MCQ on LASER

	Basics of laser
1	Which of the following phenomenon is essential for production of laser? (a) Spontaneous emission of light (b) Stimulated emission of light (c) Spontaneous absorption of light (d) Stimulated absorption of light Ans: b
2	Which of the following conditions is essential for the production of laser? (a) Pumping (b) Stimulated emission of light (c) Population inversion (d) All of above Ans: d
3	Which of the following is not a laser property? (a) Coherence (b) Highly directional (c) High Divergence (d) Extreme brightness Ans: c
4	Laser light is possible for electromagnetic radiations of (a) Visible region (b) Ultraviolet and infrared region (c) Soft X-rays (d) All of above Ans: d
5	Which medium can be used as active medium to produce laser? (a) medium containing excited states only (b) medium containing at least one meta-stable state (c) any gaseous medium (d) any solid state medium Ans: b
	Requirements of Laser
1	Spontaneous absorption takes place when electron moves from_____energy level to______energy level (a) Lower, higher (b) Higher, lower (c) Lower, lower (d) Higher, ground Ans: a
2	Spontaneous emission takes place when electron moves from_____energy level to______energy level (a) Lower, higher (b) Higher, lower (c) Lower, lower (d) Higher, higher Ans: b
3	When an electron moves from higher energy level to lower energy level, the frequency of photon emitted is given by (a) $\upsilon = (E_2 - E_1)/\lambda$ (b) $\upsilon = h/(E_2 - E_1)$ (c) $\upsilon = (E_2 - E_1)/h$ (d) $\upsilon = \lambda/(E_2 - E_1)$ Ans: c
4	When an electron moves from higher energy level to lower energy level, it may emit excess energy in the form of (a) Photons of visible light only (b) Photons of ultraviolet light only (c) Heat radiations (d) All of these Ans: d

5	When an electron moves from higher energy level to lower energy level and emits excess energy in the form of heat, the process is known as (a) Radiative transition (b) Non-radiative transition (c) Stimulated emission (d) Stimulated transition Ans: b
6	A photon incident on an electron that is already in excited state. Which of the following is possible? (a) Photon is absorbed by electron and electron moves in further excited state (b) Photon forces electron to move into lower energy state (c) Both (a) and (b) are equally and likely events (d) Energy of electron increases but it remains in the same orbit Ans: c
7	Stimulated emission takes place when a photon strikes an electron in___________energy level and forces electron to move to___________energy level (a) Lower, Metastable (b) Metastable, lower (c) Metastable, higher (d) Higher, more higher Ans: b
8	In stimulated emission, the energy of incident photon should be_________the energy level difference between two energy states (a) Equal to (b) More than (c) Less than (d) None of these Ans: a
9	In stimulate emission process, the energy of emitted photon is_________the energy of incident photon carrying out the process (a) Equal to (b) More than (c) Less than (d) None of above Ans: a
10	The life time of metastable state is about (a) 10^{-8} s (b) 10^{-3} s (c) 10^{-12} s (d) 10^{-6} s Ans: b
11	The life time of usual excited state is about (a) 10^{-+5} s (b) 10^{-1} s (c) 10^{-8} s (d) 10^{-12} s Ans: c
12	If N_1 represents number of atoms in lower energy state and N_2 represents number of atoms in higher energy state, what is usually preferred in normal system? (a) $N_1 = N_2$ (b) $N_1 > N_2$ (c) $N_1 < N_2$ (d) Any of above Ans: b
13	If N_1 represents number of atoms in lower energy state and N_2 represents number of atoms in higher energy state, what is usually preferred in population inversion? (a) $N_1 = N_2$ (b) $N_1 > N_2$ (c) $N_1 < N_2$ (d) Any of above Ans: c

14	A system in which population inversion is achieved is known as (a) Populated system (b) Active system (c) Inverted system (d) Excited system Ans: b
15	Population inversion in laser can be achieved by the process of (a) Stimulated emission (b) Spontaneous emission (c) Emission (d) Pumping Ans: d
16	Stimulated emission results into emission of light that is (a) Coherent (b) Incoherent (c) May be coherent or incoherent (d) Cannot be defined correctly Ans: a
17	Active medium in a laser can be (a) Solids containing meta-stable states (b) Liquids containing meta-stable states (c) Gases containing meta-stable states (d) All of above Ans: d
18	The atoms in a medium, which are responsible for laser transition are called as (a) Energetic atoms (b) Active centers (c) Excited atoms (d) Populated atoms Ans: b
19	The purpose of resonant cavity is to (a) Re-circulate the light within the medium (b) To enhance stimulated emission (c) Allow the photons traveling along axis of cavity to come out (d) All of above Ans: d
20	Population inversion is responsible for which property in laser? (a) Least divergence (b) More intensity (c) Coherence (d) Monochromatic Ans: b
	Properties of laser
1	Laser beam is coherent, which means all the photons in laser beam have (a) Same phase or constant phase difference (b) Same energy (c) Same wavelength (d) Same directionality Ans: a
2	Laser beam is monochromatic, which means all the photons in laser beam have (a) Same phase (b) Same energy (c) Same wavelength (d) Same directionality Ans: c
3	Which of the following is responsible for high directionality of laser beam? (a) Pumping (b) Cavity resonator (c) Population inversion (d) Spontaneous emission Ans: b
4	Which of the following is responsible for amplification of light in laser? (a) Pumping process (b) Stimulated emission (c) Resonant cavity (d) Spontaneous emission Ans: b

