VCD-25/11/19 **F.Y.B.Sc SEM-I CHEMISTRY P-I**

**MARKS 100** **TIME 3 HRS**

NOTE: i) All the questions are compulsory.
ii) Figures to right indicate full marks.
iii) Use of non –programmable calculator / log table is allowed.

Q.1 A. Select the correct option. [12]

i) State functions are----------
a) path dependent b) inexact differentials c) path independent

ii) Volume is ---------
a) extensive property b) intensive property c) colligative property

iii) All four quantum numbers of any two electrons cannot be _____
a) same b) different c) both a and b

iv) Carbocations are electron _____
a) Rich b) deficient c) both a and b

v) Methyl Carbocation is----------carbocation
a) primary b) secondary c)tertiary

vi) Carbon-Carbon bond length is maximum in ---------- bond
a) triple b) double c) triple

vii) _____ are electron deficient species.
a) electrophiles b) nucleophiles c) bases

viii) The shape of P orbital is ----------
a)Spherical b) Dumb bell c) Elliptical

ix)In ground state of an atom, the electron occupies the---------- energy orbitals
a)Highest b) Lowest c) Middle

x)Bond angle in methane molecule is
a) 107° b) 104°. I c) 109°28

xi) 3s orbital has radial nodes
a) Three b) One c) Two

xii)---------- is non polar molecule.
a) $CCl_4$ b) $H_2O$ c) HCl

B. State whether true of False [03]

1) Leroth law of thermodynamics was discovered before first and second law of thermodynamics.
2) Molar heat capacity is is intensive property.
3) State functions are path dependent.

C. Match the following columns [05]

| Column A | Column B |
|---|---|
| 1) S block element | a) Energy |
| 2) Intensive property | b) S |
| 3) Ether | c) H |
| 4) Enthalpy | d) Sodium |
| 5) Entropy | e) R-0-R |

Q2. Answer any four of the following: [20]

A) If the heat of formation of methane at constant pressure is -74.9 KJmol-1 298 K , What is its value at constant volume?
B) Define the term i) open system ii) Boundry iii ) State function iv) Isothermal process v) Isochoric process
C) Explain the term Heat capacity
D) Explain relationship between mole fraction and molarity.
E) Give limitations of first law of thermodynamics.
F) Calculate the Heat of formation of benzene at $25^0$ C,if the heat of combustion of benzene ,Carbon ,and hydrogen are -780.90,94.05,-68.32,Kcal respectively at $25^0$

Q3. Answer any four of the following: [20]

A) Explain Rutherford's model of atom based on alpha particle scattering experiment.
B) Explain Lyman and Balmer series of spectral lines observed in atomic spectrum of hydrogen. In which spectral regions are the lines observed?
C) What is meant by atomic size? Explain its variation down the group.
D) State modern periodic law. What are the types of elements in the long form of periodic table
E) State Aufbau principle. Draw the energy level diagram for the orbitals.
F) Explain advantages of Bohr's atomic model.

Q4. Answer any four of the following: [20]

A)Draw structures of the following compounds

1) n-butane
2) Methyl cyclopentane
3) Propanone
4) N- Methyl - butanamine

5) Nitroethane

B) Give one example of following reactions

1) Elimination Reaction
2) Addition Reaction

C) Explain sp hybridization with suitable example.

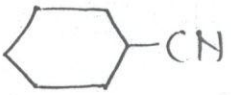
D) Explain structure of free radicals.

E) Distinguish between sigma and pi bonds.

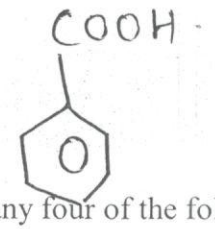
F) Give IUPAC names of following compound-

i) $C_2H_5OH$

ii) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CONH_2$

iii) 

iv) $C_6H_5CN$

v) 

Q5. Answer any four of the following: [20]

A) 12 g of Na2CO3 dissolved in 100ml of solution Na=23,C=12,O==16 Calculate (i)Formality (ii) Molarity of the Na+ and CO3-2 ions.

B) Calculate the weight of following substances that will be required to prepare 250 ml of 0.1N solution. (a) HCl (b) NaOH

C) State modern pe: iodic law. Explain briefly classification of elements as main group and transition elements with two examples of each.

D) State factors influencing ionization enthalpy values. First ionization enthalpy of nitrogen is higher than that of oxygen. Explain.

E) Define i) Inductive effect ii) electrometric effect iii) Resonance iv) Hyperconjugation v) free radical)

F) Explain the Hybridization of oxygen in methanol.