# Engineeing Physics

# UNIT 1A

Q. Interference of light is evidence that
A. the speed of light is very large
B. light is a transverse wave
C. light is electromagnetic in character
D. light is a wave phenomenon
Ans. D

Q. Interference occurs when two (or more) waves meet while travelling along the
A. Different medium
B. Same medium
C. Two medium
D. Many medium
Ans. B

Q. During the interference of light, energy is
A. Created at maxima
B. Destroyed at the minima
C. Not conserved
D. Redistributed
Ans. D

Q. In Huygen's wave theory the locus of all points in same phase is
A. A ray
B. A half period zone
C. A wave front
D. A vibration
Ans. C

Q. The wave front originating from a rectilinear slit is called
A. Cylindrical wave front
B. Spherical wave front
C. Circular wave front
D. None of these
Ans. A

Q. The two waves are said to be coherent when the phase difference between them is
A. Constant
B. Zero or constant
C. $90^0$
D. Changing continuously.
Ans. B

Q. Which of the following is conserved when light waves interfere?
A. Amplitude
B. Intensity
C. Energy
D. Momentum
Ans. C

Q. Two light sources are said to be coherent if they are obtained from
A. Two ordinary bulbs
B. Two wide sources
C. Two independent point sources
D. A single point source
Ans. D

Q. To demonstrate the phenomenon of interference
A. Two sources which emit radiation of same frequency are required.
B. Two sources which emit radiation of same frequency and have a constant phase difference are required.
C. Two sources which emit radiation are required of nearly same frequency are required.
D. Two sources which emit radiation of different wavelengths
Ans. B

Q. For sustained interference of light, the two sources should
A. be close to each other
B. be narrow
C. have a same amplitude
D. have a constant phase difference
Ans. D

Q. For maxima and minima to be sharp
A. The source must be narrow
B. The source must be broad
C. The distance between the slits and the screen should be large
D. The interfering waves should have equal amplitudes
Ans. D

Q. Intensity of light depends upon
A. Wavelength
B. Amplitude
C. Frequency
D. Velocity
Ans. B

Q. Two waves of same amplitude 'A' and same frequency are reaching a point simultaneously. What should be the phase difference between the two waves so that the amplitude of the resultant wave be '2A'.
A. $90^0$
B. $120^0$
C. $0^0$
D. $180^0$
Ans. C

Q. Two sources of intensities *I* and *4I* are used to produce interference. The resultant intensity of *5I* is obtained where phase difference is
A. $\pi$
B. $2\pi/3$
C. $\pi/2$
D. zero
Ans. D

Q. Two sources of intensities *I* and *4I* are used to produce interference. The resultant intensity of *5I* is obtained where phase difference is
A. $\pi$
B. $2\pi$
C. 0
D. both B and C
Ans. D

Q. The condition that is absolutely necessary/must/unavoidable for producing a steady state interference pattern is
A. Coherence
B. Monochromatic
C. Equal amplitudes
D. Point source
Ans. A

Q. A complete and precise definition of interference where all the necessary conditions are satisfied is
A. Superposition of two waves
B. Superposition of any number of waves
C. Superposition of waves resulting into modification of intensity
D. Superposition of wave fronts and redistribution of intensity into alternate maxima and minima
Ans. D

Q. Two coherent monochromatic light beams of intensities *I* and *4I* are superposed. The maximum and minimum possible intensities in the resultant beam are
A. *5I* and *I*
B. *5I* and *3I*
C. *3I* and *I*
D. *9I* and 3*I*
Ans. B

Q. The two waves of intensity *I* and *4I* are superpose. The ratio of maximum to minimum intensity is
A. 9:1
B. 5:3
C. 5:1
D. 4:1
Ans. B

Q. Ratio of intensities of two waves is 25:4. Then the ratio of maximum to minimum intensity will be
A. 5:2
B. 4:25
C. 25:4
D. 49:9
Ans. D

Q. In an interference pattern energy is
A. Created at position of maxima
B. Destroyed at position of maxima
C. Conserved but redistributed
D. Not conserved
Ans. C

Q. Two coherent sources whose intensity ratio is 81:1 produce interference fringes. What is the ratio of their amplitudes?
A. 10:1
B. 9:1
C. 8:1
D. 9.9:1
Ans. B

Q. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. $(2n-1)\,\lambda/2$
B. $(2n-1)\,\lambda/4$
C. $n\lambda$
D. $(2n+1)\,\lambda/2$
Ans. C

Q. For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. $(2n-1)\,\lambda/3$
B. $(2n-1)\,\lambda/4$
C. $n\lambda$
D. $(2n+1)\,\lambda/2$
Ans. D

Q. For destructive interference to take place between two monochromatic light waves of wavelength $2\lambda$, the path difference should be,
A. $2n\lambda$
B. $(2n-1)\lambda/4$
C. $(2n-1)\lambda$
D. $(2n+1)\lambda/2$
Ans. C

Q. One beam of coherent light travels path $P_1$ in arriving at point Q and another coherent beam travels path $P_2$ in arriving at the same point. If these two beams are to interfere destructively, the path difference $P_1 - P_2$ must be equal to
A. an odd number of half-wavelengths.
B. zero.
C. a whole number of wavelengths.
D. a whole number of half-wavelengths.
Ans. A

Q. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. Very large
B. Very Small
C. Integral multiple of wavelength λ
D. Odd multiple of wavelength λ
Ans. C

Q. For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. Very large
B. Very Small
C. Integral multiple of wavelength λ
D. Odd multiple of half the wavelength λ
Ans. D

Q. Two waves of same frequency and amplitude meet at a point where they are 180° out of phase. Which of the following is incorrect?
A. They superimpose, resulting in zero intensity.
B. Their amplitudes subtract, resulting in zero amplitude.
C. Destructive interference occurs.
D. Their energy at that point disappear and thus the energy of the waves after interference is half that of the original waves.
Ans. D

Q. When interference takes place
A. Only maxima is produced
B. Only minima is produced
C. Maxima and Minima is not produced
D. None of the above
Ans. D

Q. For maxima and minima to be sharp
A. The source must be narrow
B. The source must be broad
C. The interfering waves should have equal amplitudes

D. The distance between the slits and the screen should be large
Ans. C

Q. Two waves originating from sources $S_1$ and $S_2$ having zero phase difference and common wavelength λ will show completely destructive interference at a point P if ($S_1P$ - $S_2P$) is
A. $5\lambda$
B. $3\lambda/4$
C. $2\lambda$
D. $11\lambda/2$
Ans. D

Q. For two coherent waves $y_1 = a_1 \sin\omega$ and $y_2 = a_2 \sin\omega$ having zero phase difference between them, the resultant intensity due to interference is
A. $(a_1 - a_2)^2$
B. $(a_1 + a_2)^2$
C. $({a_1}^2 - {a_2}^2)$
D. $({a_1}^2 + {a_2}^2)$
Ans. D

Q. For two interfering waves $y_1 = a\cos\omega$ and $y_2 = b\cos(\omega + \Phi)$, destructive interference at the point of observation takes place if $\Phi$ equals
A. $\pi$
B. $\pi/2$
C. 0
D. None of these
Ans. A

Q. In which of the following the interference is produced by division of amplitude method
A. Uniform thickness film
B. Non-uniform thickness film
C. Newton's rings
D. All above
Ans. D

Q. In which of the following the interference is produced by division of wave front method.
A. Uniform thickness film
B. Non-uniform thickness film
C. Newton's rings
D. None of these
Ans. D

Q. The thin film interference is based on
A. Division of wavelength
B. Division of wavefront
C. Division of intensity
D. None of the above
Ans. C

Q. The thin film interference is based on
A. Division of amplitude
B. Division of wavelength
C. Division of wavefront
D. Division of frequency
Ans. A

Q. If the path difference between the two interfering waves is *2λ,* the phase difference between them is equal to
A. $2\pi$
B. $\pi$
C. $3\pi$
D. $4\pi$
Ans. D

Q. If the path difference between the two interfering waves is *λ,* the phase difference between them is equal to
A. $2\pi$
B. $\pi$
C. $3\pi$
D. $4\pi$
Ans. A

Q. If the path difference between the two interfering waves is $3\lambda/2$ ,the phase difference between them is equal to
A. $2\pi$
B. $\pi$
C. $3\pi$
D. $4\pi$
Ans. C

Q. If the path difference between the two interfering waves is $\lambda/2$ ,the phase difference between them is equal to
A. $2\pi$
B. $\pi$

C. $3\pi$
D. $4\pi$
Ans. B

Q. The phase difference between two points $x$ distance apart of a light wave of wavelength $\lambda$ entering a medium of refractive index $\mu$ from air is
A. $\mu \frac{2\pi}{\lambda} x$
B. $(\mu - 1) \frac{2\pi}{\lambda} x$
C. $\frac{1}{(\mu-1)} \frac{2\pi}{\lambda}$
D. $\frac{1}{\mu} \frac{2\pi}{\lambda} x$
Ans. A

Q. When light wave suffers reflection at the interface between glass and air incident through glass, a change of phase of the reflected wave is,
A. Zero
B. $\pi/2$
C. $\pi$
D. $2\pi$
Ans. A

Q. When light wave suffers reflection at the interface between glass and air incident through air, a change of phase of the reflected wave is,
A. Zero
B. $\pi/2$
C. $\pi$
D. $2\pi$
Ans. C

Q. According to Stokes's law the phase of the light is reversed when the light is
A. Reflected from the surface of denser medium
B. Reflected from the surface of rarer medium
C. Transmitted from denser to rarer medium
D. Transmitted from rarer to denser medium
Ans. A

Q. According to Stoke's law the phase of the light is not reversed when
A. Light is reflected from the surface of denser medium
B. Light is reflected from medium from medium of very high refractive index to medium of very low refractive index
C. Light is reflected from denser medium to relatively less denser medium
D. Light is reflected from the surface of rarer medium
Ans. D

Q. The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional path difference between them is
A. $\pm \lambda/2$
B. $\lambda/2$
C. $2\lambda$
D. $3\lambda/2$
Ans. A

Q. The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional phase difference between them is
A. $2\pi$
B. $\pi$
C. $3\pi$
D. $3\pi/2$
Ans. B

Q. The two monochromatic and coherent interfering rays, both originated by reflection at rare medium then the additional path difference between them is
A. $\lambda/2$
B. $\lambda$
C. 0
D. $3\lambda/2$
Ans. C

