

## Reflection and Refraction of Light at Plane Surface

1. When light travels from glass to air, the incident angle is  $\theta_1$  and the refraction angle is  $\theta_2$ . the true relation is :
  - a)  $\theta_1 = \theta_2$
  - b)  $\theta_1 > \theta_2$
  - c)  $\theta_1 < \theta_2$
  - d) Not predictable
2. Two mirrors are kept at  $60^\circ$  to each other and a body is placed in the middle. The total number of images formed is:
  - a) Three
  - b) Four
  - c) Five
  - d) Six
3. If an object is placed unsymmetrically between two plane mirrors inclined at an angle  $72^\circ$ , then the total number of images formed is:
  - a) 5
  - b) 4
  - c) 2
  - d) infinite
4. If an object is placed symmetrically between two plane mirrors, inclined at an angle of  $72^\circ$ . then the total total number of images formed is:
  - a) 5
  - b) 4
  - c) 2
  - d) Infinite
- 5) A ray of light is incident on a plane mirror at an angle of incidence of  $30^\circ$ , the deviation Produced by the mirror is :

|               |                |
|---------------|----------------|
| a) $30^\circ$ | b) $60^\circ$  |
| c) $90^\circ$ | d) $120^\circ$ |
- 6) when a ray of light enters a glass slab from air:
  - a) its wavelength decreases
  - b) its wavelength decreases
  - c) its frequency increases
  - d) neither wavelength nor frequency changes
- 7) When a light enters from air to water, then its:
  - a) frequency increases and speed decreases
  - b) frequency is the same but the wavelength is smaller in water than in air:
  - c) frequency is same but wavelength in water is greater than in air

d) frequency decreases and wavelength is smaller in water than in air

8) When light waves suffer reflection at the interface between air and glass, the change of phase of reflected wave is equal to:

- a) zero  
b)  $\frac{\pi}{2}$   
c)  $\pi$   
d)  $2\pi$

9) A glass slab ( $n=1.5$ ) of thickness 3.5 cm is placed on a ink spot. A person looks at it from a distance of 5.0 cm above the ink spot. The distance of the spot will appear to be:

- a) 2.0  
b) 3.5  
c) 4.0  
d) 5.0

10) The refractive index of water with respect to air is  $\frac{4}{3}$  and the refractive index of glass with respect to air is  $\frac{3}{2}$ . Then the refractive index of water with respect to glass:

- a)  $\frac{9}{8}$   
b)  $\frac{8}{9}$   
c)  $\frac{1}{2}$   
d) 2

11) When a composite light wave passes through a medium other than vacuum, the speed of:

- a) all component frequencies in the medium are equal  
b) higher frequency is the less than the speed of lower frequency  
c) higher frequency is the less than the speed of lower frequency  
d) all frequency are greater than those in vacuum

12) If  $\mu_{ij}$  represents the refractive index when a light ray goes from medium i to j then the product  $\mu_{21} \times \mu_{32} \times \mu_{43}$  equal to:

- a)  $\mu_{32}$   
b)  $\mu_{42}$   
c)  $\mu_{31}$   
d)  $1/\mu_{14}$

13) The refractive index of water is  $\frac{4}{3}$  and the glass is  $\frac{5}{3}$ . Then the critical angle for a ray of light entering from water from glass will be:

- a)  $\sin^{-1}(4/5)$   
b)  $\sin^{-1}(5/4)$   
c)  $\sin^{-1}(20/9)$   
d)  $\sin^{-1}(9/20)$

14) Which of the following does not change when light goes from medium to another?

