

B. Sc DEGREE END SEMESTER EXAMINATION - OCT 2020 : FEBRUARY 2021**SEMESTER 1 : CHEMISTRY****COURSE : 19U1RCHE1 : THEORETICAL AND INORGANIC CHEMISTRY I***(For Regular - 2020 Admission and Supplementary/Improvement - 2019 Admission)*

Time : Three Hours

Max. Marks: 60

PART A**Answer All (1 mark each)**

1. Which branch of science is considered as the central science ?
2. The oxidation number of oxygen in OF_2 is
3. What is a primary standard in volumetric analysis?
4. Which indicator can be used in the titration of strong base vs weak acid.
5. The energies of two radiations with wavelengths 6000 \AA and 2000 \AA are in the ratio
6. A wavefunction ψ satisfying the condition $\psi\psi^*d\tau=1$ is said to be
7. The quantum number specifies the shape of the orbital in which a particular electron is present.
8. What designation is given to a sublevel having $n = 4$ and $l = 1$?

(1 x 8 = 8)**PART B****Answer any 6 (2 marks each)**

9. What is hypothesis? How does it differ from a law?
10. Define the terms normality and mole fraction.
11. 120 g of NH_2CONH_2 is dissolved in 324 mL of water. Calculate the mole fraction of urea in the solution.
12. The true value for the determination of the NaOH in a given aqueous solution of it is 4.012 gL^{-1} . The result reported by an experimentalist is found to be 3.982 gL^{-1} . Calculate the absolute and relative percentage error.
13. Explain the terms permanganometry and dichrometry.
14. What is de-Broglie's idea about the wave-particle duality of matter?
15. Represent the energy levels and eigen functions for the first two energy levels of a particle-in-one-dimensional box.
16. What do you mean by a well behaved wavefunction?

(2 x 6 = 12)**PART C****Answer any 4 (5 marks each)**

17. Explain the sequential steps in scientific method
18. What is mean, median, mode, variance and standard deviation?
19. Give a brief account of using potassium permanganate in titrimetry.
20. Explain the shapes of s, p and d orbitals
21. Why does the uncertainty principle contradict Bohr's theory of hydrogen atom? Among concept of orbit and orbital, to which concept uncertainty principle is closely related? Justify your answer. Calculate the uncertainty in the velocity of an electron if the uncertainty in its position is 100 pm .

22. What do you mean by electronic configuration of atoms.? How it is different from MO configuration? Give an account of antisymmetry principle, energy order principle and Hunds rule helpful for the electronic configuration of atoms. Write the electronic configuration of atoms of elements with atomic number 42 and 47 and comment about it.

(5 x 4 = 20)

PART D

Answer any 2 (10 marks each)

23. Give an account on redox titrations.
24. Describe briefly the following:
- | | |
|-------------------------|-------------------------------------|
| a. Photoelectric effect | b. Compton Effect |
| b. Black body radiation | d. Rutherford nuclear model of atom |
25. Explain the theory of different acid base titrations with examples.
26. Derive time independent Schrodinger equation?

(10 x 2 = 20)