

Q3. A parallel beam of light is incident on a plane transmission grating having 3000 lines/cm. A third order diffraction is observed at 30° . Calculate the wavelength of the line.

Given:- $a+b = 1/3000$; $n=3$; $\theta=30$

Formula:- $(a + b)\sin \theta = n \lambda$, $n=1,2,3...$

Solution:- $\lambda = \frac{a+b}{n} \times \sin \theta$

$$= \frac{1}{3000 \times 3} \times \sin 30$$
$$= \frac{1}{9000 \times 2} = 5.555 \times 10^{-5} \text{ cm}$$

Ans:- The wavelength of the line is $5.555 \times 10^{-5} \text{ cm}$.