1. What is diffraction ?
2. What are the essential conditions for diffraction to take place ?
3. "Diffraction of sound is very easily noticed but diffraction of light is not observed in day-to-day life." Why ?
4. What is diffraction pattern ?
5. What is the nature of the incident wavefront in Fresnel diffraction ?
6. Why do we use lenses in Fraunhofer diffraction ?
7. What is the nature of the incident wavefront in a Fraunhofer diffraction ?
8. In Fraunhofer diffraction at a single slit, pass monochromatic light through a rectangular slit. What is the nature of the slit image got on the screen ? If the width of the slit is very wide what would have been the nature of the image ?
9. How is central maximum produced in the Fraunhofer single slit diffraction pattern ?
10. Why do we get alternate maxima and minima of varying intensity in the diffraction pattern due to a single slit ?
11. In Fraunhofer diffraction at a single slit, what is the condition for getting the first secondary minimum. How will you explain its formation ? Use appropriate diagrams.
12. Explain the term secondary maxima with reference to the Fraunhofer diffraction at a single slit.
13. Name the factors on which the width of the central maxima depend, in the Fraunhofer diffraction pattern.
14. In Fraunhofer diffraction due to a single slit, the diffraction pattern is seen first using red light and then using violet light. Will there be any change in the diffraction pattern ? Explain.

15. Is it possible to have the same width for the central maxima in the Fraunhofer diffraction pattern when (*i*) blue, and (*ii*) yellow lights are used ? If yes, explain.
16. What is meant by angular half width of the central maximum ? What is full width ?
17. What is Fresnel's distance ?
18. Draw a diagram to show the variation of intensity on the diffraction pattern due to a single slit with $\sin\theta$.
19. What is the effect of diffraction on optical instruments ?
20. Discuss the diffraction effects at a straight edge.
21. Distinguish between interference and diffraction.
22. What is a plane transmission grating ?
23. How is a grating made ?
24. Give an example of diffraction grating ?
25. Using a diffraction grating is it possible to get more than one principal maxima ? If so how ?
26. Draw a diagram to show the variation of intensity with angle of diffraction pattern in a grating.
27. What is the maximum number of order that can be obtained using a diffraction grating ?
28. What is grating element ?
29. What is meant by 'corresponding points' in a grating ?
30. Write down the grating law ?
31. How will you increase the angular width of the diffraction pattern observed in a grating ?

[Selected from the previous years ISC, AISSCE, HSSCE, Various State Boards Qns. and NCERT text.]

1. Light of wavelength 5900 Å falls normally on a slit of width 11.8×10^{-7} m. The resulting diffraction pattern is received on a screen. Calculate angular position of the first minimum. Also find the angular width of the central maximum. [**Ans.** 60°]

2. Light of wavelength 6000 Å from a distant source falls on a slit 0.5 mm wide. What is the distance between the two dark bands on each side of the central band of the diffraction pattern observed on a screen placed 2.0 m from the slit ? [**Ans.** 4.8×10^{-3} m]

3. A plane transmission gravity having 8000 lines per cm is being used at normal incidence. Find the longest wavelength which can be observed in the first order. [**Ans.** 12500 Å]

4. A slit of width 'a' is illuminated by a light of wavelength 5500 Å. What will be the value of 'a' when (a) the first minimum falls at an angle of diffraction of 30°. (b) the first minimum maximum falls at an angle of diffraction of 30°. [**Ans.** 1.1×10^{-6} m, 1.65×10^{-6} m]

5. Red light of wavelenght 6500 Å from a distant source falls in a slit 0.50 mm wide. What is the distance between the two dark bands on each side of the central bright band of the diffraction pattern observed on a screen placed 1.8 m from the slit ? [**Ans.** 4.68 mm]

6. Light of wavelength 600 nm is incident on an apperture of size 2 mm. Calculate the distance upto which the ray of light can travel, such that its spread is less than the size of the aperture. [**Ans.** 6.67]

7. A slit 400 cm wide is irradiated with microwave of wavelength 2.0 cm. Find the angular spread of central maxima assuming incidence normal to the plane of the slit. [**Ans.** ±30°]

8. In Fraunhofer diffraction monochromatic light of wavelength 6000 Å is passed through a single slit of width 1 mm. Upto what distance can ray optics be applied to a good approximation. [**Ans.** 1.67 m]

9. On a slit of width 2.2×10^{-5} cm monochromatic light of wavelength 6500 Å is allowed to fall normally. Find the angular positions of the first two mixima on either side of the central maxima. [**Ans.** ±17.16°, ±36.22°]

10. Plane waves of $\lambda = 6.01 \times 10^{-5}$ cm, falls normally on straight slit of width 0.20 mm. Calculate the total angular width of the central maximum and also the linear width as observed on a scre[illegible] 2m away. [**Ans.** 3×10^{-3} rad, 12×10^{-3} m]