- a) Frequency  
b) Wavelength  
c) Speed  
d) Intensity

15) One cannot see through fog because:

- a) fog absorbs light  
b) light is scattered by the droplets in the fog  
c) light suffers total reflection at the droplet in the fog

d) the reflective index in the fog is infinity

15) Total internal reflection can occur when light passes:

a) from denser to a rarer medium

b) from rarer to a denser medium

c) from one medium to another of equal reflective index

d) from one medium to another of equal absorption coefficient

16) When a light ray falls on a given plate at an angle of incidence of  $60^\circ$ , the reflected and the refracted ray are found to be normal to each other. Then the refractive index of the material of the plate is:

a) 0.577

b) 1.732

c) 1.5

d) 2

17) The critical angle for light going from medium x into medium y is  $\theta$ . The speed of light in medium x is  $v$ . The speed of light in medium y is:

a)  $v(1 - \cos \theta)$

b)  $v/\sin \theta$

c)  $v/\cos \theta$

d)  $v \cos \theta$

18) A beam of light is converging towards a point I on a screen. A plane parallel plate of glass whose thickness in the direction of beam =  $t$ , reflective index =  $\mu$ , is introduced in the path of the beam. The convergence point is shifted by:

a)  $t(1 - 1/\mu)$  away

b)  $t(1 + 1/\mu)$  away

c)  $t(1 - 1/\mu)$  nearer

d)  $t(1 + 1/\mu)$  nearer

19) A glass slab is placed in the path of a beam of convergent light; the point of convergence of light

a) moves towards the glass slab

b) moves away from the glass slab

c) remains at the same point

d) undergoes a lateral shift

20) A mixture of red and green colour lights is incident on a glass slab of uniform thickness. Then, the emergent rays emerge from:

a) the same point but in different directions

b) different points but in the same direction

c) the same point and in the same direction

d) different points and in different direction

21) A green leaf placed in a dark room is illuminated the red light. The leaf appears:

- a) green
- b) red
- c) yellow
- d) black

22) A person is 6 feet tall. How tall must a vertical mirror be if he is able to see his entire length ?

- a) 3 ft
- b) 4.5 ft
- b) 7.5 ft
- d) 6 ft

23) If the refractive index of water is  $\frac{4}{3}$  and that of glass is  $\frac{5}{3}$ , then the critical angle of incidence for which a light tending to go from glass to water is:

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

24) Two mirror are perpendicular to each other as shown in the figure. A light  $AB$  is incident on the mirror  $M_1$ . Then the reflected ray is also suffer a reflection from a mirror  $M_2$ . The final ray after reflection  $M_2$  will parallel to the incident ray if:

- a)  $i=45^\circ$
- b)  $i=60^\circ$
- c)  $i<30^\circ$
- d) for any  $i$  between  $0^\circ$  to  $90^\circ$

25) Optical fibres are based on:

- a) total internal reflection
- b) less scattering
- c) refraction
- d) less absorption coefficient

26) A disc is a placed on a surface of pond which have refractive index  $\frac{5}{3}$ . A source of light is placed 4m below the surface pf liquid. The minimum radius of disc needed so that light is not coming out is:

- a)  $\infty$
- b) 3m
- c) 6m
- d) 4m

27) Why is refractive index in a transparent medium greater than one?

- a) because the speed of light in vacuum is always less than speed in a transparent medium
- b) because the speed of light in vacuum is always greater than speed in a transparent medium
- c) Frequency of way changes when it crosses the medium
- d) None of the above

28) A ray of light strikes a transparent surface from air at an angle  $\theta$ . If the angle between the reflected and refracted ray is a right angle, the refractive index of the other surface is given by:

- a)  $\mu=1/\tan \theta$
- b)  $\mu=\tan^2\theta$
- c)  $\mu=\sin \theta$
- d)  $\mu=\tan \theta$

29) A light ray is incident perpendicular to one face of  $90^\circ$  prism and is totally internally reflected at a glass-air interface. If the angle of reflection is  $45^\circ$  , we conclude that the refractive index  $n$  is:



c)  $8/3m$

d)  $20/3m$

38) A beam of light is incident at  $60^\circ$  to a plane surface. The reflected ray and refracted ray are perpendicular to each other, then refractive index of surface is:

a)  $\sqrt{3}$

b)  $1/\sqrt{3}$

b)  $1/2\sqrt{3}$

c) none of these

39) A small coin is resting on a bottom on a beaker filled with liquid. A ray of light from the coin travels up to the surface of liquid and moves along its surface. How fast is the light traveling in liquid?

