Physics

Subject: Engineering Physics (EAS-101 [redacted])

OBJECTIVE TYPE QUESTIONS

Prof (Dr.) H.K. SAHJWANI

Q.1 In Young's double slit experiment, the intensity ratio of two sources is 9:1.
The amplitude ratio of the two sources and intensity ratio of maximas and minimas of interference pattern are

(a) 3:1 and 9:1 (b) 81:1 and 3:1
(c) 3:1 and 4:1 (c) 3:1 and 1:4

Q2 The ratio of intensities of maxima and minima in an interference pattern are in the ratio of 49:9, what is the ratio of intensities of two coherent sources used.

(a) 7:3 (b) 49:9 (c) 5:2 (d) 25:4

Q.3 For a line source the wave front is

(a) Plane at small distance and cylindrical at large distance
(b) Spherical at small distance and cylindrical at large distance
(c) cylindrical at small and large distance
(d) cylindrical at small distance but plane at large distance.

Q4. (a) White light is used to illuminate two slits in Young's double slit experiment. The separation between slits is 'b' and the screen is at a distance $d (\gg b)$ from slits. At a point on the screen, in front of one of the slits, certain wavelengths are missing. Some of these missing wavelengths are

(a) $\lambda = \frac{b^2}{3d}$ (b) $\lambda = \frac{2b^2}{d}$ (c) $\frac{b^2}{d}$ (d) $\frac{2d^2}{b}$

Q.5 A parallel monochromatic beam of light is incident normally on a narrow slit. A diffraction pattern is formed on a screen perpendicular to the direction of the incident beam. At the first minimum of the diffraction pattern, the phase difference between two extreme rays of slit is

(a) zero (b) 2π (c) π (d) $\pi/2$

Q.6 A beam of light of $\lambda = 600$ nm from a distant source falls on a single slit 1.00 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between first dark finges on either side of central maxima is

(a) 1.2 cm (b) 600 nm (c) 1.2 mm (d) 2.4 mm

Q(7) In Newton ring experiment diameters of Newton's rings are proportional to

(a) $\sqrt{n}$ for bright rings

(b) $\sqrt{2n+1}$ for dark rings

(c) $\sqrt{2n+1}$ for dark as well as bright rings

(d) $\sqrt{n}$ for dark rings.

Q(8) Maximum number of order of spectrum which can be observed by diffraction grating is given by

(a) $\frac{a+b}{\lambda}$ (b) $\frac{\lambda}{a+b}$ (c) $(a+b)\lambda$ (d) $\frac{(a+b)\cos\theta}{\lambda}$

where a+b is grating element.

Q(9) The condition for observing Fraunhoffer diffraction from single slit is that wave front incident on the slit should be

(a) spherical (b) Plane (c) elliptical (d) cylindrical.

Q(10) Yellow light is used in a single slit Fraunhoffer diffraction with slit width 0.6mm. If yellow light is replaced by ultra violet (UV) rays then

(a) Pattern will become narrow

(b) Pattern will become wider

(c) Diffraction pattern will disappear

(d) Intensity of all fringes will increase on the screen

Q(11) Light is completely polarised in reflection at angle of incidence given by

(a) $\mu = \tan\theta_p$ (b) $\mu = \tan\theta_c$ (c) $\mu > \tan\theta_p$ (d) $\mu < \tan\theta_c$

where θ_p and θ_c are Brewster and critical angles respectively.

Q(12). Polarisation shows that

(a) Light is particle in nature

(b) Light is transverse wave

(c) Light is longitudinal wave

(d) Light has dual nature of Particle as well as wave.

Q(13) For differentiating between mixture of unpolarised light and plane polarised light from elliptically polarised light we use

(a) Quarter wave plate (b) half wave plate (c) polarimeter

(d) Full wave plate

Q(14) Choose the correct statement

(a) ordinary ray has vibration ∥ to principal section
(b) ordinary ray has vibrations perpendicular to principal section
(c) Extra ordinary ray has vibrations parallel to principal section.
(d) Extra ordinary ray has vibration ⊥ to p-section

Q(15). when light (unpolarised) is allowed to fall on surface of transparent medium at polarising angle then

(a) Both reflected and transmitted rays are completely polarised
(b) Reflected ray will be partially polared & transmitted rays are completely polarised
(c) Both reflected and transmitted rays are partially polarised.
(d) Reflected ray is completely polarised where as transmitted light is partially polarised.

Q(16). Two Nicol prisms are first crossed and then one of them is rotated through 60°. The percentage of incident light transmitted is

(a) 1.25 (b) 25.0 (c) 37.5 (d) 50.

Q(17) In optical fibre, the relation between refractive indices μ_1 of core and μ_2 of cladding is

(a) $\mu_1 = \mu_2$ (b) $\mu_1 > \mu_2$ (c) $\mu_1 < \mu_2$ (d) $\mu_1 = \frac{1}{2}\mu_2$.

Q(18) Core diameter in step index monomode fibre (SMF) and multi-mode fibres are of the ranges

(a) 5-10 μm & 10-20 μm (b) 30-50 μm & 10-20 μm
(c) 5-10 μm & 50-80 μm (d) 20-30 μm & 50 to 80 μm.

Q(19) Amount of pulse broadening in multimode step index fibre is expressed as

(a) $\Delta\tau = \frac{\mu_2 l}{2c}\Delta^2$ (b) $\Delta\tau = \frac{\mu_1 l \Delta}{c}$ (c) $\Delta\tau = \frac{2c}{\mu_2 l}\Delta^2$ (d) $\Delta\tau = \frac{c}{\mu_1 l}\Delta$

Q(20) The reduction in amplitude and intensity of a signal as it is guided through an optical fibre is called

(a) Dispersion (b) attenuation (c) diffusion (d) scattering

Q(21) Modal dispersion in a single mode step index fibre is

(a) Greater than that of multimode fibre (MMF)
(b) equal to MMF (c) Almost zero (d) may be larger or smaller than MMF

(22) Propagation of light through fibre core depends upon

- (a) Refraction (b) Interference (c) Polarisation (d) Total internal reflection

(23) Energy losses in communication through optical fibre are

(a) Absorption losses (b) Rayleigh scattering losses
(c) Bending losses (d) All the above

(24). Attenuation losses are measured in
(a) Joules (b) Joule per second per km
(c) decibel/km (d) decibel.

(25) For communication through optical fibre the angle of incidence θ with axis of optical fibre & acceptance angle α are such that
(a) $\alpha = \theta$ (b) $\alpha \leq \theta$ (c) $\alpha \geq \theta$ (d) $\alpha = \theta^2$

(26) For a massless particle
(a) $v = c$ (b) $v > c$ (c) $v < c$ (d) $v = 0$

(27) Energy and momentum of massless particle are given by
(a) p/c & EC (b) pc & E/c
(c) p/c & E/c (d) pc & EC

(28) Relativistic energy and momentum are related by
(a) $E = p^2/2m$
(b) $E = \frac{1}{3} p^2/2m$
(c) $E = \sqrt{pc + m_0c^2}$
(d) $E^2 = p^2c^2 + m_0^2c^4$

(29) If KE of a fast moving particle (relativistic) is twice its rest mass energy then
(a) $m = 2m_0$ (b) $m = m_0$ (c) $m = 3m_0$ (d) $m = 4m_0$

(30) If a body moves with such a velocity so that its length reduces by $\frac{3}{4}$th of its original length then
(1) $v = \frac{c}{\sqrt{2}}$ (2) $v = \frac{\sqrt{3}}{2}c$ (c) $v = \sqrt{2}\,c$ (d) $v = \frac{2}{\sqrt{3}}c$