CHAPTER = 13 PHYSICAL OPTICS
MULTIPLE CHOICE QUESTIONS (BOOK XI)

1 If the wavelength of an electromagnetic wave is about the diameter of a cricket ball, what type of radiation is it?

a) X-ray
b) Ultraviolet
c) Radio waves
d) Visible light

2 Electromagnetic waves from an unknown source in space are found to be diffracted when passing through gaps of the order of 10^{-5} m, which type of wave are they most likely to be?

a) microwaves
b) Ultraviolet
c) Radio waves
d) infra-red waves

3 Huygens's conception of secondary waves

a) helps us to find the focal length of a thick lens
b) is a geometrical method to find a wavefront
c) is used to determine the velocity of light
d) is used to explain the polarization of light

4 Interference fringes are produced using monochromatic light of the same intensity from a double slit screen. If the intensity of light emerging from one of the slits is reduced, the effect on the interference pattern will be

a) All the dark and bright fringes become brighter.
b) All the dark and bright fringes become darker.
c) Bright fringes become brighter and dark fringes become darker.
d) Bright fringes become darker and dark fringes become brighter.

5 In Young's experiment when the distance between slits and screen is doubled, while the separation of slits is halved, then the fringe width will be;

a) 4 times
b) ¼ times
c) doubled
d) unchanged

6 A ray of light passes from air into water. Striking the surface of the water with an angle of incidence 45°. Which of these quantities change as the light enters the water?
i)Wavelength ii) frequency iii) speed of propagation iv) direction of propagation

a) i and ii only.
b) iii and iv only.
c) i, iii, and iv only.
d) all of them.

7 A hill separates a television (TV) transmitter from a house. The Transmitter cannot be seen from the house but still, the TV in the house has good reception. What wave phenomena make it possible?

a) Coherence of waves
b) Diffraction of waves
c) Interference of waves
d) Refraction of waves

8 Monochromatic light is incident on a diffraction grating and a diffraction pattern is observed. Which effect is observed by replacing the grating with one that has more lines per millimeter.

a) The number of maxima decreases with a decrease in angle between first and second-order maxima.

b) The number of maxima decreases with an increase in angle between first and second-order maxima.

c) The number of maxima increases with a decrease in angle between first and second-order maxima.

d) **The number of maxima increases with an increase in angle between first and second-order maxima.**

9 Optically active substances are those substances which

a)produce polarized light

b) rotate the plane of polarization of polarized light

c) produce double refraction

d) convert a plane-polarized light into circularly polarized light

10 Plane polarized light is passed through a Polaroid. On viewing through the Polaroid we find that when Polaroid is given one complete rotation about the direction of light

a) The intensity of light, gradually decreases to zero and remains at zero.

b)The intensity of light, gradually increases to a maximum and remains at maximum.

c) There is no change in the intensity of light.

d)The intensity of light, varies such that it is twice maximum and twice zero.

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EXAMS PRACTICE MULTIPLE CHOICE QUESTIONS

1. When both the point source and the screen are placed at a finite distance from the point source and the screen and placed at phenomenon is called:

a) Fresnel diffraction **b) Fraunhofer diffraction**

c) Huygens diffraction d) Newton diffraction

2. Diffraction of lights is a special type of:

a) Reflection b) Refraction

c) Interference d) Polarization

3. In the Michelson Interferometer, a semi-silvered plate is used to obtain:

a) Dispersion **b) Phase coherence**

c) Monochromatic light d) Unpolarized light

4 Which of the following is not electromagnetic waves?

a) X-rays b) Radio waves

c) Ultraviolet **d) α-rays**

5 The condition for interference in thin films is reserved because of:

a) Small thickness of films b) Refraction

c) Phase reversal d) reflection

6. Which of the following demonstrates the transverse nature of light is provided by:

a) Interference **b) Polarization**

c) Diffraction d) Refraction

7. Light possesses:

a) Transverse nature b) Electromagnetic character

c) Dual nature **d) All of these**

8. The evidence of the transverse nature of light is provided by:

a) Polarization b) Diffraction

c) Interference d) Dispersion

9. In thin films destructive interference occurs when the path difference is:

a) An odd multiple of half-wavelength

b) Only an even multiple of wavelength

c) An integral multiple of wavelength

d) None of the above

10. The number of lines rules per centimeter on a diffraction grating is 4000. Its grating element is:

a) 2.5×10^{-4} m **b) 2.5×10^{-6} m**

c) 4×10^{-3} m d) 4×10^{3} m

11. The Wave Theory of Light cannot explain:

a) Polarization **b) Photoelectric effect**

c) Interference d) Diffraction

12. Which of the following equations represents the Bragg's Law?

a) $m\lambda = 2d \sin\theta$ b) $m\lambda = d \sin\theta/2$

c) $m\lambda = d\sin2\theta$ d) $2\, m\, \lambda = d\sin2\theta$

13. The characteristics properties of light that do not change with the medium are:

a) Frequency b) Wavelength

c) Velocity d) none of these

14. The appearance of color in soap bubbles is due to:

a) Polarization b) Diffraction

c) Reflection **d) Interference**

15. In thin film interference the position of construction interference and destructive interference are interchanged due to:

a) Phase coherence **b) Phase reversal**

c) Diffraction d) Interference

16. The bending of light at the sharp corners of an obstacle is called:

a) Interference b) Polarization

c) Diffraction d) Refraction

17. Electromagnetic waves consist of an oscillatory electric field and a magnetic field, Both fields are:

a) Parallel to each other

b) Parallel to the direction of propagation

c) Perpendicular to each other

d) None of these

18. When Two waves of the same amplitude are added constructively, the intensity becomes

a) Double b) Half

c) Four Times d) One-Fourth

19. If instead of monochromatic light white light is used for interference of light, what would be the change in the observation?

a) The pattern will not be visible

b) The shape of the pattern will change from hyperbolic to circular

c) Colored fringes will be observed with a white bright fringe at the center

d) The bright and dark fringes will change position

20. The dispersion of white light after passing through the prism is due to:

a) Different intensities b) Different amplitudes

c) Different temperatures **d) Different wavelengths**

21. 1. What changes are observed in a diffraction pattern if the whole apparatus is immersed in water?

a) The Wavelength of light increases

b) Width of central maximum increases

c) Width of central maximum decreases

d) Frequency of light decreases

22. In young's double-slit experiment the fringe spacing is:

a) $d\lambda$ **b) $\lambda L/d$**

c) $\lambda/4$ d) 2λ

23. How shall a diffraction pattern change when white light is used instead of a monochromatic light?

a) The pattern will no longer be visible

b) The shape of the pattern will change from hyperbolic to circular

c) The colored pattern will be observed with a white bright fringe at the center

d) The bright and dark fringes will change position

24. Colours in thin soap films are due to:

a) Refraction of light b) Diffraction of light

c) Interference of light d) Scattering of light

25. To replace a bright fringe by the next bright in Michelson's Interferometer, the moveable mirror is moved through a distance equal to:

a) λ **b) $\lambda/2$**

c) $\lambda/4$ d) 2λ