a)  $2.4 \times 10^8$  m/s

b)  $3.4 \times 10^8$  m/s

c)  $1.2 \times 10^8$  m/s

d)  $1.8 \times 10^8$  m/s

40) A fish is at a depth of 12 cm in water and is viewed by an observer on the bank of a lake. To what height is the image of the fish raised? (refractive index of water =  $4/3$ )

a) 9cm

b) 12cm

c) 3.8cm

d) 3cm

## Reflection and refraction of light of spherical surface



c)  $(x_1 x_2) / 2$

d)  $\sqrt{x_1 x_2}$

10) A concave mirror of focal length  $f$  produces an image  $n$  times the size of the object. If the image is real, then the distance of the object from the mirror is:

a)  $(n-1)f$                       b)  $[(n-1)/n]f$

c)  $[(n+1)/n]f$                 d)  $(n+1)f$

11) A convex mirror of a focal length  $f$  produces an image  $(1/n)$  th of the size of the object. The distance of the object from the mirror is:

a)  $nf$             b)  $f/n$             c)  $(n+1)f$         d)  $(n-1)f$

12) The short linear object of length  $L$  lies on the axis of a spherical mirror of focal length  $f$  at distance  $u$  from the mirror. Its image has an axial length  $L'$  equal to:

a)  $L[f/(u-f)]^2$                 b)  $L[(u+f)f]^{1/2}$

b)  $L[(u-f)/f]^2$                 d)  $L[f/(u+f)]^2$

13) A thin convergent glass lens ( $\mu_g=1.5$ ) has a power of +5.0 D. when this lens is immersed in a liquid of refractive index  $\mu_l$ , it acts in a divergent lens of focal length 100cm. the value of  $\mu_l$  must be:

a)  $4/3$                       b)  $5/3$                       c)  $5/4$                       d)  $6/5$

14) A lens behaves as a converging lens in air and a diverging lens in water. The refractive index of material is:

a) equal to unity        b) equal to 1.33

c) between unity and 1.33        d) greater than 1.33

15) Parallel rays of light are focussed by a thin convex lens. A thin concave lens of small focal length is then joined to the convex lens and the result is that:

a) the focal point shifts away from the lens by a small distance

b) the focal point shifts towards the lens by a small distance

c) the focal point does not shift at all

d) the focal point shifts to infinity

16) A glass concave lens is placed in a liquid in which it behaves like a convergent lens. If the refractive indices of glass and liquid with respect to air are  $\mu_g$  and  $\mu_l$  respectively then:

a)  $\mu_g = 5\mu_l$                 b)  $\mu_g > \mu_l$

c)  $\mu_g < \mu_l$                 d)  $\mu_g = 2\mu_l$

17) A double convex air bubble in water will behave as:

a) convergent lens        b) divergent lens

c) plane glass slab        d) concave mirror

18) In case of a curved mirror in the distance of object ( $u$ ) and image ( $v$ ) are measured from the pole and a graph is plotted between  $(1/u)$  and  $(1/v)$ , the graph is the:

- a) straight line passing through the origin
- b) straight line making an intercept with both u and v axes
- c) parabola
- d) hyperbola

19) In case of curved mirror if the object and image distance are measured from the focus and a graph is plotted between them, the graph will be a:

- a) straight line passing through the origin
- b) straight line not passing through the origin
- c) parabola
- d) hyperbola

20) the sun (diameter =  $D$ ) subtends an angle of  $\theta$  radian at the pole of a concave mirror of focal length  $f$ . the diameter of the image of the sun formed by a mirror is :

