1. **A thin rod of length lies along the axis of a concave mirror of focal length  One end of its magnified image touches an end of the rod. The length of the image is**

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

1. **A ray of light falls on the surface of a spherical glass paper weight making an angle  with the normal and is refracted in the medium at an angle . The angle of deviation of the emergent ray from the direction of the incident ray**

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

1. **Light enters at an angle of incidence in a transparent rod of refractive index *n*. For what value of the refractive index of the material of the rod the light once entered into it will not leave it through its lateral face whatsoever be the value of angle of incidence**

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

1. **A glass hemisphere of radius 0.04 m and *R.I.* of the material 1.6 is placed centrally over a cross mark on a paper (i) with the flat face; (ii) with the curved face in contact with the paper. In each case the cross mark is viewed directly from above. The position of the images will be**

(a) (i) 0.04 *m* from the flat face; (ii) 0.025 *m* from the flat face

(b) (i) At the same position of the cross mark; (ii) 0.025 *m* below the flat face

(c) (i) 0.025 *m* from the flat face; (ii) 0.04 *m* from the flat face

(d) For both (i) and (ii) 0.025 *m* from the highest point of the hemisphere

1. **One face of a rectangular glass plate 6 *cm* thick is silvered. An object held 8 *cm* in front of the first face, forms an image 12 *cm* behind the silvered face. The refractive index of the glass is**

(a) 0.4 (b) 0.8 (c) 1.2 (d) 1.6

1. **A ray of light is incident at the glass–water interface at an angle *i*, it emerges finally parallel to the surface of water, then the value of  would be**

*r*

*r*

*i*

Glass

Water

*μw =* 4/3

(a) (4/3) sin *i*

(b) 1/sin *i*

(c) 4/3

(d) 1

1. **A glass prism = 1.5) is dipped in water = 4/3) as shown in figure. A light ray is incident normally on the surface *AB*. It reaches the surface BC after totally reflected, if**

*B*

*A*

*θ*

*C*

(a) sin  8/9

(b) 2/3 < sin< 8/9

(c) sin   2/3

(d) It is not possible

1. **Shown in the figure here is a convergent lens placed inside a cell filled with a liquid. The lens has focal length + 20 *cm* 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 *cm*

Liquid

Lens

(b) – 80 *cm*

(c) – 24 *cm*

(d) –100 *cm*

1. **A hollow double concave lens is made of very thin transparent material. It can be filled with air or either of two liquids *L*1 and *L*2 having refractive indices *n*1 and *n*2 respectively (*n*2>*n*1>1). The lens will diverge a parallel beam of light if it is filled with**

(a) Air and placed in air

(b) Air and immersed in *L*1

(c) *L*1 and immersed in *L*2

(d) *L*2 and immersed in *L*1

1. **The size of the image of an object, which is at infinity, as formed by a convex lens of focal length 30*cm* is 2 *cm*. If a concave lens of focal length 20 *cm* is placed between the convex lens and the image at a distance of 26 *cm* from the convex lens, calculate the new size of the image**

(a) 1.25 *cm* (b) 2.5 *cm* (c) 1.05 *cm* (d) 2 *cm*

1. **An achromatic prism is made by crown glass prism  and flint glass prism . If  and , then resultant deviation for red coloured ray will be**

(a) 1.04° (b) 5° (c) 0.96° (d) 13.5°

1. **A spherical surface of radius of curvature *R* separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in the glass. A point object *P* placed in air is found to have a real image *Q* in the glass. The line *PQ* cuts the surface at a point *O*, and PO = OQ. The distance *PO* is equal to**

(a) 5 *R* (b) 3 *R* (c) 2 *R* (d) 1.5 *R*

1. **A plano-convex lens when silvered in the plane side behaves like a concave mirror of focal length 30*cm*. However, when silvered on the convex side it behaves like a concave mirror of focal length 10 *cm*. Then the refractive index of its material will be**

(a) 3.0 (b) 2.0 (c) 2.5 (d) 1.5

1. **A light source is located at  as shown in the figure. All sides of the polygon are equal. The intensity of illumination at  is . What will be the intensity of illumination at **