5	Which of the following is responsible for monochromaticity of light in laser? (a) Pumping process (b) Stimulated emission (c) Resonant cavity (d) Population inversion Ans: b
	Semiconductor Laser
1	In semiconductor laser diode, active medium is (a) P type semiconductor (b) N type semiconductor (c) PN Junction (d) Cavity resonator Ans: c
2	In semiconductor laser diode, cavity resonator is (a) P type semiconductor (b) N type semiconductor (c) PN Junction (d) Wave guide and polished ends Ans: d
3	In semiconductor laser diode, the work of cavity resonator and polished ends is (a) To re-circulate the light for stimulated emission (b) To focus the laser beam (c) To make laser beam less divergent (d) All of these Ans: d
4	Semiconductor laser diode works in which of the following mode? (a) Equilibrium mode (b) Forward bias (c) Reverse bias (d) None of above Ans: b
5	In semiconductor laser diode, pumping energy comes from (a) Reverse bias current (b) Forward bias current (c) Laser light reflected from polished ends (d) Random moving electrons Ans: b
6	In semiconductor laser diode, what is purpose of reflected photons from polished ends? (a) They strike electrons in conduction band and activate stimulated emission (b) They are absorbed by electrons in valence band to move them to conduction band (c) They provide amplification of light due to process (a) and (b) (d) None of these Ans: c
7	Semiconductor laser diode can be designed to operate in which of electromagnetic region? (a) Ultraviolet (b) Infrared (c) Visible (d) All of above Ans: d
8	In semiconductor laser, pumping process is (a) Electrical pumping (b) Forward biasing (c) Optical pumping (d) Chemical pumping Ans: b
9	Which types of semiconductors are preferred in semiconductor laser (a) Direct bandgap (b) Indirect bandgap (c) Both (a) and (b) (d) None (a) and (b) Ans: a

10	In semiconductor single hetero junction laser diode, the light will be confined in …… a) the top layer of the diode laser b) middle layer c) bottom layer of the diode laser d) none of these Ans: b
11	In single hetero junction semiconductor diode laser the outer layers are made up of ……. a) two similar extrinsic semiconductors of same materials. b) two dissimilar intrinsic semiconductors of same materials. c) two dissimilar extrinsic semiconductors of different materials. d) none of these. Ans: c
	Co2 laser
1	A Co2 laser is (a) Solid state laser (b) Gas laser (c) Dye laser (d) Semiconductor laser Ans: b
2	In CO2 gas lasers, which of the following types of energy level changes will be used to amplify the intensity of light. a) change in electronic energy levels.. b) change in vibrational enegy levels. c) change in rotational enegy levels.. d) none of these. Ans: b
3	In CO2 gas lasers, the role N2 gas is a) to extract energy from electrical source and transfer it to CO2. b) to extract energy from electrical source and transfer it to He. c) to extract energy from optical source and transfer it to CO2. d) none of these. Ans: a
4	Co2 laser emits light in which wavelength region? (a) Ultravoilet (b) Infrared (c) Visible (d) Far infrared Ans: b
5	In Co2 laser, the combination of CO_2 and Nitrogen is chosen mainly because (a) Two of the excited energy levels of CO_2 and Nitrogen are equal in terms of energy (b) All of these (c) Nitrogen is lighter and can be easily accelerated and to collide with CO_2 (d) CO_2 can be excited only when it collides with Nitrogen Ans: b
6	In CO_2 laser, active centre is…….. (a) Helium (b) Nitrogen (c) CO_2 (d) All of these Ans: c
7	In CO_2 laser, the purpose of electric discharge mechanism is primarily (a) Provide pumping (b) Resonance cavity

