Light -1

Q.1 A converging lens of focal length 10cm forms an image two times magnified twice. Calculate position of object.

Q.2 The refractive index of glass is 1.5.What is the speed of light in glass? (speed of light in vacuum is $3.0 \times 10^{8} ms^{-1}$)

Q.3 A tank is filled with water to a height of 12.5cm.The apparent depth of needle lying at the bottom of tank is measured by a microscope to be 9.4cm. What is the refractive index of water? If water is replaced by a liquid of refractive index 1.63 upto the same height, by what distance would the microscope have to be moved to focus on the needle again ?

Q.4 A ray of light of frequency of 5×10^{14}Hz is passed through a liquid. The wavelength of light measured inside the liquid is found to be 450×10^{-9}m. Calculate the refractive index of the liquid.

Q.5 A ray of monochromatic light travelling in vacuum with speed c, wavelength λ and frequency v, enter into a medium of refractive index 1.5. What will be its new speed , wavelength and frequency ?

Q.6 Calculate speed of light in a medium, whose critical angle is 45^{0}.

Q.7 Sunlight is incident on a concave mirror, parallel to its principle axis. The image is formed at a distance of 12cm from the pole. Find the radius of curvature of mirror.

Q.8 A 2cm high object is placed at a distance of 32cm from a concave mirror. The image is real inverted and 3cm in size. Find the focal length of mirror and its position where the image is formed.

Q.9A concave mirror of focal length 'f' produces of an image 'n' times the size of object. If the image is real then find the distance d of the object from the mirror .

Q.10 The refractive index of diamond is 5/2. The refractive index of glass is 3/2. Find the refractive index of glass w.r.t. diamond.

Q.11 Velocity of light in glass is 2×10^{8} ms^{-1} and then in air is 3×10^{8} ms^{-1}. By how much would an ink dot appear to be raised, when covered by a glass plate 6.0cm thick?

Q.12 A ray of light is travelling in a glass cube placed in water. Find the critical angle for the glass-water interface.

Q.13 A pin which is 2cm long is placed at a distance 16cm from a convex lens. Assuming it to be perpendicular to the principal axis , find the position, size and the nature of image if the focal length of lens is 12cm.

Q.14 A 4.0cm high object is placed at a distance 60cm from a concave lens of focal length 20cm. Find the size of image.

Q.15 A lamp is 5.0m from a wall. Find the length of a concave mirror which will form a four times magnified image of the lamp on the wall.

Q.16 A light ray of wavelength 6000Å in air enters a medium with a refractive index 1.5. What will be the frequency and wavelength of light in the medium?

Q.17 Calculate the critical angle for the diamond having a refractive index of 2.42 and crown glass having a refractive index of 1.52.

Q.18 A fish is 30cm below the water surface in the still pond. What is its depth from the water surface if viewed from top ? Take the refractive index of water to be 4/3.

Q.19 A ray of light incident normally on a refracting surface does not suffer any refraction.

Q.20 The critical angle for total internal reflection is greater when a ray of light is travels from glass to water than when it travels from glass to air.

Q.21 If a mirror reverses right and left, why does not it reverse up and down?

Q.22 An observer moves towards a stationary plane mirror at a speed of $4ms^{-1}$. With what speed will his image move towards him ?

Q.23 When a plane mirror is rotated through an angle θ , the reflected ray turns through the angle 2θ, then find the size of image.

Q.24 The refractive index of glass is 1.5 and that of water is 1.3. If the speed of light in water is $2.25x10^{8}$ ms^{-1}, what is the speed of light in glass ?

Q.25 Does a convex lens become less convergent when it is immersed in water ?

Q.26 A person stands straight in front of a convex mirror at a distance of 30m away from it. He sees his erect image whose height is $1/6^{th}$ of his real height. Find the focal length of the convex mirror.

Q.27 A lens of focal length 'f' produces an image of an object located 15cm on one side of it at a distance of 30cm on the another side . If the lens is replaced by another lens of focal length f/2, where would the image form ? If the image has to form at the earlier position by what distance should the object be shifted ?

Q.28 A plane mirror lying on the ground is not visible from all directions. But a piece of paper can be seen from any direction. Explain.