- a)  $f\theta$
- b)  $2f\theta$
- c)  $f^2\theta/D$
- d)  $D\theta$

21) the focal length of spherical mirror is:

- a) maximum for red light
- b) maximum for blue light
- c) maximum for white light
- d) same for all light

22) In a spherical mirror is immersed in a liquid, its focal length will be:

- a) increase
- b) decrease
- c) remain unchanged
- d) depend on the nature of liquid

23) A double convex lens of focal length 6m is made of glass of refractive index 1.5 the radius of curvature of one surface is double that of the other surface. The value of smaller radius of curvature is :

- a) 6m
- b) 4.5m
- c) 9m
- d) 4m

24) A displacement method, the length of image in two position of lens between object and screen are 9cm and 4cm respectively. The length of the object must be :

- a) 6.25cm
- b)  $(3/2)$ cm
- c) 6cm
- d) 36cm

25) to obtain magnified virtual image of an object by a convex lens of focal length  $f$ , the distance between the object and the lens should be:

- a)  $>4f$
- b) between  $2f$  and  $4f$
- c)  $<f$
- d)  $>6f$

26) the minimum distance between an object and its real image formed by a concave lens:

- a)  $2f$
- b)  $4f$
- c)  $f$
- d) 0

27) An object is placed at a distance  $(f/2)$  from a convex lens. The image will be:

- a) at one of the foci, virtual and double in size
- b) at  $(3/2)f$ , real and inverted
- c) at  $2f$ , virtual and erect
- d) at  $f$ , real and inverted

28) A thin lens has focal length  $f$  and its aperture has diameter  $d$ . It forms an image of intensity  $I$ . Now the central part of the aperture upto diameter  $(d/2)$  is blocked by an opaque paper. The focal length and image intensity will change to:

- a)  $(f/2)$  and  $(I/2)$
- b)  $f$  and  $(I/4)$
- c)  $(3f/4)$  and  $(I/2)$
- d)  $f$  and  $(3I/4)$

29) Diameter of a plano-convex lens is 6cm and thickness at the centre is 3mm. If the speed of the light in material of the lens is  $2 \times 10^8$  m/s, the focal length of lens is :

- a) 15cm
- b) 20cm
- c) 30cm
- d) 10cm

30) Out of the following :

(i) pole (ii) focus (iii) radius of curvature and (iv) principal axis for a spherical mirror, the quantities that do not depend on whether the rays are paraxial or not, are:

- a) all (i), (ii), (iii), and (iv)
- b) only (i), (ii) and (iii)
- c) only (i), (iii) and (iv)
- d) only (i) and (iv)

31) Let the lateral magnification produced by a spherical mirror be  $m$ . Then for the same position of object and mirror the longitudinal magnification will be:

- a)  $m$
- b)  $\sqrt{m}$
- c)  $m^2$
- d)  $1/m$

32) A luminous point is moving with speed  $v_0$  towards a spherical mirror, along its axis. Then the speed at which the image of this point object is moving is given by: (with  $R$ =radius of curvature and  $u$ =object distance)

- a)  $v_1 = -v_0$
- b)  $v_1 = -v_0 [R/2u - R]$
- c)  $v_1 = -v_0 [2u - R/R]$
- d)  $v_1 = -v_0 [R/2u - R]^2$

33) For a concave mirror of a focal length 20cm, if the object is at a distance of 30cm from the pole, then the nature of the image and magnification will be:

- a) real and -2
- b) virtual and -2
- c) real and +2
- d) virtual and +2

34) To obtain a parallel reflected beam from a torch, the reflector of the torch should be :

- a) plane mirror
- b) spherical mirror
- c) parabolic mirror
- d) all of these

35) A square object of area 100sq. cm is placed perpendicular to the principal axis of a concave mirror. If the lateral magnification of the mirror, for the above object position is 0.4, then the area of the image will be:

- a) 16 sq. cm
- b) 40 sq. cm
- c) 100 sq. cm
- d) 250 sq. cm

36) How will an image produced by a lens change, if half the lens is wrapped in black paper?

