Section A

● **Choose correct answer from the given options. [Each carries 1 Mark]** **[50]**

1. The order of reactivity of following alcohols with halogen acids is .....

(A) $CH_3CH_2 - CH_2 - OH$

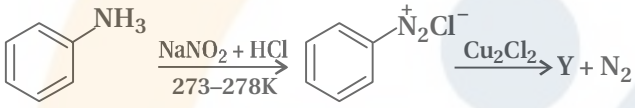
(B) $CH_3CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-OH$

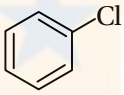
(C) $CH_3CH_2-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-OH$

(A) (A) > (B) >

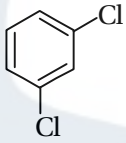
(C) (B)(C) > (B) > (A)(C)(B) > (A) > (C) (D) (A) > (C) > (B)

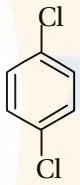
2. Identify the compound Y in the following reaction.



(A) 

(B) 

(C) 

(D) 

3. Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature ?

(A) $CH_3CH_2 - CH_2 - OH$

(B) $CH_3CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-OH$

(C) $CH_3CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$

(D) $CH_3CH_2-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-OH$

4. Which of the following compounds will give racemic mixture on nucleophilic substitution by OH^- ion ?

(i) $CH_2-\underset{\displaystyle C_2H_5}{\underset{|}{CH}}-Br$

(ii) $CH_3-\overset{\displaystyle Br}{\overset{|}{\underset{|}{C}}}-CH_3$ (C_2H_5)

(iii) $CH_2-\underset{\displaystyle C_2H_5}{\underset{|}{CH}}-CH_2Br$

(A) (i) (B) (i), (ii) and (iii) (C) (ii) and (iii) (D) (i) and (ii)

5. Which of the following are secondary bromides ?

(A) $(CH_3)_2CHBr$ (B) $(CH_3)_3C\ CH_2Br$

(C) $CH_3CH(Br)CH_2CH_3$ (D) $(CH_3)_2CBrCH_2CH_3$

6. What is the correct order of reactivity of alcohols in the following reaction ?

$R-OH + HCl \xrightarrow{ZnCl_2} R-Cl + H_2O$

(A) 1° > 2° > 3° (B) 1° < 2° > 3° (C) 3° > 2° > 1° (D) 3° > 1° > 2°

7. How many alcohols with a molecular formula $C_4H_{10}O$ are chiral in nature?

(A) 1 (B) 2 (C) 3 (D) 4

8. Give the IUPAC name of the compound given below :

$CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_2 - \underset{\underset{OH}{|}}{CH} - CH_3$

(A) 2-Chloro-5-hydroxyhexane (B) 2-Hydroxy-5-chlorohexane

(C) 5-Chlorohexan-2-ol (D) 2-Chlorohexan-5-ol

9. IUPAC name of the compound :

$CH_3 - \underset{\underset{CH_3}{|}}{CH} - OCH_3$

(A) 1-methoxy-1-methylethane (B) 2-methoxy-2-methylethane

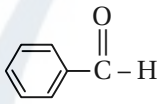
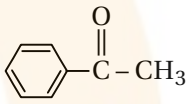
(C) 2-methoxypropane (D) Isopropylmethyl ether

10. Which of the following are used to convert $R-CHO$ to $R-CH_2OH$?

(A) H_2/Pd (B) $LiAlH_4$

(C) $NaBH_4$ (D) Reaction with R-MgX followed by hydrolysis.

11. Which of the following compounds is most reactive towards nucleophilic addition reactions ?

(A) $CH_3-\overset{\overset{O}{\|}}{C}-H$ (B) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (C)  (D) 

12. The correct order of increasing acidic strength is....

(A) Phenol < Ethanol < Chloroacetic acid < Acetic acid

(B) Ethanol < Phenol < Chloroacetic acid < Acetic acid

(C) Ethanol < Phenol < Acetic acid < Chloroacetic acid

(D) Chloroacetic acid < Acetic acid < Phenol < Ethanol

13. Compounds A and C in the following reaction are .....

$CH_3CHO \xrightarrow[(ii)\ H_2O]{(i)\ CH_3MgBr} (A) \xrightarrow[\Delta]{H_2SO_4} (B) \xrightarrow[oxidation]{Hydroboration} (C)$

(A) identical (B) positional isomers (C) functional isomers (D) optical isomers

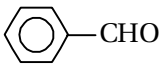
14. $CH_3-C\equiv CH \xrightarrow[1\%\ HgSO_4]{40\%\ H_2SO_4} A \xrightarrow{Isomerisation} CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

Structure of 'A' and type of isomerism in the above reaction are respectively.

