Exam. Code: 0033
Sub. Code: 0962

1129

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

BIOT-Sem-I-IV-T: Chemistry

(Same for Bioinformatics)

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.*

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UNIT-I

I. (a) Define hydrogen band and what are the conditions for its formation. Explain why is H_20 liquid while H_2S is gas.

(b) Draw energy level diagram for O_2 on the basis of M.O. theory and explain why bond order of 0_2^+ is more than that of O_2 molecule. (7+6)

II. (a) How do ionization energy and atomic radius change along a period and a group? Explain why?

(b) (i) Differentiate between absorption and emission spectrum.

(ii) What is meant by chemical shift in NMR spectrum and how it is expressed?

(iii) Explain what is zero point energy. (7+6)

III. (a) Show graphically that when a non-volatile solute is added to a solvent, the freezing point of the solution is always lower than that of pure solvent. Discuss how depression in freezing point is directly proportional to the molatily of the solution.

(b) A 40% solution of sucrose is isotonic with 30% solution of unknown organic substance. Calculate molecular mass of unknown substance [Mol. Mass of sucrose=342g/mole]. (7+6)

IV. (a) Explain in detail how rate of reaction depends upon nature of reactants and pressure of catalyst.

(b) Starting from Arrhenius equation, derive the expression $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$. (7+6)

P.T.O.

UNIT-II

V. (a) What are photochemical reactions? State and explain Einstein's law of photochemical equivalence.

(b) Write note on low and high quantum yield of photochemical reactions. (7+6)

VI. (a) What do you understand by isomerism in coordination compounds? Write note on linkage and ionization isomerism.

(b) Write IUPAC names of following: -

(i) $[Co(NH_3)_4Br_2]Cl_2$

(ii) $K[Ag(CN)_2]$

(iii) $[Cr(NH_3)_6]^{3+}$ (7+6)

VII. (a) Compare and explain SN_1 *and* SN_2 nucleophilic reactions with help of energy diagrams.

(b) Differentiate following: -

(i) Inductive effect & electromeric effect

(ii) Resonance & hyperconjugation (7+6)

VIII. (a) Compare and discuss acidic strength of following:-

$ClCH_2COOH$, CH_3COOH *and* C_2H_5COOH

(b) Discuss HVZ reaction with mechanism. Give two examples. (7+6)

UNIT-III

IX. (a) What is meant by multicenter bond? Give one example.

(b) Write order of change of electron affinity of halogens.

(c) What do you understand by activation energy?

(d) Define the terms activity and activity coefficient.

(e) What is meant by Quenching Fluorescence?

(f) What do you understand by primary and secondary valencies in coordination complexes?

(g) Discuss triplet carbine and draw its structure.

(h) Give one example of esterification. (2+2+2+2+2+2+2+1)

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