	(c) Active center (d) To activate electric circuit Ans: a
8	In CO_2 laser, population inversion in CO_2 molecules is mainly because collision of_____with ______ (a) Helium, neon (c) Nitrogen, CO_2 (b) Helium, Nitrogen (d) charge electrons, helium Ans: c
9	What is the output wavelength of CO_2 laser? (a) 10.6 nm (b) 10.6 μm (c) 10.6 Å (d) All of above Ans: b
	Optic fiber
1	In optic fiber, the purpose of cladding is to (a) Focus the laser beam (b) Refract the laser beam (c) Reflect laser beam into core (d) Propagate laser beam Ans: c
2	In optic fiber, laser light is used to carry signal because (a) It is highly monochromatic (b) It is highly directional (c) It has high intensity (d) All of these Ans: d
3	Which of the following is essential in optic fiber communication? (a) Refraction of laser (b) Reflection of laser (c) Total internal reflection (d) Total internal refraction Ans: c
4	In optic fiber, if μ_{core} is refractive index of core and $\mu_{cladding}$ is refractive index of cladding. What is essential out of following? (a) $\mu_{core} < \mu_{cladding}$ (b) $\mu_{core} = \mu_{cladding}$ (c) $\mu_{core} > \mu_{cladding}$ (d) $\mu_{core} \approx \mu_{cladding}$ Ans: c
5	If θ is angle of incidence of laser beam into core, θ_c is critical angle, what is essential to obtain totalinternal reflection of laser into core (a) $\theta = \theta_c$ (b) $\theta > \theta_c$ (c) $\theta < \theta_c$ (d) $\theta \cong \theta_c$ Ans: b
6	When a ray of light incidents at critical angle (a) It is refracted into other medium (b) It is reflected into same medium (c) It grazes the core-cladding surface and moves parallel (d) It is transmitted into other medium, without changing its path Ans: c
7	When a ray of light incidents at an angle greater than critical angle (a) It is reflected into same medium (b) It is refracted into other medium (c) It grazes the surface and moves parallel (d) It is transmitted into other medium, without changing its path Ans: a

8	In optic fiber communication, the purpose of transmitter is to (a) Carry signal using laser (b) Modulate and transmit signal (c) Receive and demodulate signal (d) Multiplexing of signal Ans: b
9	In optic fiber communication, the purpose of transmission line is to (a) Carry signal using laser (b) Modulate and transmit signal (c) Receive and demodulate signal (d) Multiplexing of signal Ans: a
10	Telephone signals are transmitted through optic fiber in the form of (a) Radio waves (b) Sound waves (c) Electrical signal (d) Visible or infrared light Ans: d
11	How does the refractive index vary in Graded Index fiber? a) Tangentially b) Radially c) Longitudinally d) Transversely Ans: b
12	When more than one mode is propagating, how is it dispersed? a) Dispersion b) Inter-modal dispersion c) Material dispersion d) Waveguide dispersion Ans :b
13	A step index multimode fiber shows intermodal dispersion. a) True b) False Ans: a
14	What causes microscopic bend? a) Uniform pressure b) Non-uniform volume c) Uniform volume d) Non-uniform pressure Ans: d
15	Which of the following loss occurs inside the fiber? a) Dispersion b) Scattering c) Absorption d) All of these Ans: d
16	What is the principle of fiber optical communication? a) Frequency modulation b) Population inversion c) Total internal reflection d) Doppler Effect Ans: c

17	What is the other name for a maximum external incident angle? a) Optical angle b) Total internal reflection angle c) Refraction angle d) Acceptance angle Ans : d
18	Which of the following has more distortion? a) Single step-index fiber b) Graded index fiber c) Multimode step-index fiber d) Glass fiber Ans: c
19	Calculate the numerical aperture of an optical fiber whose core and cladding are made of materials of refractive index 1.6 and 1.5 respectively. a) 0.55677 b) 55.77 c) 0.2458 d) 0.647852 Hint
	Holography
1	In holography, what information about the object is recorded? (a) Intensity (b) Phase (c) Both intensity and phase (d) None of above Ans: c
2	During reconstruction of image from a hologram, its works as (a) Diffraction grating (b) Reflecting mirror (c) Photography plate (d) Transparent plate Ans: a
3	During recording of image in holograms which optical property of light being recorded (a) Diffraction (b) Interference (c) Dispersion (d) Scattering Ans: b
4	For construction and reconstruction of Holograms, laser source of ………. are used (a) Same wavelengths (b) different wavelengths (c) no constraint on wavelength (d) none of these Ans: a
5	Holograms are used to record …………… images a) 1 Dimensional (b) 2 Dimensional (c) 3 Dimensional (d) 4 Dimensional Ans: c

Q.1	Source to slit distance is finite in …………….. diffraction a) Fresnel b) Fraunhofer c) Both d) none of the above	**1M**
Q.2	If λ1 and λ2 are two wavelengths incident on a grating such that λ1> λ2 and Ɵ1 and Ɵ2 are the angles at which their central maxima are formed , then…….. a) Ɵ1> Ɵ2 b) Ɵ1 < Ɵ2 c) Ɵ1= Ɵ2 d) none of the above	**1M**
Q.3	How the intensity of secondary maxima vary in case of Fraunhofer diffraction pattern for a single slit? a) Intensity of secondary maxima decreases on either side b) Intensity of secondary maxima remains constant on either side c) Intensity increases and decreases alternately d) Intensity of secondary maxima increases on either side	**1M**
Q.4	In Fraunhofer diffraction of light for a grating, diffraction pattern is observed for a monochromatic light. What is effect on diffraction pattern, if monochromatic light is replaced by a white light? a) Diffraction pattern will be completely dark b) Diffraction pattern will be completely white c) No diffraction pattern will be observed d) maxima corresponding to all colors will be observed.	**1M**
Q.5	Assuming normal incidence, what is the longest wavelength that can be observed in the third order for a transmission grating having 7000 lines per cm. a) 4671 Å b) 4761 Å c) 4861 Å d) 4681 Å	**2 M**
Q.6	A narrow slit is illuminated by a blue light. By keeping the experimental setup unchanged if blue light is replaced by orange light, the diffraction pattern will be a) wider b) narrower c) unchanged d) disappear	
Q.7	The width of a diffraction grating is 2 cm and it has 10,000 lines. Grating element of the diffraction grating is……….. a) 1 $\times 10^{-4}$ cm b) 5 $\times 10^{-4}$ cm (c) 5$\times 10^{-6}$ cm (d) 2$\times 10^{-4}$ cm	**2M**
Q.8	A diffraction pattern is obtained with red light. What happens if the red light is replaced by blue light a) No change d) diffraction pattern disappear b) Diffraction bands become narrower and crowded together c) Diffraction bands become broader and further apart.	**1M**
Q.9	Maximum number of orders available with grating is a) directly proportional to the wavelength b) inversely proportional to the grating element c) independent of grating element d) directly proportional to the grating element	**1M**
Q.10	In a plane transmission grating , as the number of slits increased the maxima become a) less brighter and much narrower b) less brighter and less narrower c) less brighter and less narrower d) much brighter and much narrower	**1M**
Q.11	Yellow light is used in a single slit diffraction experiment with slit width of 0.6 mm. If the	**1M**

