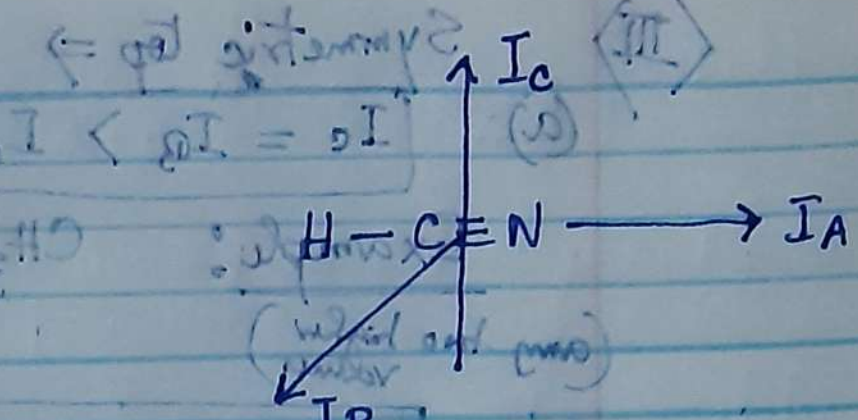
Polyatomic molecules ⇒

⟨I⟩ Linear ⇒

Example : HCN



$$I_A = 0$$
$$I_B = I_C$$

I_A axis ⇒ Rotation axis about the bond axis

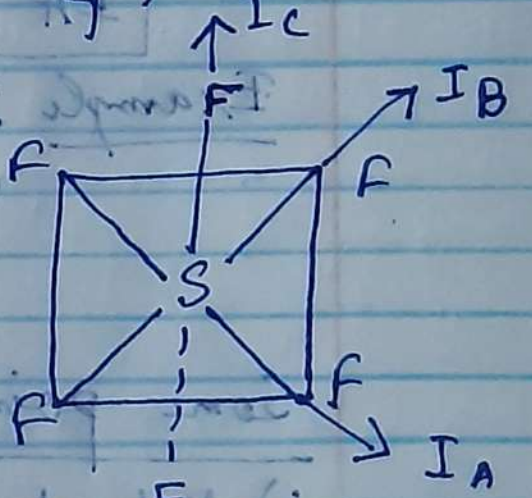
I_B axis ⇒ I_B axis is the end over end rotation about the plane of the paper

I_C axis ⇒ I_C axis is the end over end rotation at right angle to the plane of the paper.

⟨II⟩ Spherical top ⇒

Example : SF_6, CH_4, CCl_4, Isocasahedron Str.

$$I_A = I_B = I_C$$



Home tasks :- What are the values of

I_A = ?

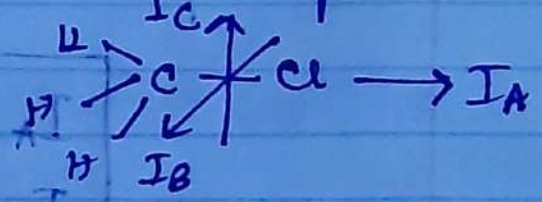
I_B = ?

I_C = ?

(III) Symmetric top ⇒

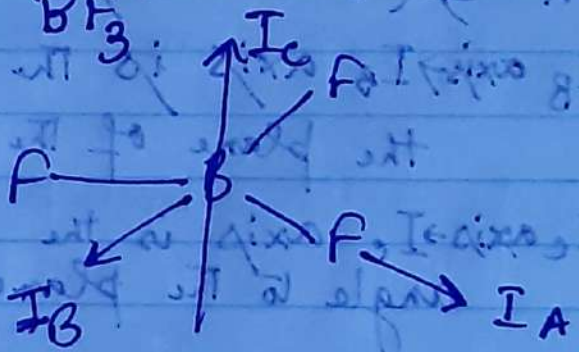
(a) $I_C = I_B > I_A$: Prolate Symmetric top

Example: CH_3Cl (any two higher values)



(b) $I_A = I_B < I_C$: Oblate Symmetric top

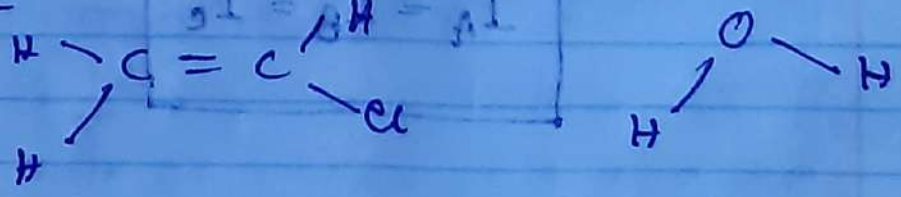
Example: BF_3 (any two lower values)



(IV) Asymmetric top ⇒

$I_A \neq I_B \neq I_C$

Example :-



Some points :-

i) Molecules having $C_{\infty v}$ and $D_{\infty h}$ point group are linear molecule.

ii) Molecule having C_n group, $n > 2$ or have S_4 axis → Symmetric top

iii) Molecule having O_h, T_d and I_h are the class of Spherical top molecule.