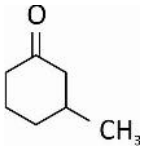
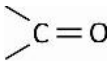
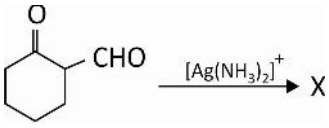
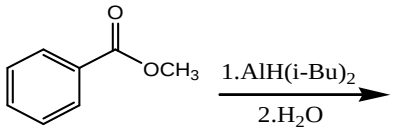
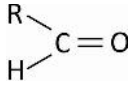
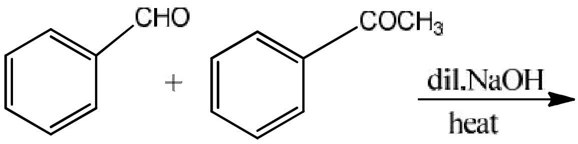
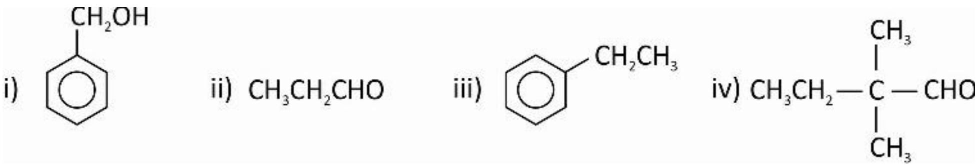
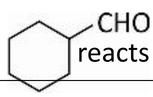
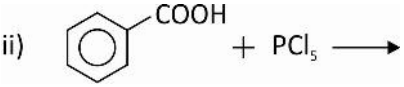
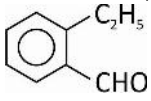
UNIT-12: ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

One mark questions:	
1. Give the IUPAC name of $C_6H_5CH{=}CH{-}CHO$	K
2. Give the IUPAC name of : 	K
3. $CH \equiv CH + H_2O \xrightarrow[HgSO_4]{H_2SO_4}$ X. Give the IUPAC name of X.	U
4. A (nitrile) + $C_6H_5MgBr \xrightarrow[2)\ H_3O^+]{1)\ Ether} C_6H_5COCH_3$. Write the structure of A.	U
5. Complete the following equation: $CH_3{-}CH = CH - CH_2 - CN \xrightarrow[H_2O]{DIBAL-H}$	K
6. Name the oxidizing agent used in Etard reaction.	K
7. Complete the following equation: $2R'COCl + R_2Cd \longrightarrow$	K
8. Name the family of carbonyl compound formed by Friedel-Craft acylation reaction.	U
9. What type of attractive forces are there between molecules of aldehydes or ketones?	U
10. Why is there a large difference in the boiling points of Butanal (b.p. 348K) and Butan-1-ol (391K)?	U
11. Arrange the following compounds in increasing order of their boiling points: Propanal, acetone methoxyethane, n-butane and propan-1-ol	U
12. Lower members of aldehydes and ketones are miscible with water? Give reason.	U
13. Give reasons: Aldehydes are more reactive than ketones in nucleophilic addition reaction.	U
14. Arrange the following compounds in the increasing order of their reactivity in nucleophilic addition reaction: Ethanal, propanal , propanone, butanone.	U
15. What is the reducing agent used in Clemmensen reduction?	K
16. Write the equation to illustrate Wolff-Kishner reduction, for 	K
17. What is X? 	U
18. Between benzaldehyde and acetaldehyde, which one of these does not answer Fehling's test?	K
19. Write the general equation for haloform reaction.	K

