Polarization; UNIT: II

Question Bank

Multiple choice questions:

(1) The polarization is possible in _____ wave
(a) **transverse** (b) longitudinal
(b) water (d) mechanical

(2) A _____ light is a wave in which the electric vector is everywhere confined to a single plane
(a) unpolarized (b) **plane polarized**
(c) circularly polarized (d) elliptically polarized

(3) The _____ component of wave is called s-component
(a) equal (b) unequal
(c) parallel (d) **perpendicular**

(4) The _____ component of wave is called p-component
(a) equal (b) unequal
(c) **parallel** (d) perpendicular

(5) The _____ of the angle of polarization is numerically equal to the refractive index of the medium
(a) sine (b) cosine
(c) cosec (d) **tangent**

(6) _____ has discovered that certain crystal absorbs light selectively
(a) Maxwell's (b) Brewster's
(c) **Biot's** (d) Nicol's

(7) The crystal that exhibit selective absorption are called _____
(a) Isotropic (b) non-isotropic
(c) **anisotropic** (d) non-anisotropic

(8) The ray which obeys Snell's law of refraction is known as _____ ray
(a) **ordinary** (b) extraordinary
(c) simple (d) electric

(9) _____ is a device which is used to find whether the light is polarized or not polarized
(a) polarizer (b) **analyzer**
(c) glass (d) polaroid

(10) A Nicol prism is made from _____ crystal
(a) tourmaline (b) quartz
(c) topaz (d) **calcite**

(11) In Nocol prism two parts of the crystal are cemented together with _____ layer
(a) oil (b) silica
(c) **Canada balsam** (d) glycerin

(12) The intensity of transmitted light through the polarizer is _____ the intensity of incident light
(a) double (b) **half**
(c) equal (d) zero

(13) In _____ materials, atoms are arranged in a regular manner
(a) **Isotropic** (b) non-isotropic
(c) anisotropic (d) non-anisotropic

(14) In _____ crystal both the refracted rays are extra ordinary rays
(a) **biaxial** (b) uniaxial
(c) triaxial (d) single axial

(15) In _____ crystal one of the refracted ray is ordinary and the other is an extra ordinary rays
(a) biaxial (b) **uniaxial**
(c) triaxial (d) single axial

(16)In positive crystal the refractive index for extraordinary ray is _____then that of ordinary ray
(a) less (b) **greater**
(c) equal (d) zero

(17)In negative crystal the refractive index for extraordinary ray is _____then that of ordinary ray
(a) **less** (b) greater
(c) equal (d) zero

(18)When two waves are in same phase then the resultant wave is _____polarized wave
(a) circularly (b) elliptically
(c) **plane** (d) non

(19)When $\delta = \frac{\pi}{2}$ between the two waves and amplitudes are unequal then the resultant wave is _____polarized wave
(a) circularly (b) **elliptically**
(c) plane (d) non

(20)When $\delta = \frac{\pi}{2}$ between the two waves and amplitudes are equal then the resultant wave is _____polarized wave
(a) **circularly** (b) elliptically
(c) plane (d) non

21 What is the path difference of the emerging wave in quarter wave plate?
(a) $\boldsymbol{\frac{\lambda}{4}}$
(b) $\frac{\lambda}{2}$
(c) $\frac{\lambda}{3}$
(d) λ

22 What is the path difference of the emerging wave in Half wave plate?
(a) $\frac{\lambda}{4}$
(b) $\boldsymbol{\frac{\lambda}{2}}$
(c) $\frac{\lambda}{3}$
(d) λ

23 What is the path difference of the emerging wave in full wave plate?
(a) $\frac{\lambda}{4}$
(b) $\frac{\lambda}{2}$

(c) $\frac{\lambda}{3}$

(d) λ

24 What is the phase difference of the emerging wave in quarter wave plate?

(a) **90^0**

(b) 180^0

(c) 2700^0

(d) 360^0

25 What is the phase difference of the emerging wave in half wave plate?

(a) 90^0

(b) **180^0**

(c) 2700^0

(d) 360^0

26 What is the phase difference of the emerging wave in full wave plate?

(a) 90^0

(b) 180^0

(c) 2700^0

(d) **360^0**

27 Substance which rotates the plane of polarization is known as

(a) Optically polarised substance

(b) **Optically active substance**

(c) Optically refractive substance

(d) Optically inactive substance

Short Questions:

1. List the method for producing the linearly polarized light
2. Define unpolarized and plane polarized light
3. Define circularly polarized and elliptically polarized light
4. What are s and p- components of wave?
5. Define polarizing angle
6. State the Brewster's law
7. State the applications of Brewster's law
8. What is the pile of plates?
9. What is meant by selective absorption?
10. What is double refraction?
11. Define polarizer and analyzer
12. What are ordinary and extra-ordinary rays?
13. What is the working of Canada balsam layer?
14. State the Malus law
15. What are the isotropic and anisotropic materials?
16. What are uniaxial and biaxial crystals?
17. What are positive and negative crystals?
18. Give the three names of uniaxial crystal
19. Give the three names of biaxial crystal
20. Give the name of positive and negative crystal
21. What is quarter wave plate?
22. What is half wave plate?
23. What is full wave plate?
24. What is specific rotation?

Long Questions:

1. Discuss the polarization by reflection and prove the Brewster law
2. State and prove Brewster's law and show that reflected and refracted rays are at right angles to each other
3. Discuss the polarization by refraction and scattering
4. Explain the phenomena of polarization by selective absorption
5. Describe the Nicol prism and explain how it can work as analyzer and polarizer?
6. How to construct the polaroid sheet? Explain its working as polarizer and analyzer
7. Show that the intensity of transmitted light through the polarizer is half the intensity of incident light
8. State and explain the law of Malus
9. What is double refraction? Give the Huygens theory of double refraction in uniaxial crystal
10. Distinguish between positive and negative crystal
11. Describe the superposition of linearly polarized light and derive the general equation of ellipse
12. Find the resultant wave when the phase angle $\delta = 0, \pi, and \frac{\pi}{2}$
13. Give the construction and working of LCD.
14. With neat and clean diagram discuss about quarter-wave plate.
15. With neat and clean diagram discuss about Half-wave plate.
16. With neat and clean diagram discuss about Full-wave plate.
17. Discuss the production and analysis of elliptically polarized light.
18. Discuss the production and analysis of circularly polarized light.
19. Discuss the construction and working of Babinet compensator.
20. Explain production of polarized light using Babinet compensator.
21. Explain in detail the analysis of elliptically polarized light using Babinet compensator.
22. Explain the construction and working of Half-shade polarimeter.
23. What is half shade polarimeter? Discuss it in detail.