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

Please check whether you have got the right question paper

NB: 1.All questions are compulsory
2. Answers to the same questions must be written together
3. Figures to the right indicate full marks
4. The use of log table/ non programmable calculator is allowed

Q 1 (A) Select the correct option and complete the following statements**(Any twelve)** **(12)**

i) The rate law of the reaction, A + B ⟶ Product is given by $d[Product]/dt = k[A]^{1/2}.[B]^2$. The order of the reaction will be _____ .
a) 0.5 b) 2.5 c) 2

ii) _____unit of rate constant of a first order reaction.
a) s^{-1} b) mol L^{-1} s^{-1} c) mol^{-1} L s^{-1}

iii) For a single step reaction 2A + B ⟶ Products, the molecularity is _____
a) 1 b) 2 c) 3

iv) The rate of evaporation of a liquid depends upon_____
a) surface area b) nature of liquid c) both a and b

v) Insects can walk on the surface of water due to _____.
a) viscosity b) surface tension c) optical activity

vi) The SI unit of coefficient of viscosity is _____.
a) kg m s^{-1} b) kg m^{-1} s c) kg $m^{-1}s^{-1}$

vii) In the interhalogen compound IF_7 oxidation state of Iodine is _____
a) +1 b) -1 c) +7

viii) In diamond, carbon atoms have undergone _____ hybridization .
a) sp b) sp^2 c) sp^3

ix) The chemical formula of quick lime is _____.
a) CaO b) $CaCO_3$ c) $Ca(OH)_2$

x) Among the following, _____ is a diagonal pair.
a) oxygen-sulphur b) boron- silicon c) lithium-beryllium

xi) The tendency of elements to form a long chain of same atoms is called _____.
a) allotropy b) catenation c) isotope

xii) Alkali metals belong to _____.
a) s-block b) p-block c) d-block

xiii) The presence of _____ in a molecule results in formation of isomers.
a) tetrahedral carbon b) trigonal carbon c) chiral carbon

xiv) _____ differ in physical properties.
a) Enantiomers b) Diastereoisomers c) d & l isomers

xv) According to Caln Ingold Prelog system _____ is the least priority group ?
a) $-CH_3$ b) – OH c) $-CH_2OH$

xvi) Meso isomer is _____ due to internal compensation.
a) optically active b) optically inactive c) both

xvii) The main condition for optical activity is _____.
a) dissymmetry b) symmetry c) superimposability

xviii) Tartaric acid has _____ stereoisomers
a) 2 b) 4 c) 3

(B) State whether the following statements are True or False **(3)**
(Any Three)

i) Increasing the temperature of a reaction will increase the rate of reaction.
ii) Fluidity is reciprocal of viscosity.
iii) Due to inert pair effect in group 14 from carbon to lead, stability of +4 oxidation state decreases.
iv) As the ionization energy increases the metallic character also increases.
v) Staggered conformation is the most stable conformation.
vi) Specific rotation is denoted by the symbol 'θ'.

(C) Match the following columns**(Any Five)** **(5)**

(i)	Rate determining step in a reaction is	(a)	NaOH
(ii)	Nematic liquid crystals	(b)	bonds project behind the plane of paper
(iii)	Acidic oxide	(c)	Plane of symmetry
(iv)	Caustic soda	(d)	slowest step in a reaction
(v)	Meso-tartaric acid	(e)	P_2O_5
(vi)	Vertical lines in Fisher projection formulae	(f)	p- Azoxy phenetole
		(g)	first step in a reaction
		(h)	Centre of symmetry
		(i)	Na_2CO_3

Q. 2 Attempt any Four of the following

(A) Derive an expression for the rate constant of a first order reaction. **(5)**

(B) Define rate constant of a reaction .Explain pseudo first order reaction with an example. **(5)**

(C) A second order reaction involving reactants of equal concentration initially present is 0.2mol/litre. It was found to be 40% completed in 50 minutes. Calculate **(5)**

i) the rate constant

ii) half life period

(D) Define viscosity of liquid? Explain, how is it measured experimentally?. **(5)**

(E) At 293K, water formed 29 drops when flowing through the capillary of a stalagmometer, while an equal volume of ether formed 86 drops. If the densities of water and ether are 0.997 g cm^{-3} and 0.70 g cm^{-3} respectively. Find the surface tension of ether, if that of water is 72.8 x 10^{-3} N/m. **(5)**

(F) Define Liquid Crystals? How are the liquid crystals classified? **(5)**

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

(A) Discuss the oxidation states of group 15 and group 16 with respect to inert pair effect. **(5)**

(B) Summarize the characteristics of nitrides of alkali and alkaline earth metals. **(5)**

(C) Discuss the sources of emission of sulphur dioxide in the atmosphere and the technique employed to control the emission. **(5)**

(D) Justify, the anomalous behaviour of lithium. **(5)**

(E) Write the following with respect to calcium carbonate **(5)**

i. any one method of preparation.

ii. any two properties.