20. Name a reaction given by carbonyl compounds due to the acidic nature of α- hydrogen atom.	K
21. Write the IUPAC name of : HOOC – COOH	K
22. Arrange the following in the decreasing order of their acid strength: CH_3COOH, FCH_2COOH, $ClCH_2COOH$.	U
Two mark questions:	
1. How is benzaldehyde prepared by Rosenmund reduction? Give the equation.	K
2. Explain Stephen reaction with the general equation.	K
3. Give the structure and the IUPAC name of the product (an aldehyde) in the following reaction: 	U
4. In the following reaction identify A and B: $C_6H_5CN + SnCl_2 + HCl \longrightarrow A \xrightarrow{H_3O^+} B$	K
5. What is DIBAL-H? Give one specific use of it.	K
6. Identify A and B: A + $CrO_2Cl_2 \xrightarrow{CS_2}$ B $\xrightarrow{H_3O^+}$ Benzaldehyde.	K
7. Benzene is converted into acetophenone using acetylchloride in presence of anhy $AlCl_3$. Give the equation. Name the reaction.	K
8. Write the two steps involved in the manufacture of benzaldehyde from toluene.	K
9. How do you preapare benzaldehyde by Gatterman Koch reaction? Write the equation.	K
10. What is the i) geometry of the intermediate ii) change in the hybridisation state of carbon, when a nucleophile attacks the carbonyl carbon of an aldehyde.	U
11. Between benzaldehyde and propanal which is more reactive in nucleophilic addition reaction? Justify your answer.	U
12.  + $NaHSO_3 \underset{H^+}{\rightleftharpoons}$ X (final product). Write the structure of X. Mention one application of the reaction.	K
13. Name the reagents used to convert as directed: i) Aldehyde into an hemiacetal ii) ketone into a phenylhydrazone	K
14. Which of the following do not answer iodoform test? i) $CH_3CHOH\,CH_3$ ii) $CH_3CH_2CH_2OH$ iii) $C_6H_5COCH_3$ iv) $CH_3CH_2COCH_2CH_3$ v) CH_3CHO	U
15. Illustrate Clemmensen reduction with a general equation.	K
16. What is Tollens reagent? What observation is made in Tollens test?	K

17. What is Fehling's reagent? What observation is made in Fehling's test?	K
18. α- hydrogen atoms of carbonyl compounds are acidic. Give reasons.	U
19. Write the Aldol condensation reaction by taking ethanal as an example.	K
20. Complete the equation and name the product: 	K
21. H–CHO + H–CHO + conc. KOH $\longrightarrow$ A + B. Name the compounds A and B.	K
22. Which one of the following compounds would undergo aldol condensation and which one Cannizzaro's reaction? 	U
23. Carboxylic acids are more acidic than phenols. Give reasons.	U
24. What is the effect of an electron releasing group on the acidity of acids? Give reason.	U
25. Illustrate Hell-volhard-Zelinsky reaction with a general equation?	K
26. Benzoic acid is less reactive towards electrophilic substitution reaction. Why? Name the product obtained when benzoic acid is brominated.	U
Three mark questions:	
1. What are A and B in the following reaction? Write the IUPAC name of B. $C_6H_5MgBr + CH_3CH_2CN \xrightarrow{\text{ether}} A \xrightarrow{H_3O^+} B$	K
2. Write the equations for the steps involved in the mechanism of base catalysed addition of HCN to a carbonyl compound.	K
3. Write equations for the reactions: i) acetaldehyde with HCN ii) Benzaldehyde with Sodium hydrogen sulphite iii) Acetone with barium hydroxide and heat (an aldol).	K
4. Write the structure of any three cross aldol condensation products A, B, C: $CH_3CHO + CH_3CH_2CHO \xrightarrow[\text{heat}]{\text{dil.NaOH}} A + B + C$	K
5. Benzaldehyde undergoes self oxidation- reduction on heating with concentrated alkali. What are the products formed and what is the name of the reaction?	K
6. Predict the main product formed when cyclohexanecarbaldehyde  reacts with	

