Q.P. Code :12152

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

Please check whether you have got the right question paper.
N.B: 1. All questions are compulsory.
         2. Answer to the same question must be written together.
         3. Figures to the right indicate full marks.
         4. Use of non-programmable calculator is allowed.

Q.1. A]   Select the correct option and complete the following sentences :   **(12)**
i.   The rate law of the third order reaction is _____
         a) rate = K [A] [B]^2
         b) rate = K [A]^3 [B]^3
         c) rate = K [A]^2 [B]^3
ii.   The units in which molar refraction is expressed as _____
         a) cm^{3}mol
         b) cm^{-3}mol
         c) m^{3}mol^{-1}
iii. The integrated rate equation for a second order reaction with equal initial concentrations of the two reactants is _____
         a) $K = \dfrac{1}{at} \dfrac{x}{a}$

         b) $K = \dfrac{1}{a} \dfrac{x}{(a-x)}$

         c) $K = \dfrac{1}{at} \dfrac{x}{(a-x)}$
iv.   The formula used in drop number method determination of surface tension of liquid is _____
         a) $\dfrac{r_1}{r_2} = \dfrac{n_2}{n_1} \dfrac{d_1}{d_2}$

         b) $\dfrac{r_1}{r_2} = \dfrac{n_1}{n_2} \dfrac{d_1}{d_2}$

         c) $\dfrac{r_1}{r_2} = \dfrac{n_1}{n_2} \dfrac{d_2}{d_1}$

v.   Boron exhibits diagonal relationship with _____
         a) Silicon   b) Carbon   c) Sodium
vi.   Outer electronic configuration of Group 2 elements is _____
         a) ns^1 b) ns^2 c)ns^{2}np^1
vii. _____ is not an allotrope of carbon
         a) Monoclinic Sulfur   b) diamond   c) fullerene
viii. _____ element belongs to Group 13
         a) Thallium   b) silicon   c) Selenium
ix.   In flying wedge formula dotted line represents a bond _____ plane of paper.
         a) above the   b) behind the   c) on the
x.   Dextro rotatory enantiomer is designated by using symbol _____
         a) D   b) d   c) L

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xi. In chiral molecule H_3C CHOHCOOH the priority order of atoms will be _____
    a) $OH > COOH > CH_3 > H$
    b) $H > CH_3 > COOH > OH$
    c) $CH_3 > COOH > H > OH$
    d) $H > COOH > OH > CH_3$

xii. Absolute configuration can be determined using _____ techniques
    a) X-ray diffraction   b) IR   c) Polarography

B] **State whether the following statements are true or false.** **(03)**
i. For a second order reaction half life time is inversely proportional to the initial concentration.
ii. Fluorine is the least electronegative element in Group 17.
iii. Molecule with plane of symmetry is optically active.

C] **Match the following columns.** **(05)**

Column - A	Column –B
i)$K =\frac{2.303}{t} \log_{10} \frac{a}{a-x}$	a) 2^n optical isomers
ii) Refractive Index	b) Calcium oxide
iii) 'η' number of chiral carbon	c) Sodium bicarbonate
iv) Quick lime	d) Integrated rate equation for first order reaction.
v) Baking soda	e) $\frac{Sini}{Sinr}$

Q.2. A] i) The rate constant for the saponification of ethyl acetate is 0.195 $dm^3 mol^{-1} s^{-1}$ at a initial concentration of
    4×10^{-3} $mol.dm^3$. Calculate the time required for completion of 90% reaction. **(05)**
ii) Explain Acid catalysed hydrolysis of methyl acetate **(03)**

OR

A] i) A second order reaction is started with 0.01 $mol.dm^{-3}$ concentration of both the reactants. It is 10% complete in 1600 seconds. Calculate (a) the rate constant (b) the half life time of the reaction. **(05)**
ii) Explain – Acid catalyzed inversion of a cane sugar (sucrose) as a pseudo unimolecular reaction. **(03)**

Q.2. B] i) In a stalagamometer method two liquid A and B formed 40 and 60 drops for fixed volume. If the densities of A & B are 0.35×10^3 kgm^{-3} and $1 \times 10^3 kgm^{-3}$ respectively and the surface tension of B is $0.07 Nm^{-1}$ Calculate the surface tension of liquid A. **(05)**

ii) Explain any three application of liquid crystals. **(03)**

OR

B] i) The refractive index of certain compound is 1.4425 and its density is 1.588×10^3 kgm^{-3} Calculate its molar refractivity. (Molecular weight of the compound is 153) **(05)**
ii) Explain the term viscosity and draw a neat, labelled diagram of Ostwald's viscometer. **(03)**

C] i) Define (a) Molecularity of a reaction   (b) Order of a reaction **(02)**
    ii) Explain (a) Specific Refractivity   (b) Surface tension **(02)**

OR

C] i) Explain Rate of a reaction. **(02)**
    ii) Explain Molar refractivity. **(02)**

