

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86  
(For candidates admitted during the academic year 2011–12 & thereafter)

SUBJECT CODE: 11CH/MC/GC14

B.Sc. DEGREE EXAMINATION, NOVEMBER 2013  
BRANCH IV- CHEMISTRY  
FIRST SEMESTER

REG.NO .....

COURSE : MAJOR CORE  
PAPER : GENERAL CHEMISTRY I  
TIME : 30 MINUTES

MAX.MARKS : 30

SECTION – A  
ANSWER ON THE QUESTION PAPER ITSELF:

Answer ALL the questions:

(30 x 1 = 30 marks)

I Choose the right answer

- Unit of Planck constant is  
(a) Js (b) Js<sup>-1</sup> (c) J<sup>-1</sup>s (d) J<sup>-1</sup>s<sup>-1</sup>
- Davisson-Germer experiment used the crystal of  
(a) Li (b) Ni (c) Ti (d) Si
- The operator in  $\frac{d}{dx}e^{kx} = ke^{kx}$  is  
(a) k (b) e<sup>kx</sup> (c)  $\frac{d}{dx}$  (d) x
- The electronic configuration of <sup>2</sup>He is  
(a) 1s<sup>2</sup> (b) 2s<sup>1</sup> (c) 1s<sup>1</sup> (d) 2s<sup>2</sup>
- Nuclei having same number of protons and differing number of neutrons are called  
(a) isomer (b) isotope (c) isotone (d) isobar
- Which among the following is not a magic number  
(a) 2 (b) 8 (c) 10 (d) 20
- Alpha particles are nuclei of  
(a) H (b) He (c) Li (d) Be
- Acids are those that  
(a) donate neutrons (b) accept neutrons (c) donate electrons (d) accept electrons
- A molecule is aromatic if the number of π electrons is  
(a) 4n+1 (b) 4n+2 (c) 4n (d) 4n-1
- The most stable conformer of cyclohexane is  
(a) boat (b) skew-boat (c) chair (d) half-chair

**II Fill up the blanks:**

11. Unit of frequency is \_\_\_\_\_.
12. As wavelength increases, energy \_\_\_\_\_.
13. Electronic configuration of  ${}_{24}\text{Cr}$  is \_\_\_\_\_.
14. Azimuthal quantum number is also called \_\_\_\_\_.
15. The particle in Yukawa's theory is \_\_\_\_\_.
16.  ${}^2\text{He}^4 + {}^7\text{N}^{14} \rightarrow \text{_____} + {}^1\text{H}^1$
17. Chloroacetic acid is \_\_\_\_\_ acidic than acetic acid.
18. Chlorine in chloroacetic acid has \_\_\_\_\_ effect.
19. Homolytic cleavage of ethane gives \_\_\_\_\_.
20. Structure of methylcyclohexane is \_\_\_\_\_.

**III State whether the following statements are true or false:**

21. Electron exhibits both particle and wave like character.
22. *p*-orbital is spherical in shape.
23. Gamma particle is not deflected in an electric field.
24. Liquid water is a non-aqueous solvent.

25.  $\begin{array}{ccc} \text{F} & & \text{F} \\ & \text{C} = \text{C} & \\ \text{H} & & \text{H} \end{array}$  is *z*-1,2 – difluoroethene.

**IV Answer in a line or two:**

26. State the photoelectric effect.
27. State Pauli exclusion principle.
28. State the group displacement law.
29. What is HSAB principle?
30. Draw the structure of *R*-lactic acid.

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**TIME : 2 ½ MINUTES**

**MAX.MARKS : 70**

**SECTION – B**

**Answer any FIVE questions : (5 x 6 = 30 marks)**

1. Derive the de Broglie equation.
2. Sketch the shapes of *s*- and *d*- orbitals.
3. Explain the liquid-drop and the shell model of the nucleus.
4. Write a note on liquid ammonia as a solvent.
5. Explain the stability of carbocations.
6. Write a note on optical isomerism.
7. Derive an equation for the half-life of a radioactive reaction. Calculate the half-life, when the decay constant is  $6.93 \times 10^{-3} \text{ yr}^{-1}$ .

**SECTION – C**

**Answer any TWO questions : (2 x 20 = 40 marks)**

8. (a) Explain the Heisenberg principle and the Compton effect.  
(b) Discuss the postulates of quantum mechanics. (10 + 10)
9. (a) Discuss the principles of nuclear energy production.  
(b) Discuss the application of radio isotopes in medicine and in elucidation of reaction mechanism. (10 + 10)
10. (a) Write notes on hyperconjugation and steric effect.  
(b) Discuss the conformational analysis of *n*-butane. (10 + 10)

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