D 74358 (Pages : 2) Name.....

Reg. No.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(CUCBCSS–UG)

Core Course—Chemistry

CHE IB 01—THEORETICAL AND INORGANIC CHEMISTRY—I

Time : Three Hours Maximum : 80 Marks

Section A (One word/sentence)

Answer **all** *questions.*
Each question carries 1 *mark.*

1. A well-substantiated explanation of natural phenomena through observation by scientific method is called ————.
2. The overall achievements of a research project are explained in a few sentences in ———— part of the project presentation.
3. Isotones are atoms of different elements with the same number of ————.
4. The equivalent mass of a dibasic acid is ———— of its molecular mass.
5. The oxidation number of Cr in $K_2Cr_2O_7$ is ————.
6. What is the use of silica gel in desiccators ?
7. Number of significant figures in 1.000 and 0.0023, respectively are ———— and ————.
8. The ———— experiment resulted in the development of Rutherford's atom model.
9. Albert Einstein received the Nobel prize for the theoretical explanation of ————.
10. K-electron capture takes place during the conversion of ———— to ———— in the nucleus of an atom.

Section B (Short answer)

Answer any **ten** *questions.*
Each question carries 2 *marks.*

11. Name any *two* branches of modern chemistry.
12. Justify the statement – Falsification of hypothesis is an effective method in scientific research.
13. Calculate the volume of 1.008 g of $H_{2\,(g)}$ at STP.
14. Calculate the normality of sodium carbonate solution, when 0.462g of anhydrous sodium carbonate is dissolved in 100 mL water.
15. Potassium dichromate is used as a primary standard but not Potassium permanganate. Why ?
16. Write the importance of MSDS in chemistry laboratory.

Turn over

17. Write the limitations of Rutherford model of atom.

18. Find out the wave number of Hα line of Balmer series of hydrogen spectrum.

19. What is group displacement law ?

20. In permanganometric titrations dil. H_2SO_4 is used to acidify the oxalic acid/Fe^{2+} solution and not dil HCl. Why ?

21. How will you explain the emission of β-rays from nucleus ?

22. Why neutrons are better particles for artificial transmutation than α particles ?

Section C (Paragraph)

Answer any **five** *questions.*
Each question carries 6 *marks.*

23. Identify and discuss any *two* areas in biology where the knowledge in chemistry is essential for its easy study.

24. Suggest first aids for :

    (i) inhalation of poisonous gases

    (ii) burns due to phenol

    (iii) electric shock.

25. Discuss the theory of redox indicators.

26. What is meant by wave-particle duality ? Derive de Broglie's relation for the wave particle dual nature of electron.

27. The density of a 20% (w/w) aqueous solution of KI (m = 166) is $1.2 gcm^{-3}$. Calculate the molarity and molality of the solution.

28. Nuclear fission can result in explosion. How is it controlled in nuclear reactors ? What is the principle of hydrogen bomb ?

29. State and explain Hasienbergs's uncertainty principle.

30. Write briefly on C^{14} dating.

Section D (Essay)

Answer any **two** *questions.*
Each question carries 10 *marks.*

31. Discuss research design with a suitable example elaborating the different components of research project.

32. There is a recent trend in adopting double burette method of titration for quantitative analysis. Discuss the utility of this method emphasising the principle and advantages.

33. Write the merits and demerits of Bohr model of atom. Explain the origin of different series of lines in hydrogen spectrum using Bohr model of atom.

34. Discuss the principle and applications of Aston's mass spectrograph. Write any *one* method used for the enrichment of uranium.