocarbon dating technique.

26. Sketch the vibrational modes of H_2O. Which of these are IR active.

27. Distinguish between the structures of 1– propanol and 2 – propanol using the NMR method.

28. Explain the Hittorf's method for the determination of transport number.

29. What are fuel cells ? Explain the working of H_2–O_2 fuel cells Discuss the Ostwald's theory of acid–base indicators.

30. Explain briefly the different analytical methods used in chemistry.

31. Write a short note on the detection and correction of determinate errors.

(6 × 4 = 24 Marks)

SECTION – D

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

32. i). Discuss the applications of radioisotopes with suitable examples.

  ii). The activity of C–14 in an old sample of wood is found to be one – fourth of that in a fresh piece of wood. Calculate the age of the wood if the half – life of C–14 is 5730 years.

33. i). How can you use the microwave spectra to determine the bond length of a diatomic molecule.

  ii). How are bond stretching frequencies calculated by IR spectroscopy ?

34. i). Discuss the principle of Calomel electrode.

  ii). Explain the principle of potentiometric titration with a suitable example and mention its advantages.

35. i). What are the theories of acid – base indicators ? Explain any one theory in detail.

  ii). Discuss briefly permanganometric and dichrometric titrations.

(2 × 15 = 30 Marks)

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