(A) Prop-1-en-2-ol, metamerism (B) Prop-1-en-1-ol, tautomerism

(C) Prop-2-en-2-ol, geometrical isomerism (D) Prop-1-en-2-ol, tautomerism

15. Which of the following compounds do not undergo aldol condensation ?

(A) CH_3-CHO (B)  (C) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (D) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CHO$

16. The correct IUPAC name for

$CH_2 = CHCH_2NHCH_3$ is :

(A) Allylmethylamine (B) 2-amino-4-pentene

(C) 4-aminopent-1-ene (D) N-methylprop-2-en-1-amine

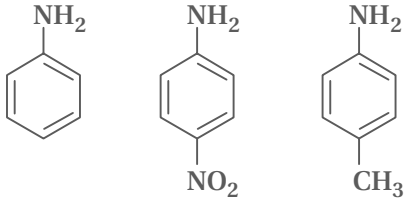
17. The correct increasing order of basic strength for the following compounds is .....

(A) II < III < I

(B) III < I < II

(C) III < II < I

(D) II < I < III



(I) (II) (III)

18. Best method for preparing primary amines from alkyl halides without changing the number of carbon atoms in the chain is

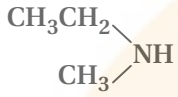
(A) Hoffmann Bromamide reaction (B) Gabriel phthalimide synthesis

(C) Sandmeyer reaction (D) Reaction with NH_3

19. Which of the following should be most volatile ?

(I) $CH_3CH_2CH_2NH_2$

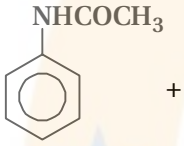
(II) $(CH_3)_3N$

(III) 

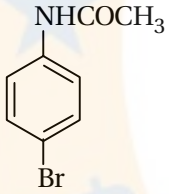
(IV) $CH_3CH_2CH_3$

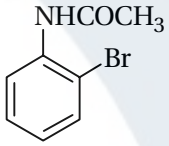
(A) (II) (B) (IV) (C) (I) (D) (III)

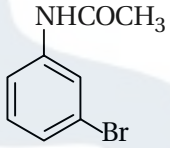
20. The product of the following reaction is .....

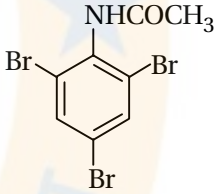


$+ Br_2/CH_3COOH \longrightarrow$

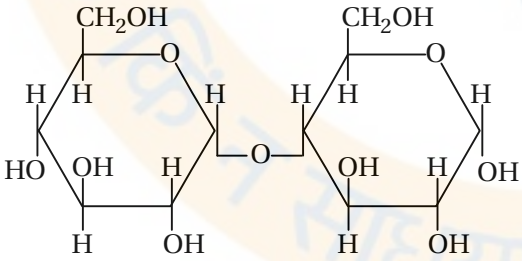
(A) 

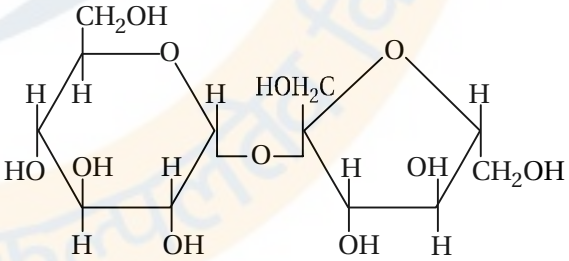
(B) 

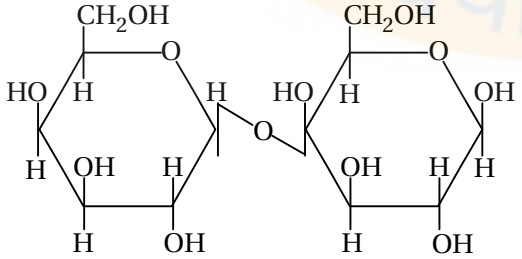
(C) 

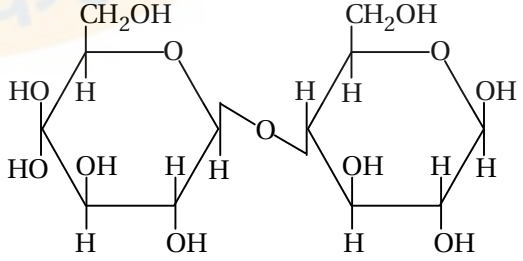
(D) 

21. In disaccharide, if the reducing groups of monosaccharides, i.e., aldehydic or ketonic groups are bonded, these are non-reducing sugars. Which of the following disaccharide is a non-reducing sugar ?