	yellow light is replaced by X-rays then the observed pattern will reveal a) that the central maximum has become narrower b) more number of fringes c) no diffraction pattern d) less number of fringes	
Q.12	Diffraction effects are more pronounced or easier to notice in the case of sound waves than in case of light waves because a) sound travels faster than light b) sound waves have a smaller wavelength c) sound waves are longitudinal d) sound waves have a longer wavelength	**1M**
Q.13	In a plane transmission grating, the intensity of principal maximum a) increases as the number of slits increases b) deceases as the number of slits increases c) remains constant as the number of slits increases d) none of these	**1M**
Q.14	A grating which will be more suitable for constructing a spectrometer for the visible and ultraviolet regions should have a) 100 lines/cm b) 1000 lines/cm c) 10,000 lines/cm d) 10^6 lines/cm	**1M**
Q.15	In a plane diffraction grating the width of principal maximum a) increases as the number of slits increases b) deceases as the number of slits increases c) remains constant as the number of slits increases d) none of these	**1M**
Q.16	In a plane diffraction grating, the angle of diffraction is a) directly proportional to the wavelength b) inversely proportional to the wavelength c) directly proportional to the square root of wavelength d) inversely proportional to the square root of wavelength	**1M**
Q.17	In far field diffraction pattern of single slit under polychromatic illumination, the first minimum with the wavelength λ_1 is found to be coincident with the third minimum at λ_2. Then the relationship between these two wavelengths is a) $3\lambda_1 = 0.3\ \lambda_2$ b) $3\lambda_1 = \lambda_2$ c) $\lambda_1 = 3\lambda_2$ d) $0.3\lambda_1 = 3\lambda_2$	**2M**
Q.18	In single slit diffraction pattern, the first diffraction minima is observed at an angle of 30^o. When the light of wavelength 500 mm is used. The width of the slit is a) 5×10^{-5} cm b) 2.5×10^{-5} cm c) 10×10^{-5} cm d) 1.25×10^{-5} cm	**2M**
Q.19	In a single slit experiment if the slit width is reduced a) the fringes become brighter	**1M**

	b) the fringes become narrower c) the fringes become wider d) the colour of the fringes change	
Q.20	The diffraction pattern of a single slit consist of a) wider dark band at the center with alternate bright and dark bands on either side b) narrow bright band at the center with alternate dark and bright bands of equal intensity on either side c) wider bright band at the center with alternate dark and bright bands of equal intensity on either side d) wider and brighter band at the center with alternate dark and bright bands of decreasing intensity on either side	**1M**
Q.21	When white light is incident on a diffraction grating the light diffracted more will be a) blue b) yellow c) violet d) red	**1M**
Q.22	In Fresnel diffraction a) source of light is kept at infinite distance from the aperture b) source of light is kept at finite distance from the aperture c) convex lens is used d) aperture width is selected so that it can act as a point source	**1M**
Q.23	Significant diffraction of x-rays can be obtained a) by a single slit b) by a double slit c) by an atomic crystal d) none of these	**1M**
Q.24	Consider the Fraunhofer diffraction pattern obtained with a single slit at normal incidence. At the angular position of the first diffraction maximum; the phase difference (in radians) between the wavelets from the opposite edges of the slit is a) $\pi/4$ b) $\pi/2$ c) 2π d) π	**1M**
Q.25	Calculate the angle at which first order minima appears for a single slit of width 0.1 mm and wavelength of light is 5890 A°	**2M**
Q.26	In Fresnels diffraction if the distances between source and obstacle and the distance between obstacle and screen is increased to a large value, we get a) Fresnels half period zone b) Diffraction pattern disappears c) Fraunhofer diffraction d) Fresnel's zone plate	**1M**
Q.27	The type of wave front incident on the obstacle in Fresnel's diffraction is a) Plane b) Cylindrical c) Elliptical	**1M**