- a) there will be no effect

- b) the size of the image will be reduced to one half
- c) the will be disappear
- d) the brightness of the image will be reduced

37) A person standing in front of a mirror finds his image larger than himself. This implies that the mirror is:

- a) concave    b) convex    c) plane    d) any of these

38) Two thin convex lenses of focal length 20cm and 5cm, respectively, are placed at a distance  $d$ . If a parallel beam incident on the first lens emerges as a parallel beam from the second lens, then the value of  $d$  is:

- a) 5cm    b) 15cm    c) 20cm    d) 25cm

39) A man standing in front of a concave spherical mirror of radius of curvature 120cm sees an image erect image of his face four times its natural size. Then the distance from the man from the mirror is:

- a) 180cm    b) 300cm    c) 240cm    d) 45 cm

40) The nature of an image of a candle flame located 40cm from a concave spherical mirror is real, inverted and magnified four times. Then the radius of curvature of the mirror is :

- a) 32cm    b) 64cm    c) 48cm    d) 80cm

41) A person cannot see the object clearly placed at a distance more than 40cm. He is advised to use a lens of power:

- a) -1.5D    b) +2.5D    c) -6.25D    d) +1.5D

42) A lens is formed by pressing mutually the plane faces of two identical plano-convex lenses each of focal length 40cm. It is used to obtain a real inverted image of the same size as the object. The object is placed from the lens at the distance of :

- a) 80m    b) 40m    c) 20m    d) 160m

43) An equiconvex glass lens (i) has a focal length  $f$  and power  $p$ . It is cut into two symmetrical halves (ii) by a plane containing a principal axis. The two pieces are recombined as shown in fig.33.8(iii). The power of the new combination is :

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

44) A concave and a convex lens have the same focal length of 20cm and are put into contact to form a lens combination. This combination is used to view an object of 5cm length kept at 20cm from the lens combination. As compared to the object, the image will be:

- a) magnified and inverted
- b) reduced and erect
- c) of the same size as the object and would be erect
- d) of the same size as the object but would be inverted

45) A real image is formed by a concave lens. If we put it in contact with a convex lens and the combination again forms a real image, which of the following is true for the new image from the combination?

- a) shifts towards the lens system
- b) shifts away from the lens system
- c) remain at the original position
- d) No image formed

46) A concave mirror of a focal length  $f$  in air is used in a medium of refractive index 2. What will be the focal length if the mirror in the medium?

- a)  $4f$
- b)  $2f$
- c)  $f/2$
- d) None of these

47) Focal length of a concave lens will be maximum for:

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

48) A substance is behaving as convex lens in air and concave lens in water; then its refractive index is:

- a) smaller than air
- b) greater than both air and water
- c) greater than air but less than water
- d) almost equal to water

49) A luminous object is placed at a distance of 30cm from a convex lens of focal length 20cm. on the other side of the lens, at what distance from a lens must a convex mirror of radius of curvature 10 cm be placed in order to have an upright image of the object coincident with it:

- a) 12cm
- b) 30cm
- c) 50cm
- d) 60cm

50) A symmetrical double convex lens is cut in two equal parts by a plane containing the principal axis. If the power of the original lens was 4D, the power of the divided lens will be:

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

51) the distance between the object and a divergent lens is  $m$  times the focal length of the lens. The linear magnification produced by the lens is:

- a)  $m$
- b)  $1/m$
- c)  $m+1$
- d)  $1/m+1$

52) the far-point of the short-sighted eyes is 200cm. the power of the lens is:

- a) -0.5D
- b) 2D
- c) 1D
- d) -1.5D

53) The near point of a short-sighted person is 10cm and he desired to read a book 30cm away from him. The power of the lens to be used by him is:

- a) -3.33D
- b) -10D
- c) -6.66D
- d) -5D

54) A convex lens  $A$  of focal length 20cm and a concave lens  $B$  of focal length 5 cm are kept along the same axis with a distance  $d$  between them. If a parallel beam of light falling on  $A$  leaves  $B$  as a parallel beam, then the distance  $d$  (in cm) will be:

- a) 25
- b) 15
- c) 30
- d) 50

55) As shown in figure, a convergent lens is placed inside a cell filled with liquid. The lens has focal length +20cm when in air, and its material has refractive index 1.50. if the liquid has refractive index 1.60, the focal length of the system is:

- a) +80    b) -80    c) -100    d) -24

56) The focal length of a convex lens is 30cm as the size of the image is quarter of the object; then the object distance is:

- a) 90cm    b) 60cm    c) 30cm    d) 40cm

57) the plane face of a plano-convex lens is silvered. If  $\mu$  be the refractive index and  $R$ , the radius of curvature of curved surface, then the system will behave like a concave mirror of a radius of curvature:

- a)  $\mu R$                       b)  $R/(\mu-1)$   
c)  $R^2/\mu$                     d)  $[(\mu+1)/(\mu-1)]$

58) A concave lens of a focal length 20cm produced an image half the size of the real object. The distance of the real object is:

- a) 20cm    b) 30cm    c) 10cm    d) 60cm    e) 40cm

59) Focal length of a plano-convex is  $F$  cm. this is made up of a material with  $\mu_g = 2$ . if it is placed in the liquid of refractive index  $\mu = 4/3$ , then its focal length will be:

- a)  $F/2$     b)  $2F$     c)  $F$     d) none of these

60) The power of the lens a short-sighted person uses is -2 dioptre. Find the maximum distance of an object, which he can see without spectacles:

- a) 25cm    b) 50    c) 100    d) 10

61) A convex lens is made up of three different materials as shown in the figure. For a point object placed on its axis, the number of image formed are:

- a) 12    b) 3    c) 4    d) 5

62) If  $m$  is the longitudinal magnification produced by a spherical mirror then the lateral magnification will be:

- a)  $2m$     b)  $m$     c)  $\sqrt{m}$     d)  $m^2$

63) A double convex lens ( $R_1 = R_2 = 10\text{cm}$ ) is having focal length of a concave mirror. The radius of the curvature of the concave mirror is:

- a) 10cm    b) 20cm    c) 40cm    d) 15cm

64) A convex lens made up of a material of refractive index  $\mu_1$  is immersed in a medium of refractive index  $\mu_2$  as shown in the figure. The relation between  $\mu_1$  and  $\mu_2$  is:

- a)  $\mu_1 < \mu_2$     b)  $\mu_1 > \mu_2$     c)  $\mu_1 = \mu_2$     d)  $\mu_1 = \sqrt{\mu_2}$

65) An air bubble is contained inside water. It behaves as a:

- a) concave lens  
b) convex lens  
c) neither convex nor concave  
d) cannot say

66) A concave mirror of focal length  $f$  in vacuum is placed in a medium of refractive index 2. Its focal length in the medium is:

- a)  $f/2$     b)  $f$     c)  $2f$     d)  $4f$

67) The equiconvex lens, shown in the figure, has a focal length  $f$ . what will be the focal length of each half if the lens is cut along  $AB$ ?

- a)  $f/2$     b)  $f$     c)  $3f/2$     d)  $2f$

68) A plano-convex lens fits exactly into a plano-concave lens. Their plane surface are parallel to each other. If lenses are made of different materials of refractive indices  $\mu_1$  and  $\mu_2$  and are is the radius of curvature of the curved surface of the lenses, then the focal length of the combination is :

- a)  $R/2(\mu_1 - \mu_2)$     b)  $R/(\mu_1 - \mu_2)$     c)  $2R/(\mu_1 - \mu_2)$     d)  $R/2(\mu_1 + \mu_2)$

