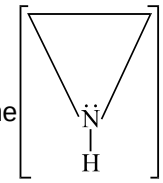
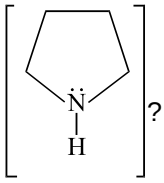
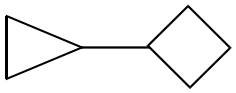
**1.** Explain the following facts

(a) Aziridine  is much less basic than

pyrolidine  ? Explain.

(b) In Di-Cyclo-Compound  ,

cyclopropyl ring express –I effect.

**2.** (a) $Me_3C\text{-}CH_2\text{-}COOH$ is more acidic than $Me_3SiCH_2COOH$ explain?
(b) Highly branched carboxylic acids are less acidic than unbranched acids? Explain?

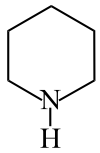
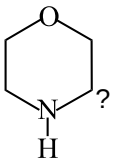
**3.** (a) Arrange the following groups in decreasing order of +I effect.

$-O^{\ominus}$, $-CO_2^{\cdot\cdot}$, $-CR_3$, $R_2CH-$, –D,H

(b) Arrange in dreasing order of acidity

$CH_3\text{-}CH_2\text{-}O^{\ominus}$, $CH_3\text{-}OH$, $CH_3\text{-}CH_2\text{-}OH$, $OH^{\cdot\cdot}$, $H_2O$

**4.** (a) Among $CH_2{=}CH\text{-}NH_2$ and $CH_3\text{-}CH_2\text{-}NH_2$ which is more basic explain without resonanse theory.
(b) $CH_3\text{-}SH$ is more acidic than $CH_3\text{-}OH$.

(c)  is more basic than  ? Explain?

**5.** Explain why methyl thio alcohol has less pH as compared to methanol under similar physical condition when dissolved in water.

**6.** Arrange in increasing order of Ka value
(a) $CH_3CN$, (b) $CH_3Cl$ (c) $CH_3NO_2$
Arrange in decreasing order of $pK_b$ value
(a)$CH_3NH_2$ (b) $NH_3$ (c) $CH_3CONH_2$

**7.** Explain the following facts:

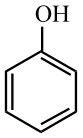
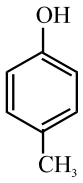
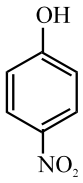
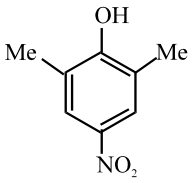
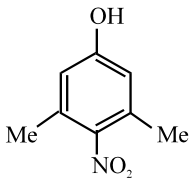
(a) $R-\overset{+}{C}=O$ is less stable than $R-C\equiv\overset{+}{O}$

(b) Aromatic amines are weaker base than aliphatic amines.

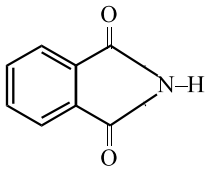
(c) Metal hydride are stronger base than metal hydroxide.

**8.** What is the order of basicity of the following compounds?
$PhNH_2$ PhNHMe $PhNMe_2$ $p\text{–}MeC_6H_4NH_2$

**9.** Arrange in the decreasing acidic strength

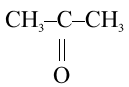
**10.** Arrange the order of basicity of the following compounds

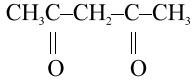


$CH_3NH_2$ $CH_3CONH_2$

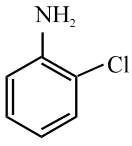
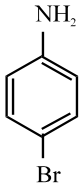
$NH_3$ $PhNH_2$

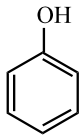
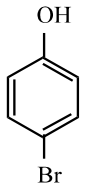
**11.** Arrange the following in increasing order of pKa values
(a) $HNO_3$ $H_2O$ $HCO_2H$ $CH_3CO_2H$ PhOH

(b) $CH_4$ $PhCH_3$ $PhC\equiv CH$ 

(c) $PhCH_3$  $CF_3CO_2H$ $NH_3$

**12.** (a) $PhCH_3$ HCN $HCO_2H$ $CH_3OH$

(b) $NH_3$  $PhNH_2$ 

(c)  $CH_2{=}CH\text{–}OH$ $HC\equiv C\text{–}OH$ 

**13.** Cyclopentadiene is more acidic than 1, 3 pentadiene whereas 1, 3, 5 cycloheptatriene is less acidic than 1, 3, 5 heptatriene. Explain.

**14.** Azulene has an appreciable dipole moment & resonance energy. Explain.

**15.** 7 bromocyclohepta triene (tropylium bromide) completely dissociates in water & gives a precipitate of AgBr instantaneously with $AgNO_3$ unlike its open chain analog, 3 bromo 1, 4 pentadiene. Explain.

