PHYSICS

BOOKS - SAI PHYSICS (TELUGU ENGLISH)

WAVES OPTICS

MCQ

1. Two coherent sources of intensity ratio $9:4$ produce interference. The intensity ratio of

maxima and minima of the interference pattern is

A. $13:5$

B. $5:1$

C. $25:1$

D. $3:2$

Answer: c

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2. Through a narrow slit of width 2 mm, diffraction pattern is formed on a screen kept at a distance 2 m from the slit. The wavelength of the light used is 6330 A and falls normal to the slit and screen. Then, the distance between the two minima on either side of the central maximum is

A. 12.7 mm

B. 1.27 mm

C. 2.532 mm

D. 25.3 mm

Answer: b

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3. In a double slit interference experiment, the fringe width obtained with a light of wavelength 5900 A was 1.2 mm for parallel narrow slits placed 2 mm apart. In this arrangement if the slit separation is increased

by one-and-half times the previous value, then the fringe width is

A. 0.9 mm

B. 0.8 mm

C. 1.8 mm

D. 1.6 mm

Answer: b

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4. Two coherent point sources S, and S, vibrating in phase emit light of wavelength X. The separation between them is 2X as shown in figure. The first bright fringe is formed at P due to interference on a screen placed at a distance D from S1 $(D > > A)$, then OP is

A. $\sqrt{D}$

B. 1.5D

C. $\sqrt{3}D$

D. 2D

Answer: c

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5. Calculate the wavelength of the K_a line for z = 31, when $a = 5 \times 10^7 Hz^{\frac{1}{2}}$ for a characteristic X-ray spectrum.

A. $1.33\overset{\circ}{A}$

B. 1.33nm

C. $133 \times 10^{-10} m$

D. 133nm

Answer: a

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6. In the Young's double slit experiment, the resultant intensity at a point on the screen is 75% of the maximum intensity of the bright fringe. Then the phase difference between the two interfering rays at that point is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: c

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7. In an optical fibre, core and cladding were made with materials of refractive indices 1.5 and 1.414 respectively. To observe total

internal reflection, what will be the range of incident angle with the axis of optical fibre?

A. $0^\circ - 60^\circ$

B. $0^\circ - 48^\circ$

C. $0^\circ - 30^\circ$

D. $0^\circ - 82^\circ$

Answer: c

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8. The diameter of objective of a telescope is 1 m. Its resolving limit for the light of wavelength 4538 $\overset{\circ}{A}$, will be

A. $5.54 \times 10^{-7} rad$

B. $2.54 \times 10^{-4} rad$

C. $6.54 \times 10^{-7} rad$

D. None of these

Answer: a

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9. Two coherent sources whose intensity ratio is $64:1$ produce interference fringes. The ratio of intensities of maximum and minima is

A. $9:7$

B. $8:1$

C. $81:49$

D. $81:7$

Answer: c

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10. In the young's double slit experiment, the intensities at two points $P(1)$ and P_2 on the screen are respectively I_1 and I_2. If P_1 is located at the centre of a bright fringe and P_2 is located at a distance equal to a quarter of fringe width from P_1, then $\frac{I_1}{I_2}$ is

A. 2

B. $\frac{1}{2}$

C. 4

D. 16

Answer: a

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11. In young's double slit experiment, the 10th maximum of wavelength λ_1, is at a distance of y_1 from the central maximum. When the wavelength of the source is changed to λ_2, 5^{th} maximum is at a distance of y_2 from its central maximum. The ratio $\left(\frac{y_1}{y_2}\right)$ is

A. $\frac{2\lambda_1}{\lambda_2}$

B. $\frac{2\lambda_2}{\lambda_1}$

C. $\frac{\lambda_1}{2\lambda_2}$

D. $\frac{\lambda_2}{2\lambda_1}$

Answer: a

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12. Four light sources produce the following four waves

(i) $y_1 = a\sin(\omega t + \phi_1)$

(ii) $y_2 = a\sin 2\omega t$

(iii) $y_3 = a' \sin(\omega t + \phi_2)$

(iv) $y_1 = a \sin(\omega t + \phi_1)$

Superposition of which two waves give rise to interference?

