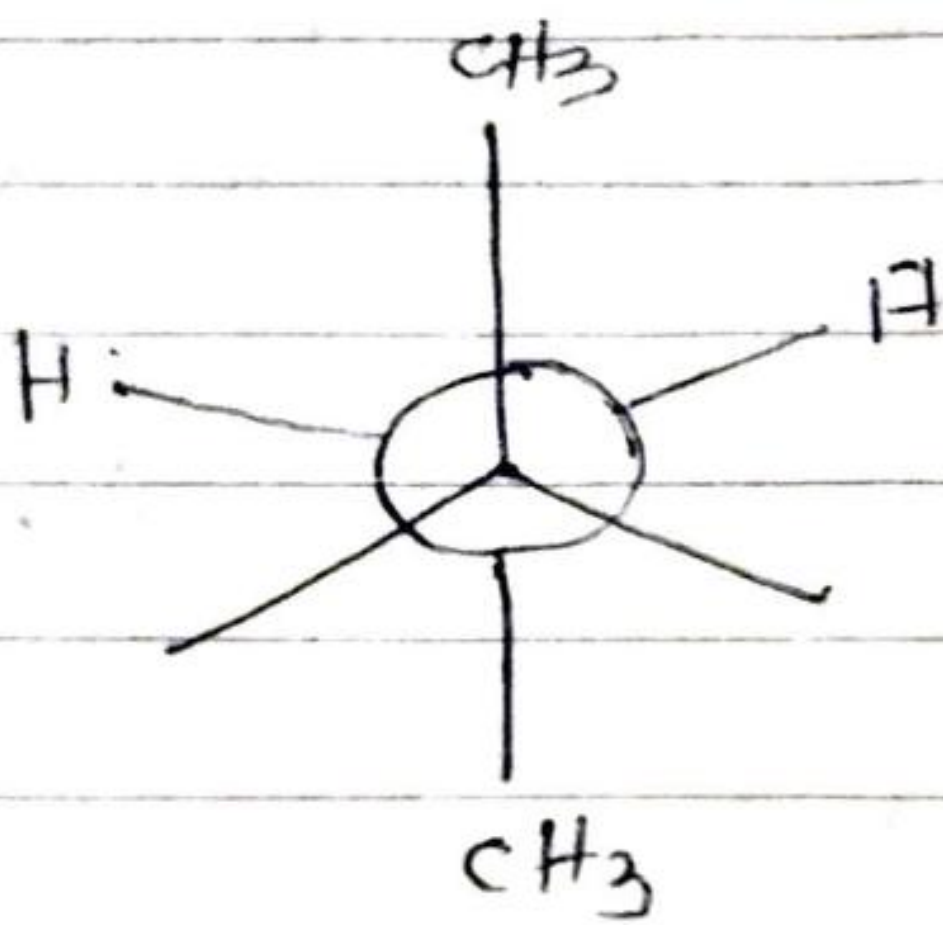


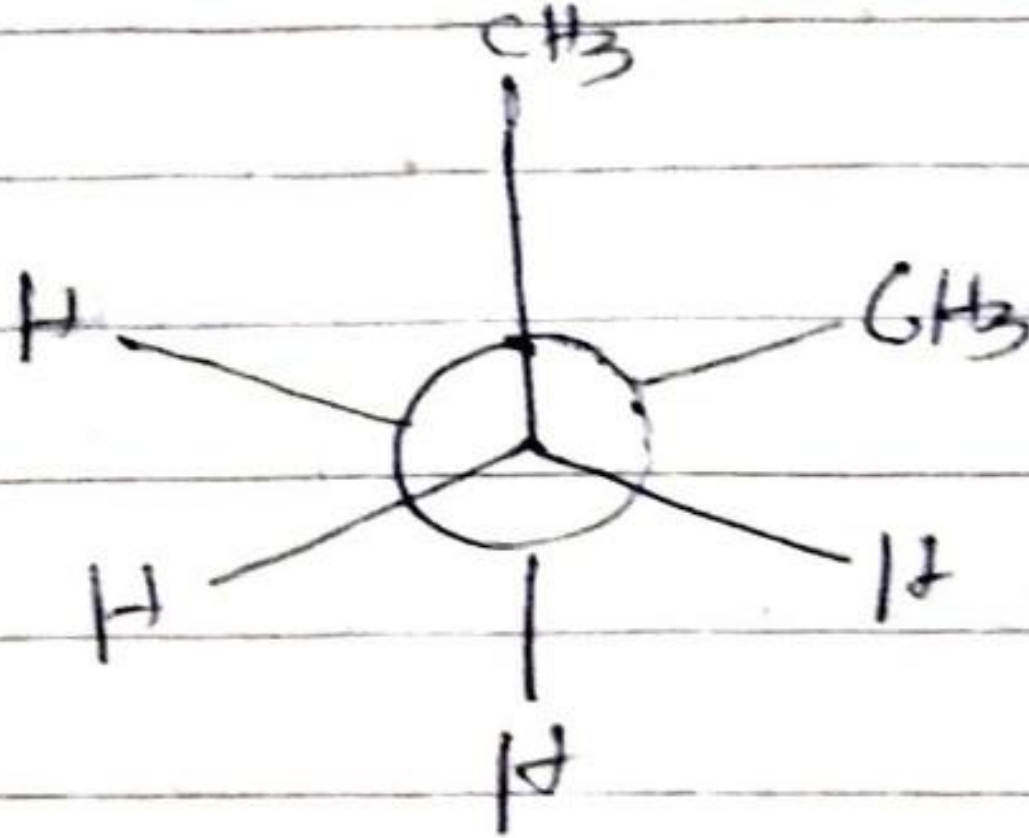
T.D.C. Part II (Chem. Honors.)