i) Tollen's reagent ii) NH_2OH iii) Zn-Hg HCl	A
7. Show how each of the following compounds can be converted to Benzoic acid: a) Ethyl Benzene b) benzamide c) benzoyl chloride?	A
8. Benzoic acid can be prepared starting from bromobenzene. Show this conversion using only inorganic reagents in the correct order (neglect organic solvent used in any step)	A
9. Complete the following equations: i) $CH_3COOH + NaHCO_3 \longrightarrow$ ii)  iii) $(C_6H_5CO)_2O + H_2O \longrightarrow$	K
10. An aromatic acid X on reduction using diborane gives Benzyl alcohol. The sodium salt of X on heating with soda lime gives Y, and on electrolysis gives Z. Identify X,Y and Z?	A
11. Give one simple chemical test to distinguish between the following pairs of compounds. i) acetic acid and acetaldehyde ii) Pentan-2-one and Pentan-3-one iii) Benzaldehyde and Benzophenone	U
Five mark questions:	
1. Give the equations for the conversions of a) Ethanoic acid to Ethanoic anhydride b) phthalic acid to phthalimide	K
2. a) Name simple chemical tests to distinguish i) propanal and ethanal ii) benzoic acid and ethyl benzoate b) $CH_3Br \xrightarrow{Mg,\ ether} A \xrightarrow[2)\ H_2O]{1)\ CO_2} B \xrightarrow[\Delta]{CH_3OH/H^+} C$. Identify the compounds A, B and C	U
3. a) Given A =  . Write the structures of the product formed when A reacts with i) $NH_2–NH_2$ ii) boiled with acidified $KMnO_4$. b) Name the reaction by which i) sodium benzoate is converted into benzene ii) Propanoic acid is converted into 2-bromopropanoic acid c) Arrange the following in increasing order of their acid strength: benzoic acid, 4-nitrobenzoic acid, 4-methoxybenzoic acid	A

4. a) Give reasons:

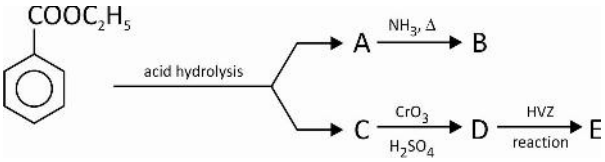
i) oxidation of toluene by CrO_2Cl_2 in CS_2 does not yield benzoic acid

ii) benzoic acid does not undergo Friedel-Craft reaction

iii) In $\overset{*}{N}H_2CONHNH_2$ (semicarbazide) the $\overset{*}{N}H_2$ group is not involved in formation of semicarbazone

b) Write a self explanatory equation for Clemmensen reduction of propanone.

5. Identify A. B, C, D and E in the following and write their names: U

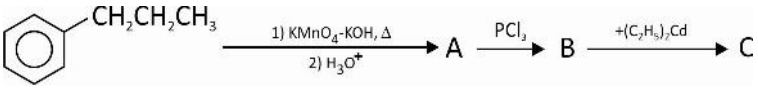


6. a) $CH_3CHO + CH_3OH \underset{\Delta}{\overset{\text{dry HCl}}{\rightleftharpoons}} A \overset{+CH_3OH}{\rightleftharpoons} B$. Write the structures of A and B. A

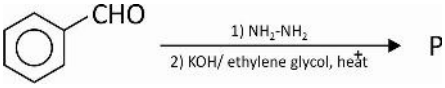
b) Write the general equation for the conversion of Grignard reagent into carboxylic acid

c) Arrange the following in increasing order of their reactivity towards HCN:
acetone, acetaldehyde, methyl tert - butyl ketone, propanaldehyde K

7. a) Identify the compounds A, B and C:



b) Give the IUPAC name of P. Name the reaction.



A

8. $C_6H_6 \xrightarrow[\text{anhy } AlCl_3]{CH_3COCl} A \xrightarrow{Zn-Hg \text{ conc. } HCl} B \xrightarrow[2)\ H_3O^+]{1)\ KMnO_4,\ KOH,\ \Delta} C.$

'A' reacts with NaOI to form D and E. Write the structures of A, B, C, D and E.

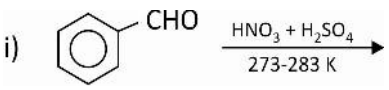
9. $C_7H_6O_2$ (A) $\xrightarrow{PCl_5}$ P $\xrightarrow{H_2, Pd, BaSO_4}$ Q $\xrightarrow{NaBH_4}$ R. A

(aromatic acid)

i) Identify P, Q, R

ii) Write the equation for the reaction between 'A' and 'R' in presence of H^+ and name the reaction. A

10. a) Complete the following equations:

i) 

ii) $R-CH_2OH \xrightarrow[2)H_3O^+]{1)\ \text{Alk. } KMnO_4}$

b) Mention one use each of : i) formaldehyde ii) acetone iii) ethanoic acid K