Q.P. Code :19945

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

Please check whether you have got the right question paper.

N.B: 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 tables / non – programmable calculator is allowed.

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

i) If the rate of a reaction = $K[A]^x [B]^y [C]^z$ then the order of a reaction is ……..
(a) $\frac{x+y}{z}$
(b) xyz
(c) x+y+z

ii) With increase in molecular mass of a liquid, the viscosity …….
(a) Increases
(b) Decreases
(c) no effect

iii) The rate of a chemical reaction ……
(a) Increases as the reaction proceeds
(b) decreases as the reaction proceeds
(c) remains constant as the reaction proceeds

iv) Insect can walk on the surface of water due to ……
(a) Viscosity
(b) Surface tension
(c) Refractivity

v) The element with maximum metallic character in Group 15 is
(a) Nitrogen
(b) Arsenic
(c) Bismuth

vi) Group 13 elements are _____ block elements
(a) s
(b) p
(c) d

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vii) _____ is a harmful product of photochemical smog
(a) Peroxyacyl nitrate
(b) $CuSO_4$
(c) $FeCl_3$

viii) The general electronic configuration of Group 17 elements is _____
(a) ns^2np^1
(b) ns^2np^5
(c) ns^2np^4

ix) Among the following _____ will exhibit optical isomerism
(a) $CH_3COCOOH$
(b) $CH_3CHOHCOOH$
(c) $CH_3\underset{\displaystyle CH_3}{\underset{|}{C}}H\text{-}COOH$

x) A plane polarized light is obtained by passing an ordinary light through _____.
(a) Spectrophotometer
(b) Nicol's Prism
(c) pH. meter

xi) The absolute configuration of L.- Glyceraldehyde is_____.
(a) R
(b) E
(c) S

xii) The spatial orientation of the atoms of a molecule is called _____.
(a) Constitution
(b) Configuration
(c) Composition

B) <u>State whether the following statements are true or</u> false **03**

i) Acid catalysed inversion of a cane sugar (sucrose) is the first order reaction.
ii) The oxidation states exhibited by Group 15 elements are +1 and +2.
iii) Fischer Projection formula represents molecule in staggered conformation.

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C) Match the Following Columns:- **05**

	Column A	**Column B**
i)	Number displays	a) second order reaction
ii)	Amphoteric oxide	b) 2^n isomers
iii)	Quick lime	c) Liquid crystals
iv)	$2CH_3CHO_{(g)} \rightarrow 2CH_{4(g)} + 2CO_{(g)}$	d) Al_2O_3
v)	'n' number of asymmetric Carbon	e) CaO

Q.2A i) A first order reaction is 70% complete in 180 sec. Calculate the time required for the completion of 95% reaction. **05**

ii) Explain the graphical representation of a first order reaction. **03**

OR

A i) Calculate the time required for the completion of 40% and 60% of a first order reaction, whose rate constant $K=2.18 \times 10^{-3}$ sec. **05**

ii) Explain Acid catalysed inversion of a cane sugar (sucrose). **03**

B i) In the determination of surface tension of a liquid by the drop number method, it gives 55 drops while water gave 25 drops for the same volume. The densities of the liquid and water are 0.996 and 0.800gcm^{-3} respectively. Find the surface tension of the liquid if that of water is $72 \times 10^{-3} Nm^{-1}$ **05**

ii) Give the classification of liquid Crystals. **03**

OR

B i) The refractive index at 295.9K of ethyl alcohol for D-line is 1.3611 and its density is 0.7885 gcm^{-3}. Calculate the molar refraction of ethyl alcohol. (Given:CH_3CH_2-OH C=12, H=1, O=16) **05**

ii) Write any three factors which affect the viscosity of a liquid. **03**

C i) Define (a) Molecularity of a reaction (b) Half time of a reaction **02**

ii) Define (a) Surface tension (b) Coefficient of viscosity **02**

OR

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C	i)	Define (a) Order of a reaction (b) Rate of a reaction	**02**
	ii)	Define (a) Relative viscosity (b) Liquid crystals	**02**
3A	i)	Lithium behaves differently with respect to other elements of Group 1. Justify the statement.	**04**
	ii)	What are the similarities between beryllium and aluminium?	**04**