	d) rregularly shaped	
Q.28	The type of wave front incident on the obstacle in Fresnel's diffraction is a) Plane b) Cylindrical c) Elliptical d) Irregularly shaped	**1M**
Q.29	A grating with 2620 lines in one inch is illuminated with light of wavelength 5000A°. The width of slit is a) 19 b) 19.6 c) 19.2 d) 18.8	**2 M**
Q.30	In a diffraction pattern obtained by a grating having 7 slits, the number of minima and secondary maxima in between any two principal maxima will be a) 6,7 b) 7,6 c) 6,5 d) 5,4	**2 M**
Q.31	The diffraction of light is significant when size of an obstacle is Comparable with wavelength of light Greater than wavelength of light Of the order of nanometer Of the order of picometer	**2 M**
Q.32	Which of the following condition is essential for observing Fresnel diffraction Source must be close to slit and screen should be at infinite distance Both source and screen must be close to slit Source must be at infinity and screen should be close to slit Both source and screen must be at infinity	**2 M**
Q.33	In Fraunhofer diffraction pattern for single slit, a central maximum is obtained when angle of diffraction Θ is zero. What it actually indicates? All the diffracted rays are parallel and focused by a slit at a single point on the screen All the diffracted rays are perpendicular and focused by slit at a single point on the screen The rays are diffracted by the slit in all directions The rays are reflected by the slit	**1M**
Q.34	The condition for minima in Fraunhofer diffraction at a single slit is a $\sin\Theta = m\lambda$. What are the values of m m can be any integer including zero m can be any integer but not equal to zero m can be a only positive integer m can be a only negative integer	**1M**

Q. No	Ans	Q. No	Ans	Q. No	Ans
1	A	13	A	25	
2	A	14	C	26	C

3	**A**	**15**	**B**	**27**	**B**
4	**D**	**16**	**A**	**28**	**A**
5		**17**	**C**	**29**	**A**
6	**A**	**18**	**C**	**30**	**C**
7		**19**	**B**	**31**	**A**
8	**B**	**20**	**B**	**32**	**B**
9	**D**	**21**	**D**	**33**	**A**
10	**D**	**22**	**B**	**34**	**B**
11	**C**	**23**	**C**		
12	**D**	**24**	**C**		

Engineering Physics

Unit - I

MCQs on Polarization of light

1 **The transverse nature of light is shown by**

A Interference

B Refraction

C Polarization

D Dispersion

2 **Plane polarized light has vibrations of electric vector**

A In one plane perpendicular to direction of propagation

B In one plane along the direction of propagation

C In all planes perpendicular to direction of propagation

D In two planes perpendicular to direction of propagation

3 **Which of the following cannot be polarized?**

A Radio waves

B Sound waves

C Light waves

D X-rays

4 **When unpolarized light is converted to polarized light its intensity**

A is increased

B remains same

C is decreased

D None of these

5 **For complete polarization, light should be**

A Monochromatic

B Dichromatic

C From mercury vapour source

D None of these

6 **We use sun glasses in the summer season, which acts as a**

A Polarizer

B Analyzer

C Bothe A and B are correct

D None of these

7 **The device used to produce the polarized light is called as**

A Analyzer

B Polarizer

C Prism

D None of these

8 **In the electromagnetic wave the electric field vibrates in _______________ possible plane/planes perpendicular to the direction of propagation of light.**

A one

B two

C three

D all

9 **A plane in which, the vibrations of electric vector of a plane polarized light comes is called as**

A Plane of polarization

B Plane of vibration

C Plane of polarized vibration

D None of these

10 **A plane perpendicular to the plane of vibration is called as**

A Plane of polarization

B Plane of vibration

C Plane of polarized vibration

D None of these

11 **A plane perpendicular to the vibrations of electric vector of a plane polarized light is called as**

A Plane of polarization

B Plane of vibration

C Plane of polarized vibration

D None of these

12 **What is the angle between the plane of vibration/oscillation and plane of polarization of the polarized light?**

A 0

B $\pi/2$

C $\pi/4$

D π

13 **When un-polarized light is incident on the reflecting surface with angle of incident other than polarizing angle, the reflected**

light is

A Un-polarized

B Plane polarized

C Partially polarized

D Circularly polarized

14 When a polaroid is rotated, the intensity of light varies but never reduces to zero. It shows that the incident light is

A Plane polarized

B Partially polarized

C Unpolarized

15 The angle of incidence at which maximum polarization occurs is known as

A Angle of polarization

B Angle of reflection

C Angle of refraction

D Critical angle

16 When un-polarized light is incident on the reflecting surface with polarizing angle, the reflected light is

A Un-polarized

B Plane polarized

C Partially polarized

D Circularly polarized

17 Polarizing angle is,

A Same for different reflecting surfaces.

B Different for same reflecting surface.

C Different for different reflecting surfaces.

D Circularly polarized

18 The plane polarized light obtained by reflection has vibrations of electric vector __________ to the reflecting surface.

