

TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
IV SEMESTER INTERNAL ASSESSMENT II EXAMINATIONS
PHYSICS (WAVES & OPTICS) QUESTION BANK

I. Choose the correct Answers.

1. The diffraction pattern produced with a grating is called _____ spectrum. [c]
(a) Single slit (b) Double slit (c) Grating (d) None of the above
2. The expression for angular width of central maximum in fraunhofer diffraction is _____ [c]
(a) $\frac{\lambda}{a}$ (b) $\frac{4\lambda}{a}$ (c) $\frac{2\lambda}{a}$ (d) $\frac{\lambda}{2a}$
3. The condition for minimum intensity in single slit diffraction is _____ [c]
(a) $e \sin \theta = \pm \frac{(2n+1)\lambda}{2}$ (b) $e \sin \theta = \pm \frac{(2m+1)\lambda}{3}$ (c) $e \sin \theta = \pm m\lambda$ (d) None of the above
4. In Fraunhofer diffraction the source of light and screen are kept at _____ distance from the obstacle. [b]
(a) Normal (b) Infinite (c) Finite (d) All the above
5. The incident wavefront in fraunhofer diffraction is _____ [b]
(a) Spherical (b) Planar (c) Straight parallel (d) None of the above
6. The production of fraunhofer diffraction patterns is observed in _____ [c]
(a) Telescope (b) Microscope (c) Both (a) and (b) (d) None of the above
7. Resolving power of a grating is _____ [b]
(a) $\frac{\partial \lambda}{\lambda}$ (b) $\frac{\lambda}{\partial \lambda}$ (c) $\lambda d \lambda$ (d) $-\lambda d \lambda$
8. A uniquely designed screen where the light is obstructed from every alternate zone is known as [d]
(a) Phase zone (b) Half period zone (c) Reversal zone (d) Zone plate
9. Convex lens has only _____ focus lens. [d]
(a) Two (b) One (c) Zero (d) None of the above
10. In diffraction, the minimum intensity fringes are partially _____ [d]
(a) Bright (b) Dark (c) White (d) Red
11. Nicol prism can be used as _____ [c]
(a) Polarizer (b) Analyzer (c) Both (a) and (b) (d) Neither (a) nor (b)
12. The reflected and refracted rays are _____ to each other. [b]
(a) 0° (b) 90° (c) 180° (d) 160°
13. The principle on which Nicol prism works is _____ [a]
(a) Double refraction (b) Scattering of light
(c) Selective absorption (d) Malu's law
14. _____ is used for finding optical rotation of certain solutions. [b]
(a) Fiber (b) Polarimeter (c) Lasers (d) Pumping schemes

15. Specific rotatory power is mathematically expressed as _____ [a]

- (a) $\frac{\theta}{1 \times c}$ (b) $\frac{\theta}{1}$ (c) $\frac{1 \times c}{\theta}$ (d) $\frac{c}{\theta \times 1}$

16. A device employed to generate and analyze the elliptically polarized light is known as _____ [d]

- (a) Analyzer (b) Nicol prism (c) Polarizer (d) Babinet compensator

17. For negative crystal, the thickness of a quarter wave plate is calculated by using $t =$ _____ [a]

- (a) $\frac{\lambda}{4(\mu_o - \mu_e)}$ (b) $\frac{\lambda}{4(\mu_e - \mu_o)}$ (c) $\frac{\lambda}{2(\mu_o - \mu_e)}$ (d) $\frac{\lambda}{2(\mu_e - \mu_o)}$

18. Snell's law, $\frac{\sin \theta_p}{\sin r} =$ _____ [b]

- (a) $\frac{\mu_1}{\mu_2}$ (b) $\frac{\mu_2}{\mu_1}$ (c) $\mu_1 - \mu_2$ (d) $\mu_2 - \mu_1$

19. The expression for the ratio of axes is given as, $\tan \phi =$ _____ [b]

- (a) $\frac{a}{b}$ (b) $\frac{b}{a}$ (c) $a - b$ (d) $b - a$

20. The phase difference between two wedges is expressed as, $\delta =$ _____ [c]

- (a) $\frac{2\pi}{\theta}$ (b) $2\pi x$ (c) $\frac{2\pi x}{\theta}$ (d) $2\pi\theta$

II. Fill in the blanks.

1. The intensity will be minimum when $\sin \lambda = \underline{0}$

2. Convex lens has only one foci.

3. The phenomenon of bending of light around the corners of an object is known as diffraction

4. Fresnel's method employs division of wave front into number of half period zones is known as Fresnel's zones

5. The expression for principle maximum of the nth order for a wavelength λ is given by $d(\sin \theta_m - \sin \theta_i) = m\lambda$

6. Dispersive power of the grating is directly related to the order of spectrum

7. The amount of diffraction increases with increasing wavelength (λ)

8. In Fresnel diffraction, the incident wave is spherical

9. The intensity of the image formed in zone plate is less

10. The phase difference between two consecutive wave is $\left(\frac{2\pi}{\lambda}\right) \times (e \times d) \sin \theta$

11. The velocities of ordinary and extraordinary rays are same along the optic axis.

12. Double refracting crystal splits up the incident ray into two rays.

13. In Nicol prism, one ray is eliminated by total Internal refraction

14. In double refracting crystal, the ray which does not obey the law of refraction is known as extraordinary ray.

15. A half wave plate introduces a further path difference of $\frac{\lambda}{2}$

16. The thickness of a quarter wave plate is given by $t = \frac{\lambda}{4(\mu_e - \mu_o)}$

17. The extraordinary wave surface lies within the ordinary wave surface.

18 The principle refractive index for e-ray is greater than the principle refractive index for O-ray.

19. Brewster law is mathematically expressed as, $\mu = \tan \theta_p$

20. A light wave is said to be linearly polarized, if the vibrations occur in a single plane.

III. Short Questions and Answers

1. Define diffraction?

A: Diffraction is defined as the phenomenon of interaction among secondary wavelets originating from distinct points of same wavefront.

2. What is a zone plate?

A: A uniquely designed screen where the light is obstructed from every alternate zone is known as zone plate.

3. Define dispersive power of a grating?

A: The ratio between the difference in the angle of diffraction of any two neighbouring spectral line and difference in wavelength between the two spectral lines is known as dispersive power.

4. Who introduced the concept of grating?

A: The concept of grating was first introduced by Fraunhofer in which a large number of parallel wires are arranged very close at regular intervals.

5. Write the expression for angular width of central maximum in Fraunhofer diffraction.

A: Angular width, $2\theta = \frac{2\lambda}{a}$

6. How polarized light is produced by double refraction.

A: The process of producing two refracted rays by a crystal is known as double refraction or birefringence.

7. Define Uniaxial crystals and given example?

A: The crystals in which two refracted rays propagate along a single direction with equal velocities is known as uniaxial crystals.

8. Define plane polarization?

A: The polarization in which the occurrence of oscillations are restricted to a single plane perpendicular to the direction of propagation is referred to as plane polarization.

9. Define polarizer.

A: An optical element which transforms an unpolarized light into polarized light using selective absorption or double refraction is known as polarizer.

10. State Brewster's law?

A: Brewster's law states that, the refractive index (μ) of the medium is equal to the tangent of the angle at which polarization occurs through reflection.