(a) 

*P*1

*P*2

*P*3

(b) 

(c) 

(d) 

1. **A container is filled with water (*R.I* = 1.33) upto a height of 33.25 *cm*. A concave mirror is placed 15 *cm* above the water level and the image of an object placed at the bottom is formed 25 *cm* below the water level. The focal length of the mirror is**

25 *cm*

15 *cm*

33.25 *cm*

**=1.33

(a) 10

(b) 15

(c) 20

(d) 25

1. **A point object is moving on the principal axis of a concave mirror of focal length  towards the mirror. When it is at a distance of  from the mirror, its velocity is  What is the velocity of the image at that instant**

(a)  towards the mirror

(b)  towards the mirror

(c)  away from the mirror

(d)  away from the mirror

1. **A telescope has an objective lens of 10 *cm* diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is 5000 Å, is of the order of**

(a) 0.5 *m* (b) 5 *m* (c) 5 *mm* (d) 5 *cm*

1. **Two point white dots are 1*mm* apart on a black paper. They are viewed by eye of pupil diameter 3 *mm*. Approximately, what is the maximum distance at which dots can be resolved by the eye ? [Take wavelength of light = 500 *nm*]**

*θ*

*d*

*x*

(a) 6 *m*

(b) 3 *m*

(c) 5 *m*

(d) 1 *m*

1. **A convex lens of focal length 30 *cm* and a concave lens of 10 *cm* focal length are placed so as to have the same axis. If a parallel beam of light falling on convex lens leaves concave lens as a parallel beam, then the distance between two lenses will be**

(a) 40 *cm* (b) 30 *cm* (c) 20 *cm* (d) 10 *cm*

1. **If an object moves towards a plane mirror with a speed *v* at an angle  to the perpendicular to the plane of the mirror, find the relative velocity between the object and the image**

*O*

*I*

*y*

*vO*

→

*vI*

→

*θ*

*θ*

*x*

(a) *v*

(b) 2*v*

(c) 

(d) 

1. **A plane mirror is placed at the bottom of the tank containing *a* liquid of refractive index . *P* is a small object at a height *h* above the mirror. An observer *O-*vertically above *P* outside the liquid see *P* and its image in the mirror. The apparent distance between these two will be**

(a) 

*O*

*P*

*h*

(b) 

(c) 

(d) 

1. **One side of a glass slab is silvered as shown. A ray of light is incident on the other side at angle of incidence . Refractive index of glass is given as 1.5. The deviation of the ray of light from its initial path when it comes out of the slab is**

45o

*μ* = 1.5

(a) 90o

(b) 180o

(c) 120o

(d) 45o

1. **Consider the situation shown in figure. Water  is filled in a breaker upto a height of 10 *cm*. A plane mirror fixed at a height of 5 *cm* from the surface of water. Distance of image from the mirror after reflection from it of an object *O* at the bottom of the beaker is**

(a) 15 *cm*

5 *cm*

10 *cm*

*O*

*cm*

*O*'

(b) 12.5 *cm*

(c) 7.5 *cm*

(d) 10 *cm*

1. **A person runs with a speed *u* towards a bicycle moving away from him with speed *v*. The person approaches his image in the mirror fixed at the rear of bicycle with a speed of**

(a) *u – v* (b) *u* – 2*v* (c) 2*u – v* (d) 2(*u – v*)

1. **Two transparent slabs have the same thickness as shown. One is made of material *A* of refractive index 1.5. The other is made of two materials *B* and *C* with thickness in the ratio 1 : 2. The refractive index of *C* is 1.6. If a monochromatic parallel beam passing through the slabs has the same number of waves inside both, the refractive index of *B* is**

*A*

*t*

*t/*3

2*t/*3

*C*

*B*

(a) 1.1 (b) 1.2

(c) 1.3(d) 1.4

1. **An object is placed infront of a convex mirror at a distance of 50 *cm*. A plane mirror is introduced covering the lower half of the convex mirror. If the distance between the object and plane mirror is 30 *cm,* it is found that there is no parallax between the images formed by two mirrors. Radius of curvature of mirror will be**