A Perpendicular

B Inclined

C Parallel

D None of these

19 The plane polarized light obtained by reflection has vibrations of electric vector parallel to

A Plane of paper

B Plane of incident light

C Reflecting surface

D None of these

20 When the light is incident at the polarizing angle on the refracting surface, which of the following is completely polarized?

A Reflected light

B Refracted light

C Both reflected and refracted light

D Neither reflected nor refracted light

21 When un-polarized light is incident on the refracting surface with polarizing angle the reflected light and refracted light are _______________ to each other.

A Perpendicular

B Inclined

C Parallel

22 According to Brewester's law, when un-polarized light is incident on the refracting surface with polarizing angle then the angle between the reflected light and refracted light is,

A 15^0

B 45^0

C 180^0

D 90^0

23 When un-polarized light is incident on the refracting surface with polarizing angle then the reflected light and refracted light is__________ and __________ respectively.

A Partially and plane polarized

B Plane and partially polarized

C Plane and plane polarize

D Partially and partially polarized

24 The mathematical statement of Brewster's law is

A $\mu = \sin i_p$

B $\mu = \sin r_p$

C $\mu = \tan i_p$

D $\mu = \cos i_p$

25 **The refractive index for plastic is 1.25. Calculate the angle of refraction for a light inclined at polarizing angle.**

A 36.8

B 38.6

C 34.6

D None of these

26 **The refractive index for water is 1.33. The polarizing angle for water is**

A 53.06

B 56^0

C 57^0

D 52.06

27 **A ray of light strikes a glass plate at an angle of 60°. If the reflected and refracted rays are perpendicular to each other, the index of refraction of glass is**

A √(3/2)

B 03-Feb

C 01-Feb

D √3

28 **The method of obtaining plane polarized light by refraction is**

A Brewester method

B Malus method

C Piles of plates method

D None of these

29 **In the method of obtaining plane polarized light by piles of plates the _____________ beam is converted into plane polarized.**

A Refracted

B Reflected

C Diffracted

D Scattered

30 **Polarization of natural light by reflection from the surface of glass was discovered in 1808 by**

A E. L. Malus

B Sir David Brewster

C Biot

D Erasmus Bartholinus

31 The intensity of the polarized light transmitted by the analyzer varies as a ______________of angle between plane of transmission of polarizer and analyzer".

A Square root of cosine

B Square of sine

C square of cosine

D Square root of sine

32 According to the Malus law, the intensity of polarized light emerging through the analyzer varies as _______ where θ is angle between plane of transmission of polarizer and analyzer.

A $\sin^2\theta$

B $\cos^2\theta$

C $\tan^2\theta$

D $\sec^2\theta$

33 According to the Malus law, the intensity of polarized light emerging through the analyzer is equal to _______ where, $I_m$is maximum intensity and θ is angle between plane of transmission of polarizer and analyzer.

A $I_m sin^2\theta$

B $I_m cos^2\theta$

C $I_m tan^2\theta$

D $I_m sec^2\theta$

34 When the crystals are perpendicular to each other, the intensity of the emergent beam from the second crystal is

A Maximum

B Minimum

C Zero

35 When the analyzer is rotated through 360°, one observes

A One extinction and two brightness

B one brightness and two extinctions

C two extinctions and two brightness

D none of the above

36 If the angle between a polarizer and analyzer is 60°. Then the intensity of transmitted light for original intensity of incident light as I is

A 0.25 I_m

B 0.50 I_m

C 0.75 I_m

D 0.125 I_m

37 Two polaroid are adjusted so as to obtain maximum intensity. Through what angle should polaroid be rotated to reduce the intensity to half of its original value?

OR

Two polarizing sheets have polarizing directions parallel so that the intensity of the transmitted light is maximum. Through what angle must either sheet be turned if the intensity is to drop by half ?

A 360

B 180

C 90

D 45

38 Two polarizing sheets have polarizing directions parallel so that the intensity of the transmitted light is maximum. If one of them is turned through angle of 315^0, the intensity of transmitted light reduces to,

A Does not reduces

B Half

C One fourth

D None of these

39 Two polaroids are adjusted so as to obtain maximum intensity. Through what angle should polaroid be rotated to reduce the intensity to one fourth of its original value?

A 360

B 180

C 60

D 45

40 The ratio of intensity of the polarized light transmitted by the analyzer to square of cosine of angle between plane of transmission of polarizer and analyzer is always ,

A Constant

B Not constant

C Less than 1

D None of these

41 In Malus law the intensity of the polarized light transmitted by the analyzer is proportional to square of cosine of angle between plane of transmission of polarizer and analyzer because,

A the cosine component of the intensity of polarized light comes in the plane of analyzer

B the cosine component of the intensity of polarized light comes in the plane of polarizer

C the sine component of the intensity of polarized light comes in the plane of analyzer

D None of these

42 The intensity of light incident on a polarizer is I, and that of the light emerging from it is also I. What is the nature of light incident on the polarizer?

