



BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Optometry
Course Name – Physical Optics
Course Code - BOPTO204
(Semester II)

Time allotted : 1 Hrs.15 Min.

Full Marks : 60

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question)

1 x 60=60

Choose the correct alternative from the following :

- (1) Light interacts with matter as
- | | |
|-----------------|-------------|
| a) wave | b) particle |
| c) both A and B | d) rays |
- (2) Electromagnetic waves are
- | | |
|-------------------------------------|------------------|
| a) longitudinal | b) transverse |
| c) both longitudinal and transverse | d) none of these |
- (3) Which of the following types of light are strongly absorbed by plants?
- | | |
|----------------------|----------------------|
| a) violet and orange | b) yellow and violet |
| c) blue and red | d) indigo and yellow |
- (4) The idea of secondary wavelets for the propagation of a wave was first given by
- | | |
|------------|------------|
| a) Newton | b) Huygens |
| c) Maxwell | d) Fresnel |
- (5) Light propagates rectilinearly, due to
- | | |
|----------------|----------------|
| a) wave nature | b) wavelengths |
| c) velocity | d) frequency |
- (6) Why light is said to have a dual nature?
- | | |
|---|---|
| a) it exhibits the properties of wave and particles | b) it exhibits the properties of reflection and diffraction |
| c) It has both interference and polarization effect | d) none of the above |
- (7) The wavenumber of a transition is 2000 cm^{-1} . In what part of the electromagnetic spectrum does this come?
- | | |
|------------------------|---------------|
| a) ultraviolet-visible | b) infrared |
| c) microwave | d) radio-wave |
- (8) *A ray of light in a dense medium of refractive index 1.4 approaches the boundary between the given medium and air at an angle of $\theta = \sin^{-1}(0.8)$, then the ray will be*
- | | |
|---------------------|-------------------------|
| a) totally absorbed | b) internally reflected |
|---------------------|-------------------------|

- c) emerging at an angle greater than $\sin^{-1}(0.8)$ d) showing an arbitrary behaviour
- (9) Sun appears red at sun rise and sunset. This is due to scattering of
- a) longer wavelengths b) shorter wavelengths
c) lower frequencies d) all frequencies
- (10) The number of optic axes in a uniaxial crystal is
- a) 1 b) 2
c) 5 d) 10
- (11) Which of the following phenomena causes polarization of light?
- a) reflection b) refraction
c) double Refraction d) none of these
- (12) Plane polarized light can be produced by
- a) reflection at polarizing angle b) Nicol prism
c) piles of plates d) all of these
- (13) The plane of vibration makes an angle with that of polarization. The value of the angle is
- a) 0^0 b) 90^0
c) 45^0 d) none of these
- (14) An unpolarised light consists of
- a) infinite number of plane polarized light b) finite number of plane polarized light
c) only two plane polarized light d) none of these
- (15) The optic axis is a direction along which
- a) the O-ray travels faster than the E-ray b) the E-ray travels faster than the O-ray
c) both O-ray and E-ray travel with the same velocity d) none of these
- (16) In a half-wave plate, the phase difference between the O-ray and E-ray is
- a) $\frac{\pi}{2}$ b) π
c) 0 d) none of these
- (17) If θ_p be the angle of polarization, then the refractive index μ of the material is given by
- a) $\sin \theta_p$ b) $\cos \theta_p$
c) $\tan \theta_p$ d) $\sec \theta_p$
- (18) A Nicol prism can act as a
- a) polarizer b) analyzer
c) both polarizer and analyzer d) none of these
- (19) If light is incident at the angle of polarization then the angle between the reflected ray and refracted ray is
- a) $\frac{\pi}{2}$ b) π
c) 0 d) $3\pi/2$
- (20) When angle of incidence is greater than Brewster angle, the reflected ray suffers a phase change of
- a) π b) $\frac{\pi}{2}$
c) 0 d) $3\pi/2$
- (21) Interference phenomena indicated
- a) light is electromagnetic wave b) rectilinear propagation of light

- c) the wave nature of light
d) none of these
- (22) For constructive interference, the phase difference is an even multiple of
a) $\frac{\pi}{2}$
b) $\frac{\pi}{4}$
c) π
d) none of these
- (23) The fringe width of interference pattern of Young's double slit experiment is ($2d$ is the distance between the two coherent sources)
a) $D\lambda/d$
b) $2D\lambda/d$
c) $D\lambda/2d$
d) $D/2d$
- (24) In Newton's ring experiment, coherent waves are produced by means of
a) division of wavefront
b) diffraction
c) division of amplitude
d) none of these
- (25) The center of the Newton's rings for the reflected system of a monochromatic source of light is
a) dark
b) bright
c) partially dark
d) none of these
- (26) Radii of Newton's rings are proportional to
a) square root of natural number
b) square of natural number
c) natural number
d) none of these
- (27) In Newton's rings experiment, the coherent sources are
a) spatial coherent
b) temporal coherent
c) partially Spatial coherent
d) none of these
- (28) If interference takes place at some region, the light energy is
a) redistributed
b) created
c) destroyed
d) none of these
- (29) If Young's double slit experiment with one source of light and two slits be performed in water instead of air
a) the fringes will be smaller in number
b) the fringes will be narrower
c) the fringes will be broader
d) no fringes will be obtained
- (30) Two waves having intensities in the ratio of 9:1 produce interference. The ratio of maximum to minimum intensity is equal to
a) 10 : 8
b) 9 : 1
c) 4 : 1
d) 2 : 1
- (31) When exposed to sunlight, thin films of oil on water exhibit brilliant colours due to the phenomenon of
a) interference
b) diffraction
c) dispersion
d) polarisation
- (32) What happens, if the monochromatic light used in Young's double slit experiment is replaced by white light?
a) no fringes are observed
b) all bright fringes become white
c) all bright fringes have colour between violet and red
d) only the central fringe is white and all other fringes are coloured
- (33) When compact disk is illuminated by a source of white light, coloured lines are observed. This is due to
a) dispersion
b) diffraction
c) interference
d) refraction
- (34) In Young's double slit experiment, coherent waves are produced by means of
a) division of wavefront
b) division of amplitude
c) refraction
d) none of these
- (35) To demonstrate the phenomenon of interference, we require two sources which emit radiation

