PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

WAVE THEORY OF LIGHT AND POLARISATION

Mcqs

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1. Which one of the following phenomena is not explained by Huygens construction of wavefront?

    A. Reflection

    B. Refraction

C. Formation of Balmer series

D. Diffraction.

Answer: C

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2. A narrow slit illuminated by light produces

A. a plane wavefront

B. a spherical wave front

C. a cylinderical wave front

D. an elliptical wave front

Answer: C

3. If wavelength of a wave is $\lambda = 6000\text{Å}$.Then wave number will be

    A. 1.66×10^7 per m

    B. 1.66×10^6 per m

    C. 166×10^3 per m

    D. 16.6×10^{-1} per m

Answer: B

4. The speed of light in air is $3 \times 10^8 m/s$ and that in diamond is 1.4×10^3 m/s. The refractive index of diamond is

A. 3.00

B. 2.143

C. 1.5

D. 1.875

Answer: B

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5. The velocity of light in a transparent medium is 2×10^8 m/s . The medium must be

   A. air

   B. diamond

   C. water

   D. glass

Answer: D

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6. If the refractive index of a medium is 1.7, the velocity of light in that medium is

A. 1.765×10^8 m/s

B. $2.5 \times 10^8 m/s$

C. $1.1 \times 10^8 m/s$

D. $2.2 \times 10^8 m/s$

Answer: A

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7. If V_g, V_w and V_d represent the velocities of light in glass , water and dimond respectively , then

A. $V_g < V_d < V_w$

B. $V_w > V_g > V_d$

C. $V_d > V_g > V_w$

D. $V_w < V_g < V_d$

Answer: B

8. The frequency of radio waves corresponding to wavelength of 20 m is

A. $3 \times 10^7 Hz$

B. 1.5×10^7 Hz

C. $5 \times 10^{-7} Hz$

D. $3 \times 10^6 Hz$

Answer: B

9. The wavelength of light of frequency 1 KHz is

A. $4 \times 10^6 m$

B. $3 \times 10^5 m$

C. $5 \times 10^5 m$

D. $2 \times 10^6 m$

Answer: B

10. The refractive index of a certain glass is 1.5 for light whose wavelength in vacuum is 6000 Å. The wavelength of this light when it passes through glass is

A. 3000Å

B. 4000Å

C. 5000Å

D. 6500Å

Answer: B

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11. Light travels through a glass plate of thickness t, having refractive index μ. If c is the velocity of light in vaccum, then the time taken by light to travel this thicness of glass is

A. $\mu t c$

B. $\dfrac{\mu t}{c}$

C. $\dfrac{t}{\mu c}$

D. $\dfrac{t c}{\mu}$

Answer: B

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12. Time taken by sunlight to penetrate 2 mm in a glass slab is of the order of (n=1.5)

A. 10^{-16} sec

B. 10^{-19} sec

C. 10^{-11} sec

D. 10^{-7} sec

Answer: C

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13. The wavelength of light in air 5000 A.U. The number of waves in 50 cm of air is

    A. 10^5 waves

    B. 10^6 waves

    C. 5×10^5 waves

    D. 0.5×10^6 waves

Answer: B

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14. The speed of light in dense flint glass is 3/5 of its speed in air. The refractive index of dense flint glass is

A. 1.5

B. 1.75

C. 1.666

D. 1.1

Answer: C

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15. Though quantum theory of light can explain a number of phenomena observed with light , it is necessary to retain the wave-nature of light to explain the phenomena of :

    A. photoelectric effect

    B. compton effect

    C. interference of light

    D. balck body radiation

Answer: C

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16. A sperical wavefront propagating in a medium changes into

    A. a circular wavefront

    B. a plane wavefront

    C. an elliptical wavefront

    D. a cylindrical wavefront

Answer: B

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17. A point source of monochromatic light is situated at the centre of a circle. What is the phase difference

between the light waves passing through the end points of any diameter ?

A. $\dfrac{\pi}{2}$

B. π

C. $\dfrac{3\pi}{2}$

D. zero

Answer: D

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18. Light passess through glass of refractive index 1.5 . What is the time required for light to travel 4×10^8 m

in glass ?

A. 3s

B. 2s

C. 1s

D. $0.5s$

Answer: B

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19. To which part of the electromagnetic spectrum does a wave of frequency 5×10^{19}Hz belong ?

A. Ultraviolet region

B. X-ray region

C. Infrared region

D. Visible region

Answer: C

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20. Which of the following rays and waves do not belong to electromagnetic spectrum ?

α rays , X rays, Ultraviolet rays , Radiowaves , Cathode rays , Ultrasonic waves, Infrared rays and Microwaves

A. α rays, X- rays , Radiowaves

B. α-rays , Ultrasonic waves, Cathode waves

C. α rays , Microwaves , Radiowaves

D. Ultrasonic waves, Infrared rays , Cathode rays

Answer: B

21. What is the shape of the wavefront in each of the following cases ?

(a) light diverging from point source.

