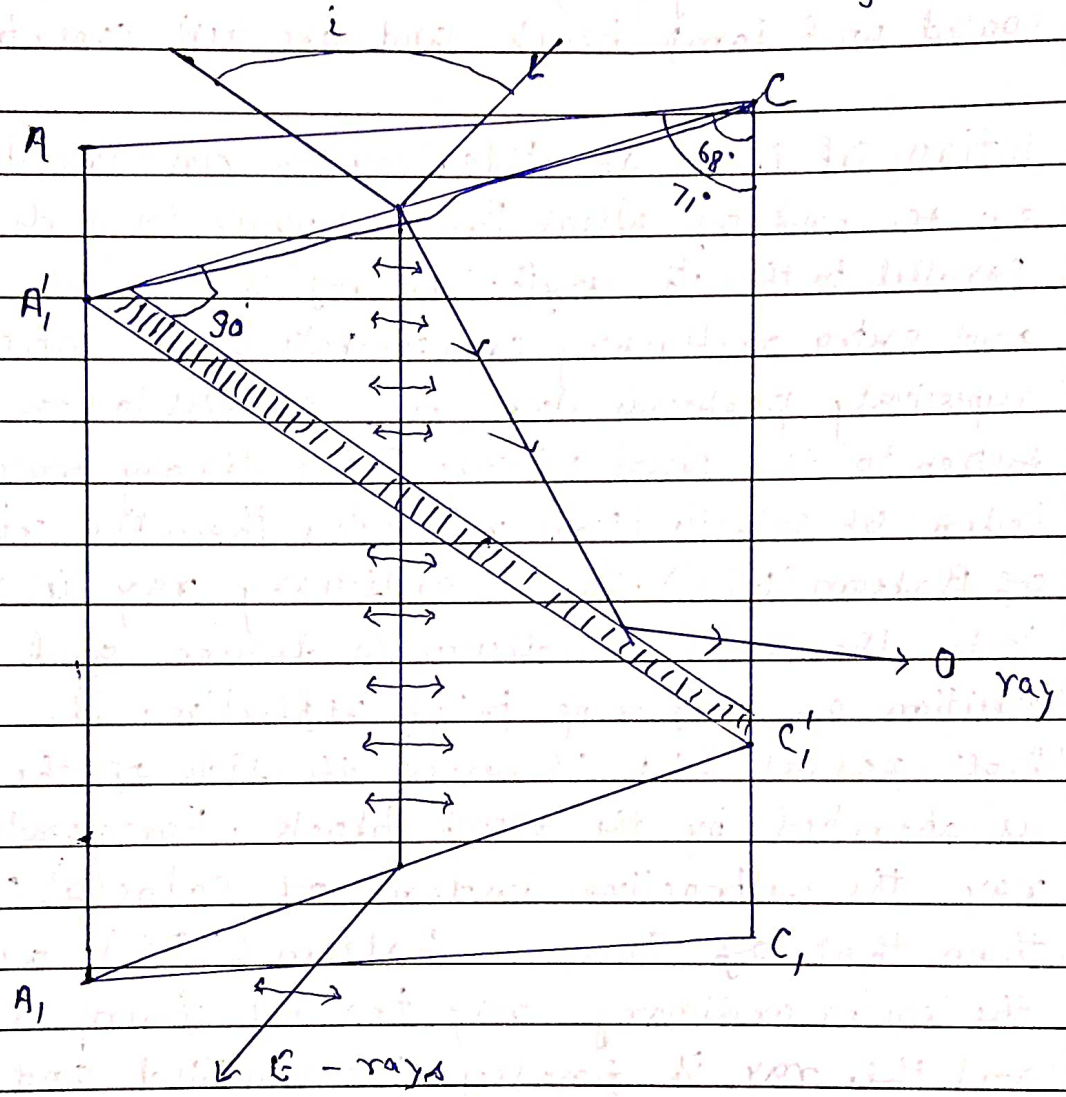
* Nicol's Prism :—

Nicol's Prism is a device in which ordinary component of light is refracted and is cut off by total reflection, while the extra ordinary component is allowed to pass through. The construction of a Nicol Prism has been shown in the figure.



The construction of Nicol consists essentially of rhombohedron of calcite crystal whose length is about three times its breadth. The principal section A C C1 A1 A is parallelogram whose angles are 71° and 109°. The two end faces of the rhomb are cut down so that the original principal section A C C1 A1 of it is Now reduced to A' C C1 A1 and its angle reduces to 68°. The crystal is so obtained to cut into two portions by a plane A'1 C'1 perpendicular

to both the principal section and the end faces of the rhomb. The cut surfaces are highly polished and cemented together by a layer of Canada Balsom which makes an angle 90° with the reduced end faces. The principal section of the crystal coincides with the principal planes of both ordinary and extra ordinary rays. The sides of the prism are coated with lamp black and are kept covered with brass.

Action of Nicol as Polariser:— An incident ray falling on the end of Nicol Prism moves in a direction nearly parallel to the its length. The ray is divided into ordinary and extra ordinary components whose vibrations are respectively perpendicular and parallel to the principal section to the Nicol prisms. For ordinary ray, the refractive index of calacite (1.66) is greater than the refractive index of Balsom (1.55). So the ordinary ray is refracted into the rare medium to denser and it is in a position of suffering total reflection. The totally reflected light passes out through the side of the prism and is absorbed by the lamp black. For extra ordinary ray, the refractive index of calacite (1.48) is less than that of Canada Balsom (1.55), and thus the extra ordinary ray travels from rare to denser and this ray is finally transmitted and emerges out of the opposite end face. The vibration of this emergent light is parallel to the shorter diagonal A_1C_1' of the face A_1B_1 of the face. Thus we get a plane polarised light whose vibrations are parallel to the shorter diagonal of the crystal.