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MSC BED PHD

Engineering Physics MCQs

U N I T 1- 6

Unit 1 Wave Optics

Unit 2 Laser and Optic Fibre Quantum

Unit 3 Mechanics Semiconductor

Unit 4 Physics Magnetism and

Unit 5 Superconductivity

Unit 6 Non Destructive Testing and Nanotechnology

Unit No. I Wave Optics (Interference & Diffraction)

Q1	The visible range of electromagnetic spectrum is	
	a	2000 A° to 4000 A°
	b	3500 A° to 7000 A°
	c	0.4 micron to 0.8 micron
	d	0.45 micron to 0.85 micron
	The answer is c	
Q2	For thin film to produce the interference pattern	
	a	The thickness of the film should be of the order of wavelength of light
	b	The thickness of the film should be lesser that the wavelength of light
	c	The thickness of the film should be slightly greater that wavelength of light
	d	There is no such condition
	The answer is c	
Q3	In rainy days the oily films spread on the rod appear colored because	
	a	The rays entering in the film are reflected back and interfere constructively and destructively
	b	The oily film contains various pigments which are colored
	c	Certain colors are reflected and certain colors are absorbed
	d	The thin film acts as a dispersive device like a prism and hence disperses the light in to spectrum
	The answer is a	
Q4	If the days are not rainy then on dry roads the films are not observed colored because	
	a	The film is maximumly absorbed in the road and the color producing pigments are also absorbed
	b	The thickness of the film becomes very much lesser than the wavelength of the light and such films can't produce interference pattern
	c	On dry road the thin films becomes excessively rough and hence can't produce the interference pattern
	d	The films on the dry road can't reflect the light, the light is completely absorbed in the film
	The answer is b	
Q5	According to Stokes's law the phase of the light is reversed when the light is	
	a	Reflected due to a denser medium
	b	Reflected due to a rarer medium
	c	Transmitted from denser to rarer medium
	d	Transmitted from rarer to denser medium
	The answer is a	
Q6	According to Stoke's law the phase of the light is not reversed when	
	a	Light is reflected from denser medium
	b	Light is reflected from medium from medium of very high refractive index to medium of very low refractive index
	c	Light is reflected from denser medium to relatively less denser medium
	d	Light is reflected due to a rarer medium
	The answer is d	
Q7	According to Stoke's law the phase of the light is not reversed when	
	a	Light is reflected from denser medium
	b	Light is reflected from medium from medium of very high refractive index to medium of very low refractive index

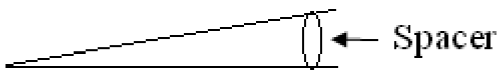
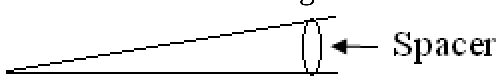
	c	Light is reflected from denser medium to relatively less denser medium
	d	Light is transmitted
	The answer is d	
Q8	In the equation for path difference of a thin film for reflected system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	i	If one of the ray is reflected from denser medium and another from rarer medium
	ii	When both the rays are reflected from denser medium
	iii	When both the rays are reflected from rarer medium
	iv	None of the above
	The answer is a	
Q9	In the equation for path difference of a thin film for reflected system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	a	If the medium above the film and below the film is denser than the film
	b	If the medium above the film is denser and medium below the film is rarer
	c	If the medium below the film is rarer and medium below the film is denser
	d	None of the above
	The answer is a	
Q10	In the equation for path difference of a thin film reflected system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	a	If the medium above the film is denser and medium below the film is rarer
	b	If the medium above the film is rarer and medium below the film is denser
	d	If the medium above the film and below the film is rarer than the film
	d	None of the above
	The answer is c	
Q11	In the equation for path difference of a thin film for reflected system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be absent, when	
	a	When upper ray is reflected from denser medium and lower ray is reflected from denser medium
	b	When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
	c	When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
	d	None of the above
	The answer is a	
Q12	In the equation for path difference of a thin film for a reflected system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be absent, when	
	a	When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
	b	When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
	c	When the upper ray is reflected from rarer medium and lower ray is reflected from rarer medium
	d	None of the above
	The answer is c	
Q11	In the equation for path difference of a thin film for reflected system ($PD = 2\mu tcor$), the	

