

2056
Bachelor of Science (FYUP)-Fourth Semester
Chemistry

Paper: Basic Concepts in Chemistry - 3

Time allowed: 3 Hours

Max. Marks: 67

NOTE: Attempt five questions in all, including Question No. 1 & 2 which are compulsory and selecting one question from each Unit.

x-x-x

Q1. Attempt the following multiple-choice questions.

- (a) The general formula of linear silicones is
- (i) $(\text{SiO}_2)_n$
 - (ii) $(\text{R}_2\text{SiO})_n$
 - (iii) $(\text{SiH}_4)_n$
 - (iv) $(\text{RSiO}_3)_n$
- (b) The hybridization of phosphorus in phosphazenes is
- (i) sp^3
 - (ii) sp^2
 - (iii) sp
 - (iv) dsp^3
- (c) One-dimensional sulphur-nitrogen conductors have
- (i) Ionic conduction
 - (ii) Metallic conduction
 - (iii) Delocalized electrons along chain
 - (iv) No conductivity
- (d) The sugar present in RNA is
- (i) Deoxyribose
 - (ii) Glucose
 - (iii) Fructose
 - (iv) Ribose
- (e) Primary structure of proteins refers to
- (i) Folding pattern
 - (ii) Amino acid sequence
 - (iii) α -helix formation
 - (iv) Quaternary arrangement
- (f) Which of the following amino acids is basic?
- (i) Aspartic acid
 - (ii) Glutamic acid
 - (iii) Serine
 - (iv) Lysine
- (g) In H_2^+ ion, the number of electrons in molecular orbitals is
- (i) 0
 - (ii) 1
 - (iii) 2
 - (iv) 3
- (h) Which of the following orbitals has electron density along the internuclear axis?
- (i) σ
 - (ii) π
 - (iii) δ
 - (iv) Non-bonding orbital
- (i) The antibonding molecular orbital is formed due to
- (i) Constructive interference
 - (ii) Destructive interference
 - (iii) Hybridization
 - (iv) Spin pairing

(9×1)
P.T.O.

(2)

Q2. Answer the following short-answer questions:-

- (a) What are zeolites?
- (b) Draw and briefly discuss the structure of triphosphazene.
- (c) Draw the structure of thiamine and cytosine.
- (d) Explain basic ideas of molecular orbital theory.
- (e) What are the conditions for the formation of molecular orbitals?

(2×5)

UNIT - I

- Q3. (a) What are silicate minerals? Discuss in detail giving their types and examples.
 (b) What are intercalation compounds? Discuss with suitable examples.
 (c) What do you mean by heterocatenation? Discuss in detail.

(8,4,4)

- Q4. (a) Discuss synthesis, properties, and applications of polysiloxanes.
 (b) What are polysilanes? Discuss their synthesis and uses.
 (c) What are polyphosphazenes? Discuss their synthesis and chemical properties.

(8,4,4)

UNIT - II

- Q5. (a) Explain electrophoresis.
 (b) Discuss Gabriel Phthalimide synthesis and Strecker synthesis.
 (c) Discuss the primary and secondary structure of DNA.
 (d) Write a note on ribonucleotides and ribonucleosides.

(4,4,4,4)

- Q6. (a) Explain solid phase peptide synthesis.
 (b) Discuss hydrazinolysis method and enzymatic method for C-terminal residue analysis.
 (c) Discuss β -pleated sheet and α -helix secondary structure of proteins.
 (d) Which methods are used to protect groups in peptide synthesis? Discuss.

(4,4,4,4)

UNIT - III

- Q7. (a) Diagrammatically explain the formation of σ , σ^* and π , π^* orbitals.
 (b) Calculate the coefficients of atomic orbitals in sp^3 hybridization.
- Q8. (a) Describe the construction of molecular orbitals for H_2^+ ion using LCAO.
 (b) What is the physical significance of wave functions in molecular orbital theory? Discuss in detail.
 (c) Compare MOT and VBT.

(8,8)

(8,4,4)