1. **A ray of light of intensity *I* is incident on a parallel glass-slab at a point *A* as shown in fig. It undergoes partial reflection and refraction. At each reflection 25% of incident energy is reflected. The rays *AB* and *A'B'* undergo interference. The ratio  is**

*I*

*A*

*B*

*B* ′

*A* ′

C

(a) 4 : 1 (b) 8 : 1

(c) 7 : 1 (d) 49 : 1

1. **A thin slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a flat glass plate as shown. The observed interference fringes from this combination shall be**

(a) Straight

(b) Circular

(c) Equally spaced

(d) Having fringe spacing which increases as we go outwards

1. **In the adjacent diagram, CP represents a wavefront and *AO* & *BP*, the corresponding two rays. Find the condition on *θ* for constructive interference at *P* between the ray *BP* and reflected ray *OP***

*C*

*Q*

*R*

*θ*

*P*

*B*

*A*

*θ*

*d*

*O*

(a) cos*θ* = 3*λ/*2*d*

(b) cos*θ* = *λ*/4*d*

(c) sec*θ* – cos*θ* = *λ*/*d*

(d) sec*θ* – cos*θ* = 4*λ*/*d*

1. **In an interference arrangement similar to Young's double slit experiment, the slits *S*1 and *S*2 are illuminated with coherent microwave sources each of frequency 106 *Hz*. The sources are synchronized to have zero phase difference. The slits are separated by distance *d* = 150 *m*. The intensity *I*is measured as a function of θ, where θ is defined as shown. If *I*0 is maximum intensity, then  for is given by**

*d/*2

*d/*2

*θ*

*S*1

*S*2

(a) for 

(b) for 

(c) for 

(d)  is constant for all values of *θ*

1. **In the Young's double slit experiment, if the phase difference between the two waves interfering at a point is *φ*, the intensity at that point can be expressed by the expression**

(a)  (b) 

(c)  (d) 

Where *A* and *B* depend upon the amplitudes of the two waves.

1. **Figure here shows *P* and *Q* as two equally intense coherent sources emitting radiations of wavelength 20 *m*. The separation *PQ* is 5.0 *m* and phase of *P* is ahead of the phase of *Q* by 90o. *A*, *B* and *C* are three distant points of observation equidistant from the mid-point of *PQ*. The intensity of radiations at *A*, *B*, *C* will bear the ratio**

*C*

*P*

*Q*

*A*

*B*

(a) 0 : 1 : 4

(b) 4 : 1 : 0

(c) 0 : 1 : 2

(d) 2 : 1 : 0

1. **In Young's double slit experiment, the intensity on the screen at a point where path difference is λ is *K*. What will be the intensity at the point where path difference is **

(a)  (b)  (c) *K* (d) Zero

1. **When one of the slits of Young’s experiment is covered with a transparent sheet of thickness 4.8 *mm*, the central fringe shifts to a position originally occupied by the 30th bright fringe. What should be the thickness of the sheet if the central fringe has to shift to the position occupied by 20th bright fringe**

(a) 3.8 *mm* (b) 1.6 *mm* (c) 7.6 *mm* (d) 3.2 *mm*

1. **In the ideal double-slit experiment, when a glass-plate (refractive index 1.5) of thickness *t* is introduced in the path of one of the interfering beams (wavelength *λ*), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is**

(a) 2*λ* (b)  (c)  (d) *λ*

1. **The time period of rotation of the sun is 25 days and its radius is . The Doppler shift for the light of wavelength 6000 Å emitted from the surface of the sun will be**

(a) 0.04 Å (b) 0.40 Å (c) 4.00 Å (d) 40.0 Å

1. **In hydrogen spectrum the wavelength of  line is 656 *nm* whereas in the spectrum of a distant galaxy,  line wavelength is 706 *nm*. Estimated speed of the galaxy with respect to earth is**

(a)  (b)  (c)  (d) 

1. **The periodic time of rotation of a certain star is 22 days and its radius is 7 × 108 *metres*. If the wavelength of light emitted by its surface be 4320 Å, the Doppler shift will be (1 day = 86400 *sec*)**

(a) 0.033 Å (b) 0.33 Å (c) 3.3 Å (d) 33 Å

1. **In a two slit experiment with monochromatic light fringes are obtained on a screen placed at some distance from the sits. If the screen is moved by  towards the slits, the change in fringe width is . If separation between the slits is , the wavelength of light used is**

(a) 6000 *Å* (b) 5000 *Å* (c) 3000 *Å* (d) 4500 *Å*

1. **In the figure is shown Young’s double slit experiment. *Q* is the position of the first bright fringe on the right side of *O*. *P* is the 11th fringe on the other side, as measured from *Q*. If the wavelength of the light used is , then  will be equal to**