Paper II, Gr. B (org. Chem.)

Conformations of n-butane are represented as —

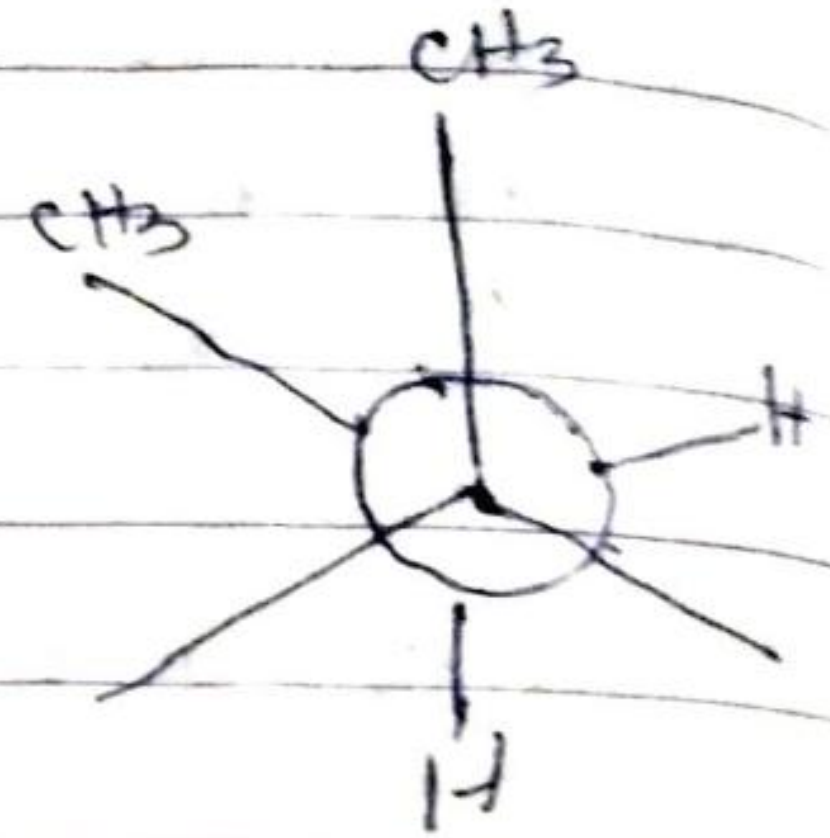


Anti (staggered)  
 $(\text{CH}_3/\text{CH}_3, \phi = 180^\circ)$



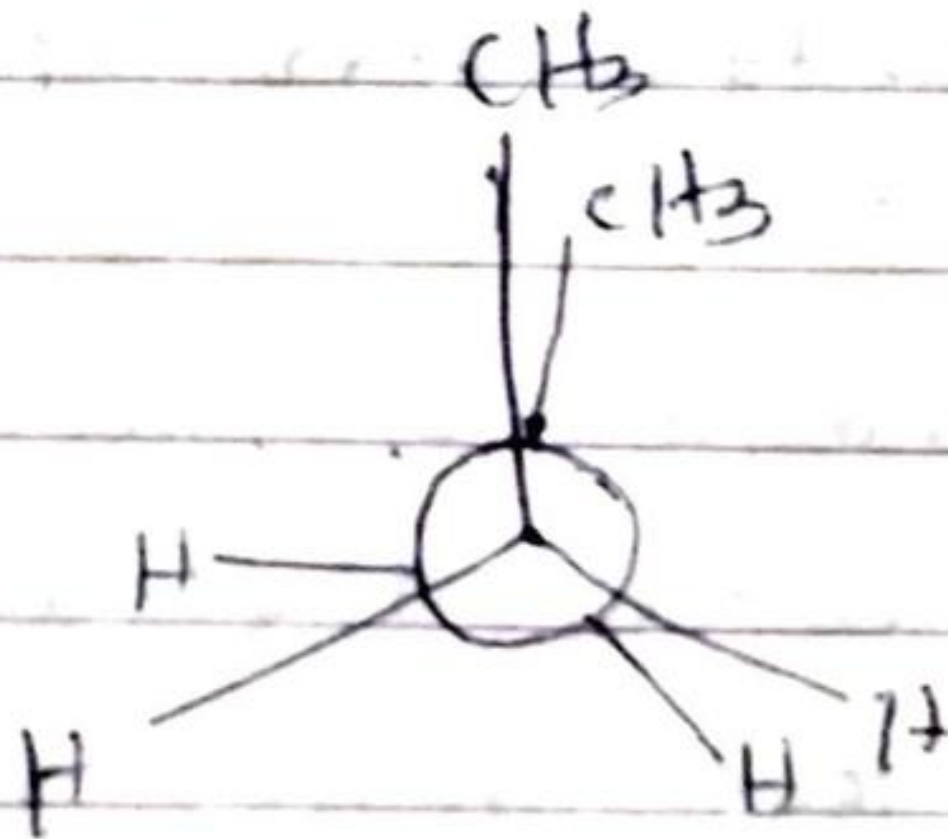
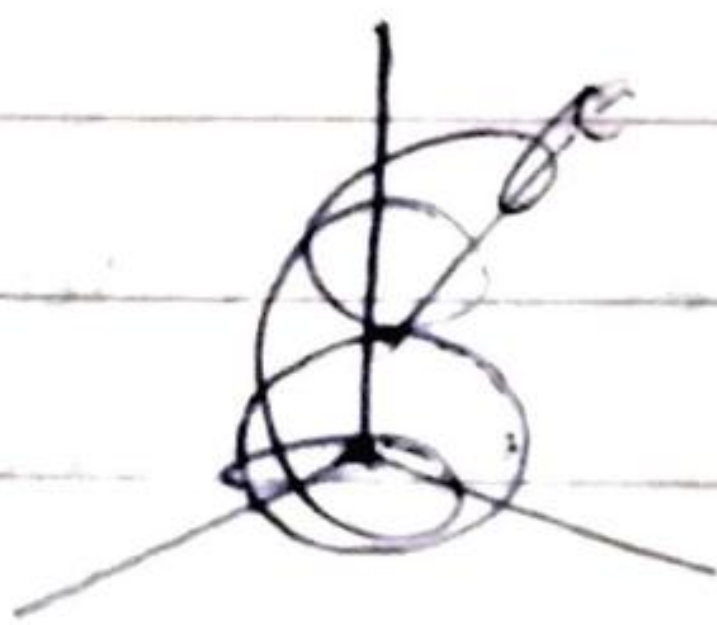
Gauche (staggered)