Q. The two monochromatic and coherent interfering rays, both originated by reflection at denser medium then the additional path difference between them is

A. $\lambda/2$

B. 0

C. $\lambda$

D. $3\lambda/2$

Ans. B

Q. If light travels a distance 't' in a medium of refractive index 'μ' then its equivalent optical path travelled in that medium is given by

A. 2μt

B. μt

C. $\mu t/2$

D. $3\mu t/2$

Ans. B

Q. The optical path covered by a light wave in a particular medium depends upon

A. Refractive index

B. Length of medium

C. Refractive index and length of medium

D. Directly proportional to refractive index and inversely proportional to length of medium

Ans. C

Q. A light wave travels a distance '*d*' in a medium of refractive index '$\mu$'. When a distance is made half, then the refractive index is,

A. Remains same

B. Doubled

C. Become Half

D. None of these

Ans. A

Q. A light wave travels a distance '*d*' in a medium of refractive index '$\mu$'. When a distance is reduced to $d/2$ and the medium is replaced by a medium having refractive index '$2\mu$' then the optical path covered by the light will

A. Remains same

B. Doubled

C. Become Half

D. None of these

Ans. A

Q. When the light is diffracted from the edge of the obstacle it bends in the region of

A. Geotechnical shadow

B. Geographical shadow

C. Geometrical shadow

D. Geological shadow

Ans. C

# UNIT 1B

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor ±λ/2 will be present, when

A. one of the ray is reflected from denser medium and another from rarer medium

B. both the rays are reflected from denser medium

C. both the rays are reflected from rarer medium

D. None of the above

Ans. A

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor ±λ/2 will be present, when

A. the medium above the film and below the film is denser than the film

B. the medium above the film is denser and medium below the film is rarer

C. the medium below the film is denser and medium above the film is rarer

D. None of the above

Ans. A

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor ±λ/2 will be present, when

A. the medium above the film is denser and medium below the film is rarer

B. the medium above the film is rarer and medium below the film is denser

C. the medium above the film and below the film is rarer than the film
D. None of the above
Ans. C

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor $\pm\lambda/2$ will be absent, when
A. When upper ray and lower ray is reflected from denser medium
B. When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
C. When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
D. None of the above
Ans. A

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor $\pm\lambda/2$ will be absent, when
A. When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
B. When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
C. When the upper ray and lower ray is reflected from rarer medium.
D. None of the above
Ans. C

Q. In the equation for path difference of a thin film for reflected system ($p.d. = 2\mu t cos r$) the factor $\pm\lambda/2$ will be absent, when
A. The medium above the film is rarer and medium below the film is rarer
B. When the medium above the film denser and medium below the film is denser
C. When the medium above the film is denser and medium below the film is rarer
D. None of the above
Ans. C

Q. In interference experiment monochromatic light is replaced by white light, we will see
A. uniform illumination of screen
B. uniform darkness on screen
C. equally spaced white and dark bands
D. few colour bands and general illumination
Ans. D

Q. In rainy days the oily films spread on the rod appear colored because
A. The rays entering in the film are reflected back and interfere constructively and destructively.
B. The oily film contains various pigments which are colored
C. Certain colors are reflected and certain colors are absorbed.
D. The thin film acts as a dispersive device like a prism and hence disperses the light into spectrum.
Ans. A

Q. If the days are not rainy then on dry roads the films are not observed colored because
A. The film is maximumly absorbed in the road and the color producing pigments are also absorbed
B. The thickness of the film becomes very much lesser than the wavelength of the light and such films can't produce interference pattern
C. On dry road the thin films becomes excessively rough and hence can't produce the interference pattern
D. The films on the dry road can't reflect the light, the light is completely absorbed in the film
Ans. B

Q. In a uniform thickness thin film all the reflected rays are
A. Parallel
B. Anti-parallel
C. Perpendicular
D. Inclined
Ans. A

Q. In a uniform thickness thin film all the transmitted rays are
A. Anti-parallel
B. Perpendicular
C. Parallel
D. Inclined
Ans. C

Q. In a non-uniform thickness thin film all the reflected rays are
A. Parallel
B. Anti-parallel
C. Not-parallel
D. None of these
Ans. C

Q. In uniform thickness thin film the reflected rays are parallel to each other. They superimpose on each other because
A. The film thickness is comparable with the wavelength of light.
B. The film is very thin
C. Incident light rays are parallel
D. The rays interfere in the eyes of the observer
Ans. D

Q. In reflected light the condition for darkness for uniform thickness film is
A. $2\mu t cosr = {2n\lambda}/{2}$
B. $2\mu t cosr = {n\lambda}/{2}$
C. $2\mu t cosr = (2n+1)\,{\lambda}/{2}$
D. $2\mu t cos(r+\theta) = n\lambda$
Ans. A

Q. In reflected light the condition for brightness for uniform thickness film is
A. $2\mu t cosr = {2n\lambda}/{2}$
B. $2\mu t cosr = {n\lambda}/{2}$
C. $2\mu t cosr = (2n+1)\,{\lambda}/{2}$
D. $2\mu t cos(r+\theta) = n\lambda$
Ans. C

Q. In transmitted light the condition for darkness for uniform thickness film is
A. $2\mu t cosr = {2n\lambda}/{2}$
B. $2\mu t cosr = {n\lambda}/{2}$
C. $2\mu t cosr = (2n+1)\,{\lambda}/{2}$
D. $2\mu t cos(r+\theta) = n\lambda$
Ans. C

Q. In transmitted light the condition for brightness for uniform thickness film is
A. $2\mu t cosr = {2n\lambda}/{2}$
B. $2\mu t cosr = {n\lambda}/{2}$
C. $2\mu t cosr = (2n+1)\,{\lambda}/{2}$
D. $2\mu t cos(r+\theta) = n\lambda$
Ans. A

Q. In uniform thickness film the conditions for brightness and darkness in reflected light and transmitted light are
A. Same
B. For brightness same but for darkness opposite.
C. Opposite
D. For darkness same but for brightness opposite.
Ans. C

Q. In uniform thickness film the conditions for brightness in reflected light and darkness in transmitted light are
A. Same for all wavelengths
B. Same but only for monochromatic light
C. Opposite for all wavelengths
D. Opposite but only for monochromatic light
Ans. A

Q. The uniform thickness film which appears bright for a light of particular wavelength in reflected light will appear --------- in transmitted light for the same wavelength.
A. Dark
B. Bright
C. Blue
D. Red
Ans. A

Q. When white light is incident normally on a soap film of thickness $5\times10^{-5}cm$ having refractive index 1.33, the

wavelength/s of maximum intensity which are reflected are
A. 26600 $A^0$
B. 3800 $A^0$
C. Both a and b
D. Neither a nor b
Ans. C

Q. When white light is incident normally on a soap film of thickness $5 \times 10^{-5} cm$ having refractive index 1.33, the wavelength/s of maximum intensity which are reflected in visible region are
A. 26600 $A^0$
B. 3800 $A^0$
C. 5320 $A^0$
D. All above.
Ans. C

Q. When white light is incident normally on a soap film of thickness $5 \times 10^{-5} cm$ refractive index 1.33, the longest wavelength of maximum intensity which is reflected is
A. 26600 $A^0$
B. 3800 $A^0$
C. 5320 $A^0$
D. None of above
Ans. A

Q. To view colours or fringes on the whole thin film it is necessary to have
A. clean source of light
B. broad source of light
C. point source of light
D. all above
Ans. B

Q. If monochromatic light is incident on the uniform thickness thin film with different angle of incidence, in the reflected light on the film we can see
A. Dark bands
B. Bright bands
C. Alternate Dark and bright bands
D. Half film dark and half film bright.
Ans. C

Q. 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. The observed interference fringes from this combination shall be
A. Circular
B. Straight
C. Equally spaced
D. None of these
Ans. B

Q. The interfering fringes are formed by a thin film of oil on water are seen in yellow light from a sodium light. The fringes are
A. Black and white
B. Yellow and black
C. Coloured
D. Coloured but without yellow
Ans. A

Q. Oil floating on water looks coloured due to interference of light. The approximate thickness of oil for such effect to be visible is
A. 1000 $A^0$
B. 10000 $A^0$
C. 1 mm
D. 1 cm
Ans. B

Q. A very thin film in reflected light appears
A. Coloured
B. Black
C. White
D. Yellow
Ans. B

Q. A thin layer of colour less oil having refractive index 1.4 is spread over water in a container. If the light of wavelength 6400 $A^0$ is absent in the reflected light, what is the minimum thickness of the oil layer?
A. 2100 $A^0$
B. 1900 $A^0$
C. 2285 $A^0$
D. 100 $A^0$
Ans. C

Q. A parallel beam of white light falls on a thin film whose refractive index is 1.33.

if the angle of refraction is $30^0$ then the thickness of the film for the reflected light to be coloured yellow ($\lambda$=6000 $A^0$) most intensively will be
A. $26(2n + 1)\ \mu m$
B. $2.6(2n + 1)\ \mu m$
C. $0.26(2n + 1)\ \mu m$
D. $260(2n + 1)\ \mu m$
Ans. C

Q. What is the least thickness of the soap film of refractive index 1.38 which will appear black when viewed with sodium light of wavelength 589.3 nm reflected perpendicular to the film?
A. 10000 $A^0$.
B. 617 nm
C. 428 nm
D. 213.5 nm
Ans. D

Q. Colours in the thin films are because of
A. Dispersion
B. Diffraction
C. Interference
D. None of them.
Ans. C

Q. When viewed in white light, soap bubbles shows colours because of
A. Scattering
B. Dispersion
C. Interference
D. Diffraction
Ans. C

Q. A stationary thin film observed in white light. The colour of thin film seen at a particular point depends upon the
A. Width of the source
B. Distance of the source
C. Location of the observer
D. None of the above
Ans. C

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 $A^0$. In the interference pattern of reflected light, which wavelength of light will be absent for second order?
A. 5500 $A^0$
B. 5000 $A^0$
C. 4000 $A^0$
D. 5005 $A^0$
Ans. B

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 $A^0$. In the interference pattern of transmitted light, which wavelength of light will be present for second order?
A. 4000 $A^0$
B. 5000 $A^0$
C. 6000 $A^0$
D. 7000 $A^0$
Ans. B

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 $A^0$. In the interference pattern of reflected light, which wavelength of light will be present for second order?
A. 5500 $A^0$
B. 5000 $A^0$
C. 4000 $A^0$
D. 5005 $A^0$
Ans. C