(b) light emerging out of a convex lens when a point source is placed at its focus.

(c) the portion of the wavefront of light from a distant star intercepted by earth.

A. Cylindrical wavefront

B. Plane wavefront

C. Converging wavefront

D. Diverging wavefront

Answer: B

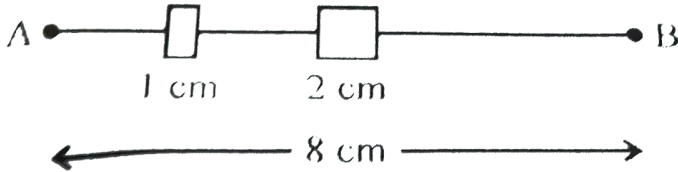▶ **Watch Video Solution**

22. A rays of light travel frons A to B , where the geometrical distance AB=8cm in air.

It passes through two transparent media havin

$n_1 = 1.5$ and $n_2 = 1.75$ as shown in the figure .

What is the optical path between A and B ?

A. 8 cm

B. 5 cm

C. 10 cm

D. 15 cm

Answer: C

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23. Two point on a plane wavefront corresponding to $\lambda = 5000\text{Å}$ are separated by a distance of 2mm. What is the phase difference between those points?

A. $\dfrac{\pi}{2}$ radian

B. Zero

C. $\dfrac{2\pi}{\lambda} \left(2 \times 10^{-3}\right)$ radian

D. π radian

Answer: B

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24. When light wave travel from one transparent medium into another , the characteristics with undergo change are

    A. frequency and wavelength

    B. frequency and amplitude

    C. velocity and wavelength

    D. velocity and frequency .

Answer: C

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25. If the critical angle for total internal reflection from a medium to vacuum is $30°$, the velocity of light in the medium is

    A. $2 \times 10^8 m/s$

    B. $1.5 \times 10^8 m/s$

    C. $1.8 \times 10^8 m/s$

    D. $2.25 \times 10^8 m/s$

Answer: B

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26. The optical path of a monochromatic light is the same if it travels through 4 cm of glass or 4.5 cm of water . If the refractive index of galss is 1.5, then the refractive index of water is

A. 1.2

B. 1.33

C. 1.42

D. 1.46

Answer: B

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27. The wave number of a beam of light in air is 2.5×10^6 per metre. What is its wavelength in glass of refractive index 1.6 ?

A. 2000Å

B. 2500Å

C. 2750Å

D. 3000Å

Answer: B

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28. A strone thrown into still water, creates a circular wave pattern moving radially outwards. If r is the distance measured from the centre of the pattern. The amplitudeof the aves varies as

A. $r^{-1/2}$

B. r^{-1}

C. r^{-2}

D. $r^{-3/2}$

Answer: B

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29. In vacum, to travel distance d, light takes time t and in medium to travel distance 5d, it takes time T. The critical angle of the medium is

A. $\sin^{-1}\left(\dfrac{5T}{t}\right)$

B. $\sin^{-1}\left(\dfrac{5t}{3T}\right)$

C. $\sin^{-1}\left(\dfrac{5t}{T}\right)$

D. $\sin^{-1}\left(\dfrac{3t}{5T}\right)$

Answer: C

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30. A completely transparent material will be invisible in vacuum when its refractive index is

A. more than unity

B. less than unity

C. equal to 1.33

D. unity

Answer: D

31. The refractive indices of water and galss w.r.t. air are 1.3 and 1.5 respectively. What will be the refractive index of galss with respect to water ?

A. $\dfrac{1.3}{1.5}$

B. $\dfrac{1.5}{1.3}$

C. $\dfrac{1.5}{2.6}$

D. $\dfrac{2.6}{1.5}$

Answer: B

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32. A ray of light travels from air to glass . It is found that the angle of refraction is half the angle of incidence . Then the angle of refraction is given by

A. $r = \cos^{-1}\left(\dfrac{n}{2}\right)$

B. $r = \sin^{-1}\left(\dfrac{n}{2}\right)$

C. $r = \tan^{-1}\left(\dfrac{n}{2}\right)$

D. $r = \cos^{-1}\left(\dfrac{2}{n}\right)$

Answer: A

33. A ray of light passes from air into a liquid. The glancing angle is $30°$. The deviation produced in the ray of light is $15°$. The refractive index of liquid is :

A. 1.224

B. 1.268

C. 1.339

D. 1.52

Answer: A

34. A ray of light falls on a transparent glass slab of refractive index 1.53 . If the reflected ray is perpendicular to the refracted ray , then the angle of incidence is approximately equal to

