

## Exemplar Problems

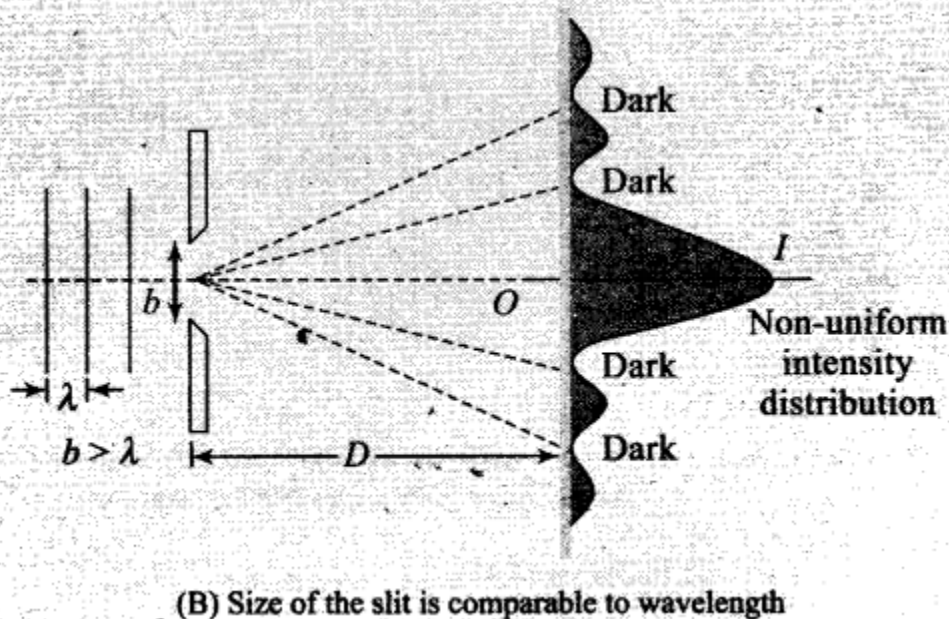
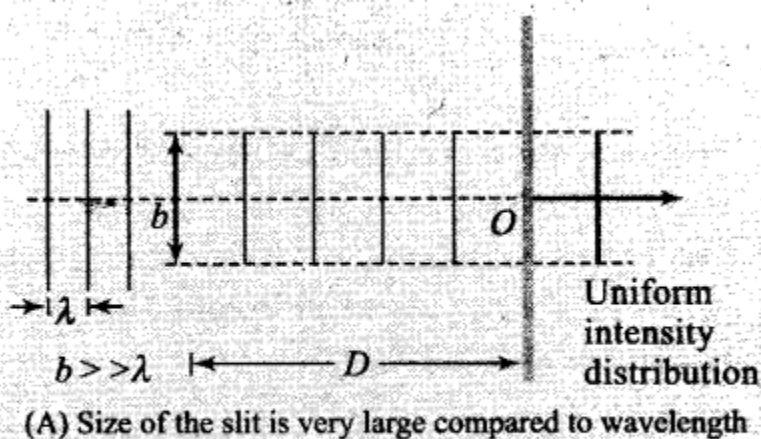
**Question 2.** Consider sunlight incident on a slit of width  $104 \text{ \AA}$ . The image seen through the slit shall

- (a) be a fine sharp slit white in colour at the centre
- (b) a bright slit white at the centre diffusing to zero intensities at the edges
- (c) a bright slit white at the centre diffusing to regions of different colours
- (d) only be diffused slit white in colour.

**Solution:** (a)

Key concept: –

Diffraction of Light is the phenomenon of bending of light around the comers of an obstacle/aperture of the size of the wavelength of light.



In figure (A), no diffraction phenomenon is observed as the size of slit is weary

large compared to wavelength. But in figure(B), there will be diffraction of light as size of slit is compared to the wavelength of light incident.

Here in the question it is given, width of the slit

$$b = 104 \text{ \AA} = 104 \times 10^{-10} \text{ m} = 10^{-6} \text{ m} = 1 \text{ \mu m}$$

Wavelength of (visible) sunlight varies from 4000 \AA to 8000 \AA.

Hence the width of slit is comparable to that of wavelength, hence diffraction occurs with maxima at centre. So, at the centre all colours appear, i.e., mixing of colours form white patch at the centre.

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