**16.** Which is the smallest aromatic substance?

**17.** Cyclopentadiene ($Ka = 10^{-15}$) is much more acidic than 1, 3 cyclohexadiene. Explain.

**18.** Indene shows acidity. Explain. Why?

**19.** Treatment of 3 chlorocyclopropene with $SbCl_5$ yields stable crystalline solid. Explain.

**20.** 1, 2, 3 tripropyl cyclopropenyl chloride has very high dipole moment. Explain.

## WORK SHEET-2 (IUPAC Nomenclature)

**1.** Write structural formulas for each of the following alcohols and alkyl halides :

(a) Cyclobutanol

(b) sec-Butyl alcohol

(c) 3-Heptanol

(d) trans-2-Chlorocyclopentanol

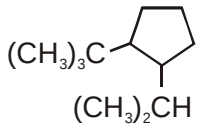
(e) 2, 6-Dichloro-4-methyl-4-octanol

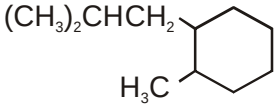
(f) trans-4-tert-Butylcyclohexanol

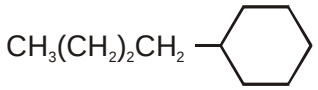
(g) 1-Cyclopropylethanol

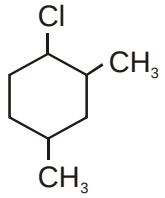
(h) 2-Cyclopropylethanol

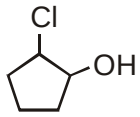
**2.** Give IUPAC names for the following substituted alkanes :

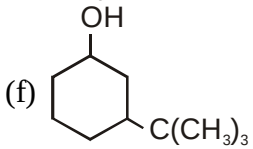
(a) 

(b) 

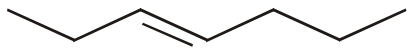
(c) 

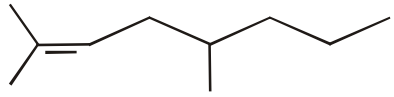
(d) 

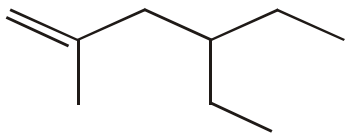
(e) 

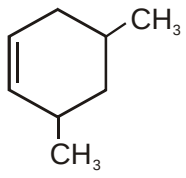
(f) 

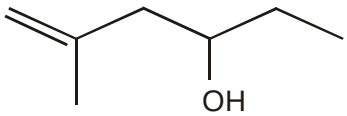
**3.** Give IUPAC names for the following alkenes :

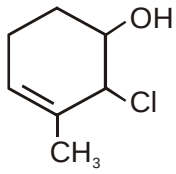
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

**4.** Write a structural formula for each of the following compounds :

(a) 1, 4-Dichloropentane

(b) sec-Butyl bromide

(c) 4-Isopropylheptane

(d) 2, 2, 3-Trimethylpentane

(e) 3-Ethyl-2-methylhexane

(f) 1, 1-Dichlorocyclopentane

(i) 4-Methyl-2-pentanol

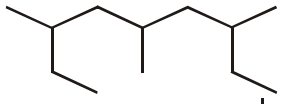
(k) 1, 4-Dicyclo propylhexane

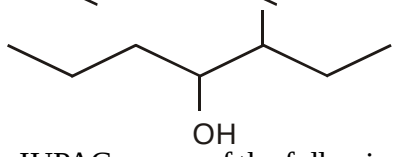
(l) Neopentyl alcohol

**5.** Give systematic IUPAC names for each of the following -

(a) $CH_3CH_2C(CH_3)_2CH(CH_2CH_3)\ CH_3$

(b) $CH_3CH_2C(CH_3)_2CH_2OH$

(c) 

(d) 

**6.** Give IUPAC names of the following compounds :

1. $CH_3–CH_2–\underset{\underset{Cl}{|}}{CH}–CH_2–\underset{\underset{CH_3}{|}}{CH}–Cl$

2. $CH_3\underset{\underset{CH_3}{|}}{CH}\ CH_2CH{=}CHCH_2CHO$

3. $CH_3–\underset{\underset{CH_3}{|}}{CH}–\overset{\overset{CH_3}{|}}{\underset{\underset{CH_2}{|}}{\underset{\underset{CH_3}{|}}{C}}}–OH\,CH_2–CH_2–\underset{\underset{COOH}{|}}{CH}–Br$

4. $CH_3–CH_2–$

5. $H–\overset{\overset{O}{\|}}{C}–\overset{\overset{O}{\|}}{C}–H$

6. $HO-\overset{\overset{O}{\|}}{C}-\overset{\overset{O}{\|}}{C}-OH$

7. $CH_2 = CH - CH_2 - C \equiv CH$

8. $CH_3-CH = CH - C \equiv CH$

9. $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-\underset{\underset{O}{\|}}{C}-CH_3$

10. $CH_3-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{NH_2}{|}}{CH}-COOH$

11. $CN-CH_2-CH_2-COOH$

12. $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-COOH$

13. $CH_3-\underset{\underset{CH_3}{|}}{CH}-C\equiv C-\underset{\underset{OH}{|}}{CH}-CHO$

14. $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH=CH-\underset{\underset{O}{\|}}{C}-CH=CH-CH_3$

15. $CH_3-\underset{\underset{CHO}{|}}{CH}-CH_2-\underset{\underset{CH_3}{|}}{CH}-COOH$

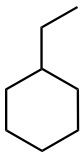
## WORK SHEET-3 (Isomerism)

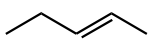
**1.** Write chain isomer of $CH_3CH_2CH_2CH_2OH$

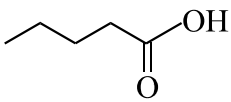
**2.** $C_5H_{12}$ has three isomers. They are converted into $C_5H_{11}Cl$. How many types of $C_5H_{11}Cl$ are obtained in each case?