$\phi(\text{CH}_3/\text{CH}_3) = 60^\circ$

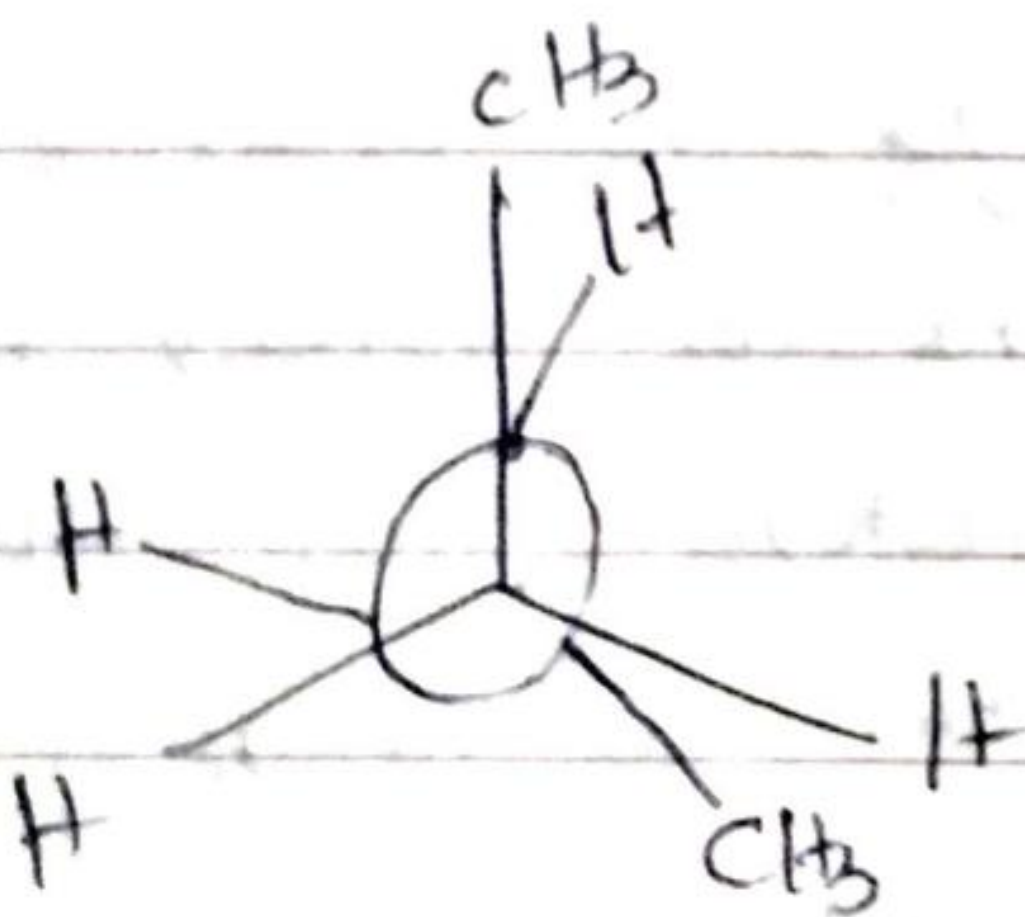


Gauche (staggered)

