

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

SUBJECT CODE: 11CH/MC/GC14

B.Sc. DEGREE EXAMINATION, NOVEMBER 2011
BRANCH IV- CHEMISTRY
FIRST SEMESTER
REG.NO

COURSE : MAJOR CORE

PAPER : GENERAL CHEMISTRY

TIME : 30 MINUTES

MAX.MARKS : 30

SECTION – A (30x1=30)
ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the questions.

I Choose the correct answer:

- If the azimuthal quantum number of an atom is 2, the magnetic quantum number can have values
(a) 1,0,1 (b) 2,1,0,-1,-2 (c) 1,-1 (d) 2,1,0
- According to the Bohr model of hydrogen atom, the following quantity is quantized
(a) Liner momentum (b) Angular momentum
(c) The liner velocity (d) The angular velocity
- The splitting of energy levels in the presence of a magnetic field is called.
(a) Stark effect (b) Zeeman effect (c) Raman effect (d) Photoelectric effect
- If two operators commute, then
(a) They are linear (b) They are Hermitian
(c) They have the same eigen values (d) They have the same eigen functions
- The massless particles are
(a) X-rays (b) beta rays (c) gamma rays (d) Protons
- The energy production in the sun and the stars is due to
(a) Nuclear fission (b) Nuclear fusion
(c) Thermo chemical reaction (d) None of these
- Which of the following is an example for lewis acids?
(a) AlCl_3 (b) NH_3 (c) CH_4 (d) B_2H_6
- Liquid sulphur dioxide is an
(a) non aqueous solvent (b) non-polar solvent (c) polar solvent (d) none of these

9. Which of the following is not an electrophile?

- (a) $\overset{+}{\text{NO}_2}$ (b) $\overset{+}{\text{CH}_3}$ (c) $\overset{+}{\text{CH}_3\text{CO}}$ (d) NH_3

10. Irradiation of ultra violet light on organic molecule produce

- (a) Carbanion (b) Carbocation (c) Free radical (d) None of these

II Fill in the blanks:

11. If mono chromatic x-rays are allowed on carbon, the Scattered X-rays have wave length _____ than the incident rays.

12. $\frac{\delta^2\psi}{\delta x^2} + \frac{\delta^2\psi}{\delta y^2} + \frac{\delta^2\psi}{\delta z^2} + \frac{8\pi^2m(E-V)}{h^2} \psi = 0$. The equation is known as _____.

13. For a electron moving in the s-orbital, its total angular momentum is _____.

14. _____ metal can be used as fuel for nuclear reactor.

15. ${}_{90}\text{Th}^{232} \longrightarrow {}_{88}\text{Ra}^{228} + \text{_____}$.

16. The conjugate base of CH_3COOH is _____.

17. $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_2 - \text{CH}_3$ can exhibit _____ isomerism.

18. If an organic compound contain chiral carbon, it exhibit _____ isomerism.

19. Aromatic compounds have _____ double bonds.

20. Completely staggered conformer has _____ energy than eclipsed conformer.

III State whether the following statements are TRUE or FALSE:

21. When a beam of ultraviolet light falls on a clean metal surface in vaccum, the surface emits electron.

22. No two electrons in an atom or ion can be having the same values for all the four quantum numbers.

23. The unit for nuclear radiation is Rontgen

24. Ammonium hydroxide is a strong base.

25. Naphthalene is not an aromatic compound.

IV Answer in a line or two:

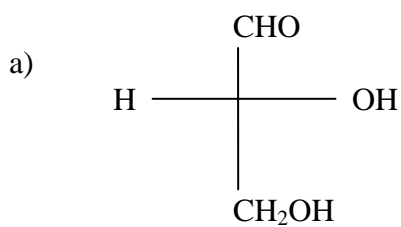
26. What is Heisenberg's principle of uncertainty?

27. State Hund's rule.

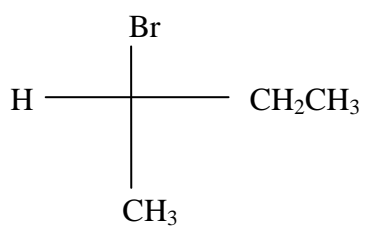
28. Define mass defect in a nucleus.

