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BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Optometry-2019/B.Optometry-2020/B.Optometry-2021
Course Name – Geometrical Optics
Course Code - BOPTO205
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Which of the following is used to split white light into different colours?
a) glass slab b) convex lens
c) concave lens d) prism

(ii) The unit of power of lens is
a) metre b) centimeter
c) diopter d) m^{-1}

(iii) Where an object should be placed in front of a convex lens to get a real image of the size of the object?
a) at the principal focus of the lens b) at twice the focal length
c) at infinity d) between the optical centre of the lens and its principal focus

(iv) The image formed by a concave lens is
a) always real and enlarged b) always real and diminished
c) always virtual and enlarged d) always virtual and diminished

(v) Which one is true for spherical mirror?
a) f = 2R b) R = 2f
c) fR = 2 d) fR = ½

(vi) In projectors which lenses are used?
a) convex lens b) concave lens
c) bipolar lens d) both (a) and (b)

(vii) The human eye is like a camera and hence it contains a system of lens. The eye lens forms

a) a straight or upright, real image of the object on the retina
b) an inverted, virtual image of the object on the retina
c) an inverted, real image of the object on the retina
d) a straight or upright, real image of the object on the iris

(viii) Total internal reflection can take place only if

a) light goes from optically rarer medium to optically denser medium.
b) light goes from optically denser medium to rarer medium.
c) the refractive indices of the two media are close to each other.
d) the refractive indices of the two media are widely different.

(ix) When light passes from air to glass, then

a) Wavelength increases
b) Wavelength decreases
c) Frequency decreases
d) Velocity remains constant

(x) Determine the power of lens of focal length 1 cm is

a) 1 D
b) 100 D
c) 10 D
d) 0.01 D

(xi) Image formed by plane mirror is

a) Real and erect
b) Real and inverted
c) Virtual and erect
d) Virtual and inverted

(xii) If an object is at infinity, Determine the position of an image formed due to convex lens.

a) Beyond F_2
b) At infinity
c) On C_2
d) At the focal point

(xiii) The speed of light in vacuum is

a) 3×10^5 m/s
b) 3×10^8 m/s
c) 3×10^8 km/s
d) 3×10^6 m/s

(xiv) Magnification for convex mirror is

a) always positive
b) always negative
c) sometimes positive
d) 1

(xv) If the angle of incidence, $\theta i = 0°$, the angle of reflection, $\theta r =$

a) 0^0
b) 90^0
c) 180^0
d) 45^0

Group-B

(Short Answer Type Questions) 3 x 5=15

2. What is the basic difference between plane mirror and spherical mirror? (3)

3. Show that the least possible distance between an object and its real image in a convex lens is four times the focal length of the lens. (3)

4. Explain the terms first principal focus and second principal focus for convex surface. (3)

5. What are the main differences between convex mirror and concave mirror? (3)

6. Calculate the focal length of a plano-convex lens, the radius of curved surface being 10 cm (μ=1.5). (3)

OR

A 2.0 cm high object is placed on the principal axis of a concave mirror at a distance of 12 cm from the pole. If the image is inverted, real and 5.0 cm high, find the location of the image and focal length of the mirror. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. State laws of reflection of light. Define absolute refractive index of a medium. (5)

8. What is optical path? How is it different from geometrical path? (5)

9. Establish that the distance between two nodal points is always equal to the distance between two principal points. (5)

10. A convex lens placed in contact with a concave lens of greater focal length. What will be the nature of the lens combination? (5)

11. A convex refracting surface of radius of curvature 40 cm separates two media of refractive indices 4/3 and 1.50. An object is kept in the first medium at a distance of 20 cm from the surface. Estimate the position of the image. (5)

12. Which type of mirror is used to give erect and enlarged image of an object? Draw with ray diagram. (5)

OR

Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed parallel to the principal axis of a convex mirror. (5)

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