Q.3 A] (i) Discuss the oxidation states of group 15 elements with respect to inert pair effect. **(04)**

(ii) Define metallic character. How does metallic character vary for group 13 elements? **(04)**

OR

A] (i) Explain the diagonal relationship between Beryllium and Aluminum. **(04)**

(ii) Justify the anomalous behavior of Lithium. **(04)**

Q.3 B] (i) What are carbides? How are the carbides of alkali metals prepared? **(04)**

(ii) Name the different types of oxides formed by alkaline earth metals. Describe the preparation of any one type of oxides. **(04)**

OR

B] (i) Formulate the hydroxides of alkali metals and compare their basic strength. **(04)**

(ii) What are nitrides? Compare the properties of nitrides of alkali and alkaline earth metals. **(04)**

C] Give one methods of preparation and two properties of Sodium carbonate. **(04)**

OR

C] Give one method of preparation and two properties of calcium carbonate. **(04)**

Q.4 A] (i) Explain the term geometric isomerism. Are they enantiomers or diastereoisomers? Give one example each of geometrical isomers in alkene and cyclic system. **(04)**

(ii) Explain the term racemic mixture with suitable example. Comment on its optical activity. **(04)**

OR

A] (i) Define conformations. Draw Newman Projection Formulae representing most stable and less stable conformations of ethane and n-butane. **(04)**

(ii) Assign D and L nomenclature to following compounds:- **(04)**

B] (i) Using suitable examples explain meso isomer. Why is it optically inactive? **(04)**

(ii) Convert following structures to Saw-horse projection formula. **(04)**

OR

B] (i) With a suitable example explain the term diastereoisomers. Give the characteristics of diastereoisomers. **(04)**

(ii) How will you represent Erythro and Threo isomers of 3-bromo-2-butanol using Fischer Projection formula? Comment on the advantages of Saw-horse Projection formula. **(04)**
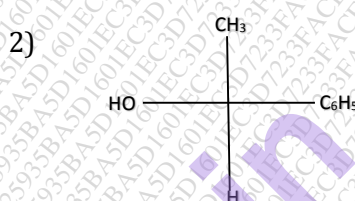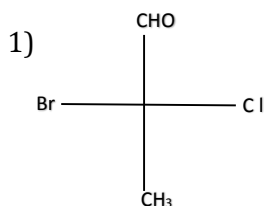
C] Assign 'E' or 'Z' descriptor to the following molecules giving priority on the basis of Sequence rule. **(04)**

1)   2)
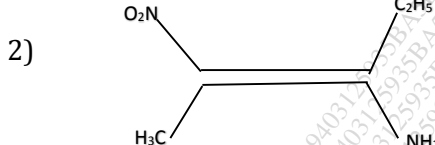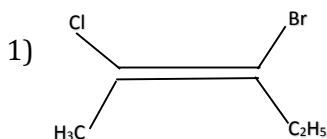
OR

Assign 'R' or 'S' descriptors to the following molecules by deciding their priority order on the basis of **(04)** sequence rule.

1)   2)

Q.5.   **Attempt any four of the following :**   **(05)**
A] Explain the following methods used in the determination of the order of a reaction
 i) Graphical Method ii) Half time Method

B] (i) Explain – Thermal decomposition of acetaldehyde as a second order reaction.   **(02)**
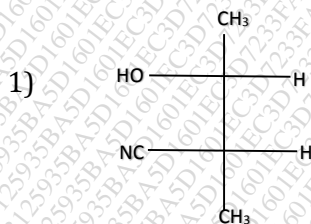   (ii)Give the classification of liquid crystals.   **(03)**
C] Name two oxides of sulfur. Write any two sources and control measures each for oxides of sulfur.   **(05)**
D] Write a short note on acid rain   **(05)**
E] (i) Assign 'D' or 'L' OR 'cis' or 'trans' whichever is applicable for following   **(03)**

1)   2)   3)
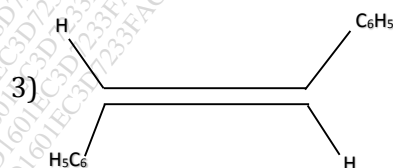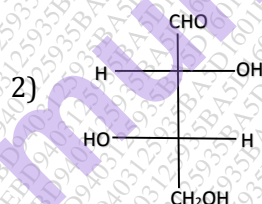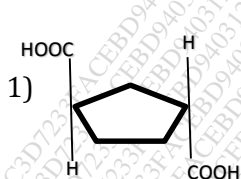
(ii)Label the following isomer as per Erythro and Threo notations   **(02)**

1)

F] (i) Identity chiral and Achiral molecules   **(02)**
   a) CH_3 $CHBr$ CH_3 b) $OHC-CHBr-CH_2OH$
   (ii)Explain the terms   **(03)**
     a) Stereogenic Centre
     b) Plane polarised light

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