A. (i)and(ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (iii) and (iv)

Answer: c

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13. Statement (S): Using Huygen's eyepiece measurement can be taken but are not correct.

Reason (R): The cross wires, scale and final image are not magnified proportionately because the image of the object is magnified by two lenses, whereas the cross wire scale is magnified by one lens only.

A. Both (A) and (R) are true, (R) explains (A)

B. Both (A) and (R) are true, but (R) cannot explains (A)

C. Only (A) is correct, but is wrong

D. Only (A) is correct, but is wrong

Answer: a

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14. If Fraunhofer diffraction experiment, L is the distance between screen and the obstacle, b is the size of obstacle and X is wavelength of

incident light. The general condition for the applicability of Fraunhofer diffraction is

A. $\frac{b^2}{L\lambda} > > 1$

B. $\frac{b^2}{L\lambda} = 1$

C. $\frac{b^2}{L\lambda} < < 1$

D. $\frac{b^2}{L\lambda} \neq 1$

Answer: c

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15. In Huygen's eyepiece

A. The cross wires are outside the eyepiece

B. Condition for achromatism is satisfied

C. Condition for minimum spherical aberration is not satisfied

D. The image formed by the objective is a virtual image

Answer: b

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16. In Young's double slit experiment, first slit has width four times the width of the second slit. The ratio of the maximum intensity to the minimum intensity in the interference fringe system is

A. $2:1$

B. $4:1$

C. $9:1$

D. $8:1$

Answer: c

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17. A light ray of wavelength X is passing through a pin hole of diameter D and the effect is observed on a screen placed at a distance L from the pin hole. The approximation of geometrical optics are applicable if

A. $D \leq \lambda$

B. $\frac{L\lambda}{D^2} = 1$

C. $\frac{L\lambda}{D^2} > > 1$

D. $\frac{L\lambda}{D^2} < < 1$

Answer: c

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18. Consider the following statements A and B and identify the correct answer.

A. Fresnel's diffraction pattern occurs when the source of light or the screen on which the

diffraction pattern is seen or when both are the finite distance from the aperture.

B. Diffracted light can be used to estimate the helical structure of nuclei acids.

A. A and B are true

B. A and B are false

C. A is true but B is false

D. A is false but B is true

Answer: c

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19. In Young's double slit experiment, an interference pattern is obtained on a screen by a light of wavelength 6000 $\mathring{A}$ coming from the coherent sources S_1 and S_2. At certain point P on the screen third dark fringe is formed. Then, the path difference $S_1P - S_2P$ in micron is

A. 0.75

B. 1.5

C. 3

D. 4.5

Answer: b

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20. Consider the following statements A and B. Identify the correct choice in the given answer

A. The refractive index of the extraordinary ray depends on the angle of incidence in the double refraction.

B. The vibration of light waves acquire one

sided ness of both ordinary and extraordinary rays in double refraction.

A. A and B are wrong

B. A and B are correct

C. A is correct B is wrong

D. A is wrong B is correct

Answer: b

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21. In Young's double slit interference experiment the wavelength of light used is 6000 $\overset{\circ}{A}$ .If the path difference between waves reaching a point P on the screen is 1.5μ, then at that point P.

A. Second bright band occurs

B. Second dark band occurs

C. Third dark band occurs

D. Third bright band occurs

Answer: c

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22. Light waves producing interference have their amplitudes in the ratio $3:2$. The intensity ratio of maximum and minimum of interference fringes is

A. $36:1$

B. $9:4$

C. $25:1$

D. $6:4$

Answer: c

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23. The difference in the number of wavelengths, when yellow light propagates through air and vacuum columns of the same thickness, is one. The thickness of the air column is: (Refractive index of air $\mu_a = 1.0003$,Wavelength of yellow light in vacuum = 6000 $\overset{\circ}{A}$)

A. 1.8 mm

B. 2 mm

C. 2 cm

D. 2.2 cm

Answer: b

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