

TITLES - Interferometer

Interferometer is the apparatus to obtain interference fringes with large path differences these <sup>times</sup> can be measured on a scale so the word interferometer.

When these interferometer is used to measure refractive index, of substance. It is called a refractometer.

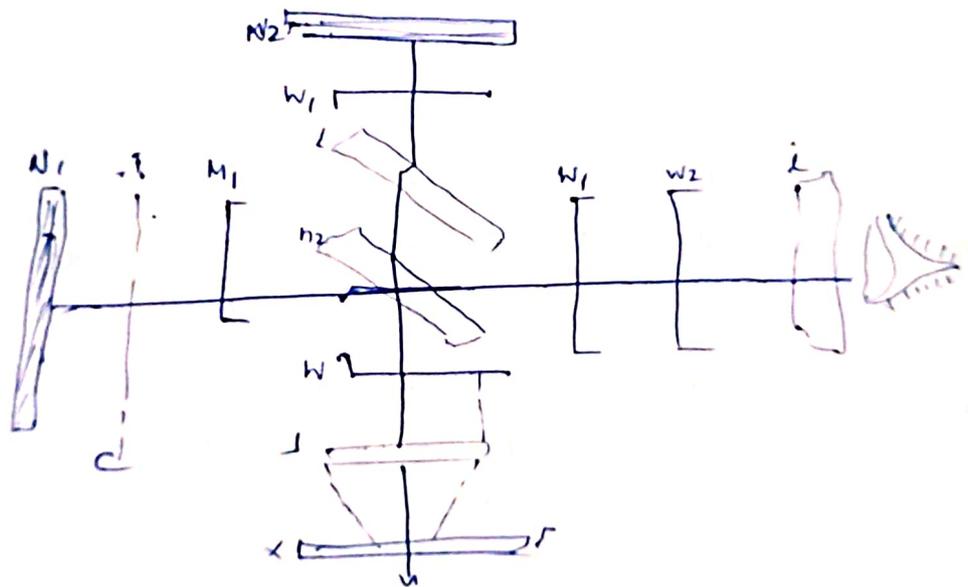
Michelson Interferometer:

An interferometer is an instrument in which the phenomenon of interference is used to make precise measurements of wavelengths or distance. In Michelson interferometer an incident beam of light strikes a tilted semi-transparent mirror and divides the light into a reflected and transmitted waves. These waves continue to their respective mirrors, and reflected, and return to the semi-transparent mirror. If the total number of oscillations of the two waves during their separate paths add up to be integral number just after recombining on the partially reflecting surface of the beam splitter, the light from the beam will add constructively and be directed towards the detector. The device then acts as a filter that transmit perfectly certain wavelength and reflects others back to the light sources. A common use of the Michelson interferometer has one mirror mounted upon a carriage so that the length of light path that branch can be varied.

A spectrum is obtained by recording photoelectrically the light intensity of the interference pattern as the carriage is moved when an absorption cell is placed on one of the arms of the interferometer. The resulting signal contains information about many wavelengths. Simultaneously, the principle advantage of this method is that the entire spectrum is recorded simultaneously with one detector.

### Principle :-

In Michelson interferometer, a beam of light from an extended source is divided into two parts of lights from of equal intensities by the partial reflection and refraction. These beams travel in two mutually perpendicular direction and come together after reflection from the plane mirrors. The beam overlap on each other and produce interference fringes.



Construction :- Michelson interferometer consists of a beam splitter, a compensating plate and two plane mirrors. The beam splitter is a partially silvered plane parallel glass plate. The compensating plate is a simple plane parallel glass plate having the same thickness as beam splitter. The two plates are held parallel to each other and are inclined at the angle of  $45^\circ$  with respect to another mirror. The plane mirror can be made perfectly perpendicular with the help of the fine screw attached to them. The interference bands are observed with the field of view of telescope.