$\phi(\text{CH}_3/\text{CH}_3) = 60^\circ$

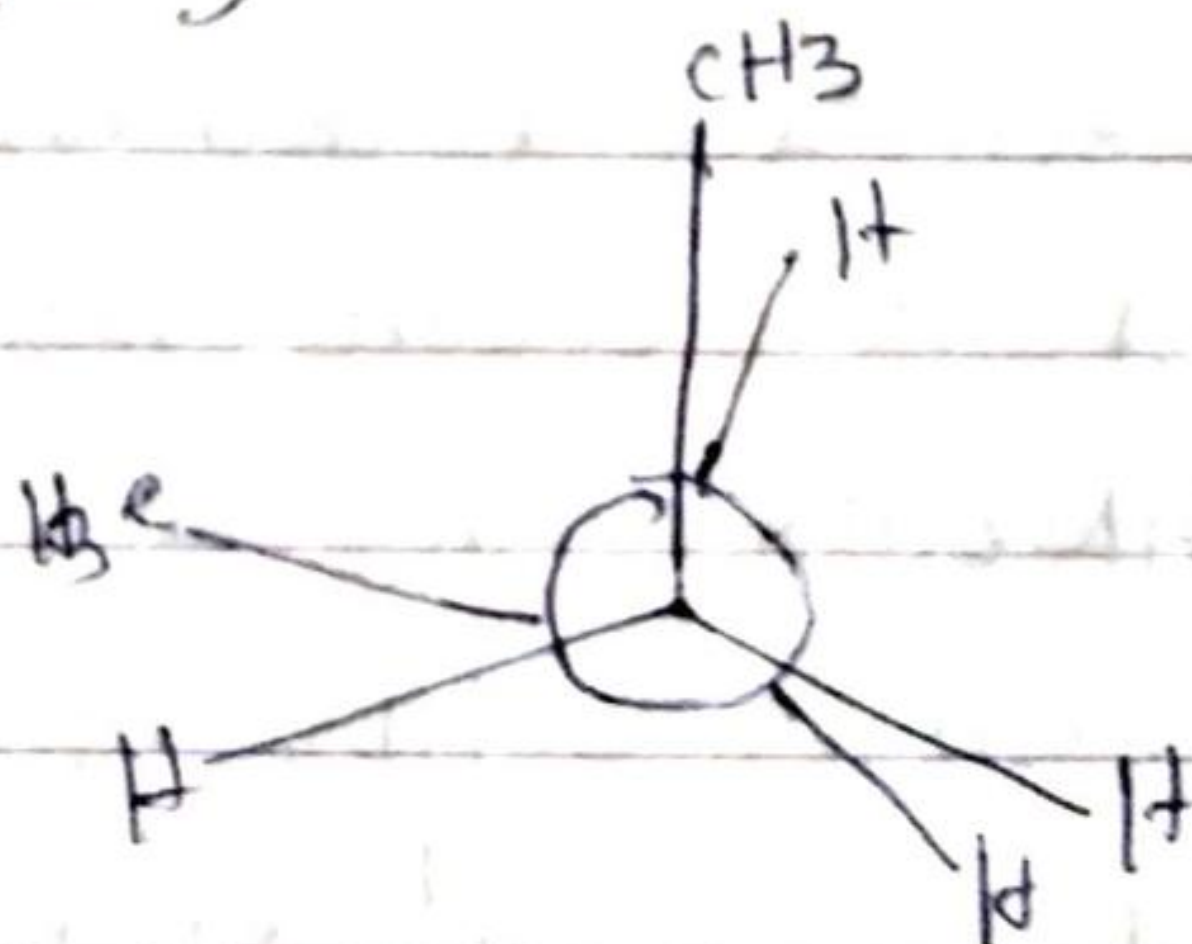


Fully eclipsed  
 $\phi(\text{CH}_3/\text{CH}_3) = 0^\circ$



Eclipsed

$\phi(\text{CH}_3/\text{CH}_3) = 120^\circ$



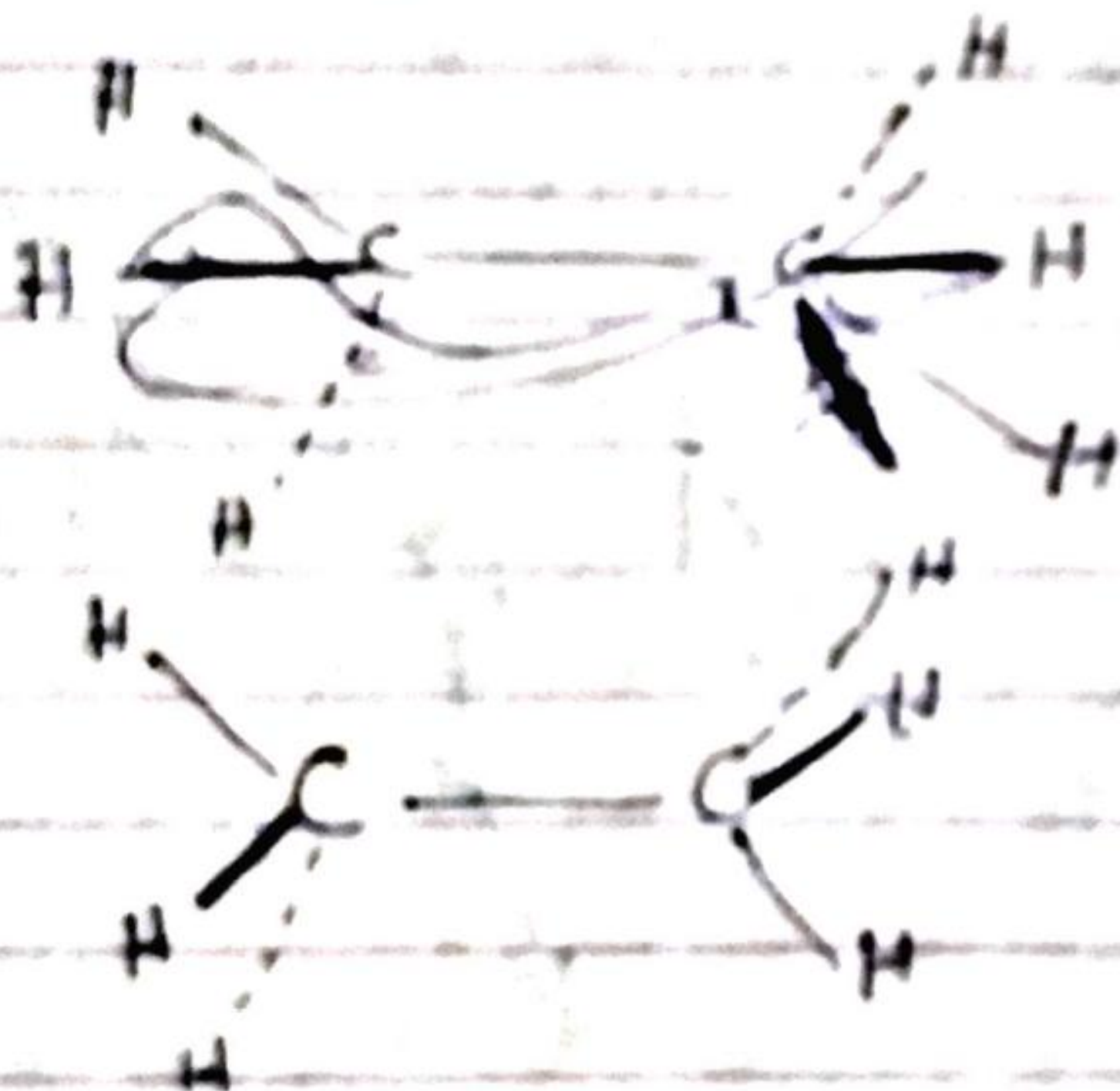
Eclipsed

$\phi(\text{CH}_3/\text{CH}_3) = 240^\circ$

