

Dronacharya Group of Institutions, Gr. Noida

Department of Applied Sciences (First Year)

Even Semester (2020-2021)

Objective Question Bank

Subject Name & Code: ENGINEERING PHYSICS & KAS-201T

Unit No.& Unit Name: 4th & Wave Optics:

1. Which of the following is a form of light whose photons share the same frequency and whose wavelengths are in phase with one another?
 - a) Coherent sources
 - b) Incoherent sources
 - c) Electromagnetic waves
 - d) Sunlight
2. Which among the following is an example of coherent sources?
 - a) Fluorescent tubes
 - b) LED light
 - c) LASER
 - d) Tungsten filament lamps
3. Pick the odd one out.
 - a) LASER
 - b) LED
 - c) Sound waves
 - d) Radio transmitters
4. Scattering of waves can be coherent and incoherent.
 - a) True
 - b) False
5. Identify the factor is not the same for coherent waves.
 - a) Frequency
 - b) Phase difference constant
 - c) Amplitude
 - d) Wavelength in phase with each other
6. Which of the following is the formula for calculating coherence time?
 - a) $T_c = \lambda^3/(c\Delta\lambda)$
 - b) $T_c = \lambda/(c\Delta\lambda)$
 - c) $T_c = \lambda^2/(c\Delta\lambda)$

d) $T_c = \lambda^2 / (c\Delta\lambda)$

7. When is the wave interference strong?

- a) When the paths taken by all of the interfering waves are greater than the coherence length
- b) When the paths taken by all of the interfering waves are lesser than the coherence length
- c) When the paths taken by all of the interfering waves are equal than the coherence length
- d) When the paths taken by all of the interfering waves are independent of the coherence length.

8. Polarisation phenomenon explains which nature of light?

- a) Transverse
- b) longitudinal
- c) Both transverse and longitudinal
- d) geometrical

9. A narrow slit is taken and a parallel beam of moving electrons is incident normally on it. At a larger distance from the slit, a fluorescent screen is placed. Which of the following statement is true if the size of the slit is further narrowed?

- a) The diffraction pattern cannot be observed on the screen
- b) The angular width of the central maxima of the diffraction pattern will increase
- c) The angular width of the central maxima of the diffraction pattern will decrease
- d) The angular width of the central maxima of the diffraction pattern remains the same

10. How does the diffraction band of blue light look in comparison with the red light?

- a) No changes
- b) Diffraction pattern becomes narrower
- c) Diffraction pattern becomes broader
- d) Diffraction pattern disappears

11. Two coherent sources of light can be obtained from

- a) Two different lamps
- b) Two different lamps but of the same colour
- c) Two different lamps of the same colour and having the same colour
- d) None of these

12. Which of the following phenomenon is not explained by Huygen's wave theory?

- a) Diffraction
- b) Interference

- c) Polarisation
- d) Photoelectric effect

13. What is the value of coherent time if L is the coherent length and c is the velocity of light?

- a) cL
- b) L/c
- c) c/L
- d) $1/Lc$

14. The ratio of the amplitude of the two sources producing interference 3 : 5, the ratio of intensities at maxima and minima is

- a) 25:6
- b) 5:3
- c) 16:1
- d) 25:9

15. The colours on the soap bubble is due to

- a) Interference
- b) Polarisation
- c) Diffraction
- d) Reflection

16. Which of the following statements indicates that light waves are transverse?

- a) Light waves can be polarised
- b) Light waves can show interference
- c) Light waves undergo diffraction
- d) They travel in the vacuum

17. Which of the following does not show any interference pattern?

- a) Soap bubble
- b) Excessively thin film**
- c) A thick film
- d) Wedge Shaped film

18. The main principle used in Interference is _____

- a) Heisenberg's Uncertainty Principle
- b) Superposition Principle**
- c) Quantum Mechanics
- d) Fermi Principle

19. When Two waves of same amplitude add constructively, the intensity becomes

- a) Double
- b) Half
- c) Four Times**
- d) One-Fourth

20. The shape of the fringes observed in interference is _____

- a) Straight
- b) Circular
- c) Hyperbolic**
- d) Elliptical

21 If instead of monochromatic light white light is used for interference of light, what would be the change in the observation?