(A) 

(B) 

(C) 

(D) 

22. DNA and RNA contain four bases each. Which of the following bases in not present in RNA ?

(A) Adenine (B) Uracil (C) Thymine (D) Cytosine

23. Which of the following reactions of glucose can be explained by its cyclic structure ?

(A) Glucose forms pentaacetate

(B) Glucose reacts with hydroxylamine to form an oxime

(C) Pentaacetate of glucose does not react with hydroxylamine

(D) Glucose is oxidized by nitric acid to gluconic acid.

24. Carbohydrates are classified on the basis of their behaviour on hydrolysis and also as reducing or non-reducing sugar. Sucrose is a .....

(A) Monosaccharide (B) Disaccharide

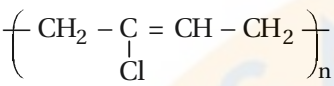
(C) Reducing sugar (D) Non-reducing sugar

25. Proteins are found to have two different types of secondary structures viz. α-helix and β-pleated sheet structure. α-helix structure of protein is stabilised by .....

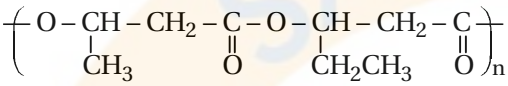
(A) Peptide bonds (B) van dar Waal's forces

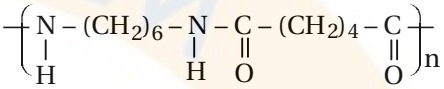
(C) Hydrogen bonds (D) dipole-dipole interactions

26. Which of the following polymer is bio-degradable ?

(A) 

(B) 

(C) 

(D) 

27. Which of the following polymers of glucose is stored by animals ?

(A) Cellulose (B) Amylose (C) Amylopectin (D) Glycogen

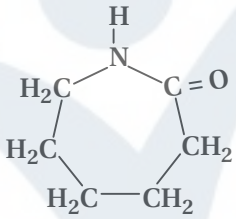
28. Which of the following polymer can be formed by using the following monomer unit ?

(A) Nylon-6,6

(B) Nylon-2–nylon-6

(B)Melamine polymer

(D)Nylon-6



29. Which of the following polymers, need atleast one diene monomer for their preparation ?

(A) Dacron (B) Buna-S (C) Neoprene (D) Novolac

30. Which of the following polymers are condensation polymers ?

(A) Bakelite (B) Teflon

(C) Butyl rubber (D) Melamine formaldehyde resin

31. The most useful classification of drugs for medicinal chemists is .....

(A) on the basis of chemical structure. (B) on the basis of drug action.

(C) on the basis of molecular targets. (D) on the basis of pharmacological effect.

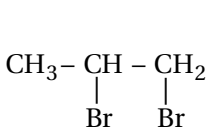
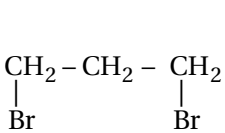
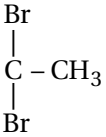
32. The compound that causes general antidepressant action on the central nervous system belongs to the class of .....

(A) analgesics (B) tranquilizers (C) narcotic analgesics (D) antihistamines

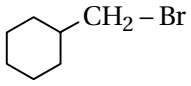
33. Polyethyleneglycols are used in the preparation of which type of detergents ?

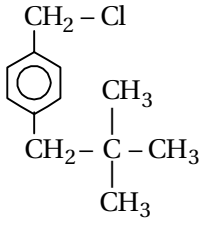
(A) Cationic detergents (B) Anionic detergents (C) Non-ionic detergents (D) Soaps

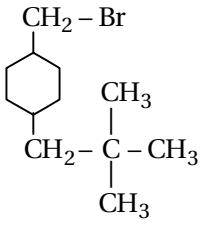
34. Which of the following is a vicinal dihalides ?