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 $A^0$. In the interference pattern of transmitted light, which wavelength of light will be absent for second order?
A. 4000 $A^0$
B. 5000 $A^0$
C. 6000 $A^0$
D. 7000 $A^0$
Ans. A

Q. When monochromatic light falls on a excessively thin film the in the reflected light the film will appear
A. Yellow
B. Dark
C. White

D. Blue
Ans. B

Q. A thin film having thickness t << λ is seen in white light. It will appear
A. White
B. Red
C. Violet
D. Black
Ans. D

Q. The loss of intensity due to reflection can be reduced substantially by coating the glass surface with a uniform film of optical thickness
A. $\lambda/2$ and $\mu$ less than that of glass
B. $\lambda/2$ and $\mu$ greater than that of glass.
C. $\lambda/4$ and $\mu$ less than that of glass
D. $\lambda/4$ and $\mu$ greater than that of glass.
Ans. A

Q. The reflectivity of the glass surface can be enhanced by coating it with a uniform film of optical thickness
A. $\lambda/2$ and $\mu$ less than that of glass
B. $\lambda/2$ and $\mu$ greater than that of glass.
C. $\lambda/4$ and $\mu$ less than that of glass
D. $\lambda/4$ and $\mu$ greater than that of glass.
Ans. A

Q. The reflectivity of the glass surface can be reduced by coating it with a uniform film of optical thickness
A. $\lambda/2$ and $\mu$ less than that of glass
B. $\lambda/2$ and $\mu$ greater than that of glass.
C. $\lambda/4$ and $\mu$ less than that of glass
D. $\lambda/4$ and $\mu$ greater than that of glass.
Ans. C

Q. The loss of intensity due to reflection can be increased substantially by coating the glass surface with a uniform film of optical thickness
A. $\lambda/2$ and $\mu$ less than that of glass
B. $\lambda/2$ and $\mu$ greater than that of glass.
C. $\lambda/4$ and $\mu$ less than that of glass
D. $\lambda/4$ and $\mu$ greater than that of glass.
Ans. C

Q. The glass surface can be made completely reflecting for a light of particular wavelength when a thin uniform thickness film is coated on it having refractive index
A. Greater than glass plate
B. Less than glass plate
C. Less than glass plate but greater than air
D. Greater than glass plate but less than air.
Ans. C

Q. A thin film of $M_gF_2$ of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely reflecting for the light of wavelength 5890 $A^0$
A. $1.31 \times 10^{-7} m$
B. $2.13 \times 10^{-7} m$
C. $3.21 \times 10^{-7} m$
D. $2.31 \times 10^{-7} m$
Ans. B

Q. A thin film of $M_gF_2$ of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely non-reflecting for the light of wavelength 5890 $A^0$
A. $6.012 \times 10^{-7} m$
B. $7.016 \times 10^{-7} m$
C. $1.067 \times 10^{-7} m$
D. $0.076 \times 10^{-7} m$
Ans. C

Q. A thin film of $M_gF_2$ of thickness $1.067 \times 10^{-7} m$ and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely non-reflective is
A. 5089 $A^0$
B. 5098 $A^0$
C. 5980 $A^0$
D. 5890 $A^0$
Ans. D

Q. A thin film of $M_gF_2$ of thickness $2.13 \times 10^{-7} m$ and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely reflective is
A. 5887 $A^0$
B. 5987 $A^0$
C. 5878 $A^0$
D. 5898 $A^0$
Ans. C

Q. A thin film of $M_gF_2$ of thickness $1.083 \times 10^{-7} m$ and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely non-reflective is
A. 8597 $A^0$
B. 5978 $A^0$
C. 9785 $A^0$
D. 7859 $A^0$
Ans. B

Q. In order to see the brightest reflection of light after passing through the film, coated on the glass, having more refractive index than film, which of the following must be true?
A. the thickness of the film must be greater than the wavelength.
B. the wavelength must be equal to half the thickness of the film
C. the wavelength must be equal to 4 times the thickness of the film.
D. the wavelength must be a equal to twice the thickness of the film.
Ans. D

Q. In order to see no reflection of light after passing through the film, coated on the glass, having more refractive index than film, which of the following must be true?
A. the thickness of the film must be greater than the wavelength.
B. the wavelength must be equal to half the thickness of the film
C. the wavelength must be equal to quarter the thickness of the film.
D. the wavelength must be a multiple of twice the thickness of the film.
Ans. C

# UNIT 1C

Q. A thin optically flat slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a optically flat glass plate and a piece of paper is inserted from one side between them. The observed interference fringes from this combination shall be
A. Circular
B. Circular and equally spaced
C. Straight
D. Straight and equally spaced
Ans. D

Q. A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width depend upon,
A. Wavelength of light
B. Refractive index of the film
C. Angle of wedge
D. All above
Ans. D

Q. In case of wedge shaped film, the fringes are produced in a plane defined by
A. Edge of the film and the lower surface of the film
B. Edge of the film and upper surface of the film
C. Upper and lower surface of the film
D. None of the above
Ans. A

Q. A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width does not depend upon,
A. Wavelength of light
B. Refractive index of the film
C. Thickness of the film
D. Angle of wedge
Ans. C

Q. A wedge shaped film can produce distinct fringes only if the wedge angle is in

A. Degrees
B. Minutes
C. Seconds
D. There is no such condition necessary
Ans. C

Q. A wedge shape film observed in reflected sunlight first through a red glass and then through a blue glass. The number of fringes in later case is
A. Less
B. More
C. Equal in both cases
D. None of these
Ans. B

Q. When illuminated by monochromatic light the interference pattern of non uniform thickness film in reflected light is alternate bright and dark fringes having same fringe width because
A. Each fringe is the locus of the points at which the thickness of the film has a constant value.
B. Fringe width does not depend on the thickness of the film.
C. Both a and b
D. None of these
Ans. C

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the reflected system is
A. $2\mu t cos(r+\theta) = 2n\lambda/2$
B. $2\mu t cos(r+\theta) = (2n-1)\lambda/2$
C. $2\mu t cos r = n\lambda$
D. $2\mu t cos r = (2n-1)\lambda/2$
Ans. B

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the transmitted system is
A. $2\mu t cos(r+\theta) = 2n\lambda/2$
B. $2\mu t cos(r+\theta) = (2n-1)\lambda/2$
C. $2\mu t cos r = n\lambda$
D. $2\mu t cos r = (2n-1)\lambda/2$
Ans. A

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the reflected system is
A. $2\mu t cos(r+\theta) = 2n\lambda/2$
B. $2\mu t cos(r+\theta) = (2n-1)\lambda/2$
C. $2\mu t cos r = n\lambda$
D. $2\mu t cos r = (2n-1)\lambda/2$
Ans. A

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the transmitted system is
A. $2\mu t cos(r+\theta) = 2n\lambda/2$
B. $2\mu t cos(r+\theta) = (2n-1)\lambda/2$
C. $2\mu t cos r = n\lambda$
D. $2\mu t cos r = (2n-1)\lambda/2$
Ans. B

Q. Light of wavelength 6000 $A^0$ falls normally on a thin wedge shaped film of refractive index 1.35 forming fringes that are 2.0 mm apart. The angle of wedge will be,
A. $0.063^0$
B. $0.0063^0$
C. $0.63^0$
D. $0.00063^0$
Ans. B

Q. When monochromatic light is incident normally on a non uniform thickness air film having very small angle of wedge then the condition of darkness in reflected light is
A. $2\mu t cos\, r = n\lambda$
B. $2t = n\lambda$
C. $2\mu t = n\lambda$
D. $2\mu t + \frac{\lambda}{2} = n\lambda$
Ans. B

Q. When monochromatic light is incident normally on a non uniform

thickness film having very small angle of wedge and refractive index μ then the condition of darkness in reflected light is
A. $2\mu t cos\, r = n\lambda$
B. $2t = n\lambda$
C. $2\mu t = n\lambda$
D. $2\mu t + \frac{\lambda}{2} = n\lambda$
Ans. C

Q. When monochromatic light is incident normally on a non uniform thickness film having very small angle of wedge and refractive index μ then the condition of brightness in reflected light is
A. $2\mu t cos\, r = n\lambda$
B. $2t = n\lambda$
C. $2\mu t = n\lambda$
D. $2\mu t + \frac{\lambda}{2} = n\lambda$
Ans. D

Q. When the wedge angle of the film increases, the fringe width is
A. Decreased
B. Increased
C. There is no change
D. Increased and then decreased
Ans. A

Q. When the wedge angle of the film decreases, the fringe width is
A. Decreased
B. Increased
C. There is no change
D. Increased and then decreased
Ans. B

Q. Which of the following light would produce an interference pattern with the largest separation between the bright fringes?
A. Red
B. Orange
C. Green
D. Blue
Ans. A

Q. Which of the following light would produce an interference pattern with the smallest separation between the bright fringes?
A. Red
B. Orange
C. Green
D. Blue
Ans. D

Q. A wedge shaped film produces an interference pattern. It is immersed in a medium of higher refractive index. Then the fringe width will
A. Decrease
B. Increase
C. There will not be any noticeable change
D. The fringes will become invisible and undefined
Ans. A

Q. A wedge shaped film produces an interference pattern. It is immersed in a medium of lower refractive index. Then the fringe width will
A. Decrease
B. Increase
C. There will not be any noticeable change
D. The fringes will become invisible and undefined
Ans. B

Q. A wedge shaped film is a convenient tool for measuring the diameters of thin wires because
A. The fringe width is directly proportional to the thickness of the wire
B. The fringe width is inversely proportional to the thickness of the wire
C. The fringe width is inversely proportional to length of the wire
D. None of the above
Ans. B

Q. When we test the optical flatness of a glass plate by interference, it is said to be optically flat when
A. Fringe widths are same
B. Fringe widths reduce gradually towards edge of wedge.
C. Fringe widths increase gradually towards edge of wedge.