OR

A	i)	What is allotropy? Explain any two allotropic modifications of sulfur.	**04**
	ii)	What are the oxidation states exhibited by group 14 elements? Elaborate with respect to inert pair effect.	**04**
B	i)	What are the different types of oxides formed by alkali metals? Explain the method of formation of any two types of oxides.	**04**
	ii)	Write the general formula of hydroxides formed by Group 2 elements. Describe the variation in the basic character of the hydroxides of Group 2 elements.	**04**

OR

B	i)	What are nitrides? Give complete balanced equations for the following reactions. (a) Hydrolysis of lithium nitride (b) Hydrolysis of beryllium nitride (c) Heating of magnesium nitride in current of hydrogen sulfide.	**04**
	ii)	Give one method of preparation of alkali metal and alkaline earth metal carbides? Write two applications of the carbides.	**04**
C		How is sodium bicarbonate prepared? Give one physical property and two applications of sodium bicarbonate.	**04**

OR

C		Give one method of preparation, one chemical property and two applications of sodium hydroxide	**04**

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Q.4A i) Convert following Newman projections into Fischer Projections and identify the meso isomer. **04**

ii) In a molecule of 1-Bromo-1-chloroethane how many stereogenic centres are there? Draw enantiomers of it. Will this molecule be optically active or inactive? **04**

OR

A i) Distinguish between Enantiomers and Diastereoisomers. **03**

ii) Using Newman Projection Formula draw different conformations of n-butane considering ($C_2 - C_3$) bond. Comment on their relative stabilities with energy profile diagram. **05**

B i) Explain geometric isomerism in olefins and cyclic compounds with suitable example **04**

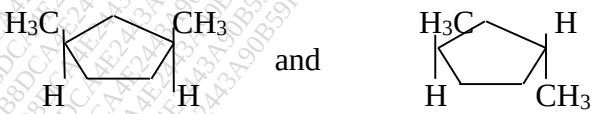
ii) What is meant by the term Threo and Erythro ? Explain with suitable example. **04**

OR

B i) Label the following as diastereoisomers / enantiomers / meso isomers **04**

1) 

2) 

3) 

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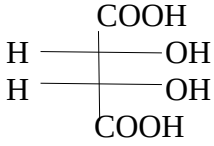
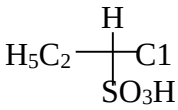
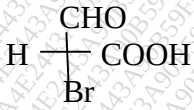
4) 

ii) Draw Fischer Projection Formulae of any two isomers of 2,3 – dichlorobutane and convert them into Sawhorse Projections **04**

C Assign R or S descriptors to the following molecules. Justify your answer. **04**

1)  2) 

OR

C What is conformation? Draw the most stable and least stable conformation of ethane using Newman Projection and Sawhorse Projection. **04**

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

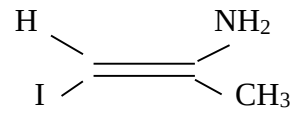
A. Derive an expression for the rate constant of a second order reaction with equal initial concentrations of the two reactants. **05**

B. i) Explain Ostwald's isolation method of determination of a order of a reaction. **02**
ii) Draw a neat, labelled diagram of Stalagamometer and give its use. **03**

C. Describe any two sources of sulfur oxide emissions and the health hazards caused by these emissions. **05**

D. What are the different types of oxides of nitrogen which act as air pollutants? Describe two control techniques of nitrogen oxide emissions. **05**

E. i) Assign E/Z descriptors to the following geometrical isomers. Justify your answer **03**

1)  2) 

ii) What is racemic mixture? **02**

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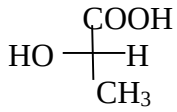
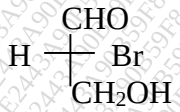
F. i) Which of the following compound have stereogenic centre? **03**

1) 2 – Chloro-2-methylbutane
2) 3 – iodopentane
3) 2 – bromobutane

ii) Assign D and L configuration to the following compounds **02**

1) 

2) 

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