DPP

DAILY PRACTICE PROBLEMS

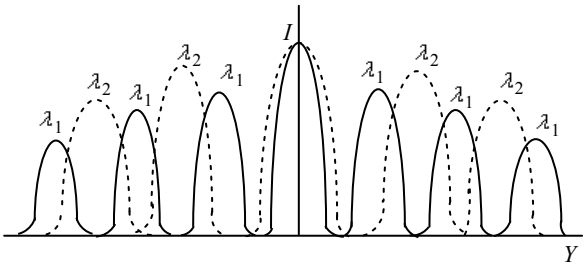
Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 10**

Topic :-WAVE OPTICS

1. In a single slit diffraction experiment first minimum for red light (660 nm) coincides with first maximum of some other wavelength λ'. The value of λ' is
   a) 4400 Å b) 6600 Å c) 2000 Å d) 3500 Å
2. In Young's double slit experiment with sodium vapour lamp of wavelength 589 nm and the slits 0.589 mm apart, the half angular width of the central maximum is
   a) $\sin^{-1} 0.01$ b) $\sin^{-1} 0.0001$ c) $\sin^{-1} 0.001$ d) $\sin^{-1} 0.1$
3. Infrared radiation was discovered in 1800 by
   a) William Wollaston b) William Herschel c) Wilhelm Roentgen d) Thomas Young
4. By Huygen's wave theory of light, we cannot explain the phenomenon of
   a) Interference b) Diffraction c) Photoelectric effect d) Polarization
5. A single slit is used to observe diffraction pattern with red light. On replacing the red light with violet light the diffraction pattern would
   a) Remain unchanged b) Become narrower c) Become broader d) Disappear
6. The width of the diffraction band varies
   a) Inversely as the wavelength
   b) Directly as the width of the slit
   c) Directly as the distance between the slit and the screen
   d) Inversely as the size of the source from which the slit is illuminated

7. The angular width of the central maximum of the diffraction pattern in a single slit (of width $'a'$) experiment, with λ as the wavelength of light is
   a) $\frac{3\lambda}{2a}$ b) $\frac{\lambda}{2a}$ c) $\frac{2\lambda}{a}$ d) $\frac{\lambda}{a}$

8. Following diffraction pattern was obtained using a diffraction grating using two different wavelengths λ_1 and λ_2. With the help of the figure identify which is the longer wavelength and their ratios.



a) λ_2 is longer than λ_1 and the ratio of the longer to the shorter wavelength is 1.5
b) λ_1 is longer than λ_2 and the ratio of the longer to the shorter wavelength is 1.5
c) λ_1 and λ_2 are equal and their ratio is 1.0
d) λ_2 is longer than λ_1 and the ratio of the longer to the shorter wavelength is 2.5

9. The ozone layer absorbs
a) Infrared radiations b) Ultraviolet radiations c) X-rays d) γ-rays

10. A plane electromagnetic wave is incident on a material surface. If the wave delivers momentum p and energy E, then
a) $p = 0, E = 0$ b) $p \neq 0, E \neq 0$ c) $p \neq 0, E = 0$ d) $p = 0, E \neq 0$

11. The magnetic field in a plane electromagnetic wave is given by
$B_y = 2 \times 10^{-7} \sin(0.5 \times 10^3 x + 1.5 \times 10^{11} t)$
This electromagnetic wave is
a) A visible light b) An infrared wave c) A microwave d) A radio wave

12. The radiation pressure (in N/m^2) of the visible light is of the order of
a) 10^{-2} b) 10^{-4} c) 10^{-6} d) 10^{-8}

13. The phenomenon of interference is shown by
a) Longitudinal mechanical waves only b) Transverse mechanical waves only
c) Electromagnetic waves only d) All the above types of waves

14. In Young's double slit experiment we get 60 fringes in the field of view of monochromatic light of wavelength 4000Å. If we use monochromatic light of wavelength 6000 Å, then the number of fringes obtained in the same field of view are
a) 60 b) 90 c) 40 d) 1.5

15. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is
a) Polarized b) Of longer wavelength
c) Of shorter wavelength d) Of high intensity

16. Three observers A,B and C measure the speed of light coming from a source to be v_A,v_B and v_C. The observer A moves towards the source, the observer C moves away from the source with the same speed. The observer B stays stationary, the surrounding space is vacuum every where. Then
a) $v_A > v_B > v_C$ b) $v_A < v_B < v_C$ c) $v_A = v_B = v_C$ d) $v_A = v_B > v_C$

17. Intensities of the two waves of light are I and $4I$. The maximum intensity of the resultant wave after superposition is
    a) $5\ I$ b) $9\ I$ c) $16\ I$ d) $25\ I$
18. The waves of wavelength 5900 Å emitted by any atom or molecule must have some finite total length which is known as coherence length. For sodium light, this length is 2.4 cm. The number of oscillations in this length will be
    a) 4.068×10^8 b) 4.068×10^4 c) 4.068×10^6 d) 4.068×10^5
19. If white light is used in a biprism experiment then
    a) Fringe pattern will be disappears
    b) All fringe will be coloured
    c) Central fringe will be white while others will be coloured
    d) Central fringe will be dark
20. If separation between screen and source is increased by 2%, what would be the effect on the intensity
    a) Increases by 4% b) Increases by 2% c) Decreases by 2% d) Decreases by 4%