A Polarized

B Unpolarized

C Partially polarized

D Circularly polarized

43 When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into two components, both are

A unpolarized

B Plane polarized

C Partially polarized

D Circularly polarized

44 **When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into _______ plane polarized beam of light.**

A one

B two

C three

D four

45 **When a beam of un-polarized light is incident upon a crystal such as calcite then the beam on entering the crystal get split up into two plane polarized beam of light having their planes of vibrations_____________ to each other**

A parallel

B anti-parallel

C perpendicular

D not parallel

46 **When a beam of un-polarized light is incident upon a crystal such as calcite, then the beam on entering the crystal get split up into two plane polarized beam of light having their planes of vibrations mutually perpendicular to each other . This phenomenon is known as**

A Polarization by refraction

B Polarization by double reflection

C Polarization by reflection

D Polarization by double refraction

47 **The chemical name of the calcite crystal is**

A hydrated calcium carbonate

B hydrated sodium carbonate

C hydrated aluminium carbonate

D none of tthese

48 **The structure of calcite-crystal is**

A Rectangular

B Rhombohedra

C Triangular

D parallelepiped

49 **In the structure of calcite the line joining**

the two blunt corners of the crystal gives

A Direction of its central axis

B Direction of its optic axis

C Direction of its principle axis

D None of these

50 **In the calcite crystal the number of optic axis is**

A one

B two

C three

D infinite

51 **At blunt corner all the sides are making ____________angle with each other.**

A acute

B obtuse

C right

D None of these

52 **In calcite structure all acute and obtuse angles are _____ and _____ respectively.**

A 71^0 and 109^0

B 109^0 and 71^0

C 68^0 and 112^0

D 69^0 and 111^0

53 **A plane containing the optic axis and perpendicular to the opposite faces of the crystal is called the**

A vibration plane

B principle plane

C optic axis

D None of these

54 **A rotating calcite crystal is placed over an ink dot. On seeing through the crystal, one finds**

A two stationary dots

B two dots moving along straight lines

C one dot rotating about the other

55 **The examples of double refracting crystals are**

A Calcite

B quartz

C Tourmaline

56 In case of positive crystals,

A The velocity of ordinary ray is less than velocity of extraordinary ray

B The velocity of ordinary ray is equal to velocity of extraordinary ray

C The velocity of ordinary ray is greater than velocity of extraordinary ray

D The velocity of extraordinary ray is greater than velocity of ordinary ray

57 In case of negative crystals,

A The velocity of ordinary ray is less than velocity of extraordinary ray

B The velocity of ordinary ray is equal to velocity of extraordinary ray

C The velocity of ordinary ray is greater than velocity of extraordinary ray

D The velocity of extraordinary ray is greater than velocity of ordinary ray

58 Huygen explained the phenomenon of double refraction on the basis of

A Primary wavelets

B Secondary wavelets

C Circular wavelets

D Cylindrical wavelets

59 When light is incident on the doubly refracting crystal perpendicular to the optic axis of the crystal then

A The O- and E- ray travel in different directions with same velocity

B The O- and E- ray travel in same directions with same velocity

C The O- and E- ray travel in different directions with different velocity

D The O- and E- ray travel in same directions with different velocity

60 When light is incident on the doubly refracting crystal parallel/along to the optic axis of the crystal then

A The O- and E- ray travel in different directions with same velocity

B The O- and E- ray travel in same

directions with same velocity

C The O- and E- ray travel in different directions with different velocity

D The O- and E- ray travel in same directions with different velocity

61 When light is incident on the doubly refracting crystal normally such that the optic axis is inclined to the crystal surface then

A The O- and E- ray travel in different directions with same velocity

B The O- and E- ray travel in same directions with same velocity

C The O- and E- ray travel in different directions with different velocity

D The O- and E- ray travel in same directions with different velocity

62 When light is incident on the doubly refracting crystal along the optic axis of the crystal then O ray and E ray

A Does not split up and travels with different velocity.

B Does not split up and travels with same velocity.

C Split up into two component and travels with different velocity

D Split up into two component and travels with same velocity

63 When light is incident on the doubly refracting crystal perpendicular to optic axis of the crystal then O ray and E ray

A Does not split up and travels with different velocity.

B Does not split up and travels with same velocity.

C Split up into two component and travels with different velocity

D Split up into two component and travels with same velocity

64 When light is incident normally on the doubly refracting crystal such that the surface on which light is incident is cut perpendicular to its optic axis then O ray and E ray

A Does not split up and travels with different velocity.
B Does not split up and travels with same velocity.
C Split up into two component and travels with different velocity
D Split up into two component and travels with same velocity

65 When light is incident normally on the doubly refracting crystal such that the surface on which light is incident is cut parallel to its optic axis then O ray and E ray

A Does not split up and travels with different velocity.
B Does not split up and travels with same velocity.
C Split up into two component and travels with different velocity
D Split up into two component and travels with same velocity

66 In double refraction we get two refracted rays called O-ray and E- ray. Which of the following statements is true?

A only the O-ray is polarized
B only the E-ray is polarized
C both O and E rays are polarized
D neither O-ray nor E-ray is polarized

67 For a double refracting crystal, the refractive indices for the ordinary and extraordinary rays are denotted by μ_0 and μ_e. Which of the following relations is valid along the optical axis of the crystal?