D. None of above
Ans. A

Q. Newton's rings are observed with two different media between the glass surfaces. The ratio of their refractive indices is 9:25, then the ratio of diameter of $n^{th}$ ring will be,
A. 81:625
B. 3:5
C. 18:50
D. 5:3
Ans. D

Q. Newton's rings are observed with two different media between the glass surfaces. The $n^{th}$ rings have diameters as 49:100, then the ratio of refractive indices is,
A. 10:7
B. 7:10
C. 100:49
D. 49:100
Ans. A

Q. In transmitted light the central fringe of Newton's rings is,
A. Dark
B. Bright
C. Steady
D. None of these.
Ans. B

Q. In reflected light, the central fringe of Newton's rings is dark because the path difference between reflected rays is,
A. nλ
B. $2n\,{}^{\lambda}/_{2}$
C. ${}^{\lambda}/_{2}$
D. ${}^{n\lambda}/_{2}$
Ans. C

Q. The central fringe can be made bright in reflected light if air film between lens and glass plate is replaced by liquid having refractive index
A. less that lens and less than glass plate.
B. greater that lens and less than glass plate.
C. greater that lens and greater than glass plate.
D. None of these
Ans. B

Q. The diameters of dark Newton' rings in reflected light are proportional to
A. $\sqrt{n}$
B. $n^2$
C. $\sqrt{2n-1}$
D. ${}^{1}/_{\sqrt{n}}$
Ans. A

Q. The diameters of bright Newton' rings in reflected light are proportional to
A. $\sqrt{n}$
B. $n^2$
C. $\sqrt{2n-1}$
D. ${}^{1}/_{\sqrt{n}}$
Ans. C

Q. The square of diameters of dark Newton' rings in reflected light are proportional to
A. $\sqrt{n}$
B. $n^2$
C. $\sqrt{2n-1}$
D. ${}^{1}/_{\sqrt{n}}$
Ans. B

Q. The square of diameters of bright Newton' rings in reflected light are proportional to
A. Natural number
B. Complex number
C. Even natural number
D. Odd natural number
Ans. D

Q. In Newton' rings experiment if the radius of curvature of a plano-convex lens is increased the angle of wedge
A. Increases
B. Decreases
C. Becomes zero
D. None of these
Ans. B

Q. If the Newton's rings arrangement is illuminated by white light the central fringe will be

A. Violet

B. Red

C. Dark

D. Bright

Ans. C

Q. The Newton's ring cannot be practically seen in transmitted light because

A. They are not observed in transmitted light.

B. The contrast between bright and dark rings is not good.

C. The contrast between bright and dark rings is good.

D. It is very difficult to make arrangement to see them.

Ans. B

Q. Newton's rings are formed using white light. Then the central spot will be

A. Violet

B. Dark

C. Bright

D. Red

Ans. B

Q. Newton's rings are formed using white light. Then the colour of the outermost ring will be

A. Violet

B. Yellow

C. Red

D. Indigo

Ans. C

Q. In a Newton's rings experiment, the thickness of the air space between the lens and the glass plate is $1.8 \times 10^{-6}$ m for the sixth dark ring. The wavelength of the light used is...

A. $1.7 \times 10^{-8}$ m

B. $3 \times 10^{-8}$ m

C. $6 \times 10^{-7}$ m

D. $6 \times 10^{-5}$ m

Ans. C

Q. In a Newton's rings experiment, the diameter of $15^{th}$ bright ring was found to be $59 \times 10^{-4}$ m. If the radius of curvature of plano-convex lens is 1 m, calculate the wavelength of light

A. 6000 $A^0$

B. 7000 $A^0$

C. 6500 $A^0$

D. 7500 $A^0$

Ans. A

Q. In a Newton's rings experiment, the diameter of $15^{th}$ ring was 0.625 cm and that of $5^{th}$ ring was 0.225cm for air film between lens and plate. When the air film is replaced by a liquid these diameters are reduced to 0.529 cm and 0.168 cm respectively. Then the refractive index of liquid is

A. 1.531

B. 1.351

C. 1.135

D. 1.513

Ans. B

Q. In Newton's rings experiment what is the order of the dark ring produced for wavelength of light 5890 $A^0$, where the thickness of air space between the lens and the glass plate is $1.8 \times 10^{-6}$ m.

A. 6.11

B. 6

C. 5.9

D. 7

Ans. B

Q. The diameter of $n^{th}$ dark ring in Newton's rings experiment is 2.5 cm. The diameter of $n^{th}$ dark ring reduces to 2 cm when the air film is replaced by a liquid. What is the refractive index of a liquid?

A. 1.59

B. 1.56

C. 1.49

D. 1.5

Ans. B

Q. If the air film is replaced by a liquid of refractive index 1.32 in Newton ring experiment the diameter of $n^{th}$ bright ring
A. Decreases.
B. Increases.
C. Remains same.
D. None of above.
Ans. A

Q. The Newton's rings experiment is based on the phenomenon of interference of light in
A. Non-uniform thickness film.
B. Wedge shape film.
C. The film having thickness increasing from zero to maximum.
D. All above.
Ans. D

Q. In Newton's ring arrangement, bright and dark rings are obtained using sodium yellow light. If the entire arrangement is dipped into water then the diameters of rings
A. Increases
B. Decreases
C. Fringe pattern disappears
D. Remains unchanged
Ans. B

Q. In Newton's ring experiment the diameter of $5^{th}$ dark ring is reduced to half of its value after placing a liquid between plane glass plate and convex surface. The refractive index of liquid is
A. 2.5
B. 5
C. 4
D. None of these
Ans. C

Q. In Newton's rings experiment the diameter of $8^{th}$ dark ring is 0.6139 cm. If the wavelength of light used is 5890 $A^0$ then the radius of curvature of the plano convex lens used is,
A. 199.95 cm
B. 198.95 cm
C. 189.95 cm
D. None of these
Ans. A

Q. In Newton's rings experiment the radius of curvature of the plano convex lens used is 200 cm. What is the diameter of $8^{th}$ dark ring if the wavelength of light used is 5890 $A^0$.
A. 0.6319 cm
B. 0.6139 cm
C. 0.6913 cm
D. 0.6193 cm
Ans. B

Q. Monochromatic light wavelength 5000 A.U. is incident on the wedge shape air film having angle of wedge 0.0083 degree. Then the distance between consecutive bright and dark band is,
A. $1.506 \times 10^{-4}$ m.
B. $1.506 \times 10^{-5}$ m.
C. $3.012 \times 10^{-5}$ m.
D. $3.210 \times 10^{-5}$ m.
Ans. B

Q. Monochromatic light is incident on the wedge shape air film having angle of wedge 0.0083 degree. The distance between consecutive bright and dark band is $1.506 \times 10^{-5}$ m. Then the wavelength of light is,
A. 5000 A.U.
B. 2500 A.U.
C. 4000 A.U.
D. 3000 A.U.
Ans. A

# UNIT 1D

Q. Which of the following undergo maximum diffraction
A. Radio waves
B. α-rays
C. $\gamma$-rays
D. Microwaves
Ans. A

Q. An obstacle of size 1 cm will diffract
A. Sound waves
B. Light waves

C. X-rays
D. Ultrasonic waves
Ans. A

Q. The phenomenon of diffraction can be considered interference by *n* number of coherent sources. The value of *n* is
A. One
B. Two
C. Zero
D. Infinite
Ans. D

Q. The ratio of size of obstacle to the wavelength of light to be able to observe diffraction effect is
A. 1
B. 100
C. 1000
D. Infinite
Ans. D

Q. While both light and sound wave shows wave character, diffraction (bending round corners) is much harder to observe in light. This is because
A. Speed of light is far greater
B. Wavelength of light is far smaller
C. Light does not require a medium
D. Waves of light are transverse
Ans. A

Q.
In which experiment lenses are required
A. Fresnel's diffraction
B. Fraunhofer diffraction
C. Both a and b.
D. None
Ans. B

Q. In which experiment the wave front incident on the slit is not plane
A. Fresnel's diffraction
B. Fraunhofer diffraction
C. Both a and b.
D. None of these
Ans. A

Q. The diffraction pattern is produced due to
A. Reflection of secondary wavelets
B. Polarization of secondary wavelets
C. Refraction of secondary wavelets
D. Interference of secondary wavelets
Ans. D

Q. In Fraunhofer's diffraction the distance between the source and obstacle or obstacle and screen is
A. Finite
B. Not finite.
C. Infinite
D. None of these
Ans. B

Q. In Fresnel's diffraction the distance between the source and obstacle or obstacle and screen is
A. Finite
B. Not finite.
C. Infinite
D. None of these
Ans. A

Q. In Fresnel's diffraction, in the plane of diffraction the all the secondary wavelets are
A. $90^0$ out of phase
B. $180^0$ out of phase
C. out of phase
D. None of these
Ans. A

Q. In Fraunhofer's diffraction, in the plane of diffraction the all the secondary wavelets are
A. $90^0$ out of phase
B. $180^0$ out of phase
C. In phase
D. None of these
Ans. C

Q. In the Fraunhofer diffraction the incident wave front is often
A. Spherical
B. Cylindrical
C. Plane
D. None of these

Ans. C

Q. The condition for observing Fraunhofer diffraction at a single slit is that, the incident wave front on the slit is
A. Spherical
B. Cylindrical
C. Plane
D. None of these
Ans. B

Q. In the diffraction pattern due to single slit most of the intensity goes to
A. All secondary maxima
B. Principal maximum
C. First secondary maximum
D. All principal maxima
Ans. B

Q. Pick up the correct statement
A. Diffraction is exhibited by all electromagnetic waves but not by mechanical waves.
B. Diffraction cannot be observed with plane polarized light.
C. Visible light waves can be diffracted by the edge of wall.
D. The width of central maximum in the diffraction pattern due to single slit increases as wavelength increases.
Ans. D

Q. The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by
A. $\frac{A^2}{2}\frac{\sin\alpha}{\alpha}$
B. $A^2(\frac{\sin\alpha}{\alpha})^2$
C. $A^2\frac{\sin\alpha}{\alpha}\frac{\sin N\beta}{\sin\beta}$
D. $\left(\frac{\sin\alpha}{\alpha}\right)^2$
Ans. B

Q. The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by, $A^2\left(\frac{\sin\alpha}{\alpha}\right)^2$ here the value of □ is
A. $\frac{\pi}{\lambda}a\sin\theta$
B. $\frac{2\pi}{\lambda}a\sin\theta$
C. $\frac{\pi}{2\lambda}a\sin\theta$
D. $\frac{\pi}{\lambda}2a\sin\theta$
Ans. A

