Exp - 4 MONOCHROMATIC SOURCE 8/8/16

AIM: To determine the wave length of given leaser source using the transmission diffraction grating method.

APPARATUS REQUIRED:

Laser structure, grating, scale with measurement

FORMULA:

2) there are N lines per mm of the grafting, then (d). the space between the two adjent line source is 10^{-5} m

$$d = \frac{1}{N}$$

The diffraction grafting formula for the principal maximum is:-

$$d \sin\theta = n\mu$$

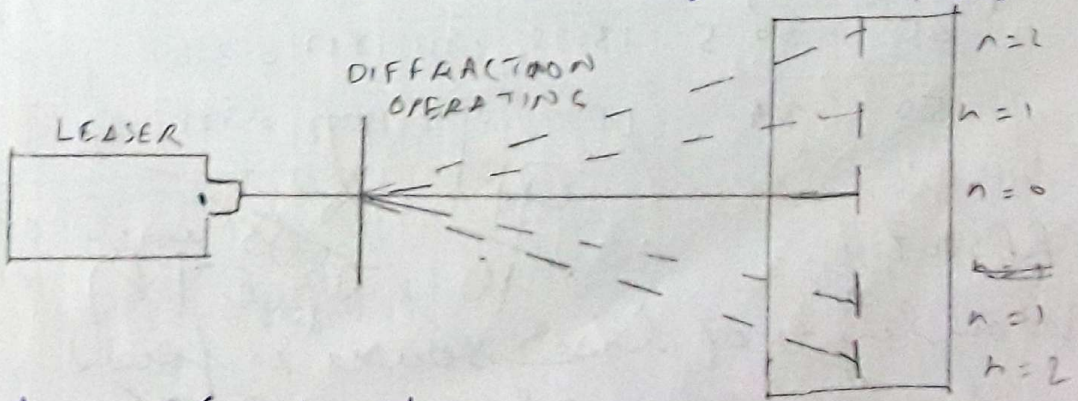
$$\mu = \frac{\sin\theta}{nN}$$

n = order of diffraction

θ = angle of diffraction

D = distance for grating to screen

d = spacing between any two lines



Least Count = 1 mm

Scanned by CamScanner

OBSERVATION TABLE :-

n	S (cm)	2L (cm)	L (cm)	$\tan\theta = L/S$	$\theta = \tan^{-1}(L/S)$	$\sin\theta$	mean	λ (cm)
1	30	3.8	1.9	0.063	3.604	0.062		
	35	4.3	2.15	0.06	3.43	0.06		
	40	~~4.7~~ 5.2	~~2.35~~ 2.6	0.065	3.71	0.064	0.0616	0.0616×10^{-5}
	45	5.6	2.8	0.062	3.54	0.061		
	50	6.2	3.1	0.062	3.54	0.061		
2	30	7.6	3.8	0.126	7.18	0.124		
	35	8.8	4.4	0.125	7.12	0.123		
	40	10.2	5.1	0.128	7.26	0.126	0.1256	0.0628×10^{-5}
	45	11.7	5.85	0.13	7.4	0.128		
	50	12.9	6.45	0.129	7.35	0.127		
3	30	11.5	5.75	0.191	10.8	0.187		
	35	13.3	6.65	0.19	10.75	0.186	0.1898	0.632×10^{-5}
	40	15.6	7.85	0.196	11.08	0.192		
	45	17.7	8.85	0.195	11.03	0.191		
	50	19.6	9.8	0.196	11.08	0.192		
4	30	15.3	7.65	0.255	14.3	0.246		
	35	18.1	9.05	0.258	14.3	0.248	0.2502	0.0630×10^{-5}
	40	21.1	10.55	0.264	14.73	0.254		
	45	23.9	11.95	0.265	14.86	0.256		
	50	26.7	13.35	0.267	14.84	0.257		
5	30	19.7	9.85	0.328	18.15	0.311		
	35	23	12.85	0.357	19.6	0.335		
	40	27.1	13.53	0.338	18.71	0.320	0.3249	0.0628×10^{-5}
	45	30.5	15.25	0.338	18.67	0.320		
	50	34	17	0.3[illegible]	18.97	0.321		

Mean: 0.0629×10^{-5}

9/10

RESULT :

Wavelength of laser source is found to be 0.0629×10^{-5} cm $\Rightarrow 6298.6 \times 10^{-10}$ m

Wavelength of laser source : 6298.6×10^{-10} m