Reg No:..... K24FY 1418 (C)
Name :.....

First Semester FYUGP Chemistry Examination NOVEMBER 2024 (2024 Admission onwards) KU1DSCCHE111 (FUNDAMENTALS OF THEORETICAL and NUCLEAR CHEMISTRY)

(DATE OF EXAM: 6-12-2024)

Time : 90 min Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Sketch the spectral series of the hydrogen atom and label them. Which of these series is observed in the visible region? 2

2. Draw and explain the molecular geometry of PCl_5 using VSEPR theory. 2

3. Explain the bonding in H_2 according to Valence Bond Theory. 2

4. Differentiate between sigma and pi bonds. 2

5. Why do isotopes have almost identical chemical properties but different physical properties? 2

6. What is molarity and write the expression to find molarity? 2

7. What are the basic components of safe laboratory practices? 2

8. What do you mean by quantitative analysis? 2

Part B (Answer any 4 questions. Each carries 6 marks)

9. What are the postulates of Bohr atom model? Write the limitations of the Bohr model. 6

10. How is the stability of ionic compounds affected by lattice energy?
Explain VSEPR Theory. How does it help to predict the shape of molecules? 6

11. a)What is bond order and explain its significance with an example?
b) How does VBT explain bonding in Hydrogen molecule? 6

12. Explain the term isotopes, isobars, isotones with examples. Correlate N/P ratio and nuclear stability. 6

13. What is the difference between accuracy and precision in the context of measurement? 6

14. Discuss the hazardous symbols and signs in the environmental and health sectors. 6

Part C (Answer any 1 question(s). Each carries 14 marks)

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15. (a) State and explain Heisenberg's uncertainty principle. Calculate the uncertainty in the velocity of a particle of mass 1×10^{-6} kg whose uncertainty in position is 9.54 Å. 7

(b) Explain the variation of ionic radii, ionisation potential, and electronegativity across a period and down the group. 7

16. (a)
- (i) Derive an expression for the decay constant of a radioactive element.
- (ii) The $\frac{^{14}C}{^{12}C}$ ratio in a certain piece of wood in a museum is 12% of that of the atmosphere. Calculate the age of the wood. Given half-life of ^{14}C is 5760 years.

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(b) Explain the different methods for nuclear waste disposal. 7

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