[Time: 3 Hours] **[Marks:100]**

Please check whether you have got the right question paper.

N.B:
1. All Question are compulsory.
2. Figures to the right indicate full marks.
3. The use of log tables/non programmable calculator is allowed.
4. Answers for the same questions as for as possible should be written together.

Q.1 (A) **Select the correct option and complete the following sentences (any twelve)** **12**

i) For exothermic reaction, internal energy is…….
a) Negative b) Positive c) Zero.

ii) If the boundary prevents any interaction of system with the surrounding, the system is called……
a) Closed system b) Open system c) Isolated system.

iii) If work is done by the system, W is taken as
a) Negative b) Positive c) Zero.

iv) The Kirchoffs equation is ……
a)($\Delta H_2 - \Delta H_1) = \Delta C_p (T_2 - T_1)$
b) $(\Delta H_1 - \Delta H_2) = \Delta C_P (T_2 - T_1)$
c) $(\Delta H_2 - \Delta H_1) = \Delta C_p (T_1 - T_2)$

v) Sum of mole fraction of two components is always……..
a) more than one b) less than one c) one

vi) The equivalent weight of ammonia is……
a)17.0 b)17/2 c)1.7

vii) The shell with n=3 is denoted as……
a) K b) L c) M

viii) 's' orbitals contains …….. electrons
a)2 b) 3 c) 4

ix) The atoms having ……. electron are called Hydrogenic atoms.
a) two b) one c) three

x) The properties of elements are periodic functions of their…… according to modern periodic law.
a) atomic weight b)atomic number c) atomic radii

xi) 'd' block elements are ……..
a) metals b) non metals c) semi conductors.

xii) The nuclear charge …….. regularly as the atomic number increases.
a) decreases b) increases c) remains the same

xiii) The group …… exhibits +I effect.
a) $-CH_3$ b) $-NO_2$ c) -Br

xiv) …… has greater dipole moment.
a) CH_3Br b)CH_3Cl c)CH_3I

xv) …… is an electrophillic reagent.
a) BF_3 b)H_2O c) NH_3

xvi) Hybridization of carbon in carbocation is _____.
a) sp^3 b) sp^2 c) sp

xvii) Propanenitrile has ……. carbon
a) two b) four c) three

xviii) …….. reactions involve heterolytic fission of covalent bonds.
a) free radical b) non-polar c) polar.

(B) State whether the following sentences are True or False (any three) 03

i) Molar entropy is an extensive property of the system.
ii) Normality is dependent on temperature.
iii) Zeeman effect is explained by Bohr's theory of atomic structure.
iv) The enthalpy of ionization for noble gases are very high.
v) Electrometric effect is temporary effect
vi) Chloroform is non polar molecule.

(C) Match the following (any five) 05

i) Intensive property	a positive centre of atom
ii) Dilute solution	b RCN
iii) Nucleus	c Temperature
iv) Electronegativity of chlorine	d $R\text{-}NO_2$
v) Nitrile	e $AlCl_3$
vi) Lewis base	f Has more solvent than solute
	g 3.0
	h NH_3

Q2 Attempt <u>any four</u> of the following.

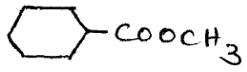
A) With suitable example, explain the concept of state function and path function. **05**
B) State the first law of thermodynamics in any three forms and derive the mathematical expression for it. **05**
C) 1.5 mole of an ideal gas at 2 atmospheres and 27^0C is compressed isothermally to one half its volume by an external pressure of 4 atmospheres. Calculate the work done (R=0.082 atm $dm^3\ K^{-1}\ mol^{-1}$ l atm dm^3=101.32 J) **05**
D) Define enthalpy of formation of molecule and explain it with suitable example. **05**
E) How can concentration of solution be classified based on physical and chemical units? **05**
F) What is the weight of solute dissolved in 100cm^3 of 0.15N Na_2CO_3 (Mol.Wt of Na_2CO_3 = 106)? **05**

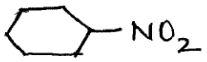
Q3 Attempt <u>any four</u> of the following

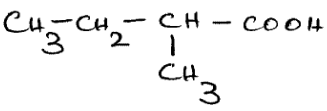
A) Calculate the effective nuclear charge (Z_{eff}) for 2p electron in Oxygen (Z=8). **05**
B) Describe Rutherford's atomic model. **05**
C) Discuss the angular shape of s and p orbital. **05**
D) Explain in brief the history of periodic table. **05**
E) How are the elements in the periodic table classified? **05**
F) Discuss the Paulings method to determine electronegativity of elements. **05**

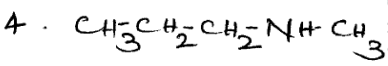
Q4 Attempt <u>any four</u> of the following.

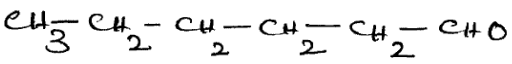
A) Write the IUPAC name for the following compounds **05**

1. 

2. 

3. 

4. 

5. 

B) Explain sp^3 hybridization of carbon with suitable example. Draw orbital diagram of methane. **05**

C) Explain the structure of free radicals. **05**

D) Explain the stability of carbocation on the basis of hyperconjugation and resonance effect. **05**

E) i) Explain the term nucleophile with suitable example. **02**

ii) Explain sp hybridization of nitrogen with suitable examples. **03**

F) i) Draw the structure of the following compounds **03**

a) Cyclobutane carbonyl chloride
b) 3-Bromo hexanoic acid
c) Butane dioic anhydride.

ii) Indicate the type of hybridisation of C, O atoms in methanol. **02**

Q5 Attempt <u>any four</u> of the following

A) Explain the term enthalpy of combustion and give its applications. **05**

B) 10g of urea (M.Wt=60) is dissolved in 297 g of water. Calculate the mole fraction of each component. **05**

C) Write short note on Aufbau principle. **05**

D) What are the factors affecting the magnitude of enthalpy of ionization. **05**

E) i) Discuss the orbital structure of ethane. **03**

ii) Explain "aniline is weakly basic than aliphatic amines." **02**

F) Write a short note on inductive effect. **05**