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

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

(DATE OF EXAM: 4-12-2024)

Time : 90 min Maximum Marks : 50

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

1. Write the Rydberg formula and explain the terms. 2
2. What is the shape of sulfur hexafluoride (SF_6)? Explain using VSEPR theory. 2
3. What is orbital overlapping, and how does it lead to bond formation? 2
4. Describe the shape and bond angles in methane (CH_4). 2
5. What are isobars? Write two examples. 2
6. What does the term precision mean in an analytical determination? 2
7. Explain the significance of material safety sheets of chemicals. 2
8. What are the precautions to be taken in case of inhalation of poisonous gas? 2

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

9. What are the postulates of Bohr atom model and explain the hydrogen spectrum based on it? 6
10. How does hybridization influence the shape of organic molecules like ethylene and acetylene?
    Explain sp^2 hybridization and its significance in bonding with an example. 6
11. a) Describe with example the significance of molecular orbital theory in predicting the stability of a molecule.
    b)Explain how Molecular Orbital Theory accounts for the bond order in diatomic molecules like N_2. 6
12. Correlate N/P ratio and nuclear stability. Explain the nuclear structure using the liquid drop model. 6
13. Discuss the choice of indicators used in acid-base titrations. 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)

15. (a) Calculate

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(i) the momentum of a particle which has a de Broglie wavelength of 0.2 nm.

(ii) the wavelength of the spectral line in the Balmer series if $n_2 = 3$.

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(b) 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

16. (a) Explain the term isotopes with examples. What are the different methods for identification and separation of isotopes. Explain. 7

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

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