Q1- Light from an argon laser strikes a diffraction grating that has 5310 grooves per cm. The center and the first order principal maxima are separated by 0.488 m on a wall 1.72 m from the grating. Determine the wavelength of the laser light.

The spacing between the adjacent grooves will be

a = 0.01/5310 m

The angular position θ for the first order maxima in a diffraction grating is given by

 $a^*sin\theta = \lambda$

Hence $\lambda = a^* \sin \theta = (0.01/5310)^* \frac{0.488}{\sqrt{0.488^2 + 1.72^2}}$

θ 1.72 m

Or $\lambda = 1.883 \times 10^{-6} \times 0.273 = 5.14 \times 10^{-7} \, \text{m}$

Q2- A helium-neon laser (λ =632 nm) is used to calibrate a diffraction grating. If the first order maximum occurs at 20.5 degree, what is the spacing between adjacent grooves in the grating?

For the first order maximum from a diffraction grating

 $a^*\sin\theta = \lambda$

or $a = \lambda / \sin \theta = 632^{*}10^{-9} / \sin 20.5^{0} = 1.80^{*}10^{-6} \text{ m}.$