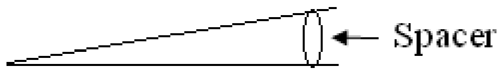
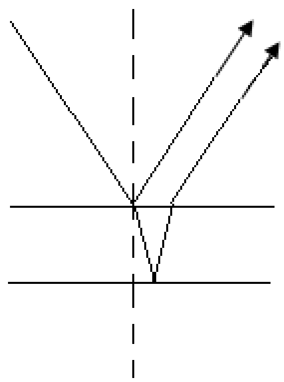
	factor $\mp\frac{\lambda}{2}$ will be absent, when	
	a	The medium above the film is rarer and medium below the film is denser
	b	When the medium above the film denser and medium below the film is denser
	c	When the medium above the film is rarer and medium below the film is rarer
	d	None of the above
	The answer is c	
Q12	In the equation for path difference of a thin film for transmitted system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	i	If one of the ray is reflected from denser medium and another from rarer medium
	ii	When both the rays are reflected from denser medium
	iii	When both the rays are reflected from rarer medium
	iv	None of the above
	The answer is a	
Q13	In the equation for path difference of a thin film for transmitted system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	a	If the medium above the film is denser and medium below the film is rarer
	b	If the medium above the film and below the film is denser than the film
	c	If the medium below the film is rarer and medium below the film is denser
	d	None of the above
	The answer is b	
Q14	In the equation for path difference of a thin film for a transmitted system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be present, when	
	a	If the medium above the film is denser and medium below the film is rarer
	b	If the medium below the film is rarer and medium below the film is denser
	c	If the medium above the film and below the film is rarer than the film
	d	None of the above
	The answer is c	
Q15	In the equation for path difference of a thin film for transmitted system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be absent, when	
	a	When upper ray is reflected from denser medium and lower ray is reflected from denser medium
	b	When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
	c	When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
	d	None of the above
	The answer is a	
Q16	In the equation for path difference of a thin film for a transmitted system ($PD = 2\mu tcor$), the factor $\mp\frac{\lambda}{2}$ will be absent, when	
	a	When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
	b	When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
	c	When the upper ray is reflected from rarer medium and lower ray is reflected from rarer medium

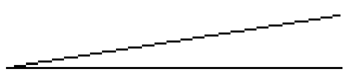
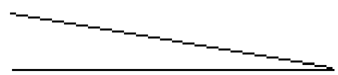
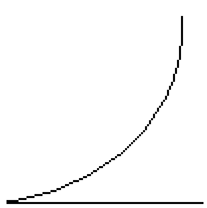
	d	None of the above
	The answer is c	
Q17	The condition that is absolutely necessary/must/unavoidable for producing a steady state interference pattern is	
	a	Coherence
	b	Distance between the slits and screen should be very large
	c	Equal amplitudes
	d	Point source
	The answer is a	
Q17a	The condition that is not absolutely essential for producing steady state interference pattern is	
	a	Coherence
	b	Equal amplitudes
	c	Point source
	d	None of the above
	The answer is ~~a~~ d	
Q18	When interference takes place	
	a	Maxima is produced
	b	Minima is produced
	c	Maxima and Minima is produced alternatively
	d	None of the above
	The answer is d (This may appear confusing but note that a, b, c, require that all condition as required for steady state and sharp interference pattern are satisfied this is not mentioned in the question, therefore d is the correct answer)	
Q19	For maxima and minima to be sharp	
	a	The source must be narrow
	b	The source must be broad
	c	The distance between the slits and the screen should be large
	d	The interfering waves should have equal amplitudes
	The answer is d	
Q19	For maxima and minima to be sharp	
	a	The source must be narrow
	b	The source must be broad
	c	The interfering waves should have equal wavelengths
	d	The distance between the slits and the screen should be large
	The answer is c	
Q20	The principle of superposition is	
	a	$y = y_1 + y_2$
	b	$y = y_1 - y_2$
	c	$y = y_1 \mp y_2$
	d	$y = y_1 \mp y_2 \mp y_3 \mp y_4 \mp y_5 \mp \cdots y_N$
	The answer is d	
Q21	A complete and precise definition of interference where all the necessary conditions are satisfied is	
	a	Superposition of two waves
	b	Superposition of any number of waves
	c	Superposition of waves resulting into modification of intensity
	d	Superposition of wavefronts and redistribution of intensity into alternate maxima and minima