    A. $28\,^{\circ}$

    B. $38\,^{\circ}$

    C. $48\,^{\circ}$

    D. $57\,^{\circ}$

Answer: D

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35. The refractive indices of glass and water w.r.t . air are 3/2 and 4/3 respectively. The refractive index of glass w.r.t. water will be

A. 1.5

B. 1.125

C. 2

D. 0.75

Answer: B

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36. A parallel beam of monochromatic light is incident on the surface of water having refractive index 4/3. The direction of the incidence beam bisects the angle between the normal to the water surface and the water surface. The angles of incidence and refraction are

A. $i = 30°, r = 20°$

B. $i = 45°, r = 20°$

C. $i = 45°, r = 32°$

D. $i = 60°, r = 40°$

Answer: C

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37. A ray of light in air is incident at an angle of $45°$ on the surface of separation of a medium. It is refracted in the medium at an angle of $30°$. What is the velocity of light in that medium ?

A. $1.5 \times 10^8 m/s$

B. $2.12 \times 10^8 m/s$

C. $3.5 \times 10^8 m/s$

D. $3.33 \times 10^8 m/s$

Answer: B

38. Red light of wavelength $750nm$ enters a glass plate of refractive index 1.5. If velocity of light in vacuum is $3 \times 10^8 m/s$, calculate velocity, wavelength and frequency of light in glass.

    A. $2.5 \times 10^{-6}m$

    B. $2.5 \times 10^{-7}m$

    C. $2.5 \times 10^{-8}m$

    D. $2.5 \times 10^{-9}m$

Answer: B

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39. Light enters from air into a medium of R.I. 1.5. What is the percentage change in its wavelength?

    A. 25 %

    B. 33.33 %

    C. 66.66 %

    D. 11.11 %

Answer: B

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40. What is the refractive index of a medium , if a light wave of frequency 5×10^{14} Hz has a wavelength of

4×10^{-7} m in the medium ?

A. 1.1

B. 1.33

C. 1.5

D. 0.67

Answer: C

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41. Refractive index of glass w.r.t water is $9/8$. What is the speed of light in water ? Given speed pf light in glass is $2 \times 10^8 m/s$.

A. $1.25 \times 10^8 m/s$

B. $1.5 \times 10^8 m/s$

C. $1.75 \times 10^8 m/s$

D. $2.25 \times 10^8 m/s$

Answer: D

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42. A beam of monochromatic light of wavelength 6000 Å in air enters water of refractive index $_a n_w = \frac{4}{3}$. What is its wavelength in water ?

A. 3500Å

B. 4000Å

C. 4500Å

D. 5000Å

Answer: C

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43. The velocity of light in glass whose refractive index

w.r.t, air is 1.5 is $2 \times 10^8 m/s$. In a certain liquid, the

velocity of light is found to be $2.5 \times 10^8 m/s$. The

refractive index of the liquid w.r.t. air is

A. 0.8

B. 0.9

C. 1.2

D. 1.33

Answer: C

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44. A ray of light travelling in air is incident at $45°$ on a medium of refractive index $\sqrt{2}$. The angle of refractive in the medium is

A. A. $45°$

B. B.$60°$

C. C.30°

D. D.70°

Answer: C

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45. The difference in speeds of a rya of light in galss

and wate is $2.5 \times 10^7 m/s$. If the R.I. of glass and water

are $\dfrac{3}{2}$ and $\dfrac{4}{3}$ respectively, then the velocity of light in

air is

A. a) $2 \times 10^8 m/s$

B. b) $2.25 \times 10^8 m/s$

C. c) $3 \times 10^8 m/s$

D. d) $2.5 \times 10^8 m/s$

Answer: C

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46. A ray of light is incident on a galss slab making on

angle of $30°$ with the surface . If the angle of refraction

in glass is $33°$, the angle of deviation of the ray during

its passage through the galss slab is

A. $30°$

B. $27°$

C. $40°$

D. $20°$

Answer: B

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47. A ray of light in incident on a glass plate at an angle

of $60°$. What is the refractive index of glass if the

reflected and refracted rays are perpendicular to each

other?

A. $\dfrac{3}{2}$

B. 1.732

C. $\sqrt{\dfrac{3}{2}}$

D. $\dfrac{1}{\sqrt{3}}$

Answer: B

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48. A Light wave travels from a rarer medium to a denser medium. What is its frequency in the denser medium of R.I. 1.5, if its frequency in the rare medium 4.5×10^{14} Hz ?

A. $3 \times 10^{14} Hz$

B. $6.75 \times 10^{14} Hz$

C. $5 \times 10^{14} Hz$

D. $4.5 \times 10^{14} Hz$

Answer: D

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49. The optical path of a monochromatic light is the same if it goes through 2.00 cm of glass or 2.25 cm of water. If the refractive index of water is 1.33, what is the refractive index of glass?