- a) of the same frequency and having a definite phase relationship
 b) of nearly the same frequency
 c) of the same frequency
 d) of different wavelengths
- (36) Fraunhofer diffraction arises when the source of light and screen is effectively at
 a) finite distance
 b) infinite
 c) semi-infinite
 d) none of these
- (37) In Fraunhofer diffraction minima are
 a) all perfectly dark
 b) never perfectly dark
 c) perfectly bright
 d) none of these
- (38) If the wavelength of the light used in single slit diffraction is increased then the width of the central maximum
 a) decreases
 b) increases
 c) remains same
 d) none of these
- (39) The intensity of central maximum due to double slit diffraction pattern is -----times greater than that of single slit pattern.
 a) 2
 b) 3
 c) 4
 d) 8
- (40) The resolving power of a grating, having N number of total rulings, in nth order is
 a) n/N
 b) nN
 c) N/n
 d) none of these
- (41) The nature of the wave front due to a point source of light is
 a) spherical
 b) plane
 c) cylindrical
 d) none of these
- (42) Missing order increases in the interference maxima in the Fraunhofer double slit pattern if
 a) slit width is constant, but slit separation is increased
 b) slit width is increased
 c) slit width is decreased
 d) slit width and slit separation both increase equally
- (43) A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light
 a) bands disappear
 b) bands become broader and farther apart
 c) no change
 d) diffraction bands become narrower and crowded
- (44) The intensity of principal maximum in the Fraunhofer diffraction spectrum produced by a grating with N number of lines is proportional to
 a) $1/N$
 b) N
 c) N^2
 d) $1/N^2$
- (45) Resolving power of telescope can be increased by increasing
 a) the wavelength
 b) the diameter of objective
 c) the diameter of eyepiece
 d) the focal length of eyepiece
- (46) Resolving power of microscope depends upon
 a) wavelength of light used (directly proportional)
 b) wavelength of light used (inversely proportional)
 c) frequency of light used
 d) focal length of objective
- (47) The radius of the half period zone is proportional to _____
 a) the wavelength of light
 b) the square root of the frequency of light
 c) the square root of the wavelength of light
 d) the frequency of light
- (48) Light of 600 nm is incident on a circular hole and is received on a screen 50 cm away. What is the radius of the hole, if the intensity of light on the screen is 4 times the intensity without the hole?
 a) 0.0258 cm
 b) 0.0478 cm

- c) 0.0548 cm
d) 0.0898 cm
- (49) The zone plate behaves like a _____
a) concave Lens with multiple foci
b) convex Lens with multiple foci
c) convex Lens with single foci
d) concave Lens with single foci
- (50) Raman Effect supports
a) corpuscular theory
b) wave theory
c) quantum theory
d) electromagnetic theory
- (51) Luminescence is because of
a) photons emitted while excited electrons drops down
b) knocking out of electrons by photons
c) photons stimulated by photons
d) all
- (52) Electro-luminescence occurs in _____
a) electrical conductors
b) electrical insulators
c) p-n junctions
d) all of these
- (53) Emission without a change in spin multiplicity
a) is called phosphorescence
b) is called fluorescence
c) is spin forbidden
d) involves an intersystem crossing
- (54) If the absorption of electromagnetic radiation by matter results in the emission of radiation of the same or longer wavelengths for a long time, the phenomenon is termed as which of the following?
a) Luminescence
b) Fluorescence
c) Phosphorescence
d) Spontaneous emission
- (55) The measurement of intensity of fluorescent X-rays provide a simple and _____ way of _____ analysis
a) destructive, quantitative
b) non-destructive, quantitative
c) destructive, qualitative
d) Non-destructive, quantitative
- (56) The energy of the emitted X-rays depends upon the _____ of the atom and their intensity depends upon the _____
a) Atomic number, amount of sample
b) Mass number, amount of sample
c) Mass number, concentration of atoms
d) atomic number, concentration of atoms
- (57) In X-ray fluorescence spectrometer, the relationship between the excitation intensity and the intensity of fluorescence does not depend on which of the following?
a) spectrum of the incident radiation
b) angle of radiance
c) molecular weight
d) incident angle
- (58) Which of the following is a light source in fluorometry
a) Mercury vapor lamp
b) Xenon discharge lamp
c) Deuterium lamp
d) Lasers
- (59) In He-Ne laser neon atoms get energy
a) on collision with He atoms
b) from chemical reactions
c) from electrical pumping
d) from optical pumping
- (60) The color of the laser output in ruby laser is
a) violet
b) blue
c) red
d) green