

# Determination of wavelength of Laser Light:

Distance between grating and Screen (D) = 17 m

Number of lines per metre length  
of the grating = N =  $10^5$

S.No	Order of diffraction (m)	Distance of different orders from the Central Spot (x) m		Mean (x) m	Angle of diffraction $\theta = \tan^{-1}[x/D]$	$\lambda = \frac{\sin \theta_m}{Nm}$ Å
		Left	Right			
1	1	1.2	1.1	1.15	3.8673	6731 Å
2	2	2.4	2.3	2.35	7.8684	6886 Å
3	3	3.6	3.5	3.55	11.7939	6856 Å
4	4	4.8	4.7	4.75	15.6103	6805 Å

## Calculation:

### Mean (x) m

$$1. \quad 1.2 + 1.1 = \frac{2.3}{2} = \underline{1.15}$$

$$2. \quad 2.4 + 2.3 = \frac{4.7}{2} = \underline{2.35}$$

$$\theta = \tan^{-1}[x/D]$$

$$1. \quad \frac{x}{D} = \frac{1.15}{17} = \underline{0.0676}$$

$$\tan^{-1} 0.0676 = \underline{3.8673}$$

$$2. \quad \frac{x}{D} = \frac{2.35}{17} = \underline{0.1382}$$

$$\tan^{-1} 0.1382 = \underline{7.8684}$$

$$\lambda = \frac{\sin \theta_m}{Nm} \text{ Å}$$

$$1. \quad \frac{\theta_m}{Nm} = \frac{3.8673}{1} = \underline{3.8673}$$

$$\sin 3.8673 = \underline{6744 \text{ Å}}$$

$$2. \quad \frac{\theta_m}{Nm} = \frac{7.8684}{2} = \underline{3.9342}$$

$$\sin 3.9342 = \underline{6861 \text{ Å}}$$

$$d_1 = 15, d_2 = 20; a_1 = 3, a_2 = 4$$

$$\phi = \frac{(a_2 - a_1)}{2(d_2 - d_1)} = \frac{4 - 3}{2(20 - 15)} = \frac{1}{10} = \underline{0.1}$$