

First Semester FYUGP Degree (Reg/Sup) Examination
November 2025
KU1DSCCHE111 - FUNDAMENTALS OF THEORETICAL
and NUCLEAR CHEMISTRY
2024 Admission onwards

Time : 1.5 hours

Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. What is normality and write the expression to find the normality?
2. What are standard solutions? Illustrate with an example specifying weight, volume, and concentration.
3. What are isotones? Give two examples.
4. What are isotopes and isobars?
5. Draw and explain the molecular geometry of ClF_3 using VSEPR theory.
6. What is orbital overlapping, and how does it lead to bond formation?
7. Sketch the spectral series of the hydrogen atom and label them. Which of these series is observed in the visible region?
8. Explain the dual nature of electrons.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Discuss sp^3d^2 hybridization and d^2sp^3 hybridization.
10. Using VSEPR theory, predict and explain the shape of CO_2 and BF_3 .
11. a) What is bond order and explain its significance with an example?
b) How does VBT explain bonding in Hydrogen molecule?
12. What are the merits and demerits of the Bohr atom model?
13. Explain the term ionisation energy. How does ionisation energy vary along a period?
14. Define electron gain enthalpy. Discuss its variation in the periodic table.

Section C

Answer any 1 questions. Each carry 14 marks.

15. (a) Discuss the safe laboratory practices.
- (b) Determine (i) the molality of a solution that contains 150 grams of NaCl dissolved in 500 grams of water (molecular weight of NaCl = 58 g/mol) and also
(ii) the molarity of the diluted solution if 100 ml of 6M HCl is diluted to 500 ml.
16. (a) Explain the different methods for nuclear waste disposal.
- (b) • (i) Explain the liquid drop model for nuclear fission reaction.
• (ii) 100 mg of Co-60 is stocked in a laboratory as a gamma ray source. It has a half-life of 5.26 years. Calculate the amount left after one year.