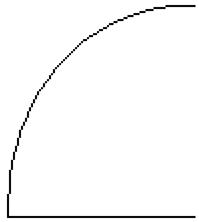
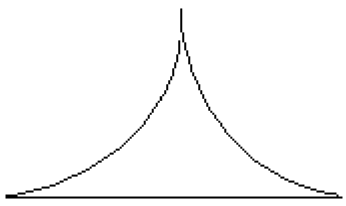
	The answer is d	
Q22	The thin film interference is based on	
	a	Division of amplitude
	b	Division of wavelength
	c	Division of wavefront
	d	Division of frequency
	The answer is a	
Q23	The thin film interference is based on	
	a	Division of wavelength
	b	Division of wavefront
	c	Division of intensity
	d	None of the above
	The answer is c	
Q24	When an oily film spread on the road in rainy days appears colored and the color pattern changes upon angle of viewing because	
	a	When film is seen at different angles different pigments are seen
	b	When the film is seen at different angles, the eye observes a point of different path difference
	c	When the film is seen at different angles it may have different thickness at that angle
	d	None of the above
	The answer is b (somebody may think that the answer is b as well as c, but fundamentally if we want an answer which is exclusively correct then the answer must be b	
Q25	For a film to produce the interference pattern	
	a	It should have uniform thickness
	b	It should have different thicknesses at different points
	c	It should have different thicknesses or different angles of incidence at different points
	d	None of the above
	The answer is c (The answer b is partially correct, answer c is exclusively correct	
Q26	If a film appears excessively greenish at a given point from a given angle from reflected side then the film will have following color from the transmitted side at the same point and the same angle	
	a	Red
	b	Yellow
	c	Blue
	d	Purple
	The answer is d	
Q27	If a film appears excessively greenish at a given point from a given angle from the transmitted side then the film will have following color from the reflected side	
	a	Purplish
	b	Reddish
	c	Bluish
	d	Yellowish
	The answer is a	
Q28	A wedge shaped film exposed to broad source produces	
	a	Straight fringes
	b	Curved fringes
	c	Straight and parallel fringes parallel to the thickness of the film
	d	Straight and parallel fringes parallel to the edge of the film

	The answer is d	
Q28	A wedge shaped film exposed to narrow produces	
	a	Straight fringes
	b	Curved fringes
	c	Parabolic fringes
	d	None of the above
	The answer is d	
Q29	A wedge shaped film can produce distinct fringes only if the wedge angle is in	
	a	Degrees
	b	Minutes
	c	Seconds
	d	There is no such condition necessary
	The answer is c	
Q30	The name of the interference pattern that an wedge film produces is	
	a	Fizau's interference pattern
	b	Haindinger's interference pattern
	c	Young's interference pattern
	d	There is no point in giving a name to such interference pattern
	The answer is a	
Q31	When a film of uniform thickness is exposed to a point source of a monochromatic source then the corresponding fringes are	
	a	Straight
	b	Circular
	c	Conical
	d	Hyperbolic
	The answer is b	
Q32	When a film of uniform thickness is exposed to a broad and monochromatic source then the corresponding fringes are	
	a	Straight
	b	Circular
	c	Conical
	d	None of the above
	The answer is d	
Q33	The interference pattern observed when a thin film of uniform thickness is is exposed to point source is called as	
	a	Haidinger's interference pattern
	b	Fizau's interference pattern
	c	Newton's interference pattern
	d	There is no point in giving name to such interference pattern
	The answer is a	
Q34	When the wedge angle of the film increases, the fringe width is	
	a	Decreased
	b	Increased
	c	There is no change
	d	Increased and then decreased
	The answer is a	
Q35	When the wedge angle of the film decreases, the fringe width is	
	a	Decreased
	b	Increased

