

Exam. Code: 0033

Sub. Code: 0962

1128

B.Sc. (Hons.) Biotechnology

1<sup>st</sup> Semester

BIOT-Sem-I-IV-T: Chemistry

Time allowed: 3 Hours

Max. Marks: 67

**NOTE:** Attempt five questions in all including Q. No.-IX (Unit-III) which is compulsory and select two questions each from Unit I-II.

-.\*-\*.\*-

**UNIT-I**

- I. (a) Draw molecular energy level diagram of NO molecule. Tell its bond order and magnetic behaviour.
- (b) What are Slater Rules? State properly calculate effective nuclear charge for one of the 4s electron of zinc atom. (6+7)
- II. (a) Explain the term ionization energy. What are the different factors on which it depends?
- (b) Define the following terms: -
- (i) Chemical shift
  - (ii) Shielding and deshielding of protons
  - (iii) Zero point energy
  - (iv) Stokes and anti stokes lines (5+8)
- III. (a) Differentiate ideal and non-ideal solutions.
- (b) Derive the relation between freezing point depression of solution and mole fraction of the dissolved solute.
- (c) Calculate osmotic pressure at 0°C of a 5% solution of urea (mol. wt=60) (R=0.0821 lit-at/deg/mol). (4+5+4)
- IV. (a) Discuss in detail effect of catalyst on rate of reaction.
- (b) Differentiate order and molecularity.
- (c) Explain the effect of temperature on reaction rate in terms of Arrhenius equation. (5+4+4)

**UNIT-II**

- V. (a) State and explain Stark-Einstein law of photochemical equivalence. What do you mean by molar extinction coefficient?
- (b) Define and explain the terms Fluorescence and phosphorescence properly. (7+6)
- VI. (a) Explain the basic postulates of Werner's coordination theory.

**Contd.....P/2**

(2)

- (b) Write IUPAC names of the following:
- $K_2[HgI_4]$
  - $[Co(en)_2Cl_2]Br$
  - $[Cr(NH_3)_6]^{3+}$
  - $Li[AlH_4]$
  - $[Co(NH_3)_3Cl_3]$
- (c) Explain with help of examples, geometrical isomerism in complexes having coordination number six. (5+5+3)
- VII. (a) Differentiate inductive effect and electromeric effect.
- (b) Discuss and compare  $S_N^1$  and  $S_N^2$  reactions with help of mechanisms.
- (c) Write a note on structure, methods of preparation and reactivity of singlet and triplet carbenes. (3+6+4)
- VIII. (a) How will you account for the fact that acid chlorides are most reactive and acid amides are least reactive towards nucleophilic substitution reactions? Justify.
- (b) Write and explain the mechanism of the following reactions:
- Esterification
  - HVZ reaction (7+6)

**UNIT-III**

- IX. Attempt the following: -
- Define linkage isomerism in coordination complexes with one example.
  - Write the units of rate constant for first and second order reaction.
  - What do you mean by activation energy?
  - Explain Allred and Rochow scale of electronegativity.
  - Tell three centred electron pair bond with example.
  - Explain briefly hyperconjugation.
  - Briefly explain the terms transmittance and absorbance.
  - Which gas is commonly known as stranger gas? (2+2+2+2+2+2+1)

- \*\_ \*\_ \*