A. $2.25 \times 10^{8} m/s$

B. $1.5 \times 10^{8} m/s$

C. $2 \times 10^8 m/s$

D. $1.75 \times 10^8 m/s$

Answer: C

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50. A ray of light of frequency 5×10^{14} Hz is passed through a liquid . The wavelength of light measured inside the liquid is found to be 450 nm . Calculate (i) wavelength of light in vacuum (ii) refractive index of liquid (iii) velocity of light in the liquid . Take velocity of light in vacuum as $3 \times 10^8 ms^{-1}$

A. 1.5

B. 1.33

C. 1.25

D. 1.8

Answer: B

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51. A wave travelling in air falls on a glass plate . It is partly reflected and partly refracted. What is the phase difference between the reflected and refracted waves ?

A. 2π

B. π

C. $\dfrac{\pi}{2}$

D. zero

Answer: B

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52. Monochromatic light to wavelength 6000Å travels through glass of refractive index $\dfrac{3}{2}$. The distance travelled by the wavefront 1 picosecond is

A. $100\mu m$

B. $200\mu m$

C. $300 \mu m$

D. $400 \mu m$

Answer: D

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53. The wave number of two waves are $2.5 \times 10^6/$ metre and $2 \times 10^6/$metre. What is the difference between their wavelengths ?

A. 5000Å

B. 4000Å

C. 2000Å

D. 1000Å

Answer: D

54. Refractive indices of water an glass are $4/3$ and $3/2$ respectively. A ray of light travelling in water is incident on the water glass interface at $30°$. Calculate the angle of refraction.

A. $\sin^{-1}\left(\dfrac{3}{4}\right)$

B. $\sin^{-1}\left(\dfrac{2}{3}\right)$

C. $\sin^{-1}\left(\dfrac{4}{9}\right)$

D. $\sin^{-1}\left(\dfrac{8}{9}\right)$

Answer: C

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55. The phase difference between incident wave and reflected wave is $180°$ when light ray

    A. strikes glass from air

    B. strikes air from glass

    C. strikes glass from diamond

    D. strikes water from glass

Answer: A

56. The time taken by a ray of light to travel through 5 cm of glass is the same as that through x cm of air. If the R.I. of glass is 1.5 , then the value of x is

A. 7.5 cm

B. 1.33 cm

C. 9cm

D. 6 cm

Answer: A

57. A ray of light travels from water to glass. Which one of the following statements is true ?

A. Frequency of light decreases

B. Wavelength of light increases

C. Velocity of light increases

D. Wavelength of light decreases

Answer: D

58. Green light of wavelength 5460Å is incident on an air glass interface. If the refractive index of glass is 1.5, the wavelength of light in glass would be $(C = 3 \times 10^8 ms^{-1})$n

A. 3640Å

B. 5460Å

C. 4861Å

D. 6240Å

Answer: A

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59. The wavelength of light in vacuum is λ. The wavelength of light in a medium of refractive index n will be

A. $n\lambda$

B. $\dfrac{\lambda}{n}$

C. $\dfrac{\lambda}{n^2}$

D. $\dfrac{n^2}{\lambda}$

Answer: B

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60. The number of waves in 7.5 cm length in vacuum is the same as the number of waves in 5 cm length of a medium . What is the refractive index of the medium ?

A. 1.25

B. 1.75

C. 1.5

D. 1.33

Answer: C

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61. A ray of light travelling from air to glass is deviated by an angle of $24°$. If the reflected and refracted rays are at right angles then the angles of incidence is

    A. $48°$

    B. $57°$

    C. $28°$

    D. $24°$

Answer: B

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62. A ray of light in air is incident on a glass slab at an angle of incidence of $60°$. When it travels through glass, it is deviated through $15°$. What is the refractive index of the material of the glass slab ?

    A. 1.275

    B. 1.225

    C. 1.8

    D. 1.5

Answer: B

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63. The refractive index of glass w.r.t. a medium is $\frac{4}{3}$. If $V_m - V_g = 6.25 \times 10^7 m/s$, then the velocity of light in the medium will be

    A. $2.5 \times 10^8 m/s$

    B. $2.25 \times 10^8 m/s$

    C. $1.875 \times 10^8 m/s$

    D. $1.5 \times 10^8 m/s$

Answer: A

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64. A ray of light passes from vaccume into a medium of refractive index n. if the angle of incidence is twice the angle of refraction, then the angle of incidence is

A. $2\sin^{-1}\left(\dfrac{n}{2}\right)$

B. $2\cos^{-1}\left(\dfrac{n}{2}\right)$

C. $\cos^{-1}\left(\dfrac{n}{2}\right)$

D. $2\sin^{-1}(n)$

Answer: B

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65. A light is travelling from air a medium the velocity of light in a medium is reduced to to 0.75 times the velocity n air assume that angle of incidence I is very small the deviation of the ray is