- a) The pattern will not be visible
- b) The shape of the pattern will change from hyperbolic to circular
- c) Colored fringes will be observed with a white bright fringe at the center**
- d) The bright and dark fringes will change position

22. Zero order fringe can be identified using _____

- a) White light**
- b) Yellow light
- c) Achromatic light
- d) Monochromatic light

23 The shape of the pattern depends on the _____

- a) Distance between the slits
- b) Distance between the slits and the screen
- c) Wavelength of light
- d) Shape of the slit**

24 A thin sheet of refractive index 1.5 and thickness 1 cm is placed in the path of light. What is the path difference observed?

- a) 0.003 m
- b) 0.004 m
- c) 0.005 m**
- d) 0.006 m

25 According to stoke's law, the expression for maxima is: $2\mu t \cos r =$ _____

- a) $n\lambda$
- b) $2n\lambda$
- c) $(2n + 1) \lambda/2$**
- d) $(n + 1) \lambda/2$

26 .Which phenomenon is observed in the following figure?

- a) Wedge-Shaped film
- b) Destructive Interference
- c) Refraction
- d) Newton's Rings**

27 When a thin plate of refractive index 1.5 is placed in the path of one of interfering beams of Michaelson Interferometer, a shift of 30 fringes is observed. If the thickness

of plate is 0.018 mm, the wavelength of the used light is _____

- a) 4000 Å
- b) 5000 Å
- c) 6000 Å**
- d) 7000 Å

28 What kind of sources are required for Young's Double Slit experiment?

- a) Coherent**
- b) Incoherent
- c) Intense
- d) Bright

29 . If the distance between the two slits is doubled, the fringe width _____

- a) Doubles
- b) Halves**
- c) Four-times
- d) Remains same

30 A thin sheet of refractive index 1.25 and thickness 0.5 cm is placed in the path of light from one source in the Young's double slit experiment. What is the path difference observed?

- a) 1.25 mm**
- b) 2.5 mm
- c) 2.78 mm
- d) 3.25 mm

31 The visibility of fringes is given by the expression _____

- a) I_{\max}/I_{\min}
- b) I_{\min}/I_{\max}
- c) $I_{\min} + I_{\max} / I_{\min} - I_{\max}$
- d) $I_{\min} - I_{\max} / I_{\min} + I_{\max}$**

32 When a plate of thickness 0.05 mm is placed in the path of a Michaelson Interferometer, a shift of 100 fringes is observed for a light of wavelength 5000 Å. What is the refractive index of the plate?

- a) 1
- b) 1.5**
- c) 2
- d) 2.5

33 1. Which of the following does not show any interference pattern?

- a) Soap bubble
- b) Excessively thin film
- c) A thick film
- d) Wedge Shaped film

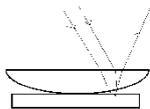
34 2. The main principle used in Interference is _____

- a) Heisenberg's Uncertainty Principle
- b) Superposition Principle
- c) Quantum Mechanics
- d) Fermi Principle

- 35 Then Two waves of same amplitude add constructively, the intensity becomes _____
- Double
 - Half
 - Four Times
 - One-Fourth
- 36 The shape of the fringes observed in interference is _____
- Straight
 - Circular
 - Hyperbolic
 - Elliptical
- 37 5. If instead of monochromatic light white light is used for interference of light, what would be the change in the observation?
- The pattern will not be visible
 - The shape of the pattern will change from hyperbolic to circular
 - Colored fringes will be observed with a white bright fringe at the center
 - The bright and dark fringes will change position
- 38 6. Zero order fringe can be identified using _____
- White light
 - Yellow light
 - Achromatic light
 - Monochromatic light
- 39 Interference is observed only when the phase difference between the two waves is zero.
- True
 - False
- 40 The shape of the pattern depends on the _____
- Distance between the slits
 - Distance between the slits and the screen
 - Wavelength of light
 - Shape of the slit
- 41 A thin sheet of refractive index 1.5 and thickness 1 cm is placed in the path of light. What is the path difference observed?
- 0.003 m
 - 0.004 m
 - 0.005 m
 - 0.006 m
- 42 According to stoke's law, the expression for maxima is: $2\mu t \cos r =$ _____
- $n\lambda$
 - $2n\lambda$
 - $(2n + 1) \lambda/2$
 - $(n + 1) \lambda/2$
- 43 The interference pattern of soap bubble changes continuously.
- True