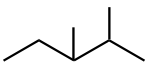
**3.** What is chain isomer of 1–butene?

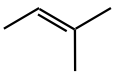
**4.** Select the pair isomers from the following:

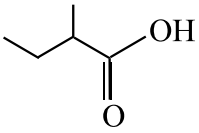
(i) 

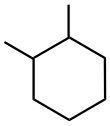
(ii) 

(iii) 

(iv) 

(v) 

(vi) 

(vii) 

**5.** Make chain isomer of cyclopentane.

**6.** Consider the following

(i) $CH_3CH_2CH_2CH_2Cl$ (ii) $CH_3\underset{\underset{Cl}{|}}{CH}CH_2CH_3$

(iii) $CH_3\underset{\underset{CH_3}{|}}{CH}CH_2Cl$ (iv) $CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$

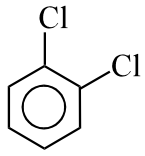
What is the type of isomerism shown by

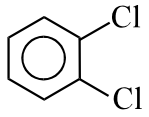
(a) (i) and (ii) .....

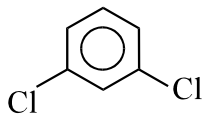
(b) (ii) and (iv) .....

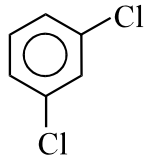
(c) (i) and (iii) .....

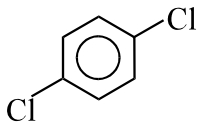
7. Select identical pairs out of

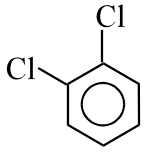
(i) 

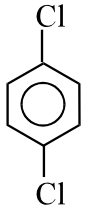
(ii) 

(iii) 

(iv) 

(v) 

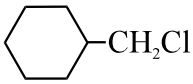
(vi) 

(vii) 

(a) .....

(b) .....

(c) .....

**8.** Write position isomers of 

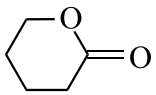
(i) ..... (ii) .....

(iii) ..... (iv) .....

**9.** There are four alkyl bromides with the formula $C_4H_9Br$. Write their structural formulae and classify each as to whether it is a primary, secondary or tertiary alkyl bromide.

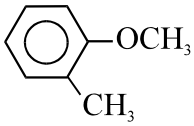
**10.** Write structural formulae for each of the following:
(a) three primary alcohols and one tertiary alcohol with the formula $C_4H_8O$
(b) A secondary alcohol with the formula $C_3H_6O$
(c) A cyclic ester with the formula $C_4H_6O_4$

**11.** (a) Cyclic compounds of the general type shown here are called lactones. What functional group does a lectone contain?



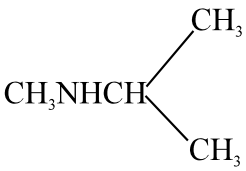
(b) Write any three structural isomers of $C_6H_{10}O$.

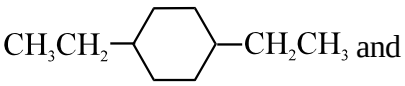
**12.** $C_5H_{12}O$ represents alcohols and ethers. Write structure of
(a) a primary alcohol .....
(b) a secondary alcohol .....
(c) a tertiary alcohol .....
(d) a tertiary ether .....
(e) a secondary ether .....
(f) a primary ether .....

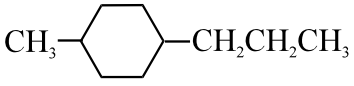
**13.** 

Write
(a) metamer of (A) .....
(b) functional isomer of (A) .....
(c) position isomer of (A) .....

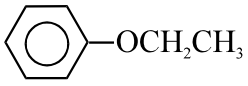
**14.** What is type of isomerism shown by following pairs?

(a) $CH_3CH_2NHCH_2CH_3$ and 

(b)  and

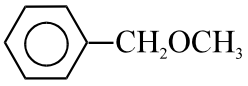


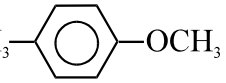
(c) $CH_3CH_2CH = CHCH_2CH_3$ and
$CH_3CH=CHCH_2CH_2CH_3$

**15.** Write metamers of 

**16.** Write all the isomers of the formula $C_5H_{10}O_2$ and the select pair of one type of isomers.

**17.** $C_8H_{10}O$ has two isomers I and II

(i) 

(ii) 

Identify the products in each case when they react with $PCl_5$ and then with aq. KOH.