

Model Question Paper (Dr. Pankaj)

B.Tech First Semester - 2008 - 09

Subject - Physics - I

Section - A

Objective Type Questions :

Ques.1 In Young's experiment if the distance between the slit is halved and the distance of screen from the slit is doubled, then the fringe width will :

- (a) Remain same (b) Reduced to Half
(c) Be Doubled (d) Increase to four times

Ques.2 Interference is possible :

- (a) only by the longitudinal waves
(b) only by the Transverse waves
(c) Both by the longitudinal and Transverse wave
(d) None of these waves

Ques.3 The shape of the fringes obtained in a wedge-shaped film is

- (a) circular (b) Elliptical (c) straight (d) curved

Ques.4 Newton's fringes are :

- (a) circular and localised in the film
(b) circular and formed at infinity
(c) Elliptical and localised in the film
(d) Hyperbolic and localised in the film.

Ques.5 The essential condition for the Fraunhofer class diffraction is that :

- (a) The incident wave front must be plane
(b) The incident wave front must be spherical

- (c) Both the incident and diffracted wavefront be plane
 (d) All the above

Ques-6 In Newton's ring experiment, it is essential that :

- (a) The white light from a narrow slit falls normally on the film
 (b) The light from an extended source is incident normally on the film.
 (c) The white light falls normally on the film
 (d) The light from an extended source is incident normally on the film.

Ques-7 If in a plane grating, the width of the slit is equal to the width of its opaque part, the missing spectrum will be the :

- (a) First order (b) Second order (c) Third order
 (d) First and second orders

Ques-8 The condition of maxima in the two slit diffraction is :

- (a) $a \sin \theta = n \lambda$ (b) $(a+b) \sin \theta = n d$
 (c) $(a+b) \sin \theta = \frac{\lambda}{n}$ (d) $a \sin \theta = \lambda/n$

Ques-9 The intensity at central maxima due to diffraction from N slits when compared to the intensity at central maxima due to diffraction at a single slit, is :

- (a) N times (b) N^2 times (c) Equal (d) Less

Ques-10 The maximum number of spectrum obtained by a grating is given by :

- (a) $\frac{2(e+d)}{\lambda}$ (b) $\frac{\lambda}{(e+d)}$ (c) $\frac{e+d}{\lambda}$ (d) $\sqrt{e+d}$

Ques-11 The resolving power of \therefore grating can be increased:

- (a) By increasing the order of spectrum
- (b) By increasing the number of lines on grating
- (c) By increasing the order of spectrum and the number of lines on grating
- (d) By increasing the ruled width of grating

Ques-12 A uni-axial double refracting crystal is:

- (a) Calcite (b) Topaz (c) Aerogonite (d) All the above

Ques-13 A plane polarised light incident on a quarter wave plate and the polarisation makes an angle 45° with optic axis. The emergent light is:

- (a) Circularly Polarised (b) Elliptically Polarised
- (c) unpolarised (d) Plane Polarised

Ques-14 In a uni-axial positive crystal:

- (a) $\mu_o = \mu_e$ (b) $\mu_o > \mu_e$ (c) $\mu_o < \mu_e$ (d) $\mu_o = 2\mu_e$

Ques-15 The correct statement is:

- (a) Light waves are the electromagnetic waves
- (b) Light waves are the electromagnetic transverse waves with vibration in all directions
- (c) Polarised light waves have the property of symmetry about the direction of propagation of wave
- (d) Sound waves in air can be polarised

Ques-16 On passing the circularly polarised light through a quarter wave plate, the emergent light is:

- (a) Plane polarised (b) unpolarised (c) circularly polarised (d) Elliptically polarised

Ques-17 The half wave plate produces a phase difference between the O- and E-waves equal to:

- (a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$ (c) π (d) $\frac{\pi}{4}$

Ques-18 On passing the plane polarised light through a quarter wave plate, circularly polarised light is obtained only if the angle between the optic axis of plate and plane of polarisation is:

- (a) 0° (b) 45° (c) 90° (d) 270°

Ques-19 The light beam when passed through a rotating Nicol, there is no variation in intensity of emergent light. The light beam is

- (a) unpolarised (b) Plane Polarised (c) Elliptically polarised (d) Circularly polarised or unpolarised

Ques-20 The angle of rotation of plane of polarisation by a solution of length 'l' and concentration 'c' is:

- (a) Directly proportional to 'l' and inversely proportional to 'c'
(b) Directly proportional to both 'l' and 'c'
(c) Inversely proportional to l and directly proportional to 'c'
(d) Inversely proportional to both 'l' and 'c'.

