This question paper contains 8 printed pages] 6/12/18 (E)

Roll No. | | | | | | | | | | |

S. No. of Question Paper : **967**

Unique Paper Code : **32175901** **IC**

Name of the Paper : **Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons**

Name of the Course : **Generic Elective : Chemistry**

Semester : **III**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Use of Calculator is permitted.

Answer *three* questions each from Section-A and Section-B.

Please indicate the section you are attempting by putting a heading and do not intermix the sections.

The question should be numbered in accordance to the number in the question paper.

P.T.O.

SECTION-A

(Inorganic Chemistry)

Attempt any *three* questions.

Question No. **1** is compulsory.

1. (*i*) Arrange the following in increasing order of their solubility in alcohol and explain the order — LiF, LiCl, LiBr, LiI.

(*ii*) Explain the significance of wave function ψ and square of wave function ψ^2 respectively.

(*iii*) Plot radial distribution curves for $2s$ and $2p$ orbitals.

(*iv*) An electron with mass 9.1×10^{-31} kg is moving with a velocity of 10^3 m/sec. Calculate kinetic energy and wavelength associated with it. ($h = 6.6 \times 10^{-34}$ J/s)

(*v*) Write time independent Schrodinger Wave Equation for Hydrogen atom and explain all the terms involved in it.

3,2.5,2,3,3

2. (*i*) Explain why copper chloride and silver chloride are insoluble in water while sodium chloride is soluble in water.

(*ii*) State Born-Lande equation for calculation of lattice energy of an ionic compound explaining all the terms involved in it.

(*iii*) Discuss the energy of hydration in relation to solubility of ionic compounds.

(*iv*) Arrange the following in increasing order of their bond angle and explain the order — H_2O, CH_4, NH_3.

(*v*) Define lattice energy.

2,3,2,3,2

3. (*i*) Sketch the molecular orbital diagram for O_2 molecule. Also arrange the following in increasing order of their bond order based on their molecular orbital diagram : O_2, O_2^+, O_2^-, O_2^{2-}.

(*ii*) Discuss the hybridization of central atom and geometry of the following molecules/ions : ClF_3, XeF_4, SO_4^{2-}.

(*iii*) What conditions must be obeyed by wave function ψ to give permissible values of Schrodinger Wave Equation ?

6. (*i*) Carry out the following conversions (any *three*) :

(*a*) But-1-yne to trans-2-Butene

(*b*) Ethane to *n*-Butane

(*c*) 2-Bromopropane to 1-Bromopropane

(*d*) Propene to Propyne.

(*ii*) Predict the product of the following reactions :

(*a*) $CH_3C \equiv CH \xrightarrow{NaNH_2} A \xrightarrow{C_2H_5Br} B$

(*b*) $CH_3-\underset{\underset{OH}{|}}{C}-(CH_3)_2 \xrightarrow{H_2SO_4} C \xrightarrow[Zn,\ H_2O]{O_3} D + E$

(*c*) $CH_3-CH=CH_2 \xrightarrow[Peroxide]{HBr} F \xrightarrow[Dry\ Ether]{Na} G$

6,6

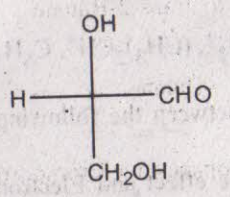
7. (*i*) Give *one* example of each of the following (any *two*) :

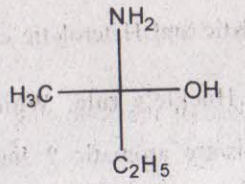
(*a*) Mesomers

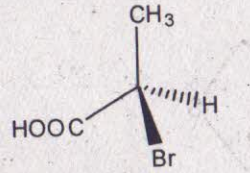
(*b*) Enantiomers

(*c*) Diastereomer.

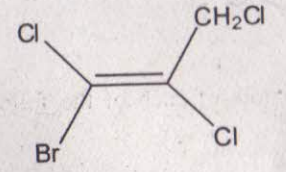
(*ii*) Showing priorities of various groups, assign R or S configuration to any *two* of the following :

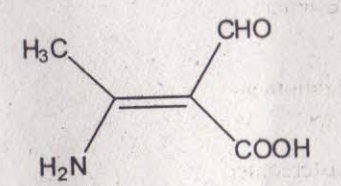
(*a*) 

(*b*) 

(*c*) 

(*iii*) Assign configuration showing priorities to the following :

(*a*) 

(*b*) 

4,4,4

P.T.O.

8. (*i*) Giving reasons, arrange the following carbocations in the increasing order of stability :

CH_3^+, $CH_3CH_2^+$, $(CH_3)_2CH^+$, $C_6H_5—CH_2^+$.

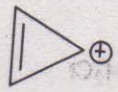
(*ii*) Differentiate between the following :

(*a*) Inductive effect and Electromeric effect

(*b*) Homolytic and Heterolytic cleavage.

(*iii*) Write down Huckle's rule. Which of the following compound/s is/are aromatic ? Justify your answer in each case.

(*a*) 

(*b*) 

4,4,4