A $\mu_0 = \mu_e$
B $\mu_0 \leq \mu_e$
C $\mu_0 < \mu_e$
D $\mu_0 > \mu_e$

68 If μ_0 and μ_e be the refractive indices of the doubly refracting crystal for O-ray and E-ray respectively then for the negative crystal which of the following relations is correct?

A $\mu_0 = \mu_e$

B $\mu_0 \leq \mu_e$

C $\mu_0 < \mu_e$

D $\mu_0 > \mu_e$

69 If μ_0 and μ_e be the refractive indices of the doubly refracting crystal for O-ray and E-ray respectively then for the positive crystals which of the following relations is correct?

A $\mu_0 = \mu_e$

B $\mu_0 \leq \mu_e$

C $\mu_0 < \mu_e$

D $\mu_0 > \mu_e$

70 The O-ray travels with the same velocity 'v_o' in all directions and hence according to Huygen the corresponding wave front is

A Ellipsoid

B Spherical

C Cylindrical

D None of these

71 The E-ray travels with the different velocity 'v_e' in different directions and hence according to Huygen the corresponding wave front is

A Ellipsoid

B Spherical

C Cylindrical

D None of these

72 In the doubly refracting crystals, the O-ray travels with the same velocity 'v_o' in all directions therefore its refractive index for O ray is _________ in all directions.

A Different

B Same

C Changes

D None of these

73 In the doubly refracting crystals, the E-ray travels with the different velocity 'v_e' in all directions therefore its refractive index for E ray is _________ in all directions.

A Different

B Same

C Changes

D None of these

74 In a doubly refracting crystal the ratio of velocities of E – ray in two different directions is 10:9, then the ratio of the refractive indices of that crystal for that ray is

A 100:81

B 81:100

C 9:10

D 10:09

75 In a doubly refracting crystal the ratio of its refractive indices for E – ray in two different directions is 10:9, then the corresponding ratio of the velocities of that ray is

A 100:81

B 81:100

C 9:10

D 10:09

76 In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is greater than that of O-ray then the crystal is

A Positive

B Negative

C Both A and B correct

D None of these

77 In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is greater than that of O-ray then

A The light is incident along the optic axis and the crystal is negative.

B The light is incident along the optic axis and the crystal is positive

C The light is incident perpendicular to the optic axis and the crystal is negative.

D The light is incident perpendicular to the optic axis and the crystal is positive.

78 In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction but the velocity of E-ray is less than that of O-ray then

A The light is incident along the optic axis and the crystal is negative.

B The light is incident along the optic axis and the crystal is positive

C The light is incident perpendicular to the optic axis and the crystal is negative.

D The light is incident perpendicular to the optic axis and the crystal is positive.

79 In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction and same velocity then

A The light is incident along the optic axis and the crystal is negative.

B The light is incident along the optic axis and the crystal is positive

C The light is incident along the optic axis and the crystal is negative or positive

D The light is incident perpendicular to the optic axis and the crystal is negative or positive.

80 In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction and but with different velocity then

A The light is incident along the optic axis and the crystal is negative.

B The light is incident along the optic axis and the crystal is positive

C The light is incident along the optic axis and the crystal is negative or positive

D The light is incident perpendicular to the optic axis and the crystal is negative or positive.

81 **In a doubly refracting crystal if O-ray and E-ray are travelling along the same direction and with same velocity then**

A The light is incident perpendicular to the optic axis and the crystal is negative.

B The light is incident perpendicular to the optic axis and the crystal is positive

C The light is incident perpendicular to the optic axis and the crystal is negative or positive

D None of these

Engineering Physics
Unit III - Polarization and Laser - Answer Key

Que No.	Ans	Que No.	Ans	Que No.	Ans								
1.	C	34.	C	67.	A								
2.	A	35.	C	68.	D								
3.	B	36.	A	69.	C								
4.	C	37.	D	70.	B								
5.	A	38.	B	71.	A								
6.	A	39.	C	72.	B								
7.	B	40.	A	73.	A								
8.	D	41.	A	74.	C								
9.	B	42.	A	75.	C								
10.	A	43.	B	76.	B								
11.	A	44.	B	77.	C								
12.	B	45.	C	78.	D								
13.	C	46.	D	79.	C								
14.	B	47.	A	80.	D								
15.	A	48.	B	81.	D								
16.	B	49.	B										
17.	C	50.	D										
18.	C	51.	B										
19.	C	52.	A										
20.	A	53.	B										
21.	A	54.	C										
22.	D	55.	D										
23.	B	56.	C										
24.	C	57.	D										
25.	B	58.	B										

26.	**A**	**59.**	**D**										
27.	**D**	**60.**	**B**										
28.	**C**	**61.**	**C**										
29.	**A**	**62.**	**B**										
30.	**A**	**63.**	**A**										
31.	**C**	**64.**	**B**										
32.	**B**	**65.**	**A**										
33.	**B**	**66.**	**C**										