A. $\delta = i$

B. $\delta = \dfrac{i}{2}$

C. $\delta = \dfrac{i}{4}$

D. $\delta = 2r$

Answer: C

66. When the same monochromatic ray of light travels through glass slab and through water, the number of waves in glass slab of thickness 6 cm is same as in water column of height 7 cm. If refractive index of glass is 1.5, then refractive index of water is
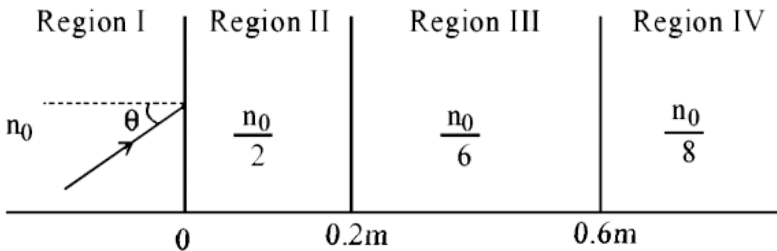
A. 1.25

B. 1.5

C. 1.33

D. 1.75

Answer: C

67. A light beam is travelling from Region I to IV (figure). The refractive index in regionals I, II, III and IV are $n_0 = \dfrac{n_0}{2}$ $(n\_0)/(6)$ and $(n\_0)/(8)$ respectively. The $\angle$ of incidence θ for which the beam just misses enter $\in$ g region IV is —

Region I | Region II | Region III | Region IV

n_0 θ $\dfrac{n_0}{2}$ $\dfrac{n_0}{6}$ $\dfrac{n_0}{8}$

0 0.2m 0.6m

A. $\sin^{-1}\left(\dfrac{3}{4}\right)$

B. $\sin^{-1}\left(\dfrac{1}{8}\right)$

C. $\sin^{-1}\left(\dfrac{1}{4}\right)$

D. $\sin^{-1}\left(\dfrac{1}{3}\right)$

Answer: B

68. A ray of light is incident on a medium of refractive index $\sqrt{2}$ at an angle of incidence of $45°$. The ratio of the width of the incident beam in air to that of the refracted beam in the medium is

A. $(3/2)^{1/2}$

B. $(2/3)^{1/2}$

C. $3/2$

D. $2/3$

Answer: B

69. For the same angle of incidence the angles fo refreaction in media P,Q ,R and S are $50°$, $40°$, $30°$, $20°$ respectively the speed of lights is minimum in medium

A. P

B. Q

C. R

D. S

Answer: D

70. Consider sound waves in air, electromagnetic waves in the visible region and transverse wave on a string . The phenomenon of polarisation can be observed in

A. sound waves in air and transverser waves on the string

B. electromagnetic waves and sound waves in air

C. electromagnetic waves in the visible region and transverse wave on the string

D. sound waves

Answer: C

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71. The polarisation of an electromagnetic wave is determined by

A. only by its magnetic filed

B. only by its electric field

C. by the direction of propagation of the wave

D. by both electric and magnetic fields.

Answer: B

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72. When an unpolarised light of inensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmittted is

A. I_0

B. Zero

C. $\dfrac{1}{4}I_0$

D. $\dfrac{1}{2}I_0$

Answer: D

73. If the refractive index of glass is $\sqrt{3}$, then its polarising angle will be

    A. 30°

    B. 45°

    C. 60°

    D. 90°

Answer: C

74. If the polarising angle for red light is $60°$, for a certain medium, then the polarising angle for the blue light for the same medium will be

    A. $60°$

    B. less than $60°$

    C. $45°$

    D. more than $60°$

Answer: D

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75. AN unpolarised beam of light is incident at the polarising angle on the surface of a transparent medium of refractive index 1.6. The angle of refraction in the medium is

A. 58°

B. 29°

C. 32°

D. 42°

Answer: C

76. At what angle should an unpolarised beam of light he incident on a medium of refractive index $\sqrt{3}$ so that the reflected beam is completely polarised ?

A. $0°$

B. $30°$

C. $45°$

D. $60°$

Answer: D

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77. A ray of unpolarised light is incident on the surface of a glass plate of refractive index 1.54 at the polarising angle. If $\tan 57° C = 1.54$, then the angle of refraction in glass is

A. $57°$

B. $43°$

C. $33°$

D. $90°$

Answer: C

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78. The relation between the polarising angle (i_p) and the refractive index (n) of the medium is given by

A. $n\sin i_p = 1$

B. $n\cot i_p = 1$

C. $n\tan i_p = 1$

D. $n\cos i_p = 1$

Answer: B

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79. Polarising angle for water is $53°4'$. If light is incident at this angle on the surface of water and

reflected , the angle of refraction is

A. $53° 4'$

B. $126° 56'$

C. $36° 56'$

D. $30° 4'$

Answer: C

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80. The Brwster angle of the glass-air interface is $54.74°$. If a ray of light going from air to glass strikes

at an angle of incidence $45°$, then the angle of refraction is

A. $60°$

B. $30°$

C. $25°$

D. $54.74°$

Answer: B

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81. Light is incident at an angle i on a glass slab. If the reflected ray is completely polarised , then the angle of

refraction is

A. $180° - i$

B. $90° + i$

C. i

D. $90° - i$

Answer: D

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82. The refractive indices of glass and water are 1.54 and 1.33 respectively. What is the polarising angle for a beam of light going from water to glass ?