Q. The first diffraction minimum due to single slit diffraction is at $\theta$ = $30^0$ for a light of wavelength 5000 $A^0$. The width of the slit is
A. $5 \times 10^{-5}$ cm
B. $10 \times 10^{-5}$ cm
C. $2.5 \times 10^{-5}$ cm
D. $1.25 \times 10^{-5}$ cm
Ans. B

Q. The first diffraction minimum due to single slit of width $10^{-4}$ cm is at θ = $30^0$. Then wavelength light used is
A. 4000 $A^0$.
B. 5000 $A^0$.
C. 6000 $A^0$.
D. 6250 $A^0$.
Ans. B

Q. A single slit Fraunhofer diffraction pattern is formed with white light. For what wavelength of light the third minimum in diffraction pattern coincides with the second minimum in the pattern for red light of wavelength 6500 A.U.?
A. 4400 $A^0$
B. 4100 $A^0$
C. 4333 $A^0$
D. 9750 $A^0$
Ans. C

Q. The single slit diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?
A. No change.
B. The diffraction band becomes narrower and crowed together.
C. The diffraction band becomes broader and farther apart.
D. Diffraction band disappear.
Ans. B

Q. Light of wavelength 6328 $A^0$ is incident on a slit having a width of 0.2 mm. The angular width of the central maximum measured from first minimum to minimum of the diffraction pattern on the screen which is 9 m away will be about

A. $0.36^0$

B. $0.18^0$

C. $0.72^0$

D. $0.09^0$

Ans. B

Q. The slit of width 'a' is illuminated by white light. The first minimum for red light of wavelength 6328 $A^0$ will fall at angle $30^0$, when 'a' will be

A. 3250 $A^0$

B. $6.5 \times 10^{-4}$ mm

C. 1.26 μm.

D. $2.6 \times 10^{-6}$ m.

Ans. C

Q. Half angular width of central maximum is $30^0$ when the slit is illuminated by light of wavelength 6000 $A^0$. Then width of the slit will be approx.

A. $12 \times 10^{-6}$ m.

B. $12 \times 10^{-7}$ m.

C. $12 \times 10^{-8}$ m.

D. $12 \times 10^{-9}$ m.

Ans. B

Q. Light of wavelength 6500 $A^0$ is incident on a slit, if first minima of red light is at $30^0$ then the slit width is about

A. $1 \times 10^{-6}m$

B. $5.2 \times 10^{-6}m$

C. $1.3 \times 10^{-6}m$

D. $2.6 \times 10^{-6}m$

Ans. C

Q. In the diffraction pattern due to single slit, the width of the central maximum,

A. With red light is less than violet light.

B. With red light is equal to violet light.

C. With red light is more than violet light.

D. None of these.

Ans. C

Q. If white light is used in diffraction at a single slit, the central maximum will be

A. White

B. Coloured

C. Black

D. None of these

Ans. A

Q. In the diffraction pattern due to single slit the width of central maximum will be

A. Greater for narrow slit

B. Less for narrow slit

C. Greater for wide slit

D. Less for wide slit

Ans. A

Q. In diffraction pattern fringe width of various fringes

A. Always equal.

B. Never equal.

C. Can be equalized.

D. None of these

Ans. B

Q. Which one of the following colours will be best suited for obtaining the sharp image of narrow circular aperture on the screen?

A. Yellow light

B. Green light

C. Red light

D. Violet light

Ans. D

Q. Which of the following will exhibit the greatest amount of diffraction?

A. light waves incident on a human hair.

B. light waves incident on a 1 cm hole.

C. sound waves incident on a 1 cm hole.

D. sound waves incident on a doorway.

Ans. C

Q. In a diffraction pattern due to single slit of width 'a', if the wavelength of light is doubled the angle of diffraction for first order minima will

A. Remain same

B. Become half

C. Doubled

D. None of these

Ans. C

Q. In the diffraction pattern due to single slit the first minimum is formed for the order m equal to
A. ± 1
B. 0
C. ± ½
D. ± 3/2
Ans. A

Q. In the diffraction pattern due to single slit the first minima is not possible for the order m = 0 because,
A. For m = 0, the condition of minimum becomes condition of secondary maxima
B. For m = 0, the condition of minimum becomes condition of principal maxima
C. Both a and b
D. None of above
Ans. B

Q. In the diffraction pattern due to single slit the position of secondary maxima is
A. Half a way between two minima
B. Half a way between two principal maxima
C. Half a way between two secondary minima
D. Half a way between principal maximum and first minima.
Ans. A

Q. In the diffraction pattern due to single slit produced on the screen the linear distance between principal maximum and first minimum depends upon
A. Slit width
B. Angle of diffraction
C. Linear distance of screen from the slit
D. All above
Ans. D

Q. In a far field diffraction pattern of a single slit under polychromatic illumination, the first minimum due to wavelength $\lambda_1$ is found to be coincident with the third minimum due to wavelength $\lambda_2$. Then the relation between the two wavelengths is
A. $3\lambda_1 = \lambda_2$
B. $3\lambda_1 = 0.3\lambda_2$
C. $0.3\lambda_1 = 3\lambda_2$
D. $\lambda_1 = 3\lambda_2$
Ans. D

Q. In diffraction at a single slit, the intensity of first secondary maximum is about
A. $(1/22)^{th}$ of the intensity of central maximum
B. $(1/62)^{th}$ of the intensity of central maximum
C. $(1/122)^{th}$ of the intensity of central maximum
D. $(1/4)^{th}$ of the intensity of central maximum
Ans. A

Q. In diffraction at a single slit, the intensity of second secondary maximum is about
A. $(1/22)^{th}$ of the intensity of central maximum
B. $(1/62)^{th}$ of the intensity of central maximum
C. $(1/122)^{th}$ of the intensity of central maximum
D. $(1/4)^{th}$ of the intensity of central maximum
Ans. B

Q. In the diffraction pattern at a single slit the condition of minima is, $a\sin\theta = m\lambda$. The value of $m$ for first order minima is
A. 0
B. 1
C. $1\frac{1}{2}$
D. $None\ of\ these$
Ans. B

Q. In a fraunhofer's diffraction at a single slit the principal maximum will form for the value of angle of diffraction $\theta$, which is equal to
A. 0
B. 1
C. $\frac{\pi}{2}$

D. $\pi$
Ans. A

Q. Parallel monochromatic beam of light is incident on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of incident beam. At the first minimum of diffraction pattern, phase difference between the rays coming from the two edges of the slit is
A. 0
B. $\pi/2$
C. $\pi$
D. $2\pi$
Ans. D

Q. At the first minima, path difference between two waves starting from the two ends of the slit in the single slit Fraunhofer diffraction experiment is
A. $\lambda/2$
B. λ
C. $3/2\lambda$
D. 2λ
Ans. B

Q. For a single slit of width d, the first diffraction minimum using light of wavelength λ will occur at an angle of
A. $\sin^{-1} \lambda/2d$
B. $\sin^{-1} \lambda/d$
C. $\sin^{-1} d/\lambda$
D. $\sin^{-1} 2d/\lambda$
Ans. B

Q. Condition of first secondary maximum in the Fraunhofer's diffraction pattern of a single slit of width 'a' is given by
A. $a \sin\theta = \lambda/2$
B. $a \cos\theta = 3\lambda/2$
C. $a \sin\theta = \lambda$
D. $a \sin\theta = 3\lambda/2$
Ans. D

Q. When a single slit Fraunhofer diffraction set up is used with light of wavelength 4000 $A^0$, the width 'b' of central maximum is found to be 0.3 cm. in the same set up if the light of wavelength 6000 $A^0$ is used the corresponding value of 'b' will be
A. 0.20 cm
B. 0.24 cm
C. 0.30 cm
D. 0.45 cm
Ans. D

Q. Light of wavelength λ is incident on a slit of width 'd'. The resulting diffraction pattern is observed on the screen at distance 'D'. The linear width of principal maxima is then equal to the width of the slit. D equals
A. $d/2\lambda$
B. $3\lambda/d$
C. $d^2/2\lambda$
D. $2\lambda^2/7d$
Ans. C

Q. A slit 5 cm wide is irradiated normally with microwaves of wavelength 1 cm. Then the angular spread of the central maximum on one side of the incident light is nearly equal to
A. 1/5 radians
B. 4 radians
C. 5 radians
D. 6 radians
Ans. A

Q. A parallel beam of light of wavelength 600 nm get diffracted by a single slit of width 0.2 mm. the angular divergence of the principal maxima on both sides of incident light is
A. $6 \times 10^{-3}$ rad
B. $3 \times 10^{-3}$ rad
C. $4.5 \times 10^{-2}$ rad
D. $9 \times 10^{-2}$ rad
Ans. A

Q. Yellow light is used in a single slit diffraction experiment with slit width of 0.6 mm. If yellow light is replaced by X rays, then the observed pattern will reveal that
A. the central maximum is narrower.
B. the central maximum is broader.

C. less number of fringes
D. no diffraction pattern is observed
Ans. A

Q. How does the width (W) of the central maximum formed from diffraction through a circular aperture (pupil) change with aperture size (D) for a fixed distance away from the aperture?
A. W increases as D increases
B. W decreases as D increases
C. W does not depend upon D
D. None of above
Ans. B

Q. The maximum number of orders of principal maxima present for diffraction of light at a single slit are for the value of angle of diffraction $\theta$ equal to
A. $0^0$
B. $45^0$
C. $90^0$
D. $180^0$
Ans. C

Q. When the light is diffracted through the circular aperture in the diffraction pattern the radius of central Airy disc can be reduced by
A. Increasing the diameter of circular aperture
B. Decreasing the diameter of circular aperture
C. Increasing the wavelength of light
D. Increasing the focal length of the lens
Ans. A

# UNIT 1E

Q. Which one of the following characteristics of electromagnetic wave is needed to explain the spectrum produced when white light falls on diffraction grating? Electromagnetic waves can
A. interfere
B. be linearly polarised
C. change speed in passing from one material to other
D. be reflected with little, if any, loss in energy
Ans. A

Q. In a plane transmission grating the intensity of principal maximum
A. Increases as number of slits increases
B. Decreases as number of slits increases
C. Remains constant
D. None of these.
Ans. A

Q. In a plane diffraction grating the directions of minima are given by
A. $(a+b)sin\theta = \pm m\lambda$
B. $N(a+b)sin\theta = \pm m\lambda$
C. $asin\theta = \pm m\lambda$
D. None of these.
Ans. B

Q. Light is incident normally on diffraction grating through which first order diffraction is seen at $32^0$. The second order diffraction will be seen at
A. $84^0$.
B. $48^0$.
C. $64^0$.
D. None of these
Ans. D

Q. The wavelength of light can be experimentally found using
A. Ripple tank
B. Diffraction grating
C. Plane mirror
D. Glass prism.
Ans. B
Q. The wavelength of light can be experimentally found using
A. Newton's rings
B. Diffraction grating
C. Both a and b
D. None of above
Ans. C

Q. Maximum number of orders available with a grating is
A. Independent of grating element.
B. Directly proportional to grating element.