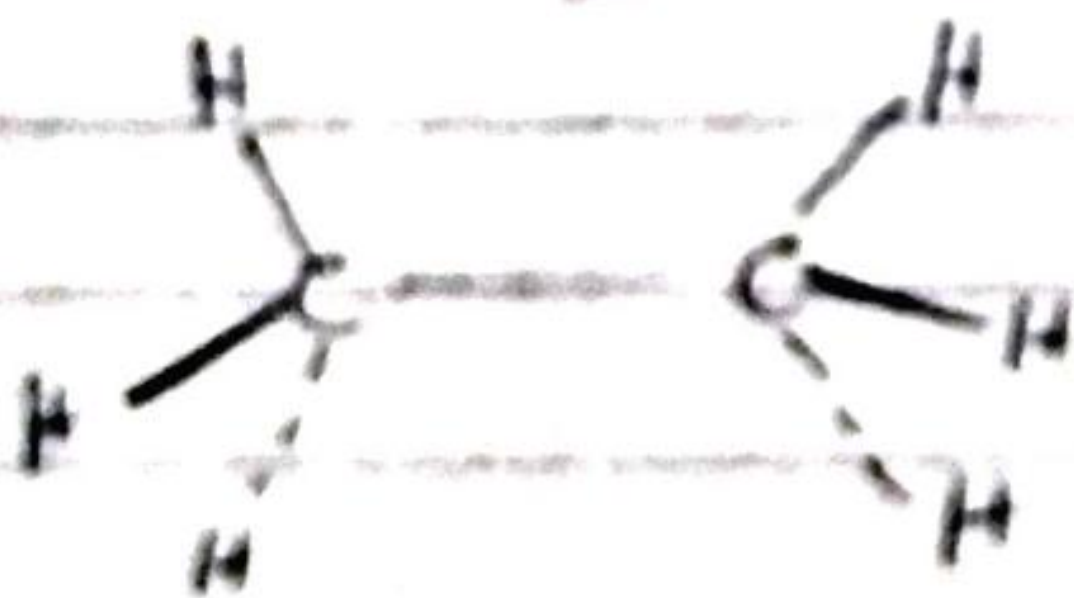
## (ii) Flying - Wedge Projection :-

- (i) The molecule is viewed side on.
- (ii) C-C bond is drawn horizontally.
- (iii) solid lines represent bonds on the plane of paper.
- (iv) dotted lines represent bonds above the plane of paper.
- (v) dash lines represent bonds below the plane of paper.