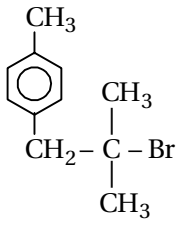
(A)  (B)  (C)  (D) All of these

35. Which of the following is a benzylic halide ?

(A) 

(B) 

(C) 

(D) 

36. The isomerism not shown by alkyl halides is....

(A) Chain isomerism (B) Functional isomersim (C) Position isomerism (D) Optical isomerism

37. The alkyl halides are best prepared from .....

(A) Alcohols (B) Alkenes (C) Ethers (D) Alkanes

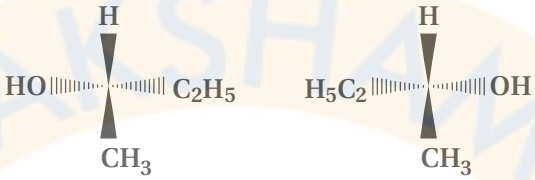
38. The given two compounds are :

(A) Constitutional isomers

(B) Enantiomers

(C) Diastereomers

(D) Identical



39. The enzyme that carries out the conversion of sucrose to glucose and fructose is .....

(A) Zymase (B) Transferase (C) Invertase (D) Zymase

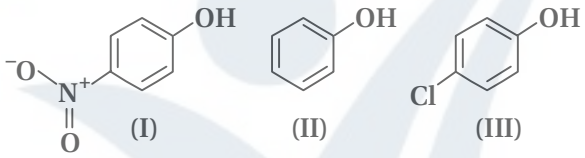
40. The reactivity of the following compounds with acetyl chloride is .....

(A) III > II > I

(B) II > III > I

(C) I > III > II

(D) II > I > III



41. Propan-1-ol is prepared from Propene by .....

(A) H_2O/H_2SO_4

(B) B_2H_6-THF and H_2O_2/OH^-

(C) Pyridinium chlorochromate in methylene dichloride

(D) $Hg(OCOCH_3)_2/H_2O$ and $NaBH_4$

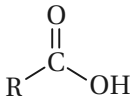
42. Propan-1-ol and Ethanol is distinguished chemically by .....

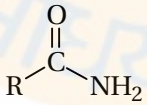
(A) Lucas test (B) Victor Meyer's test (C) Iodoform test (D) Libermann's test

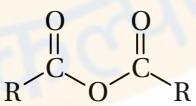
43. The major product of the reaction of alcohols with carboxylic acid in presence of acid catalyst is .....

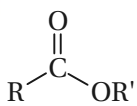
(A) Ester (B) Ether (C) Anhydride (D) Aldehyde

44. ..... is a common formula of anhydride.

(A) 

(B) 

(C) 

(D) 

45. Which is the common formula of aldehyde and ketone ?

(A) $C_nH_{2n}O$ (B) $C_nH_{2n}O_2$ (C) $C_nH_{2n+2}O$ (D) $C_nH_{2n-2}O$

46. Which hybridization is possessed by carbonyl carbon ?

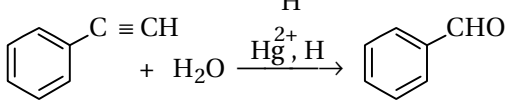
(A) *sp* (B) sp^2 (C) sp^3 (D) sp^3d

47. Aldehyde and ketone can be obtained bye hydrolysis of alkyl compounds in presence of H_2SO_4 and $HgSO_4$. Then which of the following reaction is not true ?

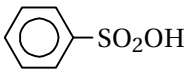
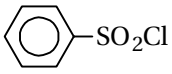
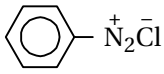
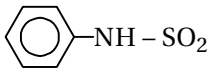
(A) $HC \equiv CH + H_2O \xrightarrow[H^+]{Hg^{2+}} CH_3CHO$

(B) $CH_3C \equiv CH + H_2O \xrightarrow[H^+]{Hg^{2+}} CH_3COCH_3$

(C) $CH_3C \equiv CCH_3 + H_2O \xrightarrow[H^+]{Hg^{2+}} CH_3 - CH_2 - \underset{\underset{O}{\|}}{C} - CH_3$

(D) 

48. What is Hinsberg reactant in the following :

(A)  (B)  (C)  (D) 

49. What is correct structure of N-ethyl, N-methyl prop-1 amine ?

(A) $CH_3 - \underset{\displaystyle CH_2CH_3}{\overset{\displaystyle |}{N}} - CH_2CH_3$

(B) $CH_3 - \underset{\displaystyle CH_2CH_2 - CH_3}{\overset{\displaystyle |}{N}} - CH_2CH_2CH_3$

(C) $CH_3 - \underset{\displaystyle CH_2CH_2CH_3}{\overset{\displaystyle |}{N}} - CH_2CH_3$

(D) $(CH_3CH_2CH_2)_3 - \ddot{N}$

50. Which reaction is useful to preparation of 1° amine ?

(A) Gabriel pthalamide (B) Hoffman reaction (C) (A) and (B) both (D) All of these

SECTION – B [16]

1. Arrange the following in the increasing order of properly indicated : bromomethane, chloromethane, dichloromethane. (Increasing order of boiling points).

