19U125

Reg. No ..... Name .....

B Sc DEGREE END SEMESTER EXAMINATION - OCTOBER 2019

SEMESTER 1 : CHEMISTRY

COURSE : **19U1CRCHE1 : THEORETICAL AND INORGANIC CHEMISTRY I**

(For Regular - 2019 Admission)

Time : Three Hours Max. Marks: 60

Section A
Answer any 8 (1 marks each)

1. What is meant by a research design?
2. Explain the term isotones.
3. What is meant by a standard solution?
4. Which indicator can be used in the titration of weak base vs strong acid.
5. The lines of the Balmer series of the hydrogen spectrum arise from the electronic transitions from higher levels to the …….. level.
6. Which of the following functions are acceptable wavefunctions?

   a. $\Psi = x$ (b) $\psi = x^2$ (c) $\psi = \sin x$ (d) $\psi = e^{-x}$

7. The number of unpaired electrons in Fe^{3+} is.....
8. What is the magnetic quantum number value for an electron having $n = 2$ and $l = 0$?

(1 x 8 = 8)

Section B
Answer any 6 (2 marks each)

9. What does the method of deduction mean in science?
10. Define oxidation and reduction in terms of the the electronic concept.
11. 120 g of NH_2CONH_2 is dissolved in 324 mL of water. Calculate the mole fraction of urea in the solution.
12. Name two indicators used in acid-base titrations. Indicate the p^H range over which they change colour.
13. 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.
14. Discuss briefly Heisenberg's uncertainty principle.
15. Which of the following functions are the eigen functions of the operator $\frac{d^2}{dx^2}$? Give the eigen value where appropriate (a) sin kx (b) $3^{e^{-5x}}$
16. What are probability distribution curves? What is their shortcoming?

(2 x 6 = 12)

Section C
Answer any 4 (5 marks each)

17. Write a note on the essential teps involved in chemical research.
18. Explain how a redox indicator works.
19. Calculate the mean, meadian and standard deviation in respect of the following measurements for the concentartion of Fe in ppm found in replicate analysis of a sample of water from a well. 19.60, 19.70, 19.80, 19.90, 20.00, 20.10
20. Explain the phenomenon of photoelectric effect and how it establishes the particle nature of light.
21. The work function of zinc is 3.6 eV. Calculate the maximum energy of the photo-electron ejected from the zinc surface by ultraviolet light of wavelength 300 nm.
22. Starting from the wave equation of a stationary wave, derive time-independent Schrodinger equation.

(5 x 4 = 20)

Section D
Answer any 2 (10 marks each)

23. Give a brief account on acid-base titrations.
24. Give an account on dichrometric titrations.
25. Set up the Schrodinger wave equation for a particle in a one-dimensional box, solve it and get the expression for the energy of the particle. Explain the term zero-point energy. Draw the energy levels wavefunctions and probability distribution curves of the first three energy levels.
26. Derive the wave equation for a particle in a three-dimensional box applying the separation of variables method.

(10 x 2 = 20)