Ques-21 The ratio between the number of atoms N_2 in the excited energy state E_2 at an absolute temperature T and number of atoms N_1 in the ground energy state E_1 is:

- (a) $e^{(E_2-E_1)/KT}$ (b) $e^{E_2/KT}$ (c) $e^{E_1/KT}$ (d) $e^{-(E_2-E_1)/KT}$

Ques-22 For laser action, the minimum number of energy states of activated substance should be:

- (a) 1 (b) 2 (c) 3 (d) zero

Ques-23 The wavelength of He-Ne laser is

- (a) 6328 \AA (b) 5000 \AA (c) 6943 \AA (d) 6000 \AA

Ques-24 Pulse laser is

- (a) Ruby laser (b) He-Ne laser (c) Chemical laser (d) Semiconductor laser

Ques-25 The postulates of special theory of relativity are applicable to

- (a) Stationary frame (b) Accelerated frames
(c) Inertial frame (d) None of these

Ques-26 The special theory of relativity shows that the Newtonian mechanics is valid at

- (a) All velocities (b) Velocities nearer to that of light
(c) Velocity much smaller than that of light
(d) Velocity in the ultra relativistic range

Ques-26 Two photons recede from each other. Their relative velocity will be

- (a) zero (b) $c/2$ (c) $2c$ (d) c

Ques-27 An inertial frame of reference must

- (a) Be at absolute rest (b) Be in absolute motion
(c) Not accelerate (d) Be attached to an observer

Ques-28 The kinetic energy of a body is twice its rest mass energy. Then the ratio of relativistic mass to rest mass of the body is

- (a) 2 (b) 3 (c) $1/2$ (d) $1/3$

Ques-29 Two photons of light are approaching each other, their relative speed is

- (a) zero (b) $c/2$ (c) c (d) Less than c

Ques-30 Michelson Morley experiment was performed to

- (a) Measure speed of light (b) To prove existence of ether
(c) To measure speed of earth relative to ether
(d) To test the isotropy of space

Ques-31 Decay of μ -meson supports

- (a) Length contraction (b) Time dilation
(c) Relativity of mass (d) Relativity of energy

Ques-32 Optical fibre is made from

- (a) Glass (b) Plastic (c) Steel (d) Either (a) & (b)

Ques-33 Optical fibre is based on the principle of:

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

Ques-34 Holography was invented by:

- (a) Denis Gabor (b) Hertz (c) T. H. Maiman
(d) Einstein

Ques-35 In optical fibre the refractive index of core is:

- (a) Greater than cladding (b) Less than cladding
(c) Equal to cladding (d) None of these

Ques-36 The angle of acceptance cone:

- (a) θ_0 (b) $2\theta_0$ (c) $\theta_0/2$ (d) $\theta_0/4$

Ques-37 In optical fibre the propagation angle of light must be equal to or less than the,

- (a) Acceptance angle (b) Incident angle
(c) Critical angle (d) Refraction

Ques-38 The value of numerical aperture ranges from

- (a) 0.13 to 0.50 (b) 0.1 to 0.15 (c) Equal to 2

(d) Equal to 5

Ques-39 The maximum number of modes supported by step-index fibre:

- (a) $N = \frac{V^2}{2}$ (b) $N = \frac{V^2}{4}$ (c) $N = V^2$ (d) $N = 0$

Ques-40 The value of normalized frequency for step index fibre:

- (a) $V = 2.405$ (b) 2.451 (c) 2.350 (d) 2.50