29. What is meant by conformational analysis?

30. Assign R and S configuration for the following organic compounds.



b)



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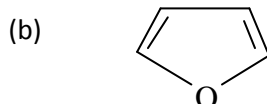
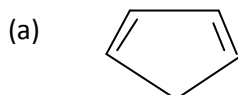
MAX.MARKS : 70

SECTION – B

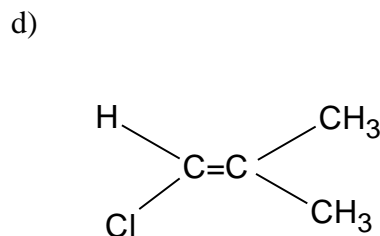
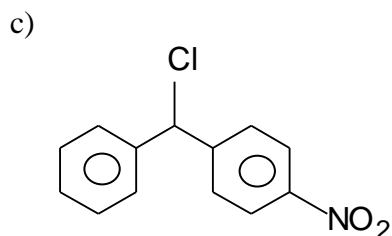
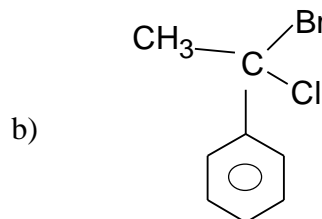
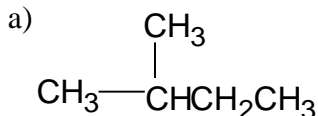
Answer any FIVE of the following:

(5 x 6 = 30)

1. What is photoelectric effect? Explain in detail.
2. Write down the Schrödinger wave equation. Explain the significance of ψ and ψ^2 .
3. What is meant by isobars, isotones and isotopes? Write an example for each.
4. Explain the concept in scintillation counter and Geiger-Muller counter.
5. Write a note on
 - (a) Bronsted-Lowry Acids and Bases
 - (b) Principle of Hard and Soft acid and bases (HSAB)
6. Define Huckel's rule for aromaticity. Predict whether the following compounds are aromatic or not.



7. What is optical isomerism?
Predict whether the following compounds are optically active or not.

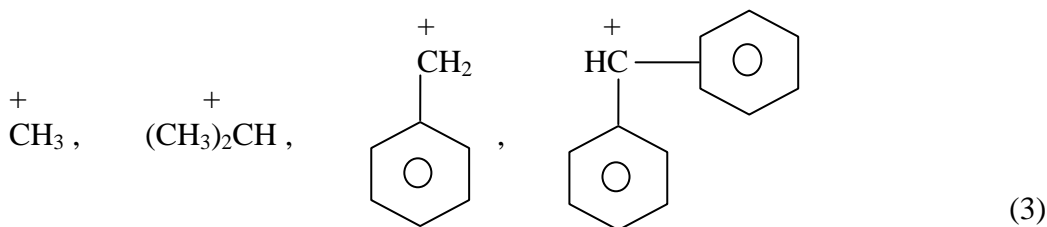


SECTION – C

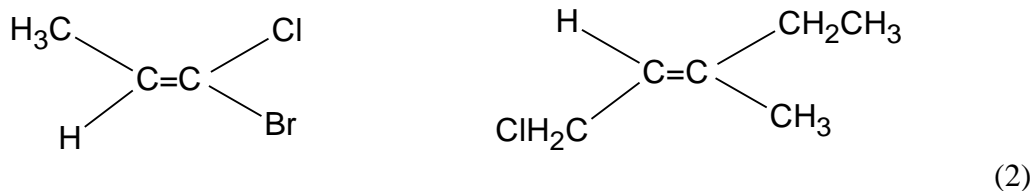
Answer any TWO of the following:

(2 x 20 = 40)

8. (a) Explain the Bohr's theory of the hydrogen atom.
 (b) Derive deBroglie equation for a particle with a wave nature.
 (c) Write reasons for the following.
 Ground state electronic configuration of copper ($z=29$) is $[\text{Ar}] 4s^1 3d^{10}$ and not $[\text{Ar}] 4s^2 3d^9$ while that of Cr ($Z=24$) is $[\text{Ar}] 4s^1 3d^5$ and not $[\text{Ar}] 4s^2 3d^4$.
 (d) List the principal and azimuthal quantum numbers of electrons in the following orbitals.
 (i) 4s (ii) 2d (iii) 3d (iv) 3p (v) 5f (4x5)
9. (a) Explain the liquid drop and shell model for a nucleus.
 (b) What are the applications of isotopes in medicine and in the study of reaction mechanisms? (14+6)
10. (a) Arrange the following carbocation in the increasing order of stability. Explain your answer.



- (b) Write the reason for the following
 (i) Trichloroacetic acid is stronger than acetic acid.
 (ii) P-nitroaniline is less basic than aniline.
 (iii) Cyclohexane exist in chair form. (5x3)
- (c) Designate E-or Z configuration for the following molecules.



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