The staggered conformation of ethane is :-



Eclipsed conformation of ethane



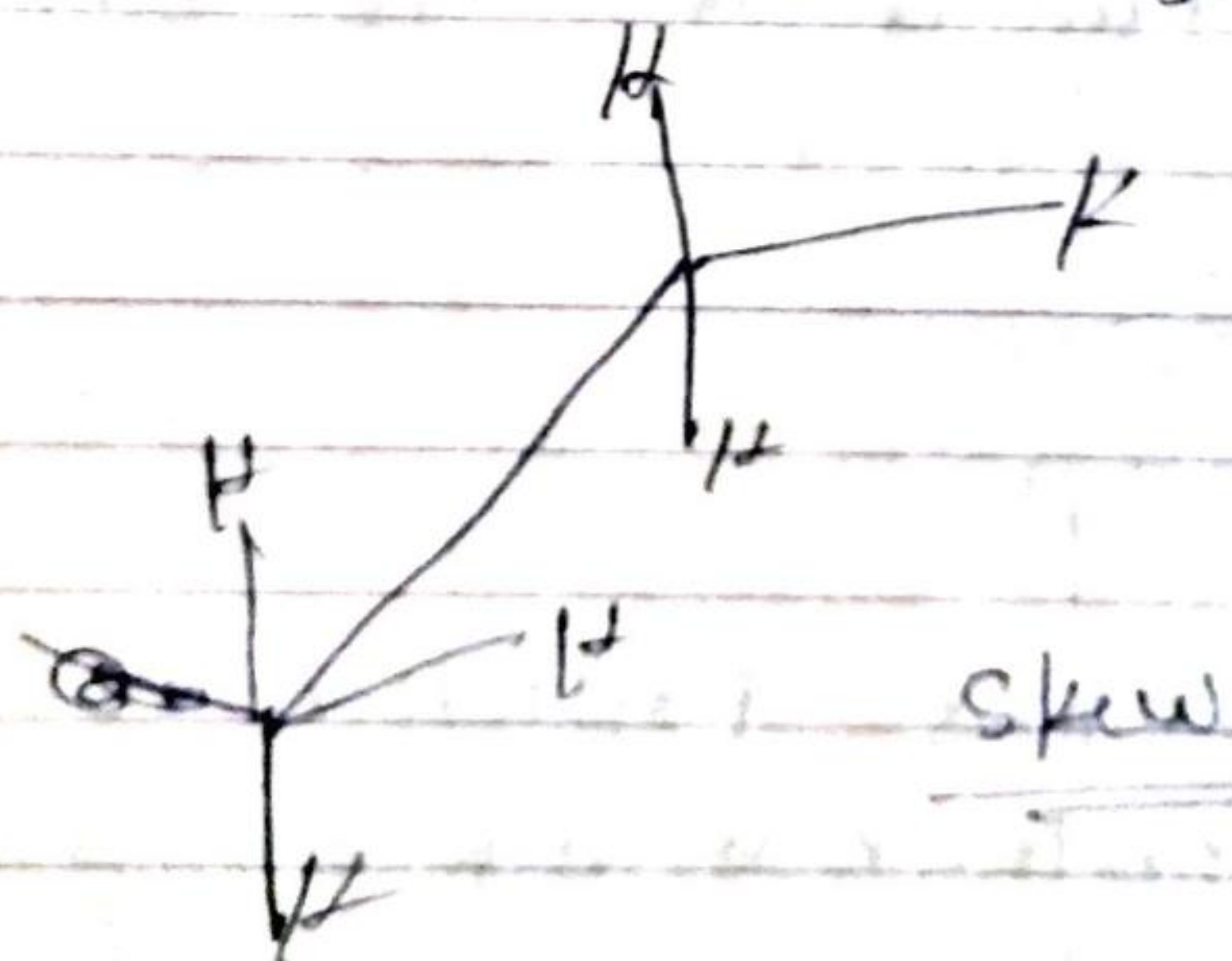
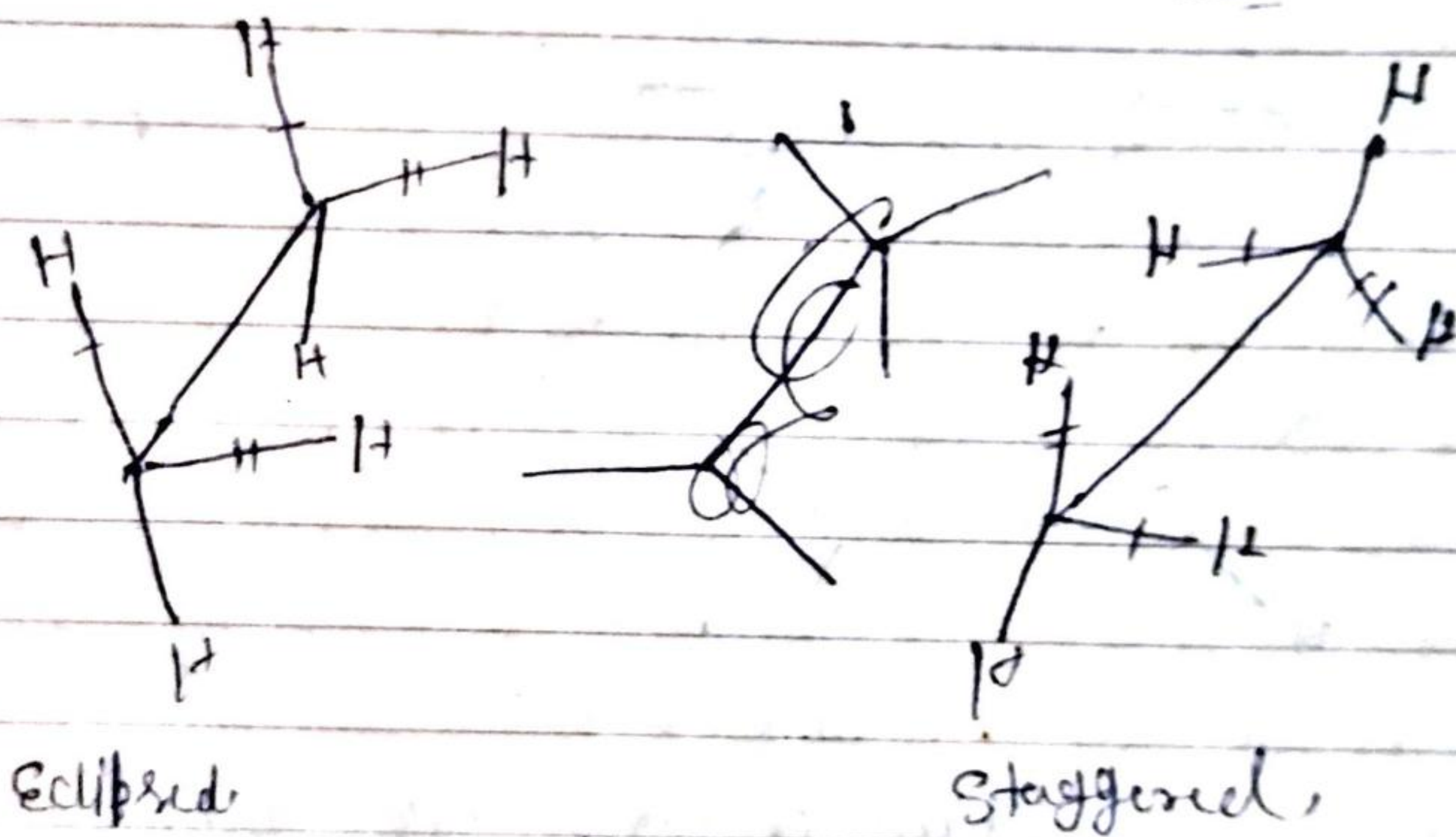
## (iii) Sawhorse Projection :-

- (i) The molecule is viewed from an angle.
- (ii) C-C bond is drawn diagonally.
- (iii) the eclipsed groups are drawn parallel to each other on the same side of the ethane line.