*S*1

*S*2

*O*

*Q*

*P*

Slit

*B*

(a) 

(b) 

(c) 

(d) 

1. **In Young’s double slit experiment, the two slits act as coherent sources of equal amplitude *A* and wavelength *λ*. In another experiment with the same set up the two slits are of equal amplitude *A* and wavelength *λ* but are incoherent. The ratio of the intensity of light at the mid-point of the screen in the first case to that in the second case is**

(a) 1 : 2 (b) 2 : 1 (c) 4 : 1 (d) 1 : 1

1. **Two coherent sources separated by distance *d* are radiating in phase having wavelength *λ*. A detector moves in a big circle around the two sources in the plane of the two sources. The angular position of *n* = 4 interference maxima is given as**

(a) 

*d*

*S*1

*S*2

(b) 

(c) 

(d) 

1. **Two coherent sources *S*1 and *S*2 are separated by a distance four times the wavelength *λ* of the source. The sources lie along *y* axis whereas a detector moves along + *x* axis. Leaving the origin and far off points the number of points where maxima are observed is**

(a) 2 (b) 3 (c) 4 (d) 5

1. **A circular disc is placed in front of a narrow source. When the point of observation is at a distance of 1 *meter* from the disc, then the disc covers first HPZ. The intensity at this point is *I*0. The intensity at a point distance 25 *cm* from the disc will be**

(a)  (b)  (c)  (d) 

1. **A wavefront presents one, two and three HPZ at points *A*, *B* and *C* respectively. If the ratio of consecutive amplitudes of HPZ is 4 : 3, then the ratio of resultant intensities at these point will be**

(a) 169 : 16 : 256 (b) 256 : 16 : 169 (c) 256 : 16 : 196 (d) 256 : 196 : 16

1. **A circular disc is placed in front of a narrow source. When the point of observation is 2 *m* from the disc, then it covers first HPZ. The intensity at this point is *I*. When the point of observation is 25 *cm* from the disc then intensity will be**

(a)  (b)  (c)  (d) 

1. **Angular width of central maxima in the Fraunhoffer diffraction pattern of a slit is measured. The slit is illuminated by light of wavelength 6000 Å. When the slit is illuminated by light of another wavelength, the angular width decreases by 30%. The wavelength of this light will be**

(a) 6000 Å (b) 4200 Å (c) 3000 Å (d) 1800 Å

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

1. **The ratio of intensities of consecutive maxima in the diffraction pattern due to a single slit is**

(a) 1 : 4 : 9 (b) 1 : 2 : 3 (c)  (d) 

1. **A beam of natural light falls on a system of 6 polaroids, which are arranged in succession such that each polaroid is turned through 30° with respect to the preceding one. The percentage of incident intensity that passes through the system will be**

(a) 100% (b) 50% (c) 30% (d) 12%

1. **A beam of plane polarized light falls normally on a polarizer of cross sectional area . Flux of energy of incident ray in 10–3 *W.* The polarizer rotates with an angular frequency of 31.4 *rad/sec*. The energy of light passing through the polarizer per revolution will be**

(a) 10–4 *Joule* (b) 10–3 *Joule* (c) 10–2 *Joule* (d) 10–1 *Joule*

1. **In a YDSE bi-chromatic light of wavelengths 400 *nm* and 560 *nm* are used. The distance between the slits is 0.1 *mm* and the distance between the plane of the slits and the screen is 1*m*. The minimum distance between two successive regions of complete darkness is**

(a) 4 *mm* (b) 5.6 *mm* (c) 14 *mm* (d) 28 *mm*

1. **The maximum number of possible interference maxima for slit-separation equal to twice the wavelength in Young’s double-slit experiment is**

(a) Infinite (b) Five (c) Three (d) Zero

1. **The *k* line of singly ionised calcium has a wavelength of 393.3 *nm* as measured on earth. In the spectrum of one of the observed galaxies, this spectral line is located at 401.8 *nm*. The speed with which the galaxy is moving away from us, will be**

(a) 6480 *km/s* (b) 3240 *km/s* (c) 4240 *km/sec* (d) None of these

1. **A Young's double slit experiment uses a monochromatic source. The shape of the interference fringes formed on a screen is**

(a) Straight line (b) Parabola (c) Hyperbola (d) Circle

1. **If  is the intensity of the principal maximum in the single slit diffraction pattern, then what will be its intensity when the slit width is doubled**

(a)  (b)  (c)  (d) 