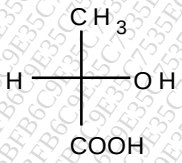
iii. any two uses.

(F) Write a note on photochemical smog. **(5)**

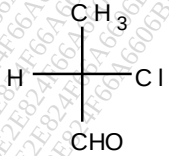
Q. 4 **Attempt any Four of the following**

(A) i) Assign the configuration 'R' or 'S' **(4)**

a)



b)

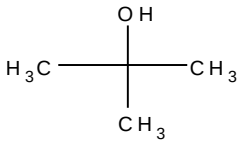


ii) Define Chirality of molecules. **(1)**

(B) i) Identify chiral and achiral molecules. **(3)**

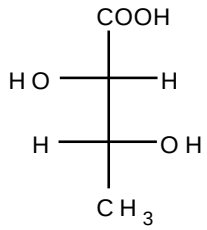
a) CH_3CHICH_3 b) CH_3CH_2OH

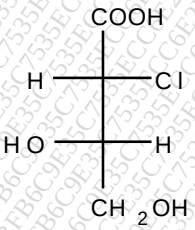
c)



ii) Assign 'D' or 'L' configuration to the following compounds **(2)**

a) b)





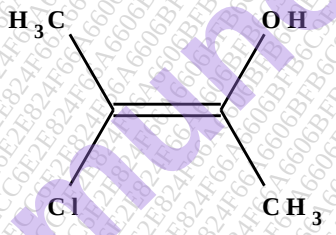
(C) i) What is meant by racemic mixture? What is resolution of racemates? **(3)**

ii) What are enantiomers? Give suitable examples. **(2)**

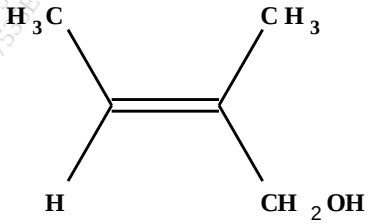
(D) i) Explain geometrical isomerism in cycloalkanes with examples. **(3)**

ii) Name the isomers as 'Z' or 'E' **(2)**

a)

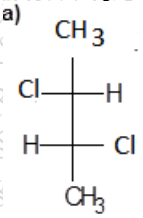


b)



(E) i) Identify the pair of diastereoisomers from the following. **(3)**

a)



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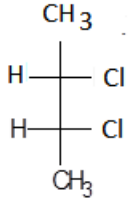
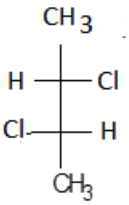


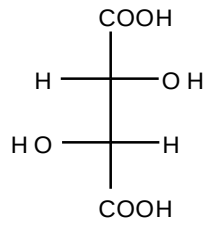
c)



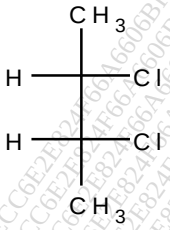
ii) Draw the Sawhorse projection formulae of mesotartaric acid **(2)**

(F) i) Convert the following Fischer projection formulae to Newmann projection formulae **(3)**

a)

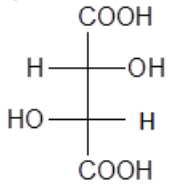


b)

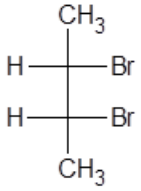


ii) Name the isomers as 'erythro' and 'threo'. **(2)**

a)



b)



Q 5 **Attempt any Four of the following**

(A) Define half life time of a reaction. Explain the half life time method for the determination of order of reaction. **(5)**

(B) Define **(5)**

i) Coefficient of Viscosity.
ii) Specific viscosity.
iii) Reduced viscosity.
iv) Relative viscosity.

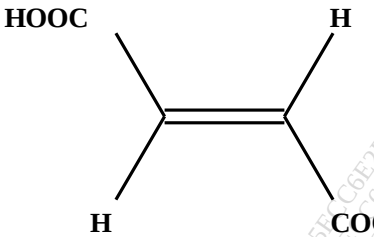
(C) Describe metallic and nonmetellic character of main group elements using appropriate properties. **(5)**

(D) What are carbides? Explain the characteristics of any two types of ionic carbides. **(5)**

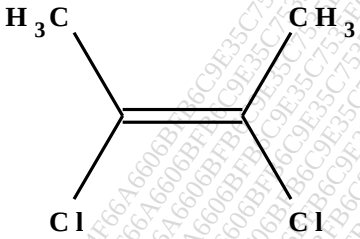
(E) i) Explain briefly what is meant by diastereoisomers **(3)**

ii) Identify cis and trans isomer for the following **(2)**

a)



b)



(F) What is conformation? Draw the conformation of n-butane by rotation of C2– C3 bond, **(5)**