(v) The staggered groups are also drawn parallel to each other on the opposite side of the oblique line.

(vi) An eclipsed form gets converted into the staggered form when a C-atom is rotated by a  $180^\circ$  around C-C bond.

(vii) A skew form is generally drawn from a staggered form or eclipsed form by rotating one of the C-atom in C-C bond around it through any angle other than  $180^\circ$  and  $360^\circ$ .

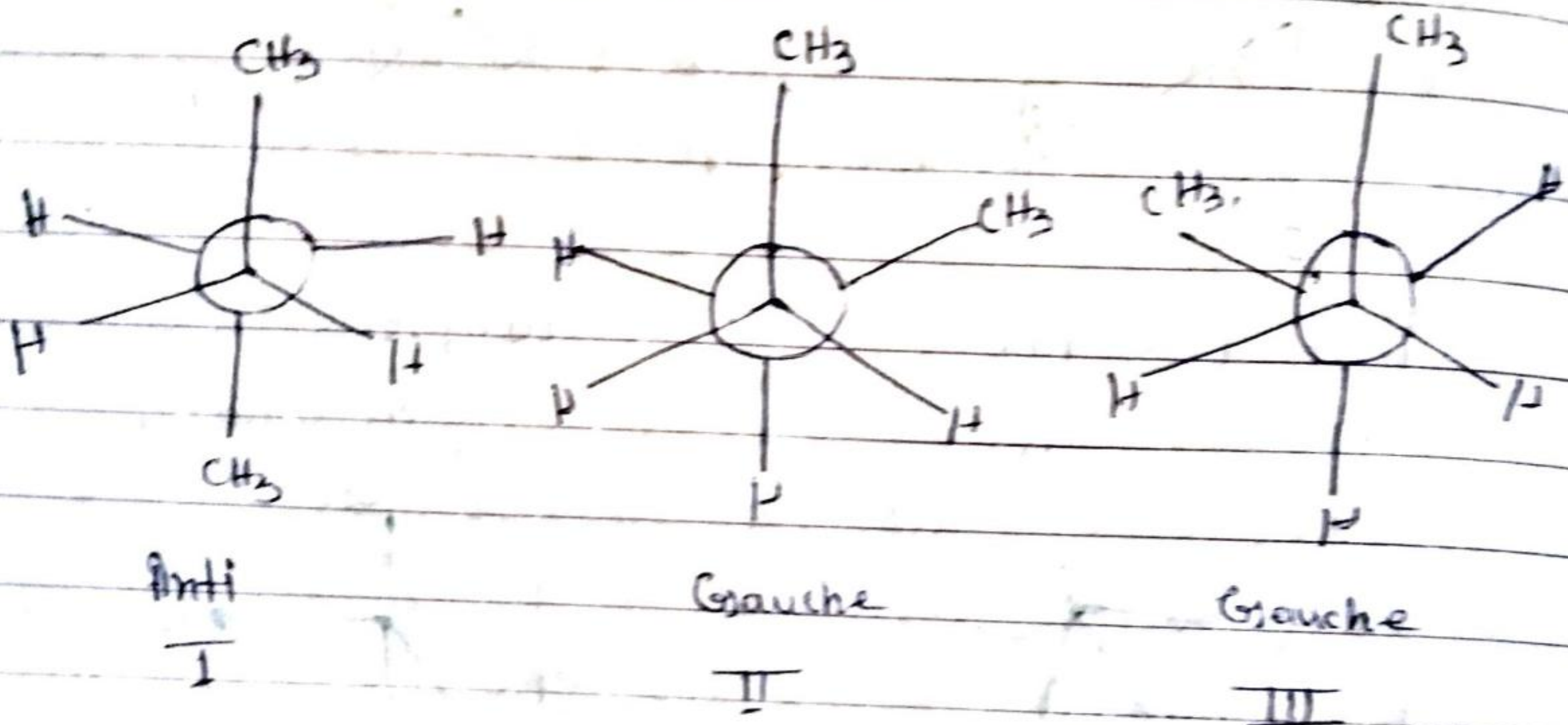


Skewness projection formula of ethane

## Conformational isomerism: →

Stable conformations, i.e. conformations of minimum energy are called conformational isomers or rotational isomers or conformers or rotamers.

Two gauche forms and one anti-form of *n*-butane are thus its three conformers or rotamers.



Anti and Gauche conformation of *n*-butane

I and II, and I and III → diastereomeric conformers

II and III are enantiomers (conformational)

As these three conformers are stable, they will remain as in equilibrium mixture in a bulk of *n*-butane. Anti-form being the most stable, its percentage will be the highest in the mixture. The percentage of each of the gauche forms will be the same because of their identical stability.