2. Describe the following reactions with example:
Hydroboration oxidation of alkenes

3. Phenol is more reactive towards electrophilic substitution reaction than benzene.Explain this statement.

4. Aldol condensation of a ketone in the presence of a dilute alkali gives 4-Hydroxy – 4 – methylpentan – 2 – one. Write the structure of the ketone and its IUPAC name.

5. Do the following conversion using suitable reagents in not more than two steps: a) Ethanol to 3 – Hydroxy butanal. b) Bromobenzene to 1 – phenyl ethanol.

6. What is the structural difference between glucose and fructose?

7. What are anomers? Give the structures of two anomers of glucose.

   explain : Hoffman Bromamide Reaction

8. What is Aldol condensation reaction. **[18]**

SECTION – C (any -6)

1. How will you bring about the following conversions?

   i. benzene to 3-bromonitrobenzene

   ii. 1-bromopropane to 2-bromopropane

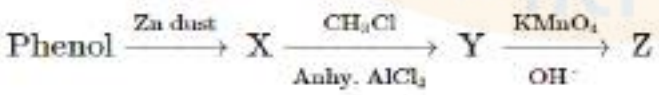
   iii. aniline to chlorobenzene

2. What is the function of ZnCl2 (anhydrous) in Lucas test for distinction between 1∘,2∘and 3∘alcohols.

3. Describe the Hinsberg's test for identification of primary, secondary and tertiary amines. Also write the chemical equations of the reactions involved.

4. How are carbohydrates classified?explain in details with examples.

5. Identify X,Y,Z in following reaction.



6. How will you bring about the following conversions?

   i. Benzene to Aniline
   ii. Aniline to benzene
   iii. p-toluidine to 2-bromo-4-methylaniline

7. Explain in detail about structures of protein.

SECTION – D (any - 4) **[16]**

1. An alkene (A with molecular formula C7H14) on ozonolysis yields an aldehyde. The aldehyde is easily oxidized to an acid (B). When B is treated with bromine in presence of phosphorous it yields a compound (C) which on hydrolysis gives a hydroxyl acid (D). This acid can also be obtained from acetone by the reaction with hydrogen cyanide followed by hydrolysis. Identify A, B, C and D and write the chemical equations for the reactions involved.

2. Five isomeric para-di- substituted aromatic compounds, A to E with molecular formula C8H8O2 were given for identification. Based on the following observations give the structures of the compounds.
(i) Both A and B form silver mirror with Tollens reagent, also B gives a positive test with FeCl3.
ii) C gives positive Iodoform test.
(iii) D is readily extracted in aqueous NaHCO3 solution.
(iv) E on acid hydrolysis gives 1,4 – dihydroxy benzene.

3. An organic compound A C3H6O2 on reaction with ammonia followed by heating yield B. Compound B on reaction with Br2 and alc. NaOH gives compound C (C2H7N). Compound C forms a foul smelling compound D on reaction with chloroform and NaOH . Identify A, B, C, D and the write the equations of reactions involved.

4. An alcohol A (C4H10O) on oxidation with acidified potassium dichromate gives carboxylic acid B(C4H8O2). Compound A when dehydrated with conc. H2SO4 at 443K gives compound C. Treatment of C with aqueous H2SO4 gives compound D(C4H10O) which is an isomer of A. Compound D is resistant to oxidation but compound A can be easily oxidised. Identify A,B,Cand D and write their structures.

5 **4. Complete the following equation and write the structures of A, B, C, D, E, and F.**

$$A \xrightarrow{P/Br_2} CH_3CH_2CH_2Br \xrightarrow{\text{Alc. KOH}} B \xrightarrow{Br_2/CCl_4} C \xrightarrow[NaNH_2]{\text{Alc. KOH}} D \xrightarrow[\text{dil. } H_2SO_4]{Hg^{2+}} E \xrightarrow{NH_2OH/H^+} F$$