A. 35°

B. 40°

C. $49^\circ\,5'$

D. $59^\circ\,4'$

Answer: C

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83. Ordinary light incident on a glass slab at the polarising angle suffers a deviation of 22°. In this case, the angle of refraction is

A. 56°

B. 34°

C. 68°

D. 22°

Answer: B

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84. A beam of light travelling in water strikes a glass plate, which is also immersed in water. When the angle of incidence is 51°, the reflected beam is found to be plane polarised . What is the refractive index of glass if the refractive index of water is $\dfrac{4}{3}$? $[\tan 51^\circ = 1.235]$

A. 1.646

B. 1.325

C. 2.123

D. 1.987

Answer: A

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85. For a given medium , the speed of light and the polarising angle are V and i_p respectively. Then from Brewster's law [C is the speed of light in vacuum]

A. $V \sin i_p = C \cos i_p$

B. $C = V \cot i_p$

C. $V \cos i_p = C \sin i_p$

D. $V = C \cos i_p$

Answer: A

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86. The angle of incidence at which reflected light is totally polarized for reflection from ait to glass (refractive index n), is :

A. $\tan^{-1}(n)$

B. $\tan^{-1}\left(\dfrac{1}{n}\right)$

C. $\sin^{-1}\left(\dfrac{1}{n}\right)$
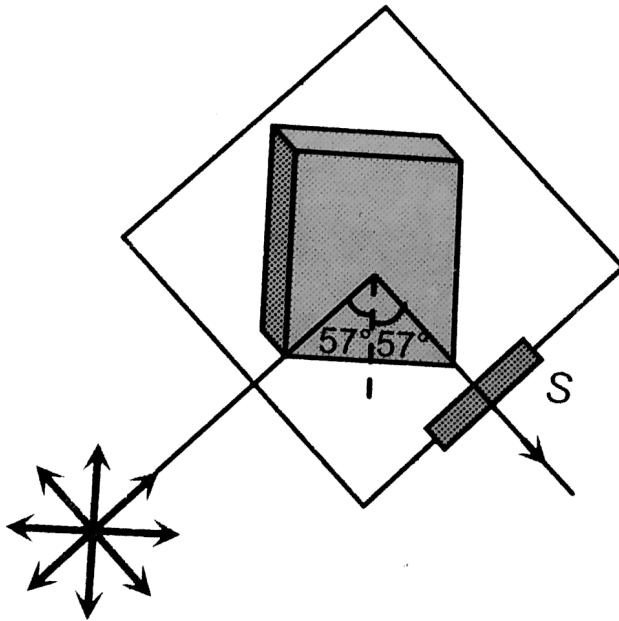
D. $\sin^{-1}(n)$

Answer: A

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87. Figure represents a glass plate placed vertically on a horizontal table with a beam of unpolarised light falling on its surface at the polarising angle of $57°$ with the normal. The electric vector in the reflected light on screen S will vibrate with respect to the plane

of incidence in a

A. vertical plane

B. Horizontal plane

C. Plane making and angle of $45°$ with the vertical

D. Plane making an angle of $57°$ with the horizontal

Answer: A

88. Polarised glass is used in sum glasses because:

A. it is cheaper

B. it is fashionable

C. if reduces the intensity of light entering the eye

D. it has good colour

Answer: C

89. Which one of the following is based on dichroism?

    A. Crown Glass

    B. Bisprism

    C. Polaroid

    D. Compound Microscope

Answer: C

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90. A beam of light incident on a polaroid and the polaroid is rotated through $360°$, about the direction

of the incident beam as the axis. If there is no change in the intesity of the transmitted light then the incident light may be

A. Linearly polarised

B. Partially polarised

C. Unpolarised

D. Completely plane polarised

Answer: C

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91. In the spectrum of light of a luminous heavenly body the wavelength of a spectral line is measured to be 4747Å while actual wavelength of the line is 4700Å. The relative velocity of the heavenly body with respect to earth will be (velocity of light is $3 \times 10^8 m/s$)

A. $2 \times 10^5 m/s$

B. $3 \times 10^5 m/s$

C. $3 \times 10^6 m/s$

D. $2.5 \times 10^6 m/s$

Answer: C

92. The spectral line for a given element , received from a distant star is shifted towards the longer wavelength by $0.028\,\%$. What is the velocity of the star ?

A. a) $5.6 \times 10^4 m/s$

B. b)$8.4 \times 10^4 m/s$

C. c)$4.2 \times 10^4 m/s$

D. d)$9.8 \times 10^4 m/s$

Answer: B

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93. The 6000Å line emitted by a gaseous element in a star iis found to have red shift of 15Å. What is the speed with which the star is receding from the earth ? $(c = 3 \times 10^8 m/s)$

    A. $5 \times 10^5 m/s$

    B. $6 \times 10^5 m/s$

    C. $7.5 \times 10^5 m/s$

    D. $9 \times 10^5 m/s$

Answer: C

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94. A star which is emitting radiation at a wavelength of 5000A is approaching the earth with a velocity of $1.50 \times 10^6 m/s$ The change in wavelegth of the radiation as received on the earth is

    A. 2.5Å

    B. 25Å

    C. 2.50Å

    D. 0.25Å

Answer: B

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95. A heavenly body is receding from earth such that the fractional change in λ is 1, then its velocity is

A. c

B. $\dfrac{3c}{5}$

C. $\dfrac{c}{5}$

D. $\dfrac{2c}{5}$

Answer: A

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96. Red shift' confirms the theory of expanding universe by using

    A. Stefan's law

    B. Wien's law

    C. Doppler's effect in light

    D. Kirchhoff's law

Answer: C

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97. The wavelength of sodium D_2 line obtained from a sodium vapour lamp is 5890Å. If the wavelength of sodium D_2 line emitted by a star is measured as 5895Å , then this implies that

    A. the star is revolving round the earh

    B. the star is moving away from the earth

    C. the star is moving towards the earth

    D. the star is stationary

Answer: B

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98. A star moves away from the earh at a speed of 0.8 c while emitting light of frequency $6 \times 10^{14} Hz$. What frequency will be observed on the earth (in units of 10^{14}Hz) ? (c=speed of light)

A. 0.24

B. 1.2

C. 30

D. 3.3

Answer: B

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99. The wavelength of light coming from a star is found to be 0.6% more than that coming from a source on earth. What is the velocity of the star ? $\left[c = 3 \times 10^8 m/s\right]$

A. A. $1.2 \times 10^6 m/s$

B. B. $1.5 \times 10^6 m/s$

C. C.$1.8 \times 10^6 m/s$

D. D. $1.6 \times 10^6 m/s$

Answer: C

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100. The spectral line of wavelength $\lambda = 5000\text{Å}$ in the light coming from a distant star is observed as 5200 Å.Determine the recession velocity of the star.

A. Receding , $1.2 \times 10^7 m/s$

B. Approaching , $1.2 \times 10^7 m/s$

C. Receding , $2.4 \times 10^7 m/s$

D. Approaching, $1.8 \times 10^7 m/s$

Answer: A

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101. The sun is rotating about its own axis. For an observer on the earth , the spectral lines emitted from the two ends of its equator show

    A. shift towards the red end

    B. shift towards the violet end

    C. shift towards the red end by one line and towards the violet end by the other

    D. no shift

Answer: C

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102. The periodic time of rotation of a certain star is 22 days and its radius is 7×10^8 metres . If the wavelength of light emitted by its surface be 4320Å, the Doppler shift will be (1 day = 86400 sec)

A. 0.33Å

B. 0.33Å

C. 3.3Å

D. 33Å

Answer: A

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103. If the polarising angle for a given medium is $60°$, then the refractive index of the medium is

A. $\dfrac{1}{\sqrt{3}}$

B. $\sqrt{\dfrac{3}{2}}$

C. 1

D. $\sqrt{3}$

Answer: D

104. A ray of light travelling through rarer medium is incident at very small angle i on a glass slab and after refraction its velocity is reduced by 20%. The angle of deviation

A. $\dfrac{i}{8}$

B. $\dfrac{i}{5}$

C. $\dfrac{i}{2}$

D. $\dfrac{4i}{5}$

Answer: B

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105. From Brewster's law, except for polished metallic surfaces, the polarising angle

A. depends on wavelength and is different for different colours

B. independent on wavelength and is different for different colours

C. independent on wavelength and is the same for different colours

D. depends on wavelength and is the same for different colours

Answer: A

106. The polarising angle the transparent medium is $'\theta'$ and 'v' is the speed of light in that medium. Then the relation between $'\theta'$ and 'v' is

(c = velocity of light in air)

A. $\theta = \tan^{-1}\left(\dfrac{v}{c}\right)$

B. $\theta = \cot^{-1}\left(\dfrac{v}{c}\right)$

C. $\theta = \sin^{-1}\left(\dfrac{v}{c}\right)$

D. $\theta = \cos^{-1}\left(\dfrac{v}{c}\right)$

Answer: B

107. When the same monochromatic ray of light travels through glass slab and through water, the number of waves in glass slab of thickness 6 cm is same as in water column of height 7 cm. If refractive index of glass is 1.5, then refractive index of water is

A. 1.258

B. 1.269

C. 1.286

D. 1.310

Answer: C

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1. A ray of light incident normally on a glass slab of refractive index 3/2, travels a distance of 6 cm in glass in time t. What will be the distance travelled by the ray in the same time (t) if it travels in air ?

A. 3cm

B. 6 cm

C. 9cm

D. $3\sqrt{3}cm$

Answer: C

2. The wavelength of green light in air is 5400 A.U. Its wavelength in the glass of refractive index 3/2 is

    A. a. 5400Å

    B. b. 2700 Å

    C. c. 3600 Å

    D. d. 8100 Å

Answer: C

3. A light wave in air enters a medium of refractive index $\frac{4}{3}$. If the wavelength of light in air is 6000Å, then the wave number of light in the medium is

A. $1.11 \times 10^6 / m$

B. $2.22 \times 10^6 / m$

C. $3.33 \times 10^6 / m$

D. $4.44 \times 10^6 / m$

Answer: B

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4. A ray of light in incident on a glass plate at an angle of $60°$. What is the refractive index of glass if the reflected and refracted rays are perpendicular to each other?

    A. $\sin i$

    B. $\cos i$

    C. $\tan i$

    D. $\mathrm{cosec} i$

Answer: C

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5. A ray of light travelling inside a rectangular glass block $\left(\mu = \sqrt{2}\right)$ is incident on the glass-air surface at an angle of incidence of $45°$. The refractive index of air is 1. The ray will

   A. will be absorbed by the glass slab

   B. will travel in air without any deviation

   C. will travel parallel to the interface i.e., the angle

   of refraction will be $90°$

   D. will be reflected back in glass

Answer: C

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6. A beam of monochromatic ligh first travels through glass of R.I. 1.5 and then through water (R.I. $= \frac{4}{3}$). If the difference in their wavelength in the two media is 40nm, then the wavelength of the monochromatic light in vacuum will be

    A. 4000Å

    B. 4400Å

    C. 4800Å

    D. 5200Å

Answer: C

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7. A ray of light is incident on the surface of plate of glass of refractive index 1.5 at the polarising angle. The angle of refraction of the ray will be

A. $0°$

B. $33° \, 42'$

C. $45°$

D. $65°$

Answer: B

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8. What is the angle which the rays of the sun must make with the surface of water (n=1.33) in a lake, so that the reflected rays are completely polarised in a plane parallel to the surface ?

A. $37°$

B. $50°$

C. $72°$

D. $67°$

Answer: A

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9. A beam of light is incident at polarising angle θ on air-glass interface. If λ_a and λ_g are the wavelength of light in air and glass respectively then

A. $\lambda_a = \lambda_g \cot \theta$

B. $\lambda_g = \lambda_a \cot \theta$

C. $\lambda_a = \lambda_g \tan^2 \theta$

D. $\lambda_g = \lambda_a \tan^2 \theta$

Answer: B

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10. When the angle of incidence is $60°$ on the surface of a glass slab, it is found that the reflected ray is completely polarised. The velocity of light in glass is

A. $\sqrt{3} \times 10^8 m/s$

B. $2 \times 10^8 m/s$

C. $3 \times 10^8 m/s$

D. $\sqrt{2} \times 10^8 m/s$

Answer: A

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11. A ray of light in air is incident on a glass plate at polarising angle of incidence. It suffers a deviation of $22°$ on entering glass. The angle of polarization is

A. $48°$

B. $57°$

C. $28.5°$

D. $24°$

Answer: B

12. If the polarizing angle of a piece of glass for green light is $54.74°$, then the angle of minimum deviation for an equilateral prism made of same glass is : [Given : $\tan 54.74° = 1.414$]

A. $54.74°$

B. $60°$

C. $45°$

D. $30°$

Answer: D

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13. Herapathite (iodo sulphate of quinine) is used in the production of

A. an achromatic prism

B. a polaroid

C. a biprism

D. a solar cell

Answer: B

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14. A rocket is going away from the earth at a speed of 10^6 m/s . If the wavelength of the light wave emitted by

a light source on it is 5400Å, what will be its Doppler

Shift ?

A. a. 1.8Å

B. b. 18Å

C. c.25Å

D. d. 14Å

Answer: B

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15. A star emitting light of wavelength 6000 Å is

moving towards the earth with a speed of $3 \times 10^6 m/s$

. What is the apparent wavelength of the emitted light

?

A. a. 6060Å

B. b. 5900Å

C. c. 5940Å

D. d. 5850Å

Answer: C

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