Wavelength of LASER Source with diffraction

Object: To determine the wavelength of given LASER source.

Apparatus Used: Laser source and grating.

Formula Used: The following formula is used for the determination the wavelength of given LASER source .

$$(e+d)\sin\theta = n\lambda$$

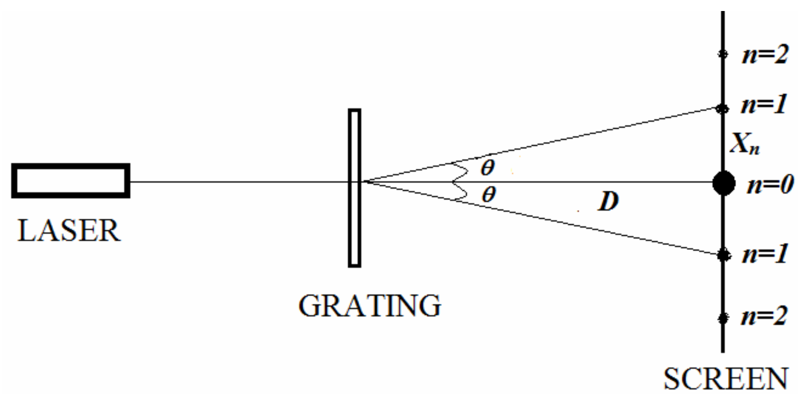
$$\lambda = \frac{(e+d)\sin\theta}{n}$$

Where, $(e+d)$ =grating element, θ =angle of diffraction,

n =order of diffraction , λ = wavelength of LASER source

$$\sin\theta = \frac{X_n}{\sqrt{X_n^2 + D^2}}$$

Ray Diagram:



or

Procedure:

1. Put the Laser source normal to the grating and switch on the laser. You will see the diffraction pattern on screen which has central bright maxima and other maxima with decreasing intensity on the both side of the central maxima.
2. If the side maxima are not equally spaced on the both side or are not in line then adjust the grating for its plane and orientation. So that the diffraction pattern will come in line and have equal distance from central point.
3. Now measure the distance between grating and screen this will give you value of D.
4. Measure the distance between the central spot and other maxima (secondary maxima, n=1, n=2) for the both side.
5. Repeat the process 3 and 4 for different values of D.

Observation:

1. number of line per inches of grating (N)=
2. grating element= $(e+d) = \frac{2.54}{N} cm$
3. Table for D and X_n

Sr.No.	***D* (cm)**	**n**	***X_n* (cm)**		λ
			Left side	**Right side**	
1.					
2.					
3.					

Calculation: Show all calculations for λ and take mean of it.

Result: The wavelength of given laser source is …………………..Å

Precaution:

1. Laser light and grating should be normal.
2. Diffracted points should be in a line on screen.
3. Diffracted points in diffraction pattern should have approximately equal/ equal distance from central point.