

Time: 3 Hours**Marks: 100****Please check whether you have got the right question paper.**

- 1) All the Questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) The use of log table / Non-programmable calculator is allowed.
- 4) Answers to the same question should be written together.

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

- i) _____ is a path function.
a) Energy b) Pressure c) Heat
- ii) _____ is an extensive property.
a) Temperature b) Pressure c) mass
- iii) 40g of NaOH in one dm^3 solution is _____.
a) 0.1N b) 0.01N c) 1M
- iv) _____ is a state function.
a) Work b) Heat c) Enthalpy
- v) A system that can exchange energy but not matter with surrounding is _____
a) closed b) Open c) isolated system
- vi) One mole of substance in 5dm^3 solution is _____.
a) 0.01M b) 0.2M c) 0.1N
- vii) The shell with $n=2$ is commonly referred to as _____.
a) K b) L c) M
- viii) The charge on the beta particle is _____.
a) neutral b) negative c) positive
- ix) According to Quantum theory $E =$ _____.
a) hc b) $h\nu$ c) $h/2\pi$
- x) The first period has only element/elements.
a) one b) two c) three
- xi) Slater proposed a set of rules for calculating
a) ionisation constant b) electronegativity c) shielding constant.

xiii) In ethanamine, nitrogen is ----- hybridized.

- a) sp^3 b) sp^2 c) sp

xiv) The carbocation is -----species.

- a) Neutral b) electron deficient c) electron rich

xv) The group exhibits -I effect.

- a) $-CN$ b) $-CH_3$ c) $C_6H_5O^-$

xvi) Cyclohexanol is alcohol.

- a) primary b) secondary c) tertiary

xvii) Anionic intermediate having a negative charge on trivalent carbon is known as ____

- a) carbocation b) carbanion c) carbon free radical

xviii) Nucleophiles are also known as

- a) Lewis acids b) Lewis bases c) neutral species

B) State whether the following sentences are true or false.

3

(Attempt any three)

- Intensive properties depend on amount.
- Enthalpy is a state function.
- Electron enters in a shell in the order of increasing energy
- Isoelectronic atoms or ions have same number of electrons.
- Monochloroacetic acid is a stronger acid than acetic acid.
- Acetylene is non-linear molecule.

C) Match the following (attempt any five).

5

- | | |
|---------------------|--------------|
| 1) H | a) C^{5+} |
| 2) 1mg/L | b) BF_3 |
| 3) Hydrogenic atom. | c) RNH_2 |
| 4) Cs | d) 1ppm |
| 5) amide | e) CN^- |
| 6) electrophile | f) $U + PV$ |
| | g) $RCONH_2$ |
| | h) 55 |

Q.2 Attempt any four of the following.

A. Derive an equation for variation of heat of reactions with temperature.

5

B. Explain normality. What volume of 5M HNO_3 is required to prepare 100cm³ of 0.837M HNO_3 ?

5

C. Explain 1) Enthalpy 2) Internal Energy

5

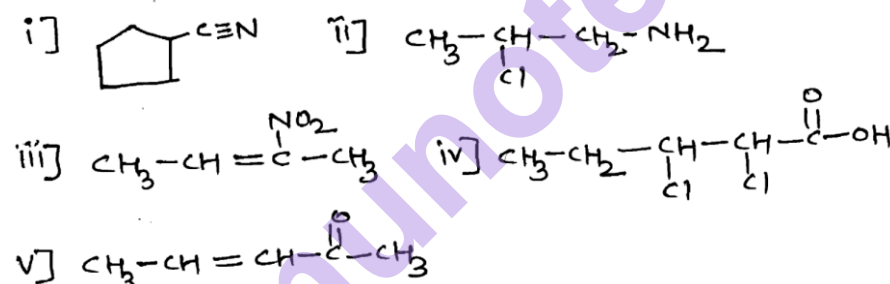
- D. Explain equivalent weight. Find the weight of H_2SO_4 required to prepare 250cm^3 of 0.05M H_2SO_4 solution. (At. Wt. H = 1, S=32, O=16). 5
- E. What is heat of reaction? For reaction $\text{H}_2\text{F}_{2(g)} \rightarrow \text{H}_{2(g)} + \text{F}_{2(g)}$ $\Delta E = -57.5 \text{ KJmol}^{-1}$ at 298 K. Calculate ΔH of reaction ($R = 8.31452 \text{ J.K}^{-1} \text{mol}^{-1}$) 5
- F. State first law of thermodynamics. Derive the mathematical expression for the same. 5

Q.3 Attempt **any four** of the following.

- A. Discuss the postulates of Bohr's atomic model. 5
- B. Write limitations of Rutherford's atomic model. 5
- C. Calculate Z_{eff} faced by 2p electron in oxygen atom ($Z = 8$) for oxygen. 5
- D. Describe in details about s and p block elements. 5
- E. Discuss on the Mulliken's method for calculation of electronegativity. 5
- F. Which factors affect the magnitude of enthalpy of ionisation? 5

Q.4 Attempt **any four** of the following.

- A. Write IUPAC names of the following compounds: 5



- B. Explain sp hybridization of carbon with suitable example. Draw orbital picture of ethene. 5
- C. Discuss the stability of carbanion on the basis of resonance and inductive effect. 5
- D. Explain the structure and shape of the dimethyl ether on the basis of hybridization of carbon and oxygen. 5
- E. i) Define: electrophilic and nucleophilic reagents. Classify the following compounds as electrophilic and nucleophilic reagents: AlCl_3 , SO_3 , CH_3OH , CH_3NH_2 3
- ii) Indicate the type of hybridization of C, O, N atoms in acetamide. 2
- F. Draw the structure of the following compounds: 5
- i) Cyclohexanamine ii) 2-methyl propanamide
- iii) Methyl cyclopentane carboxylate iv) 2-methyl-2-pentenoic acid
- v) Butanoyl chloride

Q.5 Attempt **any four** of the following.

- A. Explain 5
 i) ppm ii) ppb
- B. Four moles of an ideal gas at 2 atm. & 28°C is compressed 5
 isothermally to one third of its volume by an external pressure of 4
 atmosphere. Calculate the workdone ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$).
- C. Write a note on Aufbau principle. 5
- D. Give the classification of elements on the basis of their types. 5
- E. What are free radicals? Explain the tertiary alkyl radicals are more 5
 stable than secondary and primary radicals.
- F. Explain sp hybridization of nitrogen with suitable example. Draw 5
 orbital picture of methylamine.