	c	There is no change
	d	Increased and then decreased
	The answer is b	
Q36	A wedge shaped film produces an interference pattern. It is immersed in a medium of higher refractive index. Then the fringe width will	
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible and undefined
	The answer is a	
Q37	A wedge shaped film produces an interference pattern. It is immersed in a medium of lower refractive index. Then the fringe width will	
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible and ill-defined
	The answer is b	
Q38	As shown in the figure a wedge shaped film is formed using a spacer. If the spacer is made thicker then the fringe width will 	
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible
	The answer is a	
Q39	As shown in the figure a wedge shaped film is formed using a spacer. If the spacer is made thinner then the fringe width will 	
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible
	The answer is b	
Q40	As shown in the figure a wedge shaped film is formed using a spacer. If the spacer is taken away then the fringe width will 	
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible
	The answer is b	
Q41	As shown in the figure a wedge shaped film is formed using a spacer. If the spacer is taken towards the edge fringe width will	

		
	a	Decrease
	b	Increase
	c	There will not be any noticeable change
	d	The fringes will become invisible
	The answer is a	
Q42	As shown in the following Fig, an idealized film of uniform thickness is exposed to a ray of light, which is split in to two parallel rays. The theory in the syllabus discusses the interference of these two rays. A student argues that parallel rays can never interfere, so how you are discussing their interference? The teacher answers that 	
	a	The film is excessively thin, thus the rays are very close to each other thus they overlap and interfere
	b	The parallelness of the rays travelling through a medium is simply an idealized case and, in reality when the rays travel some distance, they change their path and interfere
	c	It is assumed that somebody is holding a lens in the path of these rays and therefore they interfere
	d	None of the above. The teacher says that he doesn't know the answer
	The answer is d (The answer which is most close to correct answer is d because the fact is that rays interfere due to a lens in the eye of an observer)	
Q43	A wedge shaped film is a convenient tool for measuring the diameters of thin wires because	
	a	The fringe width is directly proportional to the thickness of the wire
	b	The fringe width is inversely proportional to the thickness of the wire
	c	The fringe width is inversely proportional to thinness of the wire
	d	None of the above
	The answer is b	
Q44	Interference proves that	
	a	Light is a wave
	b	Light is a particle
	c	Light is both wave and particle
	d	Interference can not prove nature of light
	The answer is a (according to me the ideal answer is c, because Einstein has argued that light wave is a probability wave associated with photon. Thus maxima mean more concentration of photons/less probability of finding the photon and minima means less concentration of photons/~~less~~ more probability of finding the photon.	

	Thus the interference can be explained by using wave theory as well as particle theory. But benefit of doubt should be given to the students/teachers, so the traditional answer is a)	
Q45	In case of wedge shaped film, the fringes are produced in a plane defined by	
	a	Edge of the film and the lower surface of the film
	b	Edge of the film and upper surface of the film
	c	Upper and lower surface of the film
	d	None of the above
	The answer is a	
Q46	In case of a wedge shaped film, if the upper glass plate is slightly lifted up by keeping its orientation same the	
	a	Fringes will contract
	b	Fringes will expand
	c	Fringes will collapse
	d	None of the above
	The answer is d (While lifting the upper glass plate with same orientation the wedge angle is unaltered	
Q47	Consider two wedge shaped films as shown in following two diagrams. The fringes in fig 1 and 2 will be  Figure 1  Figure 2	
	a	Same
	b	Not be same
	c	Anti-parallel
	d	Curved but with opposite curvatures
	The answer is a	
Q48	Consider a typical wedge shaped films as shown in following Fig. The fringes in this case will be 	
	a	Parabolic
	b	Curved, with the curvature towards the edge of the film
	c	Straight but with increasing thickness
	d	None of the above
	The answer is d	
Q49	Consider a typical wedge shaped film as shown in following Fig. The fringes in this case will be	

		
	a	Parabolic
	b	Curved, with the curvature towards the edge of the film
	c	Straight but with decreasing thickness
	d	None of the above
	The answer is d	
Q50	Consider a typical wedge shaped film as shown in following Fig. the fringes will be 	
	a	Straight, at first increase width and then decrease width
	b	Curved, at in the first section, the curvature towards left side and in the second part curvature towards right side
	c	Curved, at in the first section, the curvature towards right side and in the second part curvature towards left side
	d	None of the above
	The answer is d	

	Interference	Correct Option
1.	Interference occurs when two (or more) waves meet while travelling along the a. Different medium b. Same medium c. Two medium d. Many medium	b
2.	The wave theory of light was given by a. Huygen b. Young c. Newton d. Fresnel	c
3.	In Huygen's wave theory the locus of all points in same phase is a. A ray b. A half period zone c. A wave front d. A vibration	c
4.	The wavefront originating from a rectilinear slit is called a. Cylindrical b. Spherical c. Circular d. None of these	a
5.	The two waves are said to be coherent when the phase difference between them is a. Constant b. Zero or constant c. 90^0 d. Continuously changing.	b
6.	Which of the following is conserved when light waves interfere? a. Amplitude b. Intensity c. Energy d. Momentum	c
7.	Two light sources are said to be coherent if they are obtained from a. A single point source b. A wide source	a

	c. Two independent point sources d. Two ordinary bulbs	
8.	To demonstrate the phenomenon of interference a. Two sources which emit radiation of same frequency are required. b. Two sources which emit radiation of same frequency and have a constant phase difference are required. c. Two sources which emit radiation are required of nearly same frequency are required. d. Two sources which emit radiation of different wavelengths	b
9.	For sustained interference of light, the two sources should a. be close to each other b. be narrow c. have a same amplitude d. have a constant phase difference	d
10.	Four independent waves are expressed as 1) $y_1 = a_1 \sin \omega t$ 2) $y_2 = a_2 \sin 2\omega t$ 3) $y_3 = a_3 \cos \omega t$ 4) $y_4 = a_4 \sin(\omega t + \pi/3)$ a. (1) and (2) b. (1) and (3) c. (1) and (4) d. Not possible at all	
11.	Intensity of light depends upon a. Wavelength b. Amplitude c. Frequency d. Velocity	b
12.	Two waves of same amplitude ‘a’ and same frequency are reaching a point simultaneously. What should be the phase difference between the two waves so that the amplitude of the resultant wave be ‘2a’. a. 90^0 b. 120^0 c. 0^0 d. 180^0	c
13.	Two sources of intensities *I* and *4I* are used to produce interference. The resultant intensity of *5I* is obtained where phase difference is	d

	a. π b. 2π c. $\pi/2$ d. 0	
14.	Two coherent monochromatic light beams of intensities *I* and *4I* are superposed. The maximum and minimum possible intensities in the resultant beam are a. *5I* and *I* b. *5I* and *3I* c. *3I* and *I* d. *9I* and 3*I*	b
15.	The two waves of intensity *I* and *4I* are superpose. The ratio of maximum to minimum intensity is a. 5:3 b. 9:1 c. 5:1 d. 4:1	b
16.	The maximum intensity produced by two coherent sources with zero phase difference having intensity I_1 and I_2 is a. $I_1 I_2$ b. $I_1 + I_2$ c. $I_1^2 + I_2^2$ d. $I_1 + I_2 + 2\sqrt{I_1 I_2}$	d
17.	Ratio of intensities of two waves is 25:4. Then the ratio of maximum to minimum intensity will be a. 5:2 b. 4:25 c. 25:4 d. 49:9	d
18.	In an interference pattern energy is a. Created at position of maxima b. Destroyed at position of maxima c. Conserved but redistributed d. Not conserved	c
19.	Two coherent sources whose intensity ratio is 81:1 produce interference fringes. What is the ratio of their amplitudes? a. 10:1 b. 9:1 c. 8:1 d. 9.9:1	b
20.	For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,	c

	a. $(2n-1)\lambda/_2$ b. $(2n-1)\lambda/_4$ c. n λ d. $(2n+1)\lambda/_2$	
21.	For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be, a. $(2n-1)\lambda/_2$ b. $(2n-1)\lambda/_4$ c. n λ d. $(2n+1)\lambda/_2$	d
22.	For destructive interference to take place between two monochromatic light waves of wavelength 2λ, the path difference should be, a. 2nλ b. $(2n-1)\lambda/_2$ c. $(2n-1)\lambda$ d. $(2n+1)\lambda/_2$	c
23.	For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be, a. Very large b. Very Small c. Integral multiple of wavelength λ d. Odd multiple of wavelength λ	c
24.	For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be, a. Very large b. Very Small c. Integral multiple of wavelength λ d. Odd multiple of half the wavelength λ	d
25.	Two waves originating from sources S_1 and S_2 having zero phase difference and common wavelength λ will show completely destructive interference at a point P if (S_1P - S_2P) is a. 5λ	d

	b. $3\lambda/4$ c. 2λ d. $11\lambda/2$	
26.	For two coherent waves $y_1 = a_1 \cos\omega$ and $y_2 = a_2 \sin\omega$ the resultant intensity due to interference is a. $(a_1 - a_2)^2$ b. $(a_1 + a_2)^2$ c. $(a_1^2 - a_2^2)$ d. $(a_1^2 + a_2^2)$	d
27.	For two interfering waves $y_1 = a\cos\omega$ and $y_2 = b\cos(\omega + \Phi)$, destructive interference at the point of observation takes place if Φ equals a. π b. $\pi/2$ c. 0 d. None of these	a
28.	In which of the following the interference is produced by division of amplitude method a. Uniform thickness film b. Non-uniform thickness film c. Newton's rings d. All above	d
29.	In which of the following the interference is produced by division of wave front method. a. Uniform thickness film b. Non-uniform thickness film c. Newton's rings d. None of these	d
30.	If the path difference between the two interfering waves is 2λ, the phase difference between them is equal to a. 2π b. π c. 3π d. 4π	d
31.	If the path difference between the two interfering waves is λ, the phase difference between them is equal to a. 2π	a

	b. π c. 3π d. 4π	
32.	If the path difference between the two interfering waves is $3\lambda/2$,the phase difference between them is equal to a. 2π b. π c. 3π d. 4π	c
33.	If the path difference between the two interfering waves is $\lambda/2$,the phase difference between them is equal to a. 2π b. π c. 3π d. 4π	b
34.	The phase difference between two points *x* distance apart of a light wave of wavelength λ entering a medium of refractive index μ from air is a. $\mu\frac{2\pi}{\lambda}x$ b. $(\mu-1)\frac{2\pi}{\lambda}x$ c. $\frac{1}{(\mu-1)}\frac{2\pi}{\lambda}$ d. $\frac{1}{\mu}\frac{2\pi}{\lambda}x$	a
35.	When light wave suffers reflection at the interface between glass and air incident through glass, a change of phase of the reflected wave is, a. Zero b. $\pi/2$ c. π d. 2π	a
36.	When light wave suffers reflection at the interface between glass and air incident through air, a change of phase of the reflected wave is, a. Zero b. $\pi/2$ c. π d. 2π	c

37.	The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional path difference between them is a. $\lambda/2$ b. λ c. 2λ d. $3\lambda/2$	a
38.	The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional phase difference between them is a. 2π b. π c. 3π d. $3\pi/2$	b
39.	The two monochromatic and coherent interfering rays, both originated by reflection at rare medium then the additional path difference between them is a. $\lambda/2$ b. λ c. 0 d. $3\lambda/2$	c
40.	The two monochromatic and coherent interfering rays, both originated by reflection at denser medium then the additional path difference between them is a. $\lambda/2$ b. 0 c. λ d. $3\lambda/2$	b
41.	If light travels a distance ‘t’ in a medium of refractive index ‘μ’ then its equivalent optical path travelled in that medium is given by a. 2μt b. μt c. $\mu t/2$ d. $3\mu t/2$	b

42.	The optical path covered by a light wave in a particular medium depends upon a. Refractive index b. Length of medium c. Refractive index and length of medium d. Directly proportional to refractive index and inversely proportional to length of medium	c
43.	A light wave travels a distance '*d*' in a medium of refractive index 'μ'. When a distance is made half, then the refractive index is, a. Remains same b. Doubled c. Become Half d. None of these	a
44.	A light wave travels a distance '*d*' in a medium of refractive index 'μ'. When a distance is reduced to $d/2$ and the medium is replaced by a medium having refractive index '2μ' then the optical path covered by the light will a. Remains same b. Doubled c. Become Half d. None of these	a
45.	In interference experiment monochromatic light is replaced by white light, we will see a. uniform illumination of screen b. uniform darkness on screen c. equally spaced white and dark bands d. few coloured bands then general illumination	d
	Interference Uniform and non uniform thickness film	
46.	In a uniform thickness thin film all the reflected rays are a. Parallel b. Anti-parallel c. Perpendicular d. Inclined	a
47.	In a uniform thickness thin film all the transmitted rays are a. Anti-parallel b. Perpendicular c. Parallel d. Inclined	c
48.	In a non-uniform thickness thin film all the reflected rays are a. Parallel	c

	b. Anti-parallel c. Not-parallel d. None of these	
49.	In uniform thickness thin film the reflected rays are parallel to each other. They superimpose on each other because a. They are parallel b. The film is thin c. Incident light rays are parallel d. The film thickness is comparable with the wavelength of light.	d
50.	In reflected light the condition for darkness for uniform thickness film is a. $2\mu tcosr = {}^{2n\lambda}/_{2}$ b. $2\mu tcosr = {}^{n\lambda}/_{2}$ c. $2\mu tcosr = (2n+1)\,{}^{\lambda}/_{2}$ d. $2\mu tcos(r+\theta) = n\lambda$	a
51.	In reflected light the condition for brightness for uniform thickness film is a. $2\mu tcosr = {}^{2n\lambda}/_{2}$ b. $2\mu tcosr = {}^{n\lambda}/_{2}$ c. $2\mu tcosr = (2n+1)\,{}^{\lambda}/_{2}$ d. $2\mu tcos(r+\theta) = n\lambda$	c
52.	In transmitted light the condition for darkness for uniform thickness film is a. $2\mu tcosr = {}^{2n\lambda}/_{2}$ b. $2\mu tcosr = {}^{n\lambda}/_{2}$ c. $2\mu tcosr = (2n+1)\,{}^{\lambda}/_{2}$ d. $2\mu tcos(r+\theta) = n\lambda$	c
53.	In transmitted light the condition for brightness for uniform thickness film is a. $2\mu tcosr = {}^{2n\lambda}/_{2}$ b. $2\mu tcosr = {}^{n\lambda}/_{2}$ c. $2\mu tcosr = (2n+1)\,{}^{\lambda}/_{2}$ d. $2\mu tcos(r+\theta) = n\lambda$	a
54.	In uniform thickness film the conditions for brightness and darkness in reflected light and transmitted light are a. Same b. For brightness same but for darkness opposite. c. Opposite	c

	d. For darkness same but for brightness opposite.	
55.	The uniform thickness film which appears bright for a light of particular wavelength in reflected light will appear ___________ in transmitted light for the same wavelength. a. Dark b. Bright c. Blue d. Red	a
56.	When white light is incident normally on a soap film of thickness $5 \times 10^{-5} cm$ (μ=1.33), the wavelength/s of maximum intensity which are reflected are a. 26000 A^0 b. 3800 A^0 c. Both a and b d. Neither a nor b	c
57.	In uniform thickness film the conditions of brightness and darkness for reflected and transmitted light are a. Same b. Different c. Opposite d. None of these	c
58.	To view colours or fringes on the whole thin film it is necessary to have a. clean source of light b. broad source of light c. point source of light d. all above	b
59.	If monochromatic light is incident on the uniform thickness thin film, in the reflected light on the film we can see a. Dark bands b. Bright bands c. Alternate Dark and bright bands d. Half film dark and half film bright.	c
60.	A thin slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a flat glass plate. The observed interference fringes from this combination shall be a. Circular b. Straight c. Equally spaced d. None of these	b
61.	A thin optically flat slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a optically flat glass plate and a piece of paper is inserted from one side between them. The	d

	observed interference fringes from this combination shall be a. Circular b. Circular and equally spaced c. Straight d. Straight and equally spaced	
62.	The interfering fringes are formed by a thin film of oil on water are seen in yellow light from a sodium light. The fringes are a. Black and white b. Yellow and black c. Coloured d. Coloured but without yellow	a
63.	Oil floating on water looks coloured due to interference of light. The approximate thickness of oil for such effect to be visible is a. 1000 A^0 b. 10000 A^0 c. 1 mm d. 1 cm	b
64.	A very thin film in reflected light appears a. Coloured b. Black c. White d. Yellow	b
65.	A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width depend upon, a. Wavelength of light b. Refractive index of the film c. Angle of wedge d. All above	d
66.	A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width does not depend upon, a. Wavelength of light b. Refractive index of the film c. Thickness of the film d. Angle of wedge	c
67.	A wedge shape film observed in reflected sunlight first through a red glass and then through a blue glass. The number of fringes in later case is a. Less b. More c. Equal in both cases d. None of these	b

68.		When illuminated by monochromatic light the interference pattern of non uniform thickness film in reflected light is alternate bright and dark fringes having same fringe width because a. Each fringe is the locus of the points at which the thickness of the film has a constant value. b. Fringe width does not depend on the thickness of the film. c. Both a and b d. None of these	c
69.		A thin layer of colourless oil having refractive index 1.4 is spread over water in a container. If the light of wavelength 6400 A^0 is absent in the reflected light, what is the minimum thickness of the oil layer? a. 2100 A^0 b. 1900 A^0 c. 2143 A^0 d. 100 A^0	c
70.		When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the reflected system is a. $2\mu tcos(r+\theta) = 2n\lambda/2$ b. $2\mu tcos(r+\theta) = (2n-1)\lambda/2$ c. $2\mu tcosr = n\lambda$ d. $2\mu tcosr = (2n-1)\lambda/2$	b
71.		When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the transmitted system is a. $2\mu tcos(r+\theta) = 2n\lambda/2$ b. $2\mu tcos(r+\theta) = (2n-1)\lambda/2$ c. $2\mu tcosr = n\lambda$ d. $2\mu tcosr = (2n-1)\lambda/2$	a
72.		When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the reflected system is a. $2\mu tcos(r+\theta) = 2n\lambda/2$ b. $2\mu tcos(r+\theta) = (2n-1)\lambda/2$ c. $2\mu tcosr = n\lambda$ d. $2\mu tcosr = (2n-1)\lambda/2$	a
73.		When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the transmitted system is a. $2\mu tcos(r+\theta) = 2n\lambda/2$ b. $2\mu tcos(r+\theta) = (2n-1)\lambda/2$	b

	c. $2\mu t cos r = n\lambda$ d. $2\mu t cos r = (2n-1)\lambda/2$	
74.	Light of wavelength 6000 A^0 falls normally on a thin wedge shaped film of refractive index 1.35 forming fringes that are 2.0 mm apart. The angle of wedge will be, a. $1.14 \times 10^{-4}\ rad$ b. 0.0063^0 c. $0.378'$ d. All of the above	d
75.	A parallel beam of white light falls on a thin film whose refractive index is 1.33. if the angle of incidence is 52^0 then the thickness of the film for the reflected light to be coloured yellow (λ=6000 A^0) most intensively will be a. $14(2n+1)\ \mu m$ b. $1.4(2n+1)\ \mu m$ c. $0.14(2n+1)\ \mu m$ d. $142(2n+1)\ \mu m$	c
76.	What is the least thickness of the soap film of refractive index 1.38 which will appear black when viewed with sodium light of wavelength 589.3 nm reflected perpendicular to the film? a. 10000 A^0. b. 617 nm c. 428 nm d. 213.5 nm	d
77.	When monochromatic light is incident normally on a non uniform thickness air film having very small angle of wedge then the condition of darkness in reflected light is a. $2\mu t cos\ r = n\lambda$ b. $2t = n\lambda$ c. $2\mu t = n\lambda$ d. $2\mu t + \frac{\lambda}{2} = n\lambda$	b
78.	When monochromatic light is incident normally on a non uniform thickness film having very small angle of wedge and refractive index μ then the condition of darkness in reflected light is a. $2\mu t cos\ r = n\lambda$ b. $2t = n\lambda$ c. $2\mu t = n\lambda$ d. $2\mu t + \frac{\lambda}{2} = n\lambda$	c
79.	When monochromatic light is incident normally on a non uniform thickness film having very small angle of wedge and refractive index	d

	μ then the condition of brightness in reflected light is a. $2\mu t\cos r = n\lambda$ b. $2t = n\lambda$ c. $2\mu t = n\lambda$ d. $2\mu t + \frac{\lambda}{2} = n\lambda$	
80.	A non uniform film is formed between the two identical glass plates having length 5 cm by inserting a piece of paper from one side between the plates. If the angle of wedge is	
81.	Colours in the thin films are because of a. Dispersion b. Diffraction c. Interference d. None of them.	c
82.	When viewed in white light, soap bