

2024

GIFT



PHYSICS



Final
Exams

of some educational
administrations

2nd
SEC.
FIRST TERM



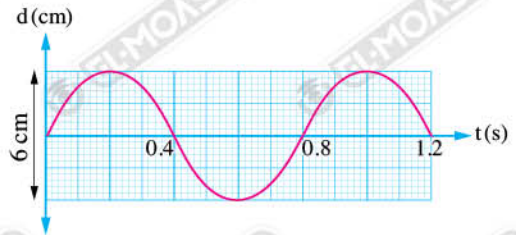
First : Choose the correct answer (1 : 20) :

1 Diamond is more shining than glass due

- (a) refraction
- (b) total internal reflection
- (c) diffusion
- (d) diffraction

2 In the given figure :

	Amplitude (cm)	T (s)	ν (Hz)
(a)	6	0.4	2.5
(b)	3	0.8	1.25
(c)	6	2.5	0.4
(d)	3	1.5	0.8

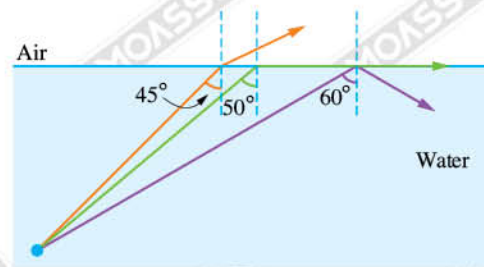


3 A liquid flows through a tube of uniform diameter (D) with velocity (v), if a stopper of cork having a hole was put at the end of the tube and the diameter of the hole equals $\frac{D}{4}$, the velocity of flow of the liquid out from the hole equals

- (a) $\frac{v}{4}$
- (b) $4v$
- (c) $16v$
- (d) $\frac{v}{16}$

4 The given figure shows 3 light rays incident from a light source inside water with different angles of incidence, so the refractive index (n) of water equals

- (a) 1
- (b) 1.3
- (c) 1.15
- (d) 1.56



5 A thin prism of apex angle 6° deviates light rays by 3° , so the refractive index of its material is

- (a) 1.5
- (b) 1.6
- (c) 1.7
- (d) 1.8

6 If the time between the pass of the first crest and the tenth crest by a point in the path of its wave motion is 0.2 sec. so the frequency of its source equals

- (a) 45 Hz
- (b) 50 Hz
- (c) 55 Hz
- (d) 60 Hz

7 A light ray is incident on the separating surface between two transparent media, if the ratio between the speeds of the light wave in the 2 media ($\frac{v_1}{v_2} = \frac{2}{3}$), so the ratio between, the frequencies of the light wave in the 2 media ($\frac{\nu_1}{\nu_2}$) equals

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{1}$ (d) $\frac{3}{2}$

8 If the absolute refractive index of water is 1.33, so the time required by light to cover a distance of 20 m in water is

(Given that : the speed of light in air = 3×10^8 m/s)

(a) 8.85×10^{-8} s (b) 1.13×10^{-7} s (c) 2.25×10^{-8} s (d) 4.52×10^{-8} s

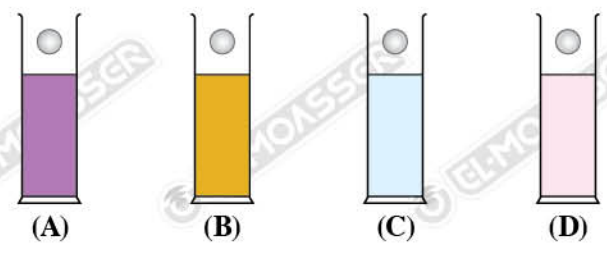
9 A transverse wave in which the vertical distance between a crest and a trough equals the horizontal distance between a crest and successive trough, if the wave speed = 3.2 m/s, its frequency = 16 Hz, so the amplitude of wave equals

(a) 0.5 m (b) 0.2 m (c) 0.1 m (d) 0.05 m

10 The ratio of the distances between the central fringe and first lighted fringe in Young's experiment in the case of using red light and using violet light is

(a) greater than one (b) less than one
(c) one (d) cannot determine the answer

11 The given figure illustrates 4 jars containing different liquids, 4 similar metallic balls fall from the same height, the time taken by the balls to reach the bottom of the jars is as follows :

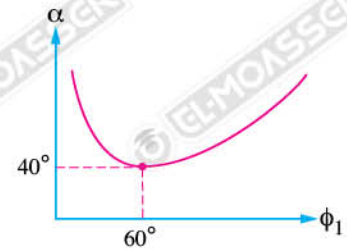


Jar	A	B	C	D
Time	0.2 s	0.6 s	0.8 s	0.4 s

So, which of the following choices is correct ?

(a) Liquid in jar (A) has the largest viscosity. (b) Liquid in jar (C) has the largest viscosity.
(c) Liquid in jar (D) has the smallest viscosity. (d) All liquids have the same viscosity.

12 The given figure represents the relation between angle of deviation (α) and the first angle of incidence (ϕ_1), so the apex angle of the prism and the refractive index are respectively



- (a) 60° , 1.5
- (b) 75° , 1.35
- (c) 80° , 1.45
- (d) 80° , 1.35

13 A major artery of diameter 0.5 cm, the speed of blood through it is 0.4 m/s, is branched into number of capillaries, the diameter of each is 0.2 cm and speed of blood in each one is 0.25 m/s, so the number of capillaries equals

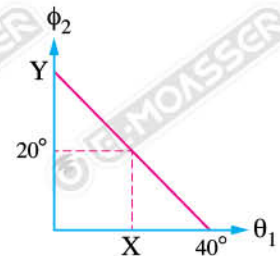
- (a) 5
- (b) 100
- (c) 20
- (d) 10

14 When the angle of incidence changes from 60° to 30° , the angle of refraction changes from 45° to

- (a) 22.5°
- (b) 24°
- (c) 25°
- (d) 30°

15 The given figure represents the relation between the second angle incidence (ϕ_2) and the first angle of refraction (θ_1), so which of the following choices is correct ?

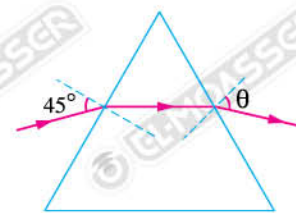
	Point Y		Point X	
	Represents	Equals	Represents	Equals
(a)	Apex angle	60°	First angle of incidence in state of minimum deviation	20°
(b)	Angle of deviation	60°	Apex angle	20°
(c)	Apex angle	40°	Angle of deviation	20°
(d)	Apex angle	40°	First angle of refraction in state of minimum deviation	20°



16 In the experiment of double slits, if the distance between the two slits is 10^{-4} m and the distance between two fringes of the same type is 3.75 mm and the screen that receives fringes is at distance of 0.75 m from the two slits, the wavelength of the used light equals

- (a) 5000 Å
- (b) 5400 Å
- (c) 6000 Å
- (d) 6400 Å

17 The given figure represents the path of light ray through equilateral glass prism, the refractive index of its material is 1.5 so angle θ equals



- (a) 47.2°
- (b) 43°
- (c) 52.4°
- (d) 27°

18 A light ray is incident with angle 45° on a triangular prism of apex angle 30° . It emerges perpendicular to the other side, so its angle of deviation equals

- (a) 30°
- (b) 25°
- (c) 20°
- (d) 15°

19 In Young's double slit experiment the fringes are more clear on

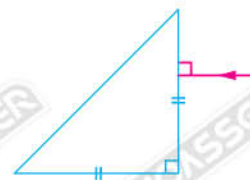
- (a) decreasing the distance between the two slits and screen
- (b) increasing the distance between the two slits and screen
- (c) increasing the distance between the two slits
- (d) decreasing the wavelength of monochromatic light use.

20 The diffraction and refraction agree in that the rays resulting after diffraction and refraction have the same initial

- (a) wavelength
- (b) direction
- (c) speed
- (d) frequency

Second : Answer the following questions (21 : 23) :

21 A light ray is incident on one side of triangular prism as in the figure. Find the angle of emergence of light ray. (Given that : $n = 1.49$)



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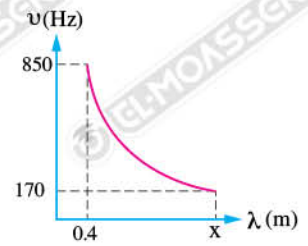
- 22 In human body, **why** is the speed of flow of blood in the major artery greater than its speed in blood capillaries although the area of capillary is less than the area of artery ?

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- 23 The opposite figure represents the relation between frequency of a wave (ν) and its wavelength (λ) for number of tuning forks vibrating in air. **Find** the value of x .



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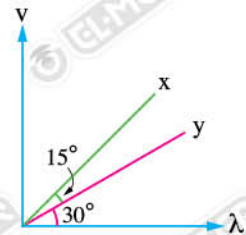


First : Choose the correct answer (1 : 20) :

1 A sound wave of wavelength λ propagates in air with a speed 330 m/s, if it has travelled to another medium in which its speed is 660 m/s, then its wavelength increases by

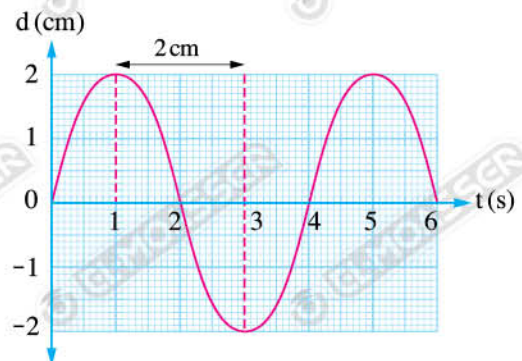
- (a) λ (b) 2λ (c) 3λ (d) 4λ

2 The opposite graph represents the relation between the wavelength (λ) for two waves (x, y) propagating in different media and the speed (v) of these two waves in each of these media, so $\frac{T_x}{T_y}$ equal



- (a) 0.577 (b) 1.73 (c) 0.464 (d) 2.15

3 The opposite graph represents the relation between the vertical displacement (d) and the time (t) of a wave motion which is formed in a rope, so the speed of the wave equals



- (a) 0.16 m/s (b) 1 m/s
(c) 0.01 m/s (d) 0.8 m/s

4 A light ray is incident from air onto the surface of a transparent material at an angle of 40° , so the angle of refraction inside the material may equal

- (a) 40° (b) 45° (c) 35° (d) 50°

5 In Young's double-slit experiment, a light of wavelength 500 nm fell on a double slit separated by a distance 2.5 mm, so an interference pattern appeared on a screen 1 m away from the two slits. So the distance between the centers of two successive interference fringes equals

- (a) 0.2×10^{-3} m (b) 2×10^{-7} m (c) 2.5×10^{-3} m (d) 2.5 m

6 The light color which has the greatest value of critical angle in glass surrounded by air is

- (a) blue (b) yellow (c) red (d) green

7 A light ray is incident on one the faces of an equilateral triangular prism getting refracted parallel to the base and emerging with an angle 60° , so the first angle of incidence (ϕ_1) of the ray equals

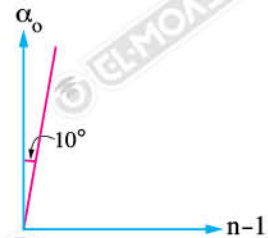
- (a) 30° (b) 60° (c) 45° (d) 90°

8 When a light of wavelength (λ) is used in Young's double-slit experiment, the path difference between the two waves at the first dark fringe equals

- (a) 1.5λ (b) λ (c) 0.5λ (d) zero

9 In the opposite graph, the apex angle of the thin prism equals

- (a) 5.67° (b) 0.176°
(c) 2.7° (d) 7.6°



10 A thin prism has an apex angle of 10° is made of a material of refractive index for red light 1.5 and for blue light 1.7, so the dispersive power of the prism equals

- (a) 0.2 (b) 1.6 (c) 0.33 (d) 0.125

11 A light ray is incident on an equilateral triangular prism, if the angle of incidence equals the angle of emergence = 45° , then the angle of deviation of the light ray equals

- (a) 20° (b) 30° (c) 45° (d) 60°

12 Which of the following angles in an equilateral triangular prism whose material has a refractive index 1.5 could have possible values of 0° or 90° ?

- (a) The deviation angle (b) The second angle of incidence
(c) The angle of refraction (d) The angle of emergence

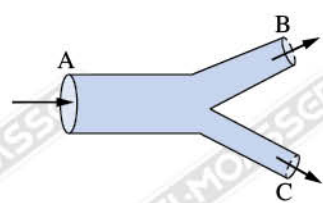
13 When the temperature of a layer of air increases, its refractive index

- (a) increases
- (b) decreases
- (c) doesn't change
- (d) increases or decreases

14 If the ratio between the absolute refractive index of the first medium and the absolute refractive index of the second medium is $\frac{2}{1}$, the ratio between the frequency of a light ray in the first medium and the frequency of the same light ray in the second medium is

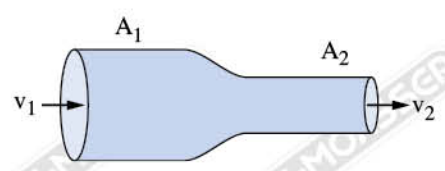
- (a) $\frac{1}{1}$
- (b) $\frac{1}{4}$
- (c) $\frac{1}{2}$
- (d) $\frac{2}{1}$

15 The opposite diagram shows a liquid flowing steadily in a tube. If the area of A = 4 cm², B = 1.5 cm², C = 1 cm² and the speed of the liquid in A = 2 m/s, B = 3 m/s, so the speed in C equals



- (a) 3.5 m/s
- (b) 9 m/s
- (c) 5 m/s
- (d) 2 m/s

16 The opposite figure shows a liquid flowing steadily, if $A_2 = \frac{A_1}{4}$ and $v_1 = 2$ m/s, then $v_2 =$

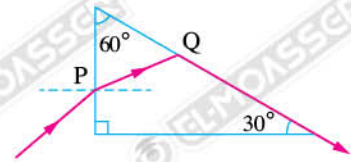


- (a) 0.5 m/s
- (b) 2 m/s
- (c) 8 m/s
- (d) 4 m/s

17 The ratio between the sedimentation rate of red blood cells in anemia patients and in rheumatic fever patients is

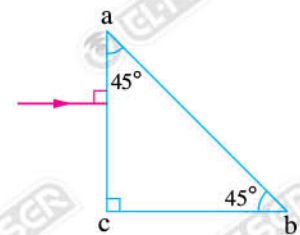
- (a) less than one
- (b) equal one
- (c) greater than one
- (d) less or greater than one

18 In the opposite figure, a light ray falls on the face of a prism at point P, so the angle of refraction equals 15° , then it falls on the opposite face at point Q and emerges tangent to that face, hence the refractive index of the prism's material for the light equals



- (a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) $\frac{1}{2}$ (d) $\frac{2}{1}$

19 In the opposite figure, if the refractive index of the prism is $\sqrt{2}$, the incident ray on face ab



- (a) undergoes total internal reflection
 (b) emerges with an angle 60°
 (c) emerges with an angle 80°
 (d) emerges tangent to that face

20 If the ratio between the apex angles of two thin prisms of the same material equals $\frac{3}{4}$, then the ratio between the dispersive powers of them respectively equals

- (a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{1}{1}$ (d) $\frac{4}{5}$

Second: Answer the following questions (21 : 23) :

21 Longitudinal wave of wavelength 20 cm and periodic time 0.4 sec. turned to transverse wave of frequency 10 Hz that travels at double the speed of the longitudinal wave, **calculate** the wavelength of the transverse wave.

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22 Water flows steadily in a tube of diameter 2 cm at a speed 8 m/s, **calculate** the mass of water coming out from the tube within one minute. ($\rho_w = 1000 \text{ kg/m}^3$)

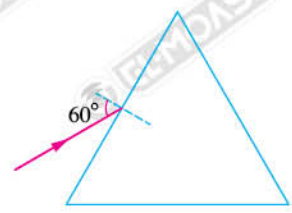
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23 The opposite figure represents a light ray that is incident at an angle of 60° on one of the faces of an equilateral triangular prism whose refractive index equals 1.5.



- (a) Trace the pass of the light ray in the prism.
- (b) Calculate the angle of deviation for the light ray.

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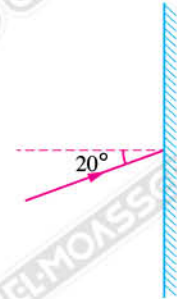
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First : Choose the correct answer (1 : 20) :

1 The opposite figure shows a light ray falling on a plane mirror at an angle of incidence 20° . If the mirror is rotated in clockwise direction by an angle 4° about an axis perpendicular to the page at the point of incidence, the angle of reflection equals

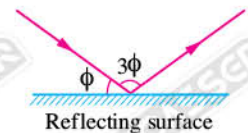


- (a) 18°
- (b) 16°
- (c) 24°
- (d) 22°

2 If a rope is fixed to the wall and its other terminal is being moved up and down so that a wave is produced in the rope, then if you move your hand faster without changing the vertical displacement of your hand's motion or the tension force in the rope, so

- (a) the frequency will increase
- (b) the amplitude will increase
- (c) the amplitude will decrease
- (d) the frequency will decrease

3 In the opposite figure, the angle of reflection equals

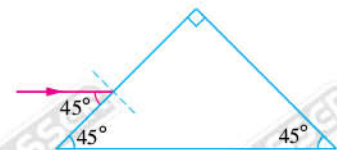


- (a) 54°
- (b) 108°
- (c) 36°
- (d) 18°

4 What is the characteristic that describes only the longitudinal waves and doesn't describe the transverse?

- (a) They transfer energy in direction of their propagation.
- (b) They can be travelling.
- (c) Their speed of propagation differs from medium to another.
- (d) They require a medium in order to propagate.

5 In the opposite figure, a light ray is incident at angle of 45° on one of the faces of an isosceles right angled triangular prism whose material refractive index is 1.5, then the value of the angle of emergence equals



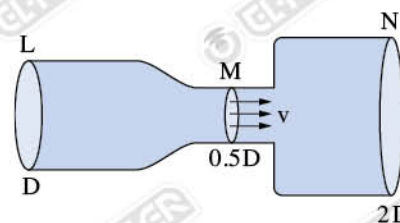
- (a) 90°
- (b) 45°
- (c) 0°
- (d) 42°

- 6 If the refractive index of medium (A) is double the refractive index of medium (B) where the speed of light in medium (A) = $0.1c$, then the speed of light in medium (B) equals
 (c = 3×10^8 m/s)
- (a) $0.1c$ (b) $0.005c$ (c) c (d) $0.2c$

- 7 A light ray deviates from its path with an angle α when it passes through a glass thin prism surrounded by air, so when this prism is submerged in water, the angle of deviation of the light ray through it becomes
- (a) α (b) less than α (c) greater than α (d) zero

- 8 The bottom of a swimming pool may not be seen when looking at it from the air because of the of the light.
- (a) interference (b) total internal reflection
 (c) refraction (d) diffraction

- 9 The opposite figure shows a liquid flowing steadily in a tube from one terminal to the other, where the diameter = $0.5D$ and the speed of liquid = v m/s at M, so the ratio of density of streamlines through the cross-sections L : N is



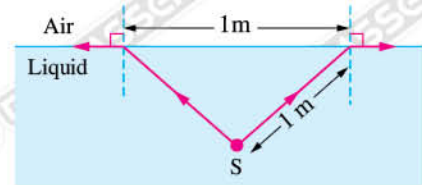
- (a) $2 : 1$ (b) $1 : 1$ (c) $12 : 3$ (d) $0.5 : 1$
- 10 If the critical angle of a light ray that transfers from a medium of refractive index 1.72 to another medium is 55° , then the refractive index of the second medium equals
- (a) 1.41 (b) 1.56 (c) 1.48 (d) 1.53

- 11 The ratio between the deviation angle of the green light and the deviation angle of the orange light is after they emerge from a triangular prism at minimum deviation position.
- (a) angular dispersion (b) deviation angle
 (c) less than 1 (d) greater than 1

- 12 When a light ray falls on one of the faces of an equilateral triangular prism in the position of minimum deviation and the angle of deviation of light equals 50° , then refractive index of the prism's material =
- (a) 1.45 (b) 1.64 (c) 1.72 (d) 1.75

- 13 When a swimmer jumps into water and rises to the surface, the force that changes its direction will be
- (a) the swimmer weight
 (b) the frictional force between the swimmer and water
 (c) the buoyant force of water that acts on the swimmer
 (d) all of these forces

- 14 The opposite figure shows light rays that are produced from a point light source placed in a transparent liquid. So, the refractive index of this liquid is

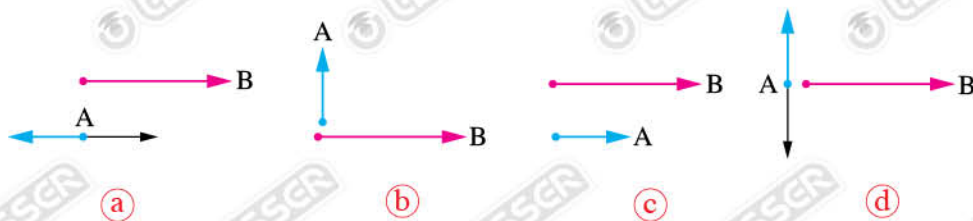


- (a) 1.5 (b) 1.8 (c) 2 (d) 1.7

- 15 A layer of a viscous liquid of thickness 12 cm is put between parallel horizontal plane plates (A, B), then the force required to move a thin plate (C) of area 0.5 m^2 between the two plates with a uniform speed parallel to them equals

- (a) $F_C = F_{AC} + F_{BC}$ (b) $F_C = F_{AB}$ (c) $F_C = F_{CB} + F_{AB}$ (d) $F_C = \text{zero}$

- 16 The figure that represents the direction of the vibration of the particles (A) relative to the direction of the propagation of the wave through a horizontal rope (B) attached to the lower branch of a horizontal tuning fork in air is

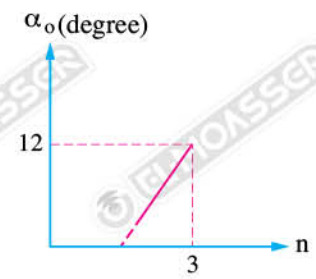


17 A triangular prism whose apex angle is three times the value of the minimum angle of deviation at which the light ray falls on one of its faces with an angle of incidence = 30° , then the second angle of incidence inside the prism =

(a) 30° (b) 22.5° (c) 15° (d) 45°

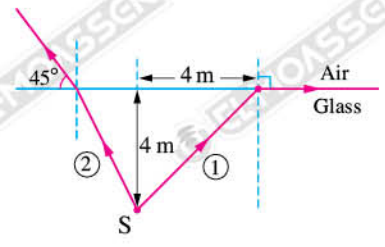
18 The opposite graph represents the angles of deviation (α_o) of light through several thin prisms with the same apex angle versus the refractive indices (n) of the materials of those prisms, so the value of any apex angle =

(a) 12° (b) 8°
 (c) 6° (d) 4°



19 The drawing shown in the figure illustrates two rays of light (1), (2) that are produced from a source S in the glass and travel to air as in the figure, so the angle between the rays (1) and (2) is equal to

(a) 75° (b) 45°
 (c) 90° (d) 60°



20 In Young's double slit experiment, when a light of wavelength λ is used, the distance between the centers of the central fringe and the ninth bright fringe was 1.5 cm. If the wavelength of the used light is changed to 1.5λ , then the distance 1.5 cm will be between the center of the central fringe and the center of the bright fringe.

(a) sixth (b) seventh (c) ninth (d) tenth

Second : Answer the following questions (21 : 24) :

21 Two waves of wavelengths 1500 cm and 350 cm respectively propagate in a medium and the difference between their frequencies is 1.3 Hz. Calculate the speed of their propagation in the medium.

- 22 The image of a coin in a cup of water appears higher than the place of the piece itself, when another quantity of water is placed in the cup, the new image of the coin appears relative to the image in the first case before the water was put.

- 23 A basin of capacity 200 liters is required to be filled with a liquid of density 800 kg/m^3 at a mass flow rate that equals 0.5 kg per second, so **calculate** the time required to fill the basin.

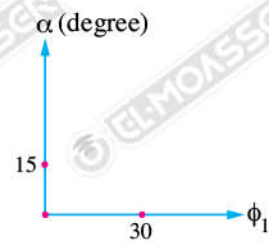
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- 24 On the opposite graph between the angle of deviation of a light ray in a triangular prism α with the change in the angle of incidence ϕ_1 and when the angle of incidence is 30° the minimum angle of deviation 15° **draw the graphic relationship on the same drawing that shows what happens to the angle of deviation when the angle of incidence is less than 30° .**



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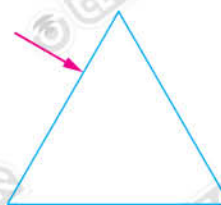
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First : Choose the correct answer (1 : 20) :

- 1 When the vibrating body passes by its origin (rest) position so, it has
- (a) maximum displacement and no velocity
 - (b) maximum displacement and velocity
 - (c) no velocity or displacement
 - (d) no displacement and maximum velocity

- 2 In the opposite figure, the ray of light fall perpendicular on one face of the faces of an equilateral triangular glass prism whose refractive index is 1.5, then the angle of emergence of the light ray equal
- (a) 30°
 - (b) 60°
 - (c) 0°
 - (d) 90°



- 3 The biggest reflective angle for a ray of light that fall from water (its refractive index 1.3) to the air is
- (a) 42°
 - (b) 45°
 - (c) 90°
 - (d) 135°

- 4 Light waves fall on different apertures of different sizes, so the diffraction of light will be most observable if the aperture size is
- (a) 1 cm
 - (b) 10^{-2} cm
 - (c) 10^{-3} cm
 - (d) 10^{-6} cm

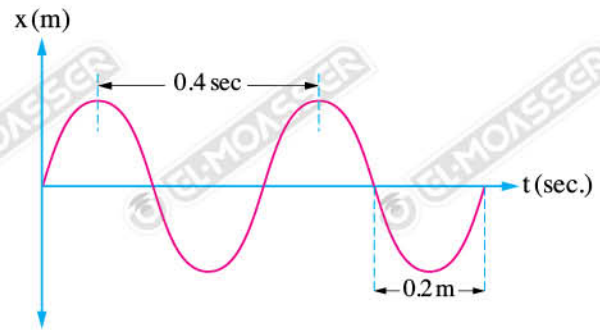
- 5 Water flows steadily through a pipe of radius 5 cm by a speed of 4 m/sec., so the volume of the liquid that flows in half min. is m^3 .
- (a) 0.9429
 - (b) 1.866
 - (c) 0.3
 - (d) 0.303

- 6 The ratio between the second angle of incidence (ϕ_2) and the first angle of incidence (ϕ_1) in triangular prism at minimum of deviation is
- (a) 1
 - (b) less than 1
 - (c) more than 1
 - (d) zero

- 7 On increasing the angle of incident on the separating surface between two medium to the double, the relative refractive index between the two medium
- (a) decreases to half (b) increases to double
(c) remains constant (d) decreases to quarter

- 8 The figure shows a transverse wave, its velocity is m/sec.

- (a) 1
(b) 2
(c) 0.8
(d) 0.08



- 9 In thin prism, we can calculate the refractive index of its material from the relation;

- (a) $\frac{\alpha_o}{A} + 1$ (b) $\frac{\alpha_o}{A} - 1$ (c) $\frac{A}{\alpha_o} + 1$ (d) $\frac{A}{\alpha_o} - 1$

- 10 The figure shows transferring ray of light from medium (x) to the air, so the velocity of light in medium (x) equals m/sec.
(Knowing that : $c = 3 \times 10^8$ m/sec.)



- (a) 2.1×10^8 (b) 1.4×10^8 (c) 2.7×10^8 (d) 1.92×10^8

- 11 If the surface area of a liquid layer has increased to the double, so the viscosity coefficient of the liquid become

- (a) double (b) halved
(c) increase four times (d) unchanged

- 12 An incident light ray fall on equilateral triangular glass prism. If the angle of incidence equals the angle of emergence which is equal to 50° , so the angle of deviation for the ray equals

- (a) 100° (b) 20° (c) 40° (d) 30°

13 When an incident ray fall on a reflecting surface and reflect on itself.

This means

- (a) angle of incidence = angle of reflection = 90°
- (b) angle of incidence = angle of reflection = 0°
- (c) angle of incidence = angle of reflection = 45°
- (d) angle of incidence \neq angle of reflection

14 A thin prism has an apex angle which equals three times angle of deviation of the light, so the refractive index of the prism equal

- (a) 1.33
- (b) 1.5
- (c) 1.6
- (d) 1.7

15 If the distance between the third crest and the eighth crest of transverse wave is 20 m, so the wavelength equal m.

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

16 In Young's experiment, the distance between the second bright fringe and the central fringe is 10 mm, the distance between the two slits is 0.36 mm and the distance between the observing screen and the double slit is 3 m, so the wavelength equal

- (a) 5×10^{-7} m
- (b) 8×10^{-7} m
- (c) 6×10^{-7} m
- (d) 4×10^{-7} m

17 In a glass prism ($\alpha = \phi_1 = A = 60^\circ$), so the refractive index of its material

- (a) 1.5
- (b) $\sqrt{2}$
- (c) 1.4
- (d) $\sqrt{3}$

18 In steady flow, if the number of lines flow in the wide section is (n), so the number of lines in the narrow section is

- (a) 0.5 n
- (b) n
- (c) 2 n
- (d) 3 n

19 A thin prism has refractive index for blue light 1.7 and 1.5 for red, so the dispersive power of the prism equal

- (a) 0.22
- (b) 0.33
- (c) 0.5
- (d) 0.6

20 Mirage phenomenon happen due to of white light.

- (a) diffraction
- (b) total reflection
- (c) interference
- (d) reflection

Second : Answer the following questions (21 : 24) :

- 21** Give reason for : Precipitation rate in case of rheumatic fever increases but decreases for anemia disease.

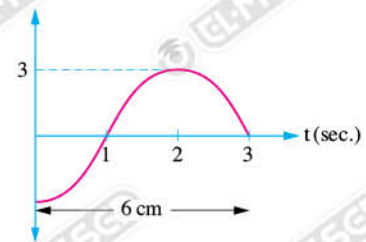
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- 22** The figure represents the relation between displacement in (cm) and time in (sec.) for transverse wave. **Find** its frequency.



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- 23** Ray of light fall on the separating surface between two media. If the angle between incident ray and separating surface is 40° and the refractive angle in the second medium is 30° . **Calculate** the relative refractive index from medium one to medium two.

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- 24** What is the function of cryolite in the reflecting prism ?

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First : Choose the correct answer (1 : 20) :

1 When performing a blood sedimentation rate test for three persons, the first has anemia, the second has rheumatic fever and the third is healthy, the terminal velocity of red blood cells in the plasma is

- (a) in the first person is higher
- (b) in the third person is higher
- (c) in the second person is higher
- (d) equal in the three persons

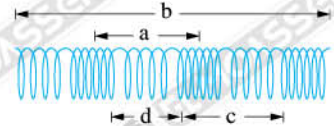
2 In Young's double-slit experiment, knowing that the distance between the central fringe and the second bright fringe is 10 mm and the distance between the two slits is 0.3 mm and the distance between the slits and the screen on which the fringes are formed is 3 m, so the wavelength of the monochromatic light used is m.

- (a) 4×10^{-7}
- (b) 8×10^{-7}
- (c) 5×10^{-7}
- (d) 6×10^{-7}

3 A thin prism of refractive index 1.5, so the ratio between angle of deviation of a light ray that passes through it and its apex angle =

- (a) $\frac{1}{4}$
- (b) $\frac{1}{5}$
- (c) $\frac{1}{2}$
- (d) $\frac{1}{3}$

4 The figure shows the propagation of a longitudinal wave through a spring. Which of the arrows shown in the figure has a length equal to the wavelength of the longitudinal wave?



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

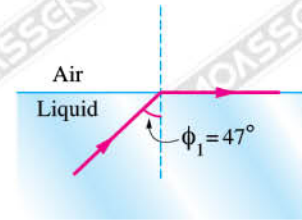
5 Which one of the following describes the relation between the wavelength of light that falls on a prism and its refractive index?

- (a) $n \propto \lambda$
- (b) $n \propto \frac{1}{\lambda}$
- (c) $n \propto \frac{1}{\lambda^2}$
- (d) $n \propto \frac{1}{\sqrt{\lambda}}$

6 Which of the following would happen to a ray of white light falling on a triangular prism that is set at the position of minimum deviation?

- (a) It emerges decomposing into the seven colors of the spectrum.
- (b) It passes through the prism without any refraction.
- (c) It undergoes total internal reflection inside the prism.
- (d) None of the above.

- 7 A light source that emits a beam of light is moving up to the surface of a liquid from which it exits into the air. Following the path shown in the figure, the absolute refractive index of the liquid is equal to



- (a) 1.29 (b) 1.62
(c) 1.37 (d) 1.45
- 8 In Young's double-slit experiment, if the blue light is replaced by a red light. Which of the following describes correctly the effect on the interference fringes?
- (a) The interference pattern disappears.
(b) The distance between the fringes increases.
(c) No change takes place.
(d) The distance between the fringes decreases.

- 9 A thin prism of apex angle 7° , its refractive index for the blue light is 1.68 and its refractive index for the red light is 1.6, so its average refractive index is
- (a) 1.62 (b) 1.64 (c) 1.65 (d) 1.67

- 10 Two flat plates with a liquid between them, if the tangential force acting on the upper plate is decreased to half its value, so the coefficient of viscosity of the liquid
- (a) increases to double (b) decreases to quarter
(c) increases 4 times (d) remains constant

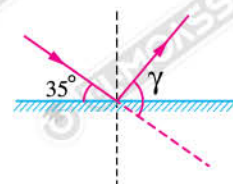
- 11 A ray of light travels from an optically denser medium (A) to a less dense medium (B), in order for the light to undergo total internal reflection. Which of the following must be true about the angle of incidence?
- (a) Must be equal to the critical angle.
(b) Must be more than the critical angle.
(c) Must be less than the critical angle.
(d) Depends on whether the two media are liquids or solids.

- 12** A liquid flows steadily through a tube, so by decreasing the cross-sectional area of the tube to $\frac{1}{3}$ its original value, the volume flow rate
- (a) decreases to $\frac{1}{3}$ its value (b) increases 9 times
 (c) increases 3 times (d) remains constant

- 13** A spring coil is tied vertically to one of the two branches of a horizontal tuning fork. When making the tuning fork vibrate, the waves generated are
- (a) longitudinal in both air and spring (b) transverse in both air and spring
 (c) longitudinal in the spring and transverse in air
 (d) longitudinal in air and transverse in the spring

- 14** If we have two transparent flexible materials (x) and (y) where material (x) has a lower refractive index than material (y) and can be used in making optical fibers, which of the two materials should be used in the inner layer and which should be used in the outer layer?
- (a) Material (y) is used in the two layers.
 (b) Material (y) is used in the inner layer and material (x) is used in the outer layer.
 (c) Material (x) is used in the inner layer and material (y) is used in the outer layer.
 (d) Material (x) is used in the two layers.

- 15** A ray of light falls on a horizontal plane mirror as shown in the figure. So, the value of the angle (γ) equals



- (a) 110° (b) 70°
 (c) 90° (d) 35°

- 16** A light ray falls with an angle of incidence (ϕ) on one face of glass triangular prism of apex angle 70° and its refractive index is $\sqrt{3}$. If the light ray emerges tangent to the opposite face, so the value of (ϕ) is

- (a) 81° (b) 90° (c) 9° (d) 35°

- 17** A light ray falls on a face of an equilateral triangular prism set at minimum angle of deviation, so the second angle of incidence (angle of inner incidence) is

- (a) 60° (b) 90° (c) 30° (d) 45°

18 A light ray refracts when it is transferred from a medium of refractive index 1.5 to air, so the maximum value of the angle of refraction is

- (a) 48.18° (b) 41.81° (c) 180° (d) 90°

19 A thin prism of apex angle 10° , knowing that : $\left(\frac{n_b}{n_r} = \frac{23}{20}\right)$ and $(n_y = 1.5)$ so the value of (n_p) is equal to

- (a) 1.3 (b) 1.6 (c) 1.4 (d) 1.5

20 Knowing that the following table represents the wavelength (λ) and frequency (ν) for different waves where all of them have the same speed and propagate in the same medium, so the value of (x) is

λ (m)	10	20	5	X	2
ν (Hz)	60	30	120	40	300

- (a) 25 m (b) 15 m (c) 13 m (d) 20 m

Second : Answer the following questions (21 : 24) :

21 What is the reason behind the presence of aquatic plants growing near the shore of the Nile?

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22 Describe why it is easier for a person standing in a lighted room to see his reflection in a glass window of that room at night than during the day.

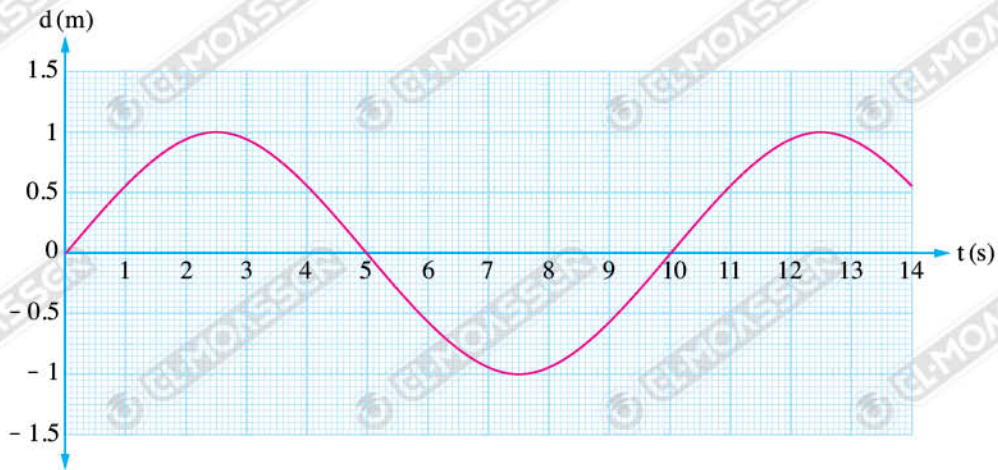
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23 The figure represents a transverse wave. Calculate its frequency.



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24 Knowing that the angle of deviation of a light ray through a triangular prism can be calculated from the relation; $\alpha = (\phi_1 - 40)^2 + 20$ where ϕ_1 is the angle of incidence. Calculate the prism refractive index at minimum deviation position.

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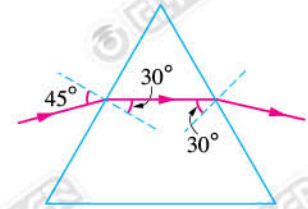
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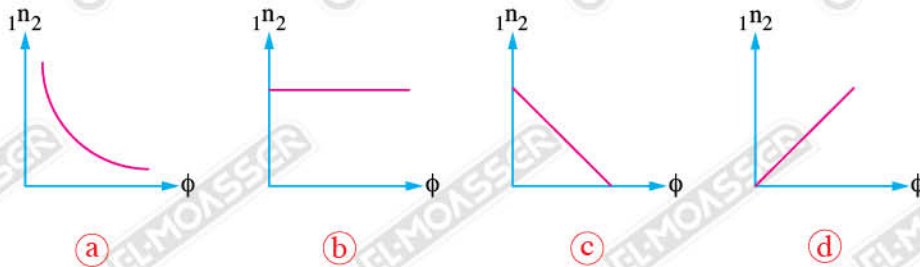


First : Choose the correct answer (1 : 20) :

- 1 The opposite figure represents an equilateral triangular prism, then the angle of deviation equals
- (a) 30° (b) 60°
 (c) 45° (d) 55°

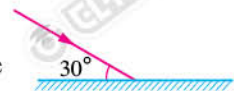


- 2 Which of the following graphs represents the relation between the relative refractive index between two media and the angle of incidence ?



- 3 If the distance between the first crest and the x crest equal 0.2 m, then the horizontal distance between a crest and its successive trough equals
- (a) $\frac{(x-1)}{0.1}$ (b) $\frac{(x-2)}{0.1}$ (c) $\frac{0.2}{(x-1)}$ (d) $\frac{0.1}{(x-1)}$

- 4 From the opposite figure:
 When the angle between the incident light ray and the surface of plane mirror is doubled, then the angle of reflection equals



- (a) 90° (b) 30° (c) 60° (d) 0°
- 5 If a light ray falls perpendicular from a medium of refractive index 1.2 to another medium of refractive index 1.5 then
- (a) its speed increases and it refracts toward the normal line
 (b) its speed decreases and it refracts toward the normal line
 (c) its speed increases and it passes without any refraction
 (d) its speed decreases and it passes without any refraction

- 6 In Young's double-slit experiment, a light of wavelength (430 nm) is used, so if the path difference = 1075 nm, then the formed fringe is
- (a) the second bright fringe (b) the second dark fringe
(c) the third bright fringe (d) the third dark fringe

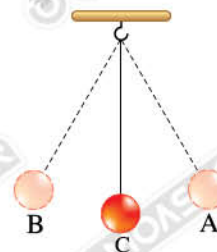
- 7 A wooden floor is covered with a layer of viscous liquid of thickness 2 mm, where a rectangular plate of area 0.12 m^2 slides on it with a velocity 0.75 m/s when it is affected by a tangential force of 126 N, then the viscosity coefficient of the liquid is N.s/m².
- (a) 1.6 (b) 1.8 (c) 2.4 (d) 2.8

- 8 Two different liquids flow in two tubes, if the relation between their densities is $\frac{1}{4}$ where the volume of the first liquid that flows through time t_1 equals double of the second that flows through time t_2 and the mass flow rate of both is the same, then the ratio $\frac{t_1}{t_2}$ equals
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{4}{1}$ (d) $\frac{2}{1}$

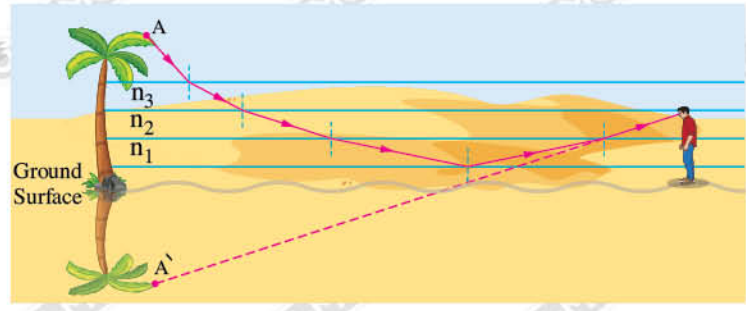
- 9 When proceeding blood precipitation rate tests for three people. The first has rheumatic fever, the second has anemia and the third is healthy, so the terminal velocity of red blood cells is
- (a) higher for the first person (b) higher for the third person
(c) higher for the second person (d) the three persons are equal

- 10 A light ray falls on one of the faces of a triangular prism and emerges from the other face where the angle of emergence is three times the angle of incidence and the angle of deviation is half the angle of incidence, then the ratio between $(\frac{\alpha}{A})$ equals
- (a) $\frac{1}{4}$ (b) $\frac{1}{7}$ (c) $\frac{2}{7}$ (d) $\frac{2}{5}$

- 11 The opposite figure shows a vibrating simple pendulum, where its frequency equals double of its periodic time numerically, then the periodic time equals
- (a) $\frac{1}{2} \text{ s}$ (b) 2 s
(c) $\sqrt{2} \text{ s}$ (d) $\frac{1}{\sqrt{2}} \text{ s}$

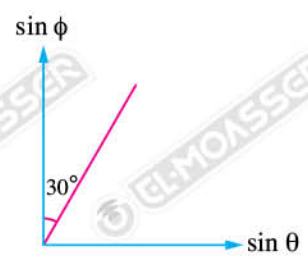


15 The following figure shows a palm tree, but we see the image inverted, so the order of the refractive indices of air layers is



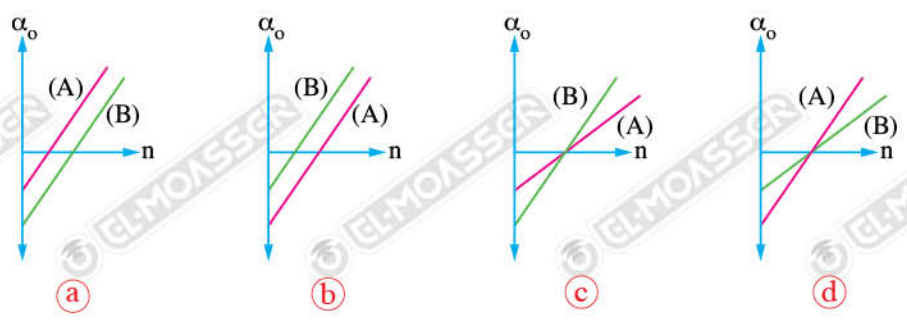
- (a) $n_1 > n_2 > n_3$
- (b) $n_1 = n_2 = n_3$
- (c) $n_1 < (n_2 = n_3)$
- (d) $n_1 < n_2 < n_3$

16 The opposite graph shows the relation between the sine of the incidence angle ($\sin \phi$) and the sine of the refraction angle ($\sin \theta$) of a light wave when travels from air to another medium, so the ratio between the wavelength of the light in air and its wavelength in the medium is equal to



- (a) $\frac{1}{2}$
- (b) $\frac{2}{1}$
- (c) $\sqrt{3}$
- (d) $\frac{1}{\sqrt{3}}$

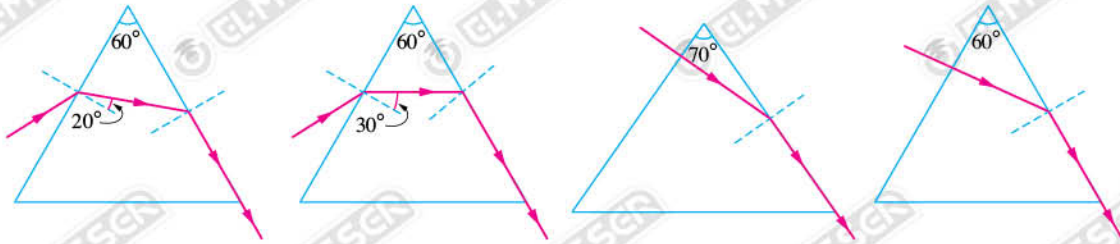
17 When a group of thin prisms (A) of the same apex angle is replaced by another (B) of smaller apex angle, the correct graphical relationship between the minimum angle of deviation and the refractive index is



18 Two parallel light rays, one is blue and the other is green, fall on a separating surface from a medium of greater optical density to a medium of less optical density, if the refraction angle of the green ray is 90° , then the blue ray is

- (a) refracted toward the normal
- (b) passed without any refraction
- (c) refracted away from the normal
- (d) reflected totally

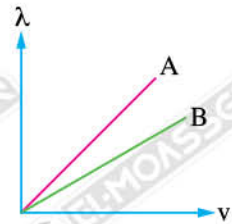
19 The following figures show four glass prisms of different materials, so they are arranged according to the refractive index as



- (a) $1 < 3 < 2 < 4$
- (b) $3 < 4 < 1 < 2$
- (c) $2 < 3 < 4 < 1$
- (d) $1 < 2 < 4 < 3$

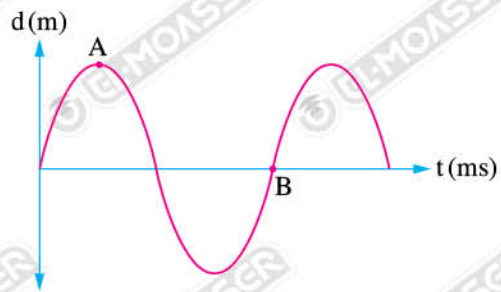
20 The opposite graph shows the relations between the speeds (v) of two different waves (A and B) and their wavelengths (λ) when they propagate through different media, so

- (a) $v_A < v_B$
- (b) $v_A > v_B$
- (c) $\lambda_A = \lambda_B$
- (d) $\lambda_A < \lambda_B$



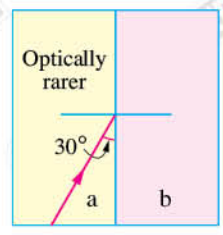
Second : Answer the following questions (21 : 24) :

21 The opposite figure shows a wave, its frequency is 50 Hz, **calculate** the time required for the wave to pass between the two points A, B.



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22 In the opposite figure, a light ray falls from medium (a) on the surface separating medium (b) and deviates from its original path by an angle of 30° . Calculate the relative refractive index between the two media (n_{ab}).

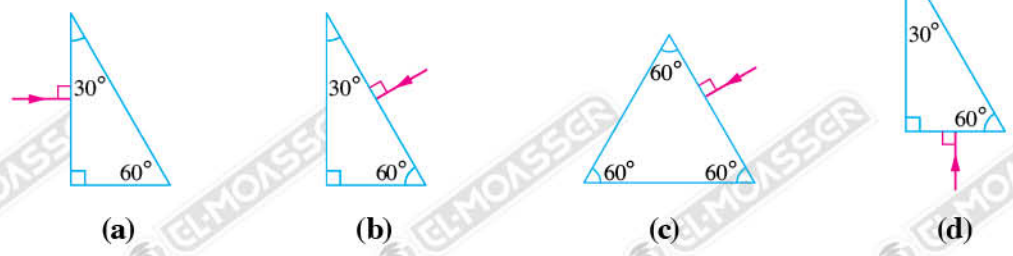


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23 If you know that $n_{\text{glass}} = 1.5$, which of the following shapes causes the incident ray to be completely reflected?



24 Water flows steadily in a tube that is branched into several identical branches, if the diameter of the main tube is 8 times as large as the diameter of one of the branches and the speed of the water flow in the branch is 4 times as large as its speed in the main tube, calculate the number of the branches.

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First : Choose the correct answer (1 : 20) :

1 If the time interval between the second crest to the tenth trough in a transverse wave is 0.1 sec., then the frequency is

- (a) 80 Hz (b) 85 Hz (c) 100 Hz (d) 60 Hz

2 A light ray falls normal to one of the faces of an equilateral triangular prism. So the second angle of incidence (ϕ_2) equals

- (a) 30° (b) 45° (c) 60° (d) 90°

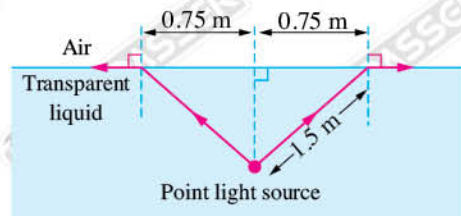
3 The light ray that has the largest critical angle when it travels from water to air is the ray.

- (a) violet (b) blue (c) yellow (d) green

4 Water flows steadily with a speed of 0.3 m/s in a tube to fill a tank of volume 30 m^3 within 15 min., so the cross-sectional area of the tube equals

- (a) 0.11 m^2 (b) 1 m^2 (c) 6.67 m^2 (d) 60 m^2

5 The opposite figure show light rays that are produced from a point light source placed in a transparent liquid. So, the refractive index of this liquid is



- (a) 1.1 (b) 2.2
(c) 1.5 (d) 2

6 The ratio between the first angle of incidence and the angle of emergence of a light ray that falls on one of the faces of a triangular prism which is at the minimum deviation position, is

- (a) greater than one (b) less than one (c) equal to one (d) indeterminable

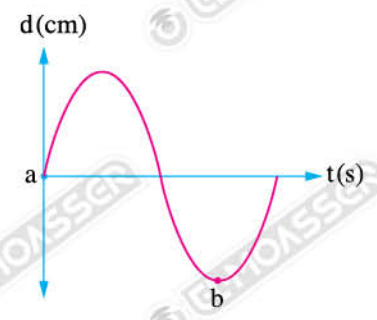
7 The following measuring units are equivalent to each other except

- (a) $\text{kg.m}^2/\text{s}^2$ (b) $\text{N.s}/\text{m}^2$ (c) $\text{J.s}/\text{m}^3$ (d) $\text{kg}/\text{m.s}$

8 What is the path difference between the two rays coming from the two slits to the first dark fringe in Young's experiment?
 (a) λ (b) 2λ (c) 0 (d) $\frac{\lambda}{2}$

9 White light falls on the face of a thin prism, which has refractive index of 1.6 and 1.5 for blue light and red light respectively, so the dispersive power of the prism equals
 (a) 0.039 (b) 0.024 (c) 0.65 (d) 0.18

10 The displacement-time graph for an oscillating pendulum is shown in the opposite figure. If the frequency of the pendulum is 60 Hz. What is the time interval between points a and b ?
 (a) $\frac{1}{45}$ sec. (b) $\frac{1}{80}$ sec.
 (c) $\frac{1}{60}$ sec. (d) $\frac{1}{120}$ sec.



11 A sound source produces 60 vibrations within 1.5 sec. and the produced wave propagates in air with a speed of 340 m/s, then the distance between the center of a compression and successive rarefaction equals
 (a) 2.8 m (b) 4.25 m (c) 5.67 m (d) 8.5 m

12 Water flows steadily in a tube, if the ratio between the diameter of its ends is $\frac{2}{3}$, then the ratio between the mass flow rates of water in them respectively is
 (a) $\frac{2}{3}$ (b) $\frac{4}{9}$ (c) $\frac{1}{1}$ (d) $\frac{3}{2}$

13 The result of multiplication of frequency and the square of periodic time =
 (a) zero (b) one
 (c) reciprocal of frequency (d) half periodic time

14 All the following are from the factors that affect the absolute refractive index except
 (a) velocity of incident light (b) type of medium
 (c) wavelength of incident light (d) temperature

15 At minimum deviation, the angle of refraction (θ_1) is equal to

- (a) apex angle
- (b) half apex angle
- (c) double apex angle
- (d) angle of emergence

16 A light ray falls on one face of a triangular prism of refractive index $\sqrt{2}$ at an angle of 45° and emerges from the opposite face at angle of 45° . Then the apex angle of the prism is

- (a) 45°
- (b) 60°
- (c) 72°
- (d) 80°

17 The critical angle between two media is given by the relation; $\sin \phi_c = \frac{n_2}{n_1}$

- (a) $n_2 < n_1$
- (b) $n_2 > n_1$
- (c) $n_2 = n_1$
- (d) the speed of light is the same in the two media

18 What is the largest angle of refraction of a light ray travelling from a glass of refractive index 1.6 into air?

- (a) 63°
- (b) 90°
- (c) 29°
- (d) 38.68°

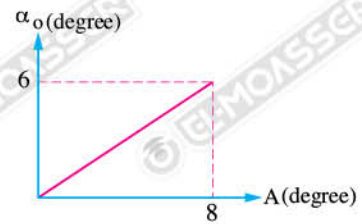
19 The opposite figure show the speed of light in four media A, B, C, D, then the optically denser material is

- (a) material A
- (b) material B
- (c) material C
- (d) material D

The speed of light



20 The opposite graph show the relation between the apex angles (A) of several thin prisms that are made of the same material and the angle of deviation (α_o) of a light ray through each of them, so the refractive index of the prisms material is



- (a) 1.3
- (b) 1.4
- (c) 1.5
- (d) 1.75

Second : Answer the following questions (21 : 23) :

21 A liquid of viscosity 0.55 N.s/m^2 separates two flat metal plates. The separation distance between them is 5 mm. The top metal plate with a surface area of 750 cm^2 is sliding with a velocity of 0.5 m/s. If the second plate is static, **find** tangential force acting on the sliding plate.

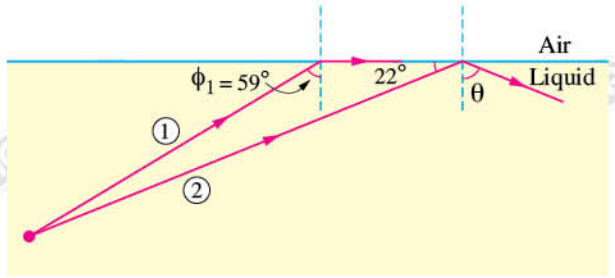
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22 The opposite figure shows light rays that falls from a liquid on the interface with air, **calculate:**
 (a) The value of (θ).



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(b) The second ray undergoes total internal reflection. **Explain.**

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23 In a rainy day, a boy noticed that he saw the lightning before hearing the thunder, **explain this observation.**

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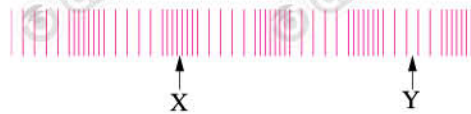
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First : Choose the correct answer (1 : 20) :

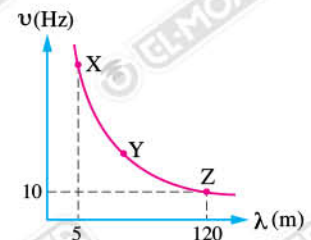
- 1 If the periodic time of a vibration body is numerically equal to nine times of its frequency, then the time of the amplitude of the vibrating body is
- (a) 0.25 s (b) 3 s (c) 0.75 s (d) 1.5 s

- 2 The following figure shows a longitudinal wave propagating in a medium with frequency of 100 Hz, if the distance between X, Y is 100 m, so the wave velocity through this medium is



- (a) 100 m.s⁻¹ (b) 2200 m.s⁻¹ (c) 3300 m.s⁻¹ (d) 4000 m.s⁻¹

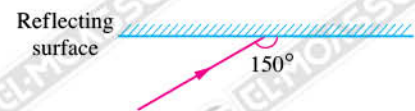
- 3 The opposite figure shows the relation between frequency and wavelength of sound waves propagating in a medium, so :



	The frequency of the sound wave X	The speed of the sound wave Y
(a)	230 Hz	1150 m/s
(b)	240 Hz	1200 m/s
(c)	240 Hz	1150 m/s
(d)	230 Hz	1200 m/s

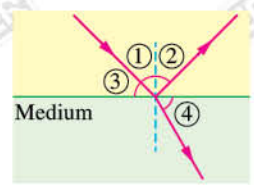
- 4 The opposite figure shows a light ray falling on a reflecting surface, so :

	The angle of reflection	The speed of the light wave
(a)	30°	decreases
(b)	60°	remains constant
(c)	30°	remains constant
(d)	60°	increases

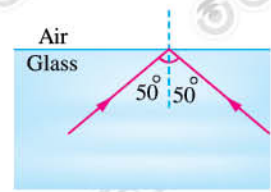
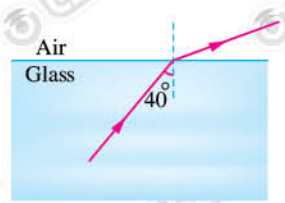
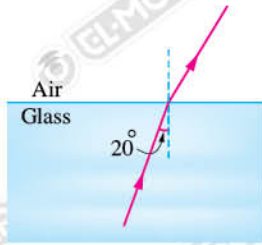


5 In the opposite figure, a light ray falls from air, so :

(a)	Angle 1 = Angle 2	Angle 3 > Angle 4
(b)	Angle 1 > Angle 2	Angle 3 < Angle 4
(c)	Angle 1 < Angle 2	Angle 3 > Angle 4
(d)	Angle 1 = Angle 2	Angle 3 < Angle 4



6 From the following figures, the critical angle from glass to air might be



- (a) 15° (b) 30° (c) 45° (d) 60°

7 If the absolute refractive index of water is $\sqrt{2}$, then the angle of incidence that lets a light ray pass from water to air equals

- (a) 35° (b) 75° (c) 45° (d) 60°

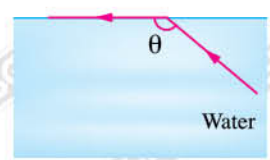
8 If the refractive indices are ($n_{\text{water}} = 1.33$), ($n_{\text{glass}} = 1.5$), ($n_{\text{diamond}} = 2.46$), then which of the previous media has a greater critical angle with respect to air?

- (a) diamond (b) water (c) glass (d) indeterminable

9 If the speed of light in water is 2.3×10^8 m/s, then the angle θ in the opposite figure is equal to

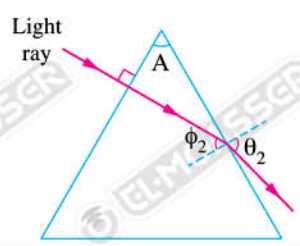
(Knowing that the speed of light in air is 3×10^8 m/s)

- (a) 100° (b) 120° (c) 130° (d) 140°



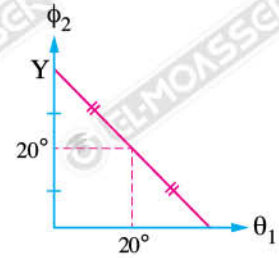
10 In the opposite figure,

- (a) $\phi_2 = \theta_2$ (b) $\theta_2 > A$
 (c) $\theta_2 < A$ (d) $\phi_2 > \theta_2$

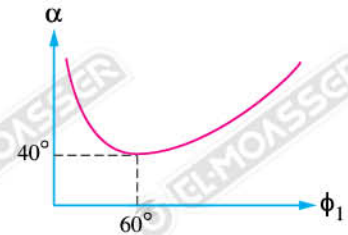


- 11 From the opposite graph of a prism whose refractive index is 1.5, which of the following choices expresses the point Y?

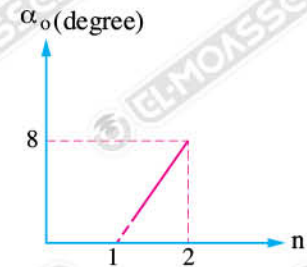
	Point Y represents	Its value
(a)	Apex angle	40°
(b)	The second angle of incidence at minimum deviation position	60°
(c)	The second angle of incidence at minimum deviation position	40°
(d)	Apex angle	60°



- 12 The opposite figure shows the relation between the angles of deviation of a light ray (α) and the angles of incidence (ϕ_1) of this light ray on one of the faces of a triangular prism, then the apex angle of the prism and its refractive index are , respectively.

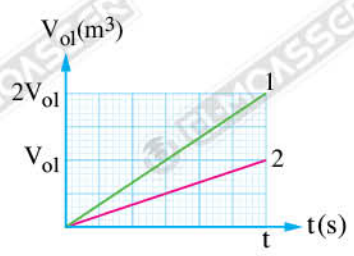


- (a) 80° , 1.45 (b) 60° , 1.5 (c) 80° , 1.35 (d) 70° , 1.5
- 13 The opposite graph shows the relation between the angles of deviation of several thin prisms that have the same apex angle and the refractive indices of these prisms, then the apex angle of any one of them equals



- 14 In Young's experiment that is carried out twice by using two different light sources in each, if the ratio between their wavelength $\frac{\lambda_1}{\lambda_2} = \frac{7}{8}$, the ratio of the distances between the centers of two consecutive fringes of the same type for the two light sources equals
- (a) $\frac{7}{8}$ (b) $\frac{8}{7}$ (c) $\frac{49}{64}$ (d) $\frac{64}{49}$

15 The opposite graph represents the relation between the volume of a specific liquid that flows steadily through a tube with time for two different liquids 1 and 2, if the ratio between the densities of two liquids $\frac{\rho_1}{\rho_2} = \frac{3}{2}$, so the ratio between the mass flow rate of the two liquids $\left(\frac{Q_{m1}}{Q_{m2}}\right)$ equals



- (a) $\frac{3}{2}$ (b) $\frac{2}{1}$ (c) $\frac{3}{1}$ (d) $\frac{2}{3}$

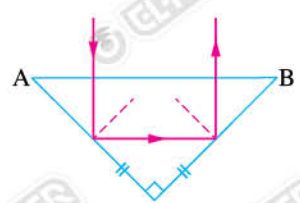
16 Four identical metallic balls are dropped from the same height into four similar cylinders that contain equal amounts of different liquids while the time that is taken by each ball to reach the bottom of the cylinder is recorded as the following table :

Cylinder	Time
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s

Which cylinder contains the liquid with higher viscosity?

- (a) Cylinder 1 (b) Cylinder 2 (c) Cylinder 3 (d) Cylinder 4

17 In the prism shown in the figure, if a light ray falls on face AB, it emerges from the same face parallel to the incident ray, so for the prism to perform its function the value of the refractive index of the prism's material should be not less than



- (a) 1.8 (b) $\sqrt{2}$ (c) 1.5 (d) $\sqrt{3}$

18 When the angle of incidence changes from 60° to 30° , the angle of refraction will change from 45° to

- (a) 22.5° (b) 15° (c) 24° (d) 23°

19 Water flow rate in a tube is 20 liters per minute. If the diameter of the tube is 1 cm, then the water speed while emerging from the tube =

- (a) 4.24 m/s (b) 1.1 m/s (c) 2.24 m/s (d) 5.2 m/s

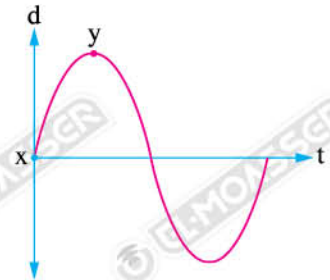
20 A tangential force between two layers of liquid, if this force is doubled, then the viscosity coefficient of liquid

- (a) decreases to its half (b) increases to the double
(c) doesn't change (d) decreases to its quarter

Second : Answer the following questions (21 : 23) :

21 In the opposite graph:

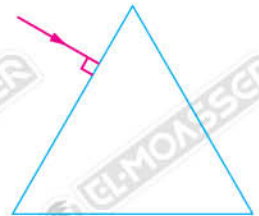
A wave of frequency 50 Hz, **calculate** the time interval between the points x, y.



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22 In the opposite figure :

Equilateral triangular prism, its refractive index is 1.5, a light ray is incident perpendicular on one of the prism faces. Trace the path of the light ray till it emerges and **find** the angle of emergence of the light ray.



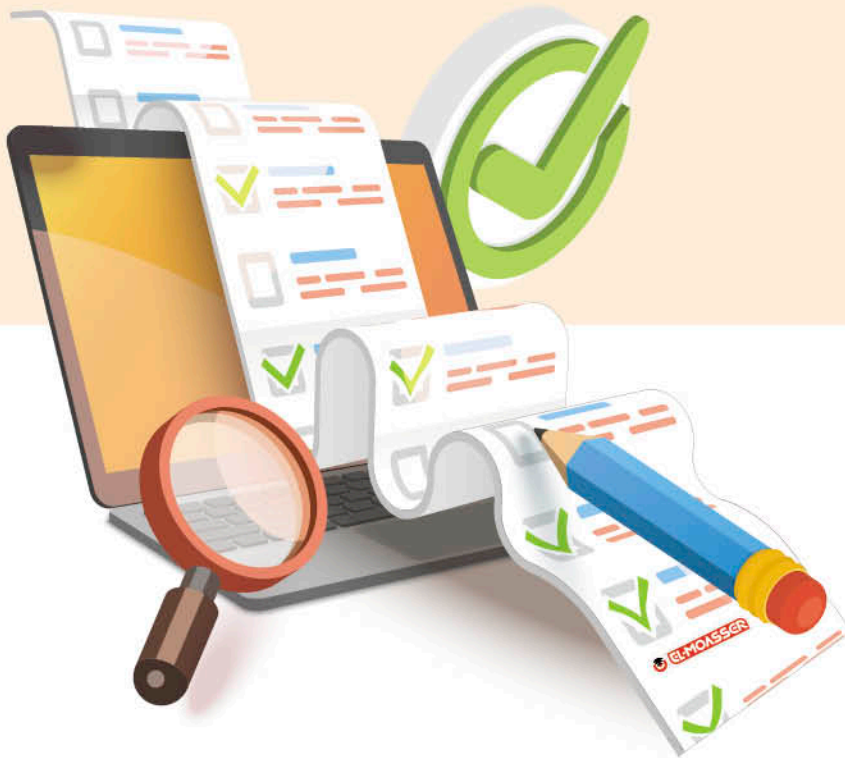
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23 **Why** does the diamond shine more than the glass?

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Answers

of The final Exams of some
Educational Administrations



PHYSICS

2024

2nd
SEC.

FIRST TERM

Answers of Final Exam 1**Cairo Governorate**
«Rod El-Farag Directorate»

- 1 (b) total internal reflection
- 2 (b) 3, 0.8, 1.25
- 3 (c) 16 v
- 4 (b) 1.3
- 5 (a) 1.5
- 6 (a) 45 Hz
- 7 (c) $\frac{1}{1}$
- 8 (a) 8.85×10^{-8} s
- 9 (d) 0.05 m
- 10 (a) greater than one
- 11 (b) Liquid in jar (C) has the largest viscosity.
- 12 (d) 80° , 1.35
- 13 (d) 10
- 14 (b) 24°
- 15 (d) Apex angle, 40° , First angle of refraction in state of minimum deviation, 20°
- 16 (a) 5000 Å
- 17 (c) 52.4°
- 18 (d) 15°
- 19 (b) increasing the distance between the two slits and screen
- 20 (d) frequency
- 21 $\sin \phi_c = \frac{1}{1.49}$
 $\therefore \phi_c = 42.16^\circ$
 $\therefore \phi_2 = 45^\circ$
 $\therefore \phi_2 > \phi_c$
 \therefore The ray will undergo total internal reflection with an angle of reflection 45° , to emerge from the other right angled face at an angle of emergence of 0° .
- 22 Because the total cross-sectional area of blood capillaries is greater than the cross-sectional area of the major artery since the number of blood capillaries is very large.
- 23 The speed of the waves produced from the forks will be the same in air, so $v = \text{constant}$
 $v_1 = v_2$
 $\lambda_1 v_1 = \lambda_2 v_2$
 $0.4 \times 850 = x \times 170$
 $x = 2 \text{ m}$



Answers of Final Exam **2**

Cairo Governorate
«El Nozha Directorate»

- 1 (a) λ
- 3 (c) 0.01 m/s
- 5 (a) 0.2×10^{-3} m
- 7 (b) 60°
- 9 (a) 5.67°
- 11 (b) 30°
- 13 (b) decreases
- 15 (a) 3.5 m/s
- 17 (a) less than one
- 19 (d) emerges tangent to that face

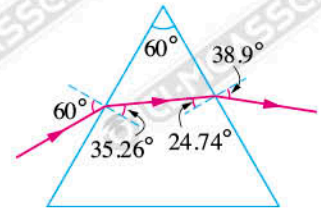
- 2 (a) 0.577
- 4 (c) 35°
- 6 (c) red
- 8 (c) 0.5λ
- 10 (c) 0.33
- 12 (d) The angle of emergence
- 14 (a) $\frac{1}{1}$
- 16 (c) 8 m/s
- 18 (b) $\sqrt{2}$
- 20 (c) $\frac{1}{1}$

21 $v_1 = \frac{0.2}{0.4} = \frac{1}{2}$ m/s
 $v_2 = 2 \times \frac{1}{2} = 1$ m/s
 $1 = \lambda_2 v_2 = \lambda_2 \times 10$
 $\lambda_2 = \frac{1}{10} = 0.1$ m = 10 cm

22 $Q_v = Av = \pi r^2 v = \pi \left(\frac{2}{2} \times 10^{-2}\right)^2 \times 8 = 25 \times 10^{-4} \text{ m}^3/\text{s}$
 $Q_m = \rho_w Av = 25 \times 10^{-4} \times 1000 = 2.5 \text{ kg/s}$
 m (1 minute) = $2.5 \times 60 = 150$ kg

23 (a) $1.5 \sin \theta_1 = \sin 60$
 $\theta_1 = 35.26^\circ$
 $\phi_2 = 60 - 35.26 = 24.74^\circ$
 $\sin \theta_2 = 1.5 \sin 24.74$
 $\theta_2 = 38.9^\circ$

(b) $\alpha = \phi_1 + \theta_2 - A = 60 + 38.9 - 60 = 38.9^\circ$

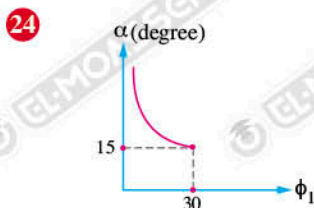


- 1 (c) 24°
 3 (a) 54°
 5 (b) 45°
 7 (b) less than α
 9 (c) 12 : 3
 11 (d) greater than 1
 13 (b) the frictional force between the swimmer and water
 15 (a) $F_C = F_{AC} + F_{BC}$
 17 (b) 22.5°
 19 (a) 75°
 21 (a) the frequency will increase
 4 (d) They require a medium in order to propagate.
 6 (d) 0.2 c
 8 (b) total internal reflection
 10 (a) 1.41
 12 (b) 1.64
 14 (c) 2
 16 (d)
 18 (c) 6°
 20 (a) sixth

21 $v_1 = v_2$
 $\lambda_1 v_1 = \lambda_2 v_2$
 $\therefore \lambda_1 > \lambda_2$
 $\therefore v_1 < v_2$
 $\therefore v_2 = v_1 + 1.3$
 $1500 \times 10^{-2} \times v_1 = 350 \times 10^{-2} (v_1 + 1.3)$
 $v_1 = 0.4$
 $v = 1500 \times 10^{-2} \times 0.4 = 6 \text{ m/s}$

22 higher

23 $Q_m = \rho Q_v$
 $Q_v = \frac{0.5}{800} = 6.25 \times 10^{-4} \text{ m}^3/\text{s}$
 $\Delta t = \frac{V_{ol}}{Q_v} = \frac{0.2}{6.25 \times 10^{-4}} = 320 \text{ s} = 5.33 \text{ minutes}$





Answers of Final Exam **4**

Giza Governorate
«Dokki Directorate»

- 1 (d) no displacement and maximum velocity
- 2 (c) 0°
- 3 (c) 90°
- 4 (d) 10^{-6} cm
- 5 (a) 0.9429
- 6 (b) less than 1
- 7 (c) remains constant
- 8 (a) 1
- 9 (a) $\frac{\alpha}{A} + 1$
- 10 (a) 2.1×10^8
- 11 (d) unchanged
- 12 (c) 40°
- 13 (b) angle of incidence = angle of reflection = 0°
- 14 (a) 1.33
- 15 (b) 4
- 16 (c) 6×10^{-7} m
- 17 (d) $\sqrt{3}$
- 18 (b) n
- 19 (b) 0.33
- 20 (b) total reflection
- 21 Because the blood precipitation rate depends on the terminal velocity of blood cells which in turns depends on the volume of the blood cells. In the case of rheumatic fever, blood cells adhere together so that the volume of each clustur becomes larger and the terminal velocity increases and the precipitation rate increases while in the case of anemia, red blood cells break down into smaller volumes so that their terminal velocity decreases and the precipitation rate becomes lower.
- 22 $v = \frac{0.75}{3} = 0.25$ Hz
- 23 $i^{n_2} = \frac{\sin \phi}{\sin \theta} = \frac{\sin 50}{\sin 30} = 1.53$
- 24 To avoid any reflection losses on the faces of the prism.

- 1 (c) in the second person is higher
- 2 (c) 5×10^{-7}
- 3 (c) $\frac{1}{2}$
- 4 (b) a
- 5 (b) $n \propto \frac{1}{\lambda}$
- 6 (a) It emerges decomposing into the seven colors of the spectrum.
- 7 (c) 1.37
- 8 (b) The distance between the fringes increases.
- 9 (b) 1.64
- 10 (d) remains constant
- 11 (b) Must be more than the critical angle.
- 12 (d) remains constant
- 13 (a) longitudinal in both air and spring
- 14 (b) Material (y) is used in the inner layer and material (x) is used in the outer layer.
- 15 (b) 70°
- 16 (a) 81°
- 17 (c) 30°
- 18 (d) 90°
- 19 (b) 1.6
- 20 (b) 15 m
- 21 As the speed of flow is directly proportional to the thickness of the liquid, the speed of water flow near the shore is low.
- 22 Because when the outside is dark, the amount of light passing from outside to inside is very small, so the person can see his image as a result of the reflection of the small amount of light reflected by the glass of the room's window and when there is light outside, the amount of light passing from outside to inside is larger than the amount of the reflected light, so it is difficult for the person to see his image by reflection.
- 23 $v = \frac{1}{10} = 0.1 \text{ Hz}$
- 24 At minimum deviation:

$$\alpha_o = 20^\circ \text{ then } \phi_1 = \theta_2 = 40^\circ$$

$$A = (2) (40) - (20) = 60^\circ$$

$$n = \frac{\sin\left(\frac{20+60}{2}\right)}{\sin\left(\frac{60}{2}\right)} = 1.285$$



Answers of Final Exam **6**

Menofia Governorate
«El-Shohadaa Directorate»

- 1 (a) 30°
 3 (d) $\frac{0.1}{(x-1)}$
 5 (d) its speed decreases and it passes without any refraction
 7 (d) 2.8
 9 (a) higher for the first person
 11 (d) $\frac{1}{\sqrt{2}}$ s
 13 (a) $T_1 > T_3 > T_4 > T_2$
 15 (d) $n_1 < n_2 < n_3$
 17 (d)
 19 (b) $3 < 4 < 1 < 2$
 21 $T = \frac{1}{v} = \frac{1}{50} = 20$ ms
 $t_{AB} = \frac{3}{4} T = 15$ ms
 22 $\therefore n_a < n_b$
 \therefore The ray gets refracted towards the normal line.
 $\therefore \phi = 90 - 30 = 60^\circ$
 $\therefore \theta = 60 - 30 = 30^\circ$
 $\therefore {}_a n_b = \frac{\sin 60}{\sin 30} = \sqrt{3}$
 23 (c), (d)
 24 $d_1 = 8 d_2$
 $v_2 = 4 v_1$
 $A_1 v_1 = n A_2 v_2$
 $d_1^2 v_1 = n d_2^2 v_2$
 $(8 d_2)^2 v_1 = n d_2^2 \times 4 v_1$
 $8^2 = 4 n$
 $n = 16$
- 2 (b)
 4 (b) 30°
 6 (d) the third dark fringe
 8 (b) $\frac{1}{2}$
 10 (b) $\frac{1}{7}$
 12 (a) decreases by 0.94°
 14 (c) $\frac{1}{1}$
 16 (c) $\sqrt{3}$
 18 (d) reflected totally
 20 (a) $v_A < v_B$

1 (b) 85 Hz

3 (c) yellow

5 (d) 2

7 (a) $\text{kg.m}^2/\text{s}^2$

9 (d) 0.18

11 (b) 4.25 m

13 (c) reciprocal of frequency

15 (b) half apex angle

17 (a) $n_2 < n_1$

19 (a) material A

21 $\eta_{vs} = \frac{Fd}{Av}$

$F = \eta_{vs} \frac{Av}{d}$

$= 0.55 \times \frac{750 \times 10^{-4} \times 0.5}{5 \times 10^{-3}} = 4.125 \text{ N}$

22

(a) $\theta = 90 - 22 = 68^\circ$

(b) Since the first ray is refracted tangent to the boundary surface between the two media, so the critical angle of the liquid with air is 59° . The second ray falls on the surface with an angle of incidence (68°) which is greater than the critical angle so that it undergoes total internal reflection.

23 The speed of light in air is 3×10^8 m/s while the speed of sound in air is about 340 m/s. Which means that light travels a lot much faster than sound and of course we see the lightning before hearing the thunder.

2 (c) 60°

4 (a) 0.11 m^2

6 (c) equal to one

8 (d) $\frac{\lambda}{2}$

10 (b) $\frac{1}{80}$ sec.

12 (c) $\frac{1}{1}$

14 (a) velocity of incident light

16 (b) 60°

18 (b) 90°

20 (d) 1.75



Answers of Final Exam

8

Qena Governorate

- 1 c) 0.75 s
- 2 d) 4000 m.s^{-1}
- 3 b) 240 Hz, 1200 m/s
- 4 b) 60° , remains constant
- 5 d) Angle 1 = Angle 2, Angle 3 < Angle 4
- 6 c) 45°
- 7 a) 35°
- 8 b) water
- 9 d) 140°
- 10 b) $\theta_2 > A$
- 11 a) Apex angle, 40°
- 12 c) 80° , 1.35
- 13 a) 8°
- 14 a) $\frac{7}{8}$
- 15 c) $\frac{3}{1}$
- 16 d) Cylinder 4
- 17 b) $\sqrt{2}$
- 18 c) 24°
- 19 a) 4.24 m/s
- 20 c) doesn't change

21 $T = \frac{1}{50} = 20 \times 10^{-3} \text{ s} = 20 \text{ ms}$
 $t_{xy} = \frac{1}{4} T = \frac{20 \times 10^{-3}}{4} = 5 \times 10^{-3} \text{ s} = 5 \text{ ms}$

22 $\sin \phi_c = \frac{1}{1.5}$

$\phi_c = 41.8^\circ$

From the figure:

The angle of emergence = 0°

- 23 Because it has a higher refractive index hence it has smaller critical angle that makes light rays undergo multiple internal reflections inside them causing diamond appears shiny.