(a) 12.5 *cm* (b) 25 *cm* (c)  (d) 

1. **A cube of side 2 *m* is placed in front of a concave mirror focal length 1*m* with its face *P* at a distance of 3 *m* and face *Q* at a distance of 5 *m* from the mirror. The distance between the images of face *P* and *Q* and height of images of *P* and *Q* are**

2*m*

2*m*

*P*

*Q*

3*m*

(a) 1 *m,* 0.5 *m,* 0.25 *m*

(b) 0.5 *m,* 1 *m,* 0.25 *m*

(c) 0.5 *m,* 0.25 *m,* 1*m*

(d) 0.25 *m,* 1*m,* 0.5 *m*

1. **A small piece of wire bent into an *L* shape with upright and horizontal portions of equal lengths, is placed with the horizontal portion along the axis of the concave mirror whose radius of curvature is 10 *cm*. If the bend is 20 *cm* from the pole of the mirror, then the ratio of the lengths of the images of the upright and horizontal portions of the wire is**

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

1. **The image of point *P* when viewed from top of the slabs will be**

*μ=*1.5

*μ=*1.5

1.5 *cm*

2 *cm*

*P*

1.5 *cm*

1.5 *cm*

(a) 2.0 *cm* above *P*

(b) 1.5 *cm* above *P*

(c) 2.0 *cm* below *P*

(d) 1 *cm* above *P*

1. **A fish rising vertically up towards the surface of water with speed 3 *ms*–1 observes a bird diving vertically down towards it with speed 9 *ms*–1. The actual velocity of bird is**

*y*

*y*'



(a) 4.5 *ms*–1

(b) 5. *ms*–1

(c) 3.0 *ms*–1

(d) 3.4 *ms*–1

1. **The slab of a material of refractive index 2 shown in figure has curved surface *APB* of radius of curvature 10 *cm* and a plane surface *CD*. On the left of *APB* is air and on the right of *CD* is water with refractive indices as given in figure. An object *O* is placed at a distance of 15 *cm* from pole *P* as shown. The distance of the final image of *O* from *P*, as viewed from the left is**

*P*

*O*

*C* '

*C*

*A*

*D*

*B*

*μ* s= 2.0

15 *cm*

20 *cm*



(a) 20 *cm*

(b) 30 *cm*

(c) 40 *cm*

(d) 50 *cm*

1. **A double convex lens, lens made of a material of refractive index , is placed inside two liquids or refractive indices  and , as shown. . A wide, parallel beam of light is incident on the lens from the left. The lens will give rise to**

(a) A single convergent beam

*μ*2

*μ*1

*μ*2

*μ*3

*μ*3

(b) Two different convergent beams

(c) Two different divergent beams

(d) A convergent and a divergent beam

1. **The distance between a convex lens and a plane mirror is 10 *cm*. The parallel rays incident on the convex lens after reflection from the mirror form image at the optical centre of the lens. Focal length of lens will be**

(a) 10 *cm*

*O*

(b) 20 *cm*

(c) 30 *cm*

(d) Cannot be determined

1. **A compound microscope is used to enlarge an object kept at a distance 0.03*m* from it’s objective which consists of several convex lenses in contact and has focal length 0.02*m*. If a lens of focal length 0.1*m* is removed from the objective, then by what distance the eye-piece of the microscope must be moved to refocus the image**

(a) 2.5 *cm* (b) 6 *cm* (c) 15 *cm* (d) 9 *cm*

1. **If the focal length of the objective lens and the eye lens are 4 *mm* and 25 *mm* respectively in a compound microscope. The length of the tube is 16 *cm*. Find its magnifying power for relaxed eye position**

(a) 32.75 (b) 327.5 (c) 0.3275 (d) None of the above

1. **Three right angled prisms of refractive indices  and  are fixed together using an optical glue as shown in figure. If a ray passes through the prisms without suffering any deviation, then**

*n*2

*n*1

*n*3

(a)  (b) 

(c) (d) 