b) False

44 Which phenomenon is observed in the following figure?



- a) Wedge-Shaped film
- b) Destructive Interference
- c) Refraction
- d) Newton's Rings

45 When a thin plate of refractive index 1.5 is placed in the path of one of interfering beams of Michaelson Interferometer, a shift of 30 fringes is observed. If the thickness of plate is 0.018 mm, the wavelength of the used light is _____

- a) 4000 Å
- b) 5000 Å
- c) 6000 Å
- d) 7000 Å

46 A thin layer of colorless oil is spread over water in a container ($\mu = 1.4$). If the light of wavelength 640 nm is absent in the reflected light, what is the minimum thickness of oil layer?

- a) 179.6 nm
- b) 198.3 nm
- c) 207.6 nm
- d) 214.3 nm

47. In Newton's ring experiment, the diameter of the 10th ring changes from 1.40 to 1.23 cm when a liquid is introduced between the lens and glass plate. What is the refractive index of the liquid?

- a) 1.05
- b) 1.15
- c) 1.25
- d) 1.35

48. Our eyes see two objects as separate, only in the angle subtended by them at the eye is greater than _____

- a) 30 seconds
- b) 1 minute
- c) 2 minute
- d) 10 seconds

49. In Rayleigh's Criterion for Resolution, two images would be just resolved when _____

- a) The central maxima of one image coincide with central maxima of the other
- b) The central maxima of one do not coincide with central maxima of the other
- c) The central maxima of one image coincides with the first minimum of the other
- d) The central maxima of one image do not coincide with the first minimum of other

48. What is the SI unit of Resolving power?

- a) m^{-1}
- b) cm^{-1}
- c) s^{-1}

d) no SI unit

49. The resolving power of a telescope is directly proportional to _____

- a) Frequency of the light used
- b) The wavelength of the light used
- c) Square of the frequency of light used
- d) Square of Wavelength of the light used

50. The resolving power of a grating is directly proportional to grating constant.

- a) True
- b) False

51. There are three prisms A, B, C of base width 5 cm each with an angle of prism 30° , 36° , 45° respectively. If the light of wavelength 5000\AA is incident on each of them, which has the highest resolving power?

- a) A
- b) B
- c) C
- d) All of them have the same resolving power

52. Light is incident normally on a grating of width $5 \times 10^{-3} \text{ m}$ with 2500 lines. What is the resolving power of the grating in the second order spectrum?

- a) 2500
- b) 5000
- c) 1250
- d) 500

53. What is the minimum number of lines per cm in a 2.5 cm wide grating spectrum which will just resolve two sodium lines (5890\AA and 5896\AA) in the first order spectrum?

- a) 98
- b) 196
- c) 392
- d) 694

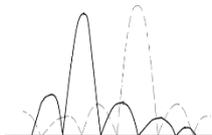
54. A microscope of objective focal length 1 cm and an eyepiece of focal length 2.0 cm has a tube length of 20 cm. What will be the magnification of the microscope?

- a) 40
- b) 100
- c) 200
- d) 250

55. A grating has 16000 per inch over a length of 5 inches. What will be the smallest wavelength difference for a light of wavelength 6000\AA ?

- a) 0.01\AA
- b) 0.02\AA
- c) 0.03\AA
- d) 0.04\AA

56. How are these two images resolved?



- a) Not resolved
- b) Just Resolved
- c) Partially resolved
- d) Well resolved