

PHYSICAL OPTICS

ANSWERS TO ONE AND TWO MARK QUESTIONS

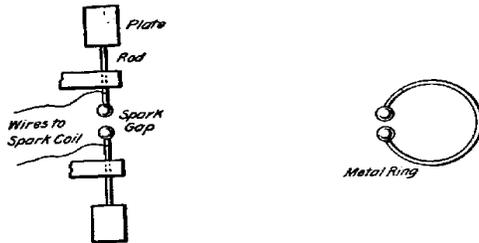
I. THEORIES OF LIGHT AND SPEED OF LIGHT

ONE MARK QUESTIONS

1. Sir Isaac Newton
2. Christian Huygen
3. James Clark Maxwell
4. Max Planck
5. Fails to explain simultaneous reflection and refraction.
6. Fails to explain polarization.
7. Fails to explain photoelectric effect.
8. Fails to explain any wave phenomena
9. Hertz
10. It is the locus of all points vibrating with same phase.
11. Zero.
12. $2.99797 \times 10^8 \text{ ms}^{-1}$.
13. The net displacement of the light is zero.
14. $C = 12 \text{ nd}$.

TWO MARK QUESTIONS

1. i) Huygen's wave theory. ii) Maxwell's electromagnetic theory.
2. i) High elasticity and ii) low density.
- 3.



4. Speed of light is useful in,
 - i) Einstein's mass energy equivalence relation, $E = mC^2$ and
 - ii) relating the frequency and the wave length of the light, $C = v\lambda$.

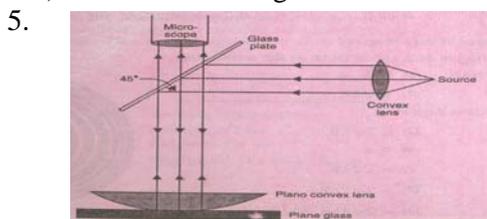
II. INTERFERENCE OF LIGHT

ONE MARK QUESTIONS

1. It is the phenomenon of redistribution of light energy or modification in the intensity of light due to the superposition of two or more similar light waves.
2. Two sources of light are said to be 'coherent', if they emit waves of same frequency (or wavelength) and are either in phase or have a constant initial phase difference.
3. Interference is said to be constructive if the resultant intensity of light becomes maximum.
4. Interference is said to be destructive if the resultant intensity of light becomes minimum.
5. The alternate bright and dark bands obtained on the screen are called interference fringes.
6. When the Plano convex lens is kept on the plane glass plate is viewed by illuminating with the light of suitable wavelength, due to the super position of reflected and transmitted light, a interference pattern consisting of alternate bright and dark rings are produced. These are called Newton's rings.

TWO MARK QUESTIONS

1. It is the distance between any two alternative bright or dark bands.
2. i) For constructive interference $p.d = n\lambda$.
ii) For destructive interference $p.d = \frac{(2n+1)\lambda}{2}$.
3. i) For constructive interference, $\phi = 2n\pi$.
ii) For destructive interference, $\phi = (2n+1)\pi$.
4. i) The two slits should be as narrow as possible,
ii) The distance between the slit and the screen must be very large.
iii) The two source light should be coherent.



II. DIFFRACTION OF LIGHT

ONE MARK QUESTIONS

1. It is the phenomenon of bending of light around corners of small obstacles and hence it's encroachment into the region of geometrical shadow.
2. It is the ability of the optical instrument to distinguish the two closely lying point objects distinctly.
3. The limit of resolution of the telescope is the minimum angular separation between two closely lying point object that can be seen distinctly.
4. The limit of resolution of the microscope is the minimum linear separation between two closely lying point object that can be seen distinctly.
5. The resolving power of an optical instrument is the reciprocal of its limit of resolution.
6. The resolving power of a telescope can be increased by increasing the diameter of its aperture.

TWO MARK QUESTIONS

1. Resolving power = $\frac{a}{1.22\lambda}$, Where $a \rightarrow$ diameter of the aperture,
 $\lambda \rightarrow$ Wave length of light is used.
2. Resolving power = $\frac{1}{d} = \frac{2n \sin \theta}{\lambda}$, Where $n \rightarrow$ RI of objective medium,
 $\lambda \rightarrow$ Wave length of light is used.
 $\theta \rightarrow$ semi vertical angle.

II. POLARISATION OF LIGHT

ONE MARK QUESTIONS

1. It is the phenomenon of restricting/confining the plane of vibration of light to one particular plane.
2. Plane of polarization is the plane containing no vibrations.
3. Plane of vibration is the plane containing the vibrations of plane polarized light.
4. It state that the refractive index of the medium is equal to tangent of polarizing angle.
5. It is the phenomenon of rotating the plane of vibration of plane polarized light.
6. Specific rotation of an optically active solution at a given temperature for a given wavelength of light is numerically equal to the rotation produced by the solution of length 1m having unit concentration.
7. Specific rotation of optically active solid at a given temperature for a give wavelength of light is numerically equal to the rotation produced per mm thickness of the solid.

TWO MARK QUESTIONS

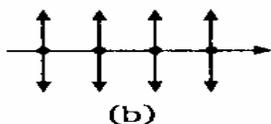
1. E- Ray O- Ray
- i) It does not obey Snell's law in all direction. i) It obey Snell's law in all direction.
- ii) It travels with different speed in different directions. ii) It travels with same speed in all direction.

2. H-Polaroid : These are the Polaroids made up of stretched thin film of polyvinyl alcohol stained with Iodine.

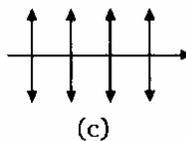
K-Polaroid : These are the Polaroids made up of a stretched film of polyvinyl alcohol heated with a suitable dehydrating agent like HCl.

3. a) in laboratories to produce and analyze plane polarized light.
b) in photographic cameras as filters, to see three-dimensional pictures,
c) in wind shields of automobiles to avoid glare
d) in sunglasses
e) in the window panes of aero planes to control intensity of light.
4. If the tip of the plane polarized light traces a circle then it is said to be circularly polarized light.
If the tip of the plane polarized light traces an ellipse then it is said to be elliptically polarized light.
5. Methods of producing plane polarized light
- (i) Reflection
 - (ii) Refraction
 - (iii) Double Refraction
 - (iv) Selective absorption

6.



Un polarized light



Polarized light

