

Sessional Exam 2025
North Gauhati College
Semester : II (FYUGP)
Subject : Chemistry II
Paper Code: CHE0200104

Total marks: 30

Time: 1hr 30 mins

PART A (INORGANIC CHEMISTRY)

1. What is the cause of unusual high boiling point of NH_3 and H_2O ? 1
2. Why ZnCl_2 is more covalent than MgCl_2 ? 2

Or

According to Fajan's Rules, covalent bonding is favoured by which types of cations and anions? 2

3. Using VSEPR theory, predict the geometry of **any two** of the following molecules:

a) H_2O b) ClF_3 c) XeF_4 d) PCl_5 1.5x2=3

4. Draw the molecular orbital energy level diagram and find out the bond order for **any one** of the following molecules? 3+1=4

a) O_2 b) CN^-

PART B (ORGANIC CHEMISTRY)

5. What is the hybridisation state of the following -ve carbon atoms: 1

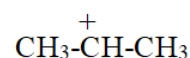
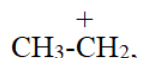
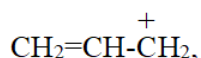


6. What do you mean by K_a value? How does it affect the acidity of an acid? 2
7. Explain why chloroacetic acid is more acidic than acetic acid? 3

Or

Explain why aromatic amines are less basic than aliphatic amines? 3

8. Explain the structure of carbocation and arrange the following in increasing order of stability. 3+1=4



PART C (PHYSICAL CHEMISTRY)

9. Define extensive and intensive properties. Give one example of each. 1

10. Deduce the relationship between temperature and volume for reversible adiabatic expansion. 3

$$TV^{\gamma-1} = \text{Constant}$$

Or

Six moles of an ideal gas expands isothermally and reversibly from a volume of 1 dm³ to a volume of 10 dm³ at 27 °C. What is the maximum work done? 3

11. Define Joule-Thomson co-efficient. Deduce the relationship: 3

$$\mu_{J,T} = -\frac{1}{C_P} \left(\frac{\partial H}{\partial P} \right)_T$$

12. Define Hess's law of constant heat summation. Calculate the standard enthalpy of formation of methane (CH₄) from the following thermochemical reaction:



$$\Delta H^0 = -890.4 \text{ kJmol}^{-1}$$

Give the ΔH^0 for CO₂ (g) and H₂O (g) are -393.7 kJmol⁻¹ and -285.8 kJmol⁻¹ respectively.

$$1+2=3$$

Or

Define Kirchoff equation. The enthalpy of reaction (ΔH) for the formation of ammonia according to the reaction $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$ at 27 °C was found to be -91.94 kJ. What will be the enthalpy of the reaction at 50 °C. The molar heat capacities at constant pressure and at 27 °C for N₂, H₂ and NH₃ are 28.45, 28.32 and 37.07 JK⁻¹mol⁻¹ respectively. 1+2=3