## Dispersion of Light and Chromatic Aberration

1) A ray of light suffers minimum deviation when incident on a  $60^\circ$  prism of refractive index  $\sqrt{2}$ . The angle of incidence is:

- a)  $\sin^{-1}$     b)  $60^\circ$     c)  $45^\circ$     d)  $30^\circ$

2) A ray is incident at an angle of incidence  $i$  on the face of a prism of small angle  $A$  and emerges normally from the opposite surface. If the refractive index of the material of the prism is  $\mu$ , the angle of incidence  $i$  is nearly equal to:

- a)  $A/\mu$     b)  $A/2\mu$     c)  $\mu/A$     d)  $\mu A/2$

3) the Cauchy 's dispersion formula is:

- a)  $n=A+B\lambda^{-2} + C\lambda^{-4}$     b)  $n=A+B\lambda^2 + C\lambda^{-4}$   
c)  $n=A+B\lambda^{-2} + C\lambda^4$     d)  $n=A+B\lambda^2 + C\lambda^4$

4) for a prism having prism angle  $60^\circ$  and  $\mu=\sqrt{2}$ , the angle of minimum deviation is:

- a)  $30^\circ$     b)  $45^\circ$     c)  $60^\circ$     d)  $90^\circ$

5) A ray of light passes through an equilateral prism of glass in such a manner that the angle of incidence is equal to the emergence and each of these angle is equal to  $(3/4)$  of the angle of prism. The angle of deviation is:

- a)  $45^\circ$     b)  $70^\circ$     c)  $39^\circ$     d)  $30^\circ$

6) the figure show the view through the eyes-piece of a prism spectrometer with the slight illuminated by the source of emitting three wavelengths corresponding to yellow (y), green (g) and unknown colour (x). the colour x may be:

- a) red    b) orange    c) pink    d) none of these

7) A glass prism has  $\mu=1.5$  and the refracting angle is  $90^\circ$ . If a ray falls on it at an angle of incidence of  $30^\circ$  then what will be the angle of emergence?

- a)  $60^\circ$     b)  $30^\circ$     c)  $45^\circ$     d) the ray will not emerge out of this prism

8) Rainbow is seen due to:

- a) interference by thin films

- b) scattering of sunlight
- c) dispersion of sunlight
- d) diffracting of sunlight

9) In a glass prism:

- a) blue light is dispersed more than red light
- b) red light is dispersed more than blue light
- c) both red light and blue light are equally dispersed
- d) none of the above

10) A convex lens, a glass slab, a glass prism and spherical solid ball have been prepared from the same optically transparent material. Dispersive power will be possessed only by:

- a) the glass slab and the prism
- b) the lens and the solid ball
- c) the prism only
- d) all of the above

11) yellow light is refracted through a prism producing minimum deviation. If  $i_1$  and  $i_2$  denote the angles of incidence and emergence of the prism, then:

- a)  $i_1 = i_2$
- b)  $i_1 < i_2$
- c)  $i_1 > i_2$
- d)  $i_1 + i_2 = 90$

12) if one face of a prism angle  $30^\circ$  and  $\mu = \sqrt{2}$  is silvered, the incident ray retraces its initial path. The angle of incidence is:

- a)  $60^\circ$
- b)  $30^\circ$
- c)  $45^\circ$
- d)  $90^\circ$

13) Angle of prism is  $A$  and its one surface is silvered. Light rays falling at an angle of incidence of  $2A$  on first surface return back through the same path after suffering reflection at the second silvered surface. Refractive index of material is :

- a)  $2 \sin A$
- b)  $2 \cos A$
- c)  $(\frac{1}{2}) \cos A$
- d)  $\tan A$

14) An isosceles prism of prism angle  $120^\circ$  has a refractive index of 1.44. Two parallel monochromatic rays enter the prism parallel to each other in air as shown in figure. The rays emerging from the opposite faces:

- a) are parallel to each other
- b) are diverging
- c) make an angle  $[\sin^{-1}(0.72)]$  with each other
- d) make an angle  $[\sin^{-1}(0.72) - 30^\circ]$  with each other

15) A prism of an angle  $30^\circ$  is silvered at one side. A ray of light incident at an angle  $45^\circ$  is reflected back. The refractive index is:

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

16) The angle of prism is  $60^\circ$  and its refractive index is 1.5. there will be no emergent light if the angle of incidence on the first face is:

- a) equal to  $30^\circ$                       b) less than  $27^\circ$                       c) more than  $30^\circ$                       d) equal to  $60^\circ$

17) the angle of prism is  $60^\circ$  and the index of refraction of glass with respect to air is 1.5. if the angle of incidence on the first face is  $i_1$  and the angle of emergence at the second face is  $i_2$  then the prism produced minimum deviation when:

- a)  $i_1=0$                       b)  $i_1 > i_2$                       c)  $i_1=i_2$                       d)  $i_1 < i_2$

18) In the Q. 17, the deviation produced by the prism will be maximum when:

- a)  $i_1=i_2$                       b) either  $i_1 = \frac{\pi}{2}$  or  $i_2 = \frac{\pi}{2}$                       c)  $i_1$  is just greater than  $i_2$                       d)  $i_1$  is just less than  $i_2$

19) A prism has a refracting angle of  $6^\circ$ . When placed in the position of minimum deviation, it produced a deviation of  $3^\circ$ . Then the angle of incidence is:

- a)  $30^\circ$                       b)  $15^\circ$                       c)  $45^\circ$                       d)  $60^\circ$

20) In the Q. 19, the angle of refraction is:

- a)  $30^\circ$                       b)  $15^\circ$                       c)  $45^\circ$                       d)  $60^\circ$

21) In the Q. 19, the angle of deviation of each face is :

- a)  $30^\circ$                       b)  $15^\circ$                       c)  $45^\circ$                       d)  $60^\circ$

22) In the Q. 19, the refractive index of material of the prism is:

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

23) A glass prism of refractive index 1.5 is immersed in water ( refractive index  $4/3$ ). A light beam incident normally on the face AB is totally reflected to reach the face AC if:

- a)  $\sin \theta > 8/9$                       b)  $2/3 < \sin \theta < 8/9$   
c)  $\sin \theta < 2/3$                       d)  $\sin \theta \geq 8/9$

24) the angle of a prism is A and if the angle of minimum deviation is  $180-2A$ , then the refractive index of the material of the prism is:

- a)  $\sin A/2$                       b)  $\cos A/2$   
c)  $\tan A/2$                       d)  $\cot A/2$

25) when a yellow light is refracted by a prism at the angle of minimum deviation, the:

- a) angle of incidence is equal to the angle of emergence  
b) angle of incidence is smaller than the angle of emergence  
c) angle of incidence is greater than the angle of emergence  
d) sum of the angle of incidence and emergence is equal to the  $90^\circ$

26) there is a prism with refractive index equal to  $\sqrt{2}$  and the refracting angle equal to  $30^\circ$ . One of the refracting surfaces of the prism is polished. A beam of monochromatic light will retrace its path if its angle of incidence over the refracting surface of the prism is:

- a)  $0^\circ$                       b)  $30^\circ$                       c)  $45^\circ$                       d)  $60^\circ$

27) An equilateral prism is placed on the prism table of a spectrometer in the position of minimum deviation. If the angle of incidence is  $60^\circ$ , the angle of deviation of the ray is:

- a)  $90^\circ$       b)  $60^\circ$       c)  $45^\circ$        $30^\circ$

28) A ray falls on prism  $ABC$  ( $AB=BC$ ) as travels as shown in the figure. The minimum refractive index of the material should be:

- a)  $4/3$       b)  $\sqrt{2}$       c) 1.5      d)  $\sqrt{3}$