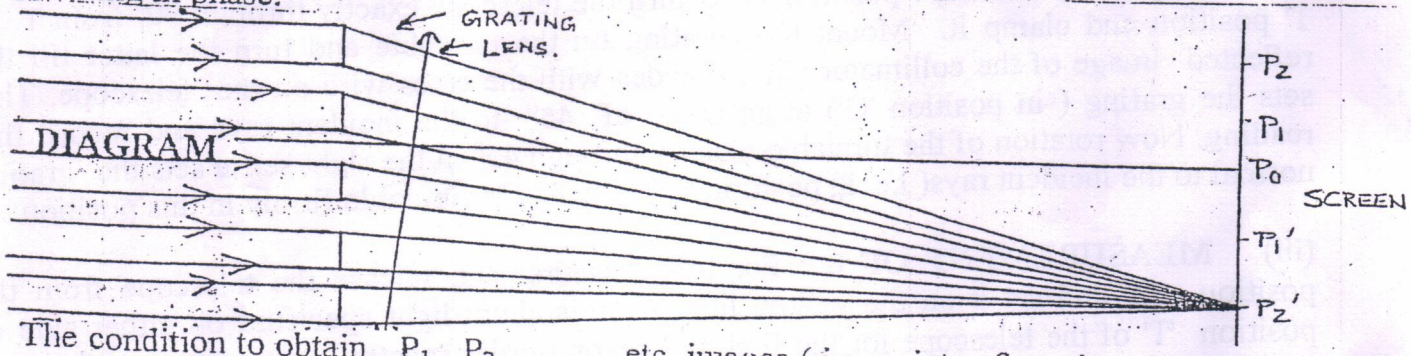
EXPERIMENT NO. 4

DETERMINE THE DISPERSIVE POWER OF Na D –LINE USING GRATING.

INTRODUCTION: Departure from the expectations of ray optics are broadly classed under the term diffraction. A diffracted image thus means an image off the line of sight due to deviation of light from the straight line path. A series of such images at increasing angles of deviation are called as Ist, 2^{nd} , 3^{rd} .... order images respectiveely shown as P_1 , P_2 , P_3 ....etc in Fig. (1) . P_o is the direct image (central order) where all diffracted rays are meeting in phase.

DIAGRAM



The condition to obtain P_1 , P_2 .....etc. images (i.e points of maxium intensity) is that the path difference at a given point on the screen , between the two rays coming from the corresponding points of the slits is an integral multiple of , i.e. the wavelength of incident light. Clearly from the Fig. (1) , this condition will be represented by the equation.

$$(a + b) \sin \theta = n \lambda$$

Dispersive power $= d\theta / d\lambda = n / (a + b) \cos \theta$

where (a+ b) is grating element

a = width of a transparency
b = width of an opacity
n = order of the spectrum
θ = angle of diffraction

Measure θ as explained below and make use of the above equation to find the dispersive power of Na D- line.

EXPERIMENTAL DETAILS:

(i) **SETTING OF SPECTROMETER FOR PARALLEL RAYS:** Point the telescope towards a distance object with a marked outline e.g. an edge of a wall. Seeing through the telescope first make the cross-wire distinctly clear adjusting the eye-piece tube.

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