

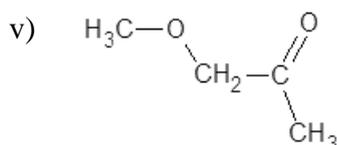
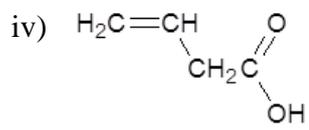
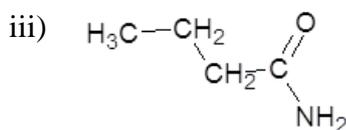
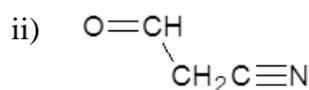
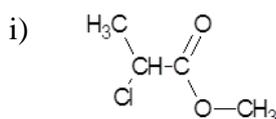
Date: 19.11.2019

Time: 3 Hours

Total Marks: 100

- N.B. 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of log-table/nonprogrammable calculator is allowed.
 4) Answers for the same question as far as possible should be written together.
1. (A) Select the correct option and complete the following sentences. (any twelve) 12
- (i) Study of thermodynamics helps
 - (a) To study the rate of reaction
 - (b) to predict the possibility of reaction
 - (c) to explain the mechanism of reaction
 - (ii) Which of the following is extensive property
 - (a) concentration
 - (b) mass
 - (c) density
 - (iii) State functions are
 - (a) path dependent
 - (b) path independent
 - (c) inexact differentials
 - (iv) 50 cm³ of 0.1N solution of HCl contains milliequivalents of HCl
 - (a) 0.05
 - (b) 0.005
 - (c) 5
 - (v) 4.0 dm³ of 4 M HNO₃ contains moles of HNO₃
 - (a) 16
 - (b) 4
 - (c) 1
 - (vi) 15 g of sodium chloride dissolved in 100 g water represents 15 % solution
 - (a) w/v
 - (b) w/w
 - (c) v/w
 - (vii) _____ are nucleons.
 - (a) Protons and electrons
 - (b) Neutrons and protons
 - (c) Neutrons and electrons
 - (viii) The atomic number of carbon is 6 and mass number is 12. It consists _____.
 - (a) 6 neutrons 12 protons
 - (b) 6 protons 12 neutrons
 - (c) 6 protons 6 neutrons
 - (ix) When electron does not change its orbit, energy is _____.
 - (a) released
 - (b) absorbed
 - (c) neither absorbed nor released
 - (x) An element with an atomic number 14 belongs to the group which heads by _____.
 - (a) ${}_6\text{C}$
 - (b) ${}_8\text{O}$
 - (c) ${}_7\text{N}$
 - (xi) The screening effect of p electrons in nth shell is _____.
 - (a) less than ns electron
 - (b) equal to ns electron
 - (c) more than ns electron
 - (xii) Quantum numbers are _____.
 - (a) complex values
 - (b) numerical values
 - (c) logical values
 - (xiii) The double barbed arrow indicates _____.
 - (a) movement of one electron
 - (b) movement of two electrons
 - (c) movement of one electron

- (xiv) Among the following groups _____ exert +I effect.
 (a) Nitro (b) isopropyl (c) carbonyl
- (xv) Net dipole moment of cis-Ethylenedichloride is _____.
 (a) Zero (b) Greater than zero (c) lesser than zero
- (xvi) -E effect is exerted during _____ addition.
 (a) electrophile (b) nucleophile (c) radical
- (xvii) _____ has complete octate.
 (a) carbocation (b) carbanion (c) radical
- (xviii) During hyperconjugation delocalization of _____ electrons takes place..
 (a) π (b) σ (c) non bonding
- (B) State whether the following statements are true or false. (any **three**) **3**
- State functions are exact differentials
 - The basicity of H_3PO_4 is three
 - Square of the magnitude of wave function is called probability density.
 - Electronic configuration of an atom with atomic number 4 is $1s^2 1p^2$.
 - Nitrogen atom can undergo sp hybridization.
 - Unsaturated compounds readily show substitution reactions.
- (C) Match the column. (any **five**) **5**
- | | |
|-----------------------------|-----------------------|
| (i) $dq=0$ | (a) Pyramidal |
| (ii) 1000 mL of 1M solution | (b) Group 1 element |
| (iii) Phosphorous | (c) Angular |
| (iv) Lithium | (d) Linear |
| (v) Amine Nitrogen | (e) Group 15 element |
| (vi) Ether Oxygen | (f) 1000 millimoles |
| | (g) adiabatic process |
| | (h) Group 13 element |
| | (i) 10^3 millions |
2. Attempt any **four** of the following.
- (A) Explain the terms i) internal energy ii) enthalpy How are they related? **5**
- (B) State first law of thermodynamics into different forms and give its limitations **5**
- (C) Calculate q , w and ΔE for 2.5 moles of an ideal gas at 2 atm expands isothermally to 2.5 times of its initial volume against external pressure of 1 atm. At 300 K. **5**
- (D) Define and explain i) Mole ii) Normality iii) Molarity iv) Molality v) Mole fraction **5**
- (E) What is percent by weight? A sample of KCl is weighing 10 g is dissolved in 200 cm^3 of water. Calculate the weight percent of KCl in solution (density of water is 1 gm /L) **5**
- (F) Explain the concept of milliequivalent and millimoles **5**

(E) Assign IUPAC names for following. 5(F) Explain the structure and shape of acetone molecule on the basis of hybridizations of Carbon and Oxygen atoms. 55. Attempt any **four** of the following.(A) 10 g of urea is dissolved in 200 g of water calculate its Molality and mole fraction of each component 5(B) Derive kirchoff's equation $\Delta H_2 - \Delta H_1 = \Delta C_p(T_2 - T_1)$ 5(C) Explain Alfred-Rochow's method for electronegativity determination. Calculate electronegativity of fluorine atom, if r_{cov} for fluorine is 7.2 nm and $Z = 9$ 5(D) What is building up principle? With diagram, explain arrangement of orbitals. 5(E) (i) Explain the effect of hyperconjugation and resonance on stability of carbon radical. 3(ii) Write a note on 'Nucleophilicity'. 2(F) (i) What is meant by Nucleophilic addition reaction? Give one example with chemical equation. 3(ii) Explain the shape and bonding in Ethene. 2
