DIFFRACTION||

CHAPTER12||

SAMPLE QUESTIONS||

1. A. Differentiate between the interference and diffraction of light.

Ans::

Table 6.5 Difference between interference and diffraction

S.No.	Interference	Diffraction
1	Superposition of two waves	Bending of waves around edges
2	Superposition of waves from two coherent sources.	Superposition wavefronts emitted from various points of the same wavefront.
3	Equally spaced fringes.	Unequally spaced fringes
4	Intensity of all the bright fringes is almost same	Intensity falls rapidly for higher orders
5	Large number of fringes are obtained	Less number of fringes are obtained

B. What should be the required slit size to observe diffraction patterns?

Ans:: **The size of the slit must be of the order of size of the wavelength of the light used.**

C. Diffraction patterns are observed by using a beam of red light, what happens if the red light is replaced by blue light?

Ans:: **The wavelength of red light is greater than that of blue light so slit size will be much larger for blue light and slit size will not be of the order of wavelength of blue light. Hence, the pattern will not be observed.**

2. A. What do you mean by diffraction of light?

Ans:: **It is defined as the bending of light beams around the corners or edge of any obstacle.**

B. Write down the types of diffraction with definitions.

Ans:**: When the source of light and obstacle are at finite distance, the wavefronts are spherical and the pattern is complex. This diffraction is called Fresnel diffraction.**

When the source and the obstacle are at infinite distance, the wavefronts are plane and rays leaving the opening of slits are parallel. This is called Fraunhofer diffraction.

Continue……

SHORT QUESTIONS AND ANSWERS||DIFFRACTION||CHAPTER12||

1. A. What is Fraunhofer diffraction?

   Ans:: **When the source and the obstacle are at infinite distance, the wavefronts are plane and rays leaving the opening of slits are parallel. This is called Fraunhofer diffraction.**

   B. Explain formation of maxima and minima due to diffraction.

   C. Show that the width of central maxima is inversely proportional to the distance between the two slits.

2. A. What is the cause of diffraction?

   Ans:: **Diffraction is caused by one wave of light being shifted by a diffracting object. This shift will cause the wave to have interference with itself.**

   B. Why can we not observe diffraction patterns in a wide slit illuminated by a monochromatic light?

   Ans:: **To observe diffraction patterns the size of the slit must be of the order of wavelength of light used but when the slit is wider it is difficult to have a diffraction pattern.**

3. A. What happens to the fraunhofer single slit diffraction pattern if the whole apparatus is immersed into water?

   Ans:: **If the experiment is taken into the water, the wavelength of the light used will decrease. The width of the pattern is directly proportional to the wavelength of light so pattern width will decrease.**

   B. Radio waves diffract around buildings but light waves do not. Why?

   Ans:: **Radio waves have greater wavelength than the light waves which means radio waves can easily be diffracted around buildings but light waves do not.**

4. A. What is diffraction grating?

   Ans:: **A diffraction grating is a tool which consists of a large number of equally spaced, parallel slits of same width ruled on glass or polished metal plate.**

   B. Explain diffraction through diffraction grating and use it to determine wavelength.

5. A. What is the resolving power of an optical instrument?

   Ans:: **The resolving power of an optical instrument is the ability to produce distinctly separate images of two close objects.**

   B. Discuss the resolving power of an optical telescope and a microscope.

6. A. What is Rayleigh's criterion for the resolving power of an optical instrument?

   Ans:: **When the central maxima of one image falls on the first minimum of the second image, images are said to be just resolved. This is Rayleigh's criterion.**

   B. How does the resolving power of a telescope increase on increasing aperture of an objective lens?

   Ans:: **As we know the resolving power of telescope is**
   (1/1.22)(D/□)
   Which means resolving power is directly proportional to the diameter of an objective lens of a telescope. Hence, resolving power increases on increasing aperture of an objective lens.

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