Anjuman Islam Janjira Degree College of Science Murud-Janjira, Raigad-402401 Affiliated to University of Mumbai	
Class: -S.Y.B.Sc.(G.S)	**Subject: - Chemistry- II**
Semester:- III	**Course code: -S3MJ4**
Exam Event:- Winter 2025 (SH)	**Marks: - 30**
Date: - 13/10/2025	**Duration: - 1:0 Hours**

N.B.
1. Figures to the right indicate full marks.
2. Draw neat labelled diagrams wherever necessary.

Q.1 A) Select the correct option & complete the sentences (Any six) **06**

1. The tendency of BF_3, $BC1_3$& BBr_3 to behave as Lewis's acid decreases in the sequence _____ .
   a) BF_3> BCl_3 >BBr_3 b) BCl_3 > BF_3> BBr_3 c) BBr_3> BCl_3 > BF_3.
2. The molecular formula of diborane is:
   a) B_2H_2 b) B_2H_6 c) BH_3
3. Which of the following is the correct electronic configuration of Silicon (Z = 14)?
   a) [He] $2s^2$ $2p^6$ $3s^2$ b) [Ne] $3s^2$ $3p^2$ c) [Ar] $3s^2$ $3p^4$
4. The concept of radius ratio rule is used to predict:
   a) Shape of molecules b) Magnetic properties c) Geometry of ionic crystals
5. Which hybrid orbital arrangement leads to tetrahedral geometry?
   a) sp b)sp^3 c) sp^2
6. _____ is the electron deficient compound.
   a) B_2H_6 b) $SiCl_4$ c)SiO_2
7. Valence Bond Theory (VBT) was proposed by:
   a) Pauling and Slater b) Heisenberg and Schrödinger c) Lewis and Kossel
8. The bond order of N_2 is:
   a) 1 b) 2 c) 3
9. The shape of SF_6 molecule is:
   a) Square planar b) Trigonal bipyramidal c) Octahedral
10. The electronic configuration of silicon is:
    a) $1s^2$ $2s^2$ $2p^4$ b) $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^2$ c) $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^4$

(B) Attempt any Thee of the following. **09**

1. Discuss the conditions for formation of ionic bond.
2. Derive the radius ratio rule and discuss its importance and limitation in predicting structure of ionic compound
3. Discuss the Born-Haber cycle with example of NaCl formation. How it is used to calculate lattice energy and stability of ionic compound.
4. Explain Hybridization and geometry in Pl_5 molecule
5. Write one method of preparation of $SiCl_4$. Explain its structure and bonding.

Q.2 (A) Select the correct option & complete the sentences (Any six) **06**

1. PCC means _____
   a) Pyridine chlorochromate b) Pyrrole chlorochromate c) Pyridinium chlorochromate
2. Diethyl malonate is _____
   a) H_5C_2OOC-CH_2-CH_2-$COOC_2H_5$ b) H_5C_2OOC-CH_2-$COOC_2H_5$
   (c) H_5C_2OOC-CH_2- CH-CH_2-$COOC_2H_5$
3. The correct order of reactivity is_____
   a) H-CO-H >R-CHO >R_2CO b) H-CO-H < R-CHO < R_2CO c) R-CHO > H-CO-H >R_2CO

4. Hydrazones are _____
   a) >C=N-NH- b) >HC-NH-NH- c) -CO-NH-NH-
5. What is an active methylene compound?

   a) A compound with a methyl group attached to a carbonyl group
   b) A compound with a methyl group attached to an alkyl group
   c) Compound with a methylene group attached to two electron-withdrawing groups

6. Which of the following is an example of a nucleophilic addition reaction?
   a) Addition of HCN to aldehydes and ketones
   b) Addition of Grignard reagent to aldehydes and ketones c) Both a and b

7. Which carbocation is more stable
   A) Tertiary b) Secondary c) Primary
8. The carbonyl group (>C=O) is polar because:
   a) Oxygen is more electronegative than carbon
   b) Carbon is more electronegative than oxygen
   c) Both have same electronegativity
9. Reaction of aldehyde with phenylhydrazine forms:
   a) Hydrazone b) Oxime c) Cyanohydrin
10. $LiAlH_4$ reduces aldehydes to:
    a) Primary alcohols b) Secondary alcohols c) Hydrocarbons

(B) Attempt any Three of the following. **09**

1. Explain the factor affecting SN1 & SN2 reaction.
2. Discuss the Addition Elimination Mechanism
3. Discuss the structure and reactivity of carbonyl compound
4. Discuss the addition reaction of aldehyde and ketones with i) HCN ii) $NaHCO_3$
5. Identify the name of the reaction and explain with mechanism.