C. Inversely proportional to grating element.
D. Directly proportional to wavelength.
Ans. B

Q. In a plane diffraction grating the angle of diffraction is
A. Directly proportional to the wavelength
B. Inversely proportional to the wavelength
C. Directly proportional to the square root of wavelength
D. Inversely proportional to the square root of wavelength
Ans. A

Q. In the equation of resultant amplitude of waves, when a light is diffracted through diffraction gratings, $E_\theta = E_m \frac{\sin\alpha}{\alpha}\frac{\sin N\beta}{\sin\beta}$ the value of $N$ is,
A. Number of lines per cm on the grating
B. Number of lines per m on the grating
C. Total number of lines on the grating
D. Number of lines per unit length
Ans. C

Q. The reciprocal of grating element a+b gives
A. Number of lines per cm on the grating
B. Number of lines per mm on the grating
C. Total number of lines on the grating
D. Number of lines per unit length
Ans. D

Q. In the grating element, a+b,
A. a must be equal to b
B. a must be greater than b
C. a must be less than b
D. none of above
Ans. D

Q. In the equation of resultant amplitude of waves, when a light is diffracted through diffraction gratings, $E_\theta = E_m \frac{\sin\alpha}{\alpha}\frac{\sin N\beta}{\sin\beta}$ the value of $\beta$ is,
A. $\frac{\pi}{\lambda} asin\theta$
B. $\frac{\pi}{\lambda}(a+b)sin\theta$
C. $\frac{\pi}{\lambda} sin\theta$
D. $\pi(a+b)sin\theta$
Ans. B

Q. A white light is incident on a diffraction grating and diffraction pattern is produced on the screen placed in front of the grating. If the length of the grating is increased without changing the value of a+b, will the diffraction pattern change?
A. Yes
B. No
C. Partially change
D. None of above
Ans. B

Q. Monochromatic light of wavelength λ is incident normally on a diffraction grating consisting of alternate transparent strips of width ‘a’ and opaque strips of width ‘b’. The angle between emerging zero order and first order spectra depends on
A. *a, b and λ*
B. *a and λ only*
C. *b and λ only*
D. *λ only*
Ans. A

Q. When monochromatic light of wavelength $5 \times 10^{-7}$ m is incident normally on a plane diffraction grating, the second order diffraction lines are formed at angles of $30^0$ to the normal to the grating. What is the number of lines per mm in the grating?
A. 250
B. 500
C. 1000
D. 1500
Ans. B

Q. Monochromatic light shines on the surface of a diffraction grating with $5.3\times10^3$ lines/cm. The first-order maximum is observed at an angle of 17°. Find the wavelength.
A. 420 nm
B. 530 nm
C. 520 nm
D. 550 nm

Ans. D

Q. Light with a wavelength of 400.0 nm passes through a diffraction grating having $1.00\times10^4$ lines/cm. What is the second-order angle of diffraction?
A. 21.3°
B. 56.5°
C. 53.1°
D. 72.1°
Ans. C

Q. Light with a wavelength of 500.0 nm passes through a $3.39 \times 10^5$ lines/m diffraction grating. The first-order angle of diffraction is
A. 9.73°
B. 36.9°
C. 23.5°
D. 53.1°
Ans. A

Q. The angle between the first-order maximum and the central maximum for monochromatic light of 2300 nm is 27°. Calculate the number of lines per centimeter on this grating.
A. 1600 lines/cm
B. 2500 lines/cm
C. 2000 lines/cm
D. 4500 lines/cm
Ans. C

Q. The light of wavelength 6000 $A^0$ is diffracted by an angle of $20^0$ in first order by diffraction grating then the value grating element is,
A. $1.75 \times 10^{-4}$ cm
B. $1.95 \times 10^{-4}$ cm
C. $1.65 \times 10^{-4}$ cm
D. $1.69 \times 10^{-4}$ cm
Ans. A

Q. The light of wavelength 6000 $A^0$ is diffracted by an angle of $20^0$ in first order by diffraction grating then the value of number of lines per cm on grating is,
A. 5741 lines/cm
B. 5714 lines/cm
C. 5471 lines/cm
D. 5147 lines/cm
Ans. B

Q. The light of wavelength λ is diffracted by an angle of $\theta$ in first order by diffraction grating then the value of number of lines per unit length on grating is,
A. Sinθ/λ
B. λ/sinθ
C. λsinθ
D. none of above
Ans. A

Q. The light of wavelength 6000 $A^0$ is diffracted by an angle of $20^0$ in first order by diffraction grating then the value of total number of lines on the grating if it is 2 cm long is,
A. 5700
B. 11800
C. 11400
D. 11824
Ans. C

Q. What is the highest order spectrum which may be seen with monochromatic light of wave length 6000 $A^0$, by means of a diffraction grating with 5000 lines/cm?
A. 5
B. 4
C. 3
D. 2
Ans. C

Q. The number of rulings (*N*) in grating is made larger, then
A. The principal and secondary (all) maxima will become sharp and intense
B. The principal and secondary (all) maxima will become faint and wide.
C. The principal maxima will become sharp and intense while, secondary maxima become weaker
D. The principal maxima will become weaker while, secondary maxima become sharp and intense
Ans. C

Q. When a beam of monochromatic light of wavelength λ is incident normally on a diffraction grating of grating element $d$. If $\theta$ is angle between second order diffracted beam and the direction of incident beam, what is the value of $\sin\theta$?

A. $\lambda/d$

B. $d/\lambda$

C. $2\lambda/d$

D. $2d/\lambda$

Ans. C

Q. Light of wavelength λ is incident normally on a diffraction grating for which the slit spacing is 3λ. What is the sine of angle between the second order maximum and the normal?

A. 1/6

B. 1/3

C. 2/3

D. 1

Ans. C

Q. A grating which should be more suitable for constructing a spectrometer for visible and ultraviolet regions should have

A. 100 lines/cm

B. 1000 lines/cm

C. 10000 lines/cm

D. 100000 lines/cm

Ans. C

Q. Green light of wavelength 5400 $A^0$ is diffracted by a grating ruled 2000 lines/cm. The angular deviation of third order of image is

A. $\sin^{-1}(0.324)$

B. $\cos^{-1}(0.324)$

C. $\tan^{-1}(0.324)$

D. $82^0$

Ans. A

Q. The example of natural diffraction grating is

A. Compact disc

B. Peacock's feather

C. Holohram

D. None of these

Ans. B

Q. The peacock's feather is a natural diffraction grating comes under the category of

A. Reflection grating

B. Refraction grating

C. Transmission grating

D. Deflection grating

Ans. A

Q. The compact disc is a man made diffraction grating comes under the category of

A. Reflection grating

B. Refraction grating

C. Transmission grating

D. Deflection grating

Ans. A

Q. Grating spectrum is produced because of

A. Dispersion of light

B. Scattering of light

C. Diffraction of light

D. Reflection of light

Ans. C

Q. In the diffraction pattern produced by transmission grating as the value of N increases the intensity of central principal maximum increases thereby

A. Intensity of other principal maxima also increases

B. Intensity of other principal maxima decreases

C. Intensity of other principal maxima remains constant

D. None of these.

Ans. B

Q. The condition for principal maximum for diffraction grating is

A. $(a+b)sin\theta = \pm m\lambda$

B. $N(a+b)sin\theta = \pm m\lambda$

C. $asin\theta = \pm m\lambda$

D. $Nasin\theta = \pm m\lambda$

Ans. A

Q. In the diffraction grating having 15000 lines/inch the slit width is $8.128 \times 10^{-5}$ cm and the distance between the two

slits is $8.805 \times 10^{-5}$ cm. Then the value of grating element is,
A. $169.33 \times 10^{-4}$ cm
B. $1.6933 \times 10^{-5}$ cm
C. $16.933 \times 10^{-4}$ cm
D. $1.6933 \times 10^{-4}$ cm
Ans. D

Q. In the diffraction grating the value of grating element is, $1.6666 \times 10^{-4}$ cm, Then the number of slits/cm is,
A. 6000
B. 1666
C. 5000
D. 6600
Ans. A

# UNIT 1F

Q. The transverse nature of light is shown by
A. Interference
B. Refraction
C. Polarization
D. Dispersion
Ans. C

Q. Plane polarized light has vibrations of electric vector
A. In one plane perpendicular to direction of propagation
B. In one plane along the direction of propagation
C. In all planes perpendicular to direction of propagation
D. In two planes perpendicular to direction of propagation
Ans. A

Q. Which of the following cannot be polarized?
A. Radio waves
B. Sound waves
C. Light waves
D. X-rays
Ans. B

Q. When unpolarized light is converted to polarized light its intensity
A. is increased
B. remains same
C. is decreased
D. None of these
Ans. C

Q. For complete polarization, light should be
A. Monochromatic
B. Dichromatic
C. From mercury vapour source
D. None of these
Ans. A

Q. We use sun glasses in the summer season, which acts as a
A. Polarizer
B. Analyzer
C. Both A and B are correct
D. None of these
Ans. A

Q. The device used to produce the polarized light is called as
A. Analyzer
B. Polarizer
C. Prism
D. None of these
Ans. B

Q. In the electromagnetic wave the electric field vibrates in _______ possible plane/planes perpendicular to the direction of propagation of light.
A. one
B. two
C. three
D. all
Ans. D

Q. A plane in which, the vibrations of electric vector of a plane polarized light comes is called as
A. Plane of polarization
B. Plane of vibration
C. Plane of polarized vibration
D. None of these
Ans. B

Q. A plane perpendicular to the plane of vibration is called as
A. Plane of polarization
B. Plane of vibration
C. Plane of polarized vibration
D. None of these
Ans. A

Q. A plane perpendicular to the vibrations of electric vector of a plane polarized light is called as
A. Plane of polarization
B. Plane of vibration
C. Plane of polarized vibration
D. None of these
Ans. A

