(i) Printed Pages: 3

(ii) Questions : 9

Roll No. .....

Sub. Code : 0961

Exam. Code : 0033

B.Sc. (Hons.) Biotechnology 1st Semester

(2122)

CHEMISTRY

Paper : BIOT-104-T

Time Allowed : Three Hours] [Maximum Marks : 67

Note :—Attempt **five** questions in all including Question No. 9 (Unit V) which is compulsory and selecting **one** question each from Units I–IV.

UNIT–I

1. (a) Discuss SLATER Rules properly. Calculate effective nuclear charge for one of the 4s electron of Zinc atom.

   (b) Draw molecular orbital energy level diagram of NO molecule. Calculate its bond order with help of electronic configuration and also tell magnetic behaviour. 7+6

2. (a) What are advantages of Raman Spectroscopy over IR Spectroscopy ?

   (b) Write about principle of NMR.

   (c) Differentiate between absorption and emission spectrum. 5+4+4

UNIT–II

3. (a) Derive Van't Hoff equation for osmotic pressure of a dilute solution. How this equation is useful in determining molar mass of a solute.

   (b) Discuss in detail ideal and non-ideal solutions. 6+7

4. (a) What is meant by Activation Energy ? Discuss how it is determined with the help of Arrhenius equation.

   (b) Derive expression for rate constant for first order reaction.

   (c) Differentiate ORDER and MOLECULARITY. 5+4+4

UNIT–III

5. (a) What is Quantum Yield of Photo Chemical reaction ? Explain with example.

   (b) Discuss in detail about Phosphorescence and Fluorescence. 5+8

6. (a) Write IUPAC names of the following :

   (i) $K_2[HgI_4]$

   (ii) $[Co(en)_2Br_2]Cl$

   (iii) $Li[Al(H)_4]$

   (iv) $[Cr(NH_3)_6]^{3+}$.

   (b) Explain Geometrical Isomerism in complexes having coordination number four and six with help of examples.

   (c) Define linkage isomerism with example. 4+8+1

UNIT–IV

7. (a) Explain and compare in detail SN^1 and SN^2 reactions with help of energy diagrams and mechanisms.

   (b) What are Carbenes ? Discuss its various types with examples. 8+5

8. (a) Discuss the following reactions with help of mechanisms :

   (i) HVZ reaction.

   (ii) Esterification reaction.

   (b) What is effect of substitution on acidic strength of carboxylic acids ? Explain with help of examples. 8+5

UNIT–V

9. Attempt the following :

   (a) What is Hyperconjugation ? 2

   (b) Explain Zero point energy. 2

   (c) Out of Na and Na^+ which is smaller in size and why ? 2

   (d) Discuss successive ionization energies. 2

   (e) Explain the term activity and activity coefficient. 2

   (f) Discuss inductive effect with example. 2

   (g) Define Hydrogen bonding with examples. 2

   (h) What is Lambert-Beer Law ? 1