Q. What is the angle between the plane of vibration/oscillation and plane of polarization of the polarized light?
A. 0
B. $\pi/2$
C. $\pi/4$
D. $\pi$
Ans. B

Q. The angle of incidence at which maximum polarization occurs is known as
A. Angle of polarization
B. Angle of reflection
C. Angle of refraction
D. Critical angle
Ans. A

Q. The plane polarized light obtained by reflection has vibrations of electric vector _________ to the reflecting surface.
A. Perpendicular
B. Inclined
C. Parallel
D. None of these
Ans. C

Q. The plane polarized light obtained by reflection has vibrations of electric vector parallel to
A. Plane of paper
B. Plane of incident light
C. Reflecting surface
D. None of these
Ans. C

Q. When the light is incident at the polarizing angle on the refracting surface, which of the following is completely polarized?
A. Reflected light
B. Refracted light
C. Both reflected and refracted light
D. Neither reflected nor refracted light
Ans. A

Q. When un-polarized light is incident on the refracting surface with polarizing angle the reflected light and refracted light are ______________ to each other.
A. Perpendicular
B. Inclined
C. Parallel
D. None of these
Ans. A

Q. According to Brewster's law, when un-polarized light is incident on the refracting surface with polarizing angle then the angle between the reflected light and refracted light is,
A. $15^0$
B. $45^0$
C. $180^0$
D. $90^0$
Ans. D

Q. When un-polarized light is incident on the refracting surface with polarizing angle then the reflected light and refracted light is__________ and __________ respectively.
A. Partially and plane polarized
B. Plane and partially polarized
C. Plane and plane polarized
D. Partially and partially polarized
Ans. B

Q. The mathematical statement of Brewster's law is
A. $\mu = \sin i_p$
B. $\mu = \sin r_p$
C. $\mu = \tan i_p$

D. $\mu = \cos i_p$
Ans. C

Q. The refractive index for plastic is 1.25. Calculate the angle of refraction for a light inclined at polarizing angle.
A. 36.8
B. 38.6
C. 34.6
D. None of these
Ans. B

Q. The refractive index for water is 1.33. The polarizing angle for water (in degree) is
A. 53.06
B. 0.0232
C. 570
D. 52.06
Ans. A

Q. A ray of light strikes a glass plate at an angle of 60°. If the reflected and refracted rays are perpendicular to each other, the refractive index of refraction of glass is
A. $\sqrt{(3/2)}$
B. 03
C. 01
D. $\sqrt{3}$
Ans. D

Q. The method of obtaining plane polarized light by refraction is
A. Brewster method
B. Malus method
C. Piles of plate's method
D. None of these
Ans. C

Q. In the method of obtaining plane polarized light by piles of plates the _____________ beam is converted into plane polarized.
A. Refracted
B. Reflected
C. Diffracted
D. Scattered
Ans. A

Q. Polarization of natural light by reflection from the surface of glass was discovered in 1808 by
A. E. L. Malus
B. Sir David Brewster
C. Biot
D. Erasmus Bartholinus
Ans. A

Q. The intensity of the polarized light transmitted by the analyzer varies as ______________of angle between plane of transmission of polarizer and analyzer".
A. Square root of cosine
B. Square of sine
C. square of cosine
D. Square root of sine
Ans. C

Q. According to the Malus law, the intensity of polarized light emerging through the analyzer varies as _______ where $\theta$ is angle between plane of transmission of polarizer and analyzer.
A. $\sin^2\theta$
B. $\cos^2\theta$
C. $\tan^2\theta$
D. $\sec^2\theta$
Ans. B

Q. According to the Malus law, the intensity of polarized light emerging through the analyzer is equal to ----------- where, $I_m$ is maximum intensity and $\theta$ is angle between plane of transmission of polarizer and analyzer.
A. $I_m\sin^2\theta$
B. $I_m\cos^2\theta$
C. $I_m\tan^2\theta$
D. $I_m\sec^2\theta$
Ans. B

Q. When the crystals are perpendicular to each other, the intensity of the emergent beam from the second crystal is
A. Maximum
B. Minimum
C. Zero
D. None of the above
Ans. C

Q. When the analyzer is rotated through $360^0$, one observes
A. One extinction and two brightness
B. one brightness and two extinctions
C. two extinctions and two brightness
D. none of the above
Ans. C

Q. If the angle between a polarizer and analyzer is 60°. Then the intensity of transmitted light for original intensity of incident light as I is
A. 0.25 $I_m$
B. 0.50 $I_m$
C. 0.75 $I_m$
D. 0.125 $I_m$
Ans. A

Q. Two polaroid are adjusted so as to obtain maximum intensity. Through what angle should polaroid be rotated to reduce the intensity to half of its original value?
A. $360^0$
B. $45^0$
C. $90^0$
D. $180^0$
Ans. B

Q. Two polarizing sheets have polarizing directions parallel so that the intensity of the transmitted light is maximum. Through what angle must either sheet be turned if the intensity is to drop by half?
A. 360
B. 180
C. 90
D. 45
Ans. D

Q. Two polarizing sheets have polarizing directions parallel so that the intensity of the transmitted light is maximum. If one of them is turned through angle of $315^0$, the intensity of transmitted light reduces to,
A. Does not reduces
B. Half
C. One fourth
D. None of these
Ans. B

Q. Two Polaroid are adjusted so as to obtain maximum intensity. Through what angle should polaroid be rotated to reduce the intensity to one fourth of its original value?
A. 360
B. 180
C. 60
D. 45
Ans. C

Q. The ratio of intensity of the polarized light transmitted by the analyzer to square of cosine of angle between plane of transmission of polarizer and analyzer is always,
A. Constant
B. Not constant
C. Less than 1
D. None of these
Ans. A

Q. In Malus law the intensity of the polarized light transmitted by the analyzer is proportional to square of cosine of angle between plane of transmission of polarizer and analyzer because,
A. The cosine component of the intensity of polarized light comes in the plane of analyzer
B. The cosine component of the intensity of polarized light comes in the plane of polarizer
C. The sine component of the intensity of polarized light comes in the plane of analyzer
D. None of these
Ans. A

Q. The intensity of light incident on a polarizer is I and that of the light emerging from it is also I. What is the nature of light incident on the polarizer?
A. Polarized
B. Unpolarized
C. Partially polarized
D. Circularly polarized
Ans. A

# UNIT 3B

Q. When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into two components, both are
A. Unpolarized
B. Plane polarized
C. Partially polarized
D. Circularly polarized
Ans. B

Q. When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into _______ plane polarized beam of light.
A. one
B. two
C. three
D. four
Ans. B

Q. When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into two plane polarized beam of light having their planes of vibrations_____________ to each other
A. parallel
B. anti-parallel
C. perpendicular
D. not parallel
Ans. C

Q. When a beam of un-polarized light is incident upon a crystal such as calcite, then the beam on entering the crystal get split up into two plane polarized beam of light having their planes of vibrations mutually perpendicular to each other . This phenomenon is known as
A. Polarization by refraction
B. Polarization by double reflection
C. Polarization by reflection
D. Polarization by double refraction
Ans. D

Q. The chemical name of the calcite crystal is
A. hydrated calcium carbonate
B. hydrated sodium carbonate
C. hydrated aluminium carbonate
D. none of these
Ans. A

Q. The structure of calcite-crystal is
A. Rectangular
B. Rhombohedra
C. Triangular
D. parallelepiped
Ans. B

Q. In the structure of calcite the line joining the two blunt corners of the crystal gives
A. Direction of its central axis
B. Direction of its optic axis
C. Direction of its principle axis
D. None of these
Ans. B

Q. In the calcite crystal the number of optic axis is
A. one
B. two
C. three
D. infinite
Ans. D

Q. At blunt corner all the sides are making ____________angle with each other.
A. acute
B. obtuse
C. right
D. None of these
Ans. B

Q. In calcite structure all acute and obtuse angles are _____ and _____ respectively.
A. $68^0$ and $112^0$
B. $109^0$ and $71^0$
C. $71^0$ and $109^0$
D. $69^0$ and $111^0$
Ans. C

Q. Plane containing the optic axis and perpendicular to the opposite faces of the crystal is called the______

A. Vibration plane
B. Principle plane
C. Optic axis
D. None of these
Ans. B

Q. Rotating calcite crystal is placed over an ink dot. On seeing through the crystal, one finds
A. two stationary dots
B. two dots moving along straight lines
C. one dot rotating about the other
D. both dots rotating about a common axis
Ans. C

Q. The examples of double refracting crystals are
A. Calcite
B. Quartz
C. Tourmaline
D. All above
Ans. D

Q. In case of positive crystals,
A. The velocity of ordinary ray is less than velocity of extraordinary ray
B. The velocity of ordinary ray is equal to velocity of extraordinary ray
C. The velocity of ordinary ray is greater than velocity of extraordinary ray
D. The velocity of extraordinary ray is greater than velocity of ordinary ray
Ans. C

Q. In case of negative crystals,
A. The velocity of ordinary ray is less than velocity of extraordinary ray
B. The velocity of ordinary ray is equal to velocity of extraordinary ray
C. The velocity of ordinary ray is greater than velocity of extraordinary ray
D. The velocity of extraordinary ray is greater than velocity of ordinary ray
Ans. D

Q. Huygen explained the phenomenon of double refraction on the basis of
A. Primary wavelets
B. Secondary wavelets
C. Circular wavelets
D. Cylindrical wavelets
Ans. B

Q. When light is incident on the doubly refracting crystal perpendicular to the optic axis of the crystal then
A. The O- and E- ray travel in different directions with same velocity
B. The O- and E- ray travel in same directions with same velocity
C. The O- and E- ray travel in different directions with different velocity
D. The O- and E- ray travel in same directions with different velocity
Ans. D

Q. When light is incident on the doubly refracting crystal parallel or along to the optic axis of the crystal then
A. The O- and E- ray travel in different directions with same velocity
B. The O- and E- ray travel in same directions with same velocity
C. The O- and E- ray travel in different directions with different velocity
D. The O- and E- ray travel in same directions with different velocity
Ans. B

Q. When light is incident on the doubly refracting crystal normally such that the optic axis is inclined to the crystal surface then
A. The O- and E- ray travel in different directions with same velocity
B. The O- and E- ray travel in same directions with same velocity
C. The O- and E- ray travel in different directions with different velocity
D. The O- and E- ray travel in same directions with different velocity
Ans. C

Q. When light is incident on the doubly refracting crystal along the optic axis of the crystal then O ray and E ray
A. Does not split up and travels with different velocity.
B. Does not split up and travels with same velocity.

C. Split up into two component and travels with different velocity
D. Split up into two component and travels with same velocity
Ans. B
Q. When light is incident on the doubly refracting crystal perpendicular to optic axis of the crystal then O ray and E ray
A. Does not split up and travels with different velocity.
B. Does not split up and travels with same velocity.
C. Split up into two component and travels with different velocity
D. Split up into two component and travels with same velocity
Ans. A

Q. When light is incident normally on the doubly refracting crystal such that the surface on which light is incident is cut perpendicular to its optic axis then O ray and E ray
A. Does not split up and travels with different velocity.
B. Does not split up and travels with same velocity.
C. Split up into two component and travels with different velocity
D. Split up into two component and travels with same velocity
Ans. B

Q. When light is incident normally on the doubly refracting crystal such that the surface on which light is incident is cut parallel to its optic axis then O ray and E ray
A. Does not split up and travels with different velocity.
B. Does not split up and travels with same velocity.
C. Split up into two component and travels with different velocity
D. Split up into two component and travels with same velocity
Ans. A

Q. In double refraction we get two refracted rays called O-ray and E- ray. Which of the following statements is true?
A. Only the O-ray is polarized
B. Only the E-ray is polarized
C. Both O and E rays are polarized
D. Neither O-ray nor E-ray is polarized
Ans. C

Q. For a double refracting crystal, the refractive indices for the ordinary and extraordinary rays are denoted by $\mu_0$ and $\mu_e$. Which of the following relations is valid along the optical axis of the crystal?
A. $\mu_0 = \mu_e$
B. $\mu_0 \leq \mu_e$
C. $\mu_0 < \mu_e$
D. $\mu_0 > \mu_e$
Ans. A

Q. If $\mu_0$ and $\mu_e$ be the refractive indices of the doubly refracting crystal for O-ray and E-ray respectively then for the negative crystal which of the following relations is correct?
A. $\mu_0 = \mu_e$
B. $\mu_0 \leq \mu_e$
C. $\mu_0 < \mu_e$
D. $\mu_0 > \mu_e$
Ans. D

Q. If $\mu_0$ and $\mu_e$ be the refractive indices of the doubly refracting crystal for O-ray and E-ray respectively then for the positive crystals which of the following relations is correct?
A. $\mu_0 = \mu_e$
B. $\mu_0 \leq \mu_e$
C. $\mu_0 < \mu_e$
D. $\mu_0 > \mu_e$
Ans. C

Q. The O-ray travels with the same velocity '$v_o$' in all directions and hence according to Huygen the corresponding wave front is
A. Ellipsoid
B. Spherical
C. Cylindrical
D. None of these

Ans. B

Q. The E-ray travels with the different velocity '$v_e$' in different directions and hence according to Huygen the corresponding wave front is ________

A. Ellipsoid
B. Spherical
C. Cylindrical
D. None of these

Ans. A

Q. In the doubly refracting crystals, the O-ray travels with the same velocity '$v_o$' in all directions therefore its refractive index for O ray is _________ in all directions.

A. Different
B. Same
C. Changes
D. None of these

Ans. B

Q. In the doubly refracting crystals, the E-ray travels with the different velocity '$v_e$' in all directions therefore its refractive index for E ray is _________ in all directions.

A. Different
B. Same
C. Changes
D. None of these

Ans. A

Q. In doubly refracting crystal the ratio of velocities of E – ray in two different directions is 10:9, then the ratio of the refractive indices of that crystal for that ray is

A. 100:81
B. 81:100
C. 9:10
D. 10:09

Ans. C

Q. In doubly refracting crystal the ratio of its refractive indices for E – ray in two different directions is 10:9, then the corresponding ratio of the velocities of that ray is

A. 100:81
B. 81:100
C. 9:10
D. 10:09

Ans. C

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is greater than that of O-ray then the crystal is

A. Positive
B. Negative
C. Both A and B correct
D. None of these

Ans. B

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is greater than that of O-ray then

A. The light is incident along the optic axis and the crystal is negative.
B. The light is incident along the optic axis and the crystal is positive.
C. The light is incident perpendicular to the optic axis and the crystal is negative.
D. The light is incident perpendicular to the optic axis and the crystal is positive.

Ans. C

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is less than that of O-ray then

A. The light is incident along the optic axis and the crystal is negative.
B. The light is incident along the optic axis and the crystal is positive
C. The light is incident perpendicular to the optic axis and the crystal is negative.
D. The light is incident perpendicular to the optic axis and the crystal is positive.

Ans. D

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction and same velocity then

A. The light is incident along the optic axis and the crystal is negative.

B. The light is incident along the optic axis and the crystal is positive
C. The light is incident along the optic axis and the crystal is negative or positive
D. The light is incident perpendicular to the optic axis and the crystal is negative or positive.
Ans. C

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction but with different velocity then
A. The light is incident along the optic axis and the crystal is negative.
B. The light is incident along the optic axis and the crystal is positive
C. The light is incident along the optic axis and the crystal is negative or positive
D. The light is incident perpendicular to the optic axis and the crystal is negative or positive.
Ans. D

Q. In doubly refracting crystal if O-ray and E-ray are travelling along the same direction and with same velocity then
A. The light is incident perpendicular to the optic axis and the crystal is negative.
B. The light is incident perpendicular to the optic axis and the crystal is positive
C. The light is incident perpendicular to the optic axis and the crystal is negative or positive
D. None of these
Ans. D
Q. The refractive index of a doubly refracting crystal for O-ray is 1.586 then the velocity of O-ray in that crystal is
A. $1.89 \times 10^8$ m/s
B. $1.98 \times 10^7$ m/s
C. $1.89 \times 10^7$ m/s
D. $1.89 \times 10^9$ m/s
Ans. A

Q. The velocity of E-ray in a doubly refracting crystal is $1.65 \times 10^8$ m/s then the refractive index of that crystal for that ray is
A. 1.181
B. 1.818
C. 1.118
D. 8.181
Ans. B

Q. Polaroid sunglasses decrease glare on sunny day because they
A. block portion of light
B. have special colour
C. completely absorb the light
D. refract the light
Ans. A

Q. We prefer Polaroid sunglasses because they
A. have soothing colours
B. reduce the intensity of light
C. are cheaper
D. can change colour of light
Ans. B

Q. Which of the following material may be used for manufacturing Polaroid?
A. Calcite
B. Tourmaline
C. Quartz
D. Quinine iodosulphate.
Ans. D

Q. Polaroids are used for
A. Control intensity of light in trains and airplanes
B. Produce three dimensional pictures
C. Eliminate headlight glare in motor cars
D. All of the above
Ans. D

Q. Optically active substances are those which
A. cause double refraction
B. convert unpolarized light into polarized light
C. rotate the plane of polarization
D. convert polarized light into unpolarized light
Ans. C

Q. Dextro rotatory optically active substance rotates the plane of vibrations

__________ as seen by an observer facing the emergent light
A. in clockwise direction
B. in anticlockwise direction
C. by $180^0$
D. None of the above
Ans. A

Q. Leavo rotatory optically active substance rotates the plane of vibrations __________as seen by an observer facing the emergent light .
A. in clockwise direction
B. in anticlockwise direction
C. by $180^0$
D. None of the above
Ans. B

Q. The substance which rotates the plane of vibration of a plane polarized light is called as
A. Optically inactive substance
B. Optically god substance
C. Optically rotating substance
D. Optically active substance
Ans. D

Q. The angle through which plane of polarization rotated is known as
A. Polarizing angle
B. Angle of rotation
C. Angle of reflection
D. Angle of refraction
Ans. B

Q. The angle of rotation produced by an optically active substance is proportional to its
A. Length traversed
B. Concentration of solution
C. $1/\lambda^2$ where $\lambda$ is the wavelength of light used
D. All of them
Ans. D

Q. The angle of rotation produced by an optically active substance is
A. greater for violet and least for red wavelength
B. least for violet and greater for red wavelength
C. same for violet and red wavelength
D. None of these
Ans. A

Q. The specific rotation of a substance is defined as
A. $S = \theta/l.c$
B. $S = 1/\theta.l.c$
C. $S = l/\theta.c$
D. $S = c/\theta.l$
Ans. A
Q. In optically active substances, for a given wavelength of light, the angle of rotation is directly proportional to
A. the area of the optically active substance
B. the length of the optically active substance traversed.
C. the volume of the optically active substance .
D. All above
Ans. B

Q. In optically active substances, the angle of rotation
A. is inversely proportional to wavelength.
B. is inversely proportional to square of wavelength.
C. is inversely proportional to square root of wavelength.
D. is directly proportional to square of wavelength.
Ans. B

Q. In optically active substances, for a given length and wavelength of light, the angle of rotation
A. directly proportional to concentration of solution of optically active substance.
B. inversely proportional to concentration of solution of optically active substance.
C. directly proportional to square of concentration of solution of optically active substance.
D. directly proportional to square root of concentration of solution of optically active substance.
Ans. A

Q. The specific rotation S is the observed angle of optical rotation θ when plane polarized light is passed through a sample with a path length of ___________ and a sample concentration of 1 gm per 1 milliliter.
A. 1 centimeter
B. 1 decimeter
C. 1 millimeter
D. 1 meter
Ans. B

Q. Determine the specific rotation if the plane of polarization is turned through 26.4° traversing 20 cm in length of 20 % sugar solution.
A. 65.5
B. $64^0$
C. $65^0$
D. $66^0$
Ans. D

Q. The plane of polarization of plane polarized light is rotated through $6.8^0$ in passing through the length of 1.8 decimeter of sugar solution of 4.5% concentration. Calculate the specific rotation of the sugar solution.
A. $83^0$
B. $84^0$
C. $85^0$
D. $86^0$
Ans. B

Q. 18 cm long tube containing sugar solution rotates the plane of polarization by $10^o$. If the specific rotation of sugar is $62^o$, determine the concentration of sugar solution.
A. 0.089
B. 0.083
C. 0.08
D. None of these
Ans. A

Q. A sugar solution in a tube of length 18 cm produces optical rotation of $12^0$. The solution is then diluted to one–third of its previous concentration. Find the optical rotation produced by 25 cm long tube containing the diluted solution.
A. 5.99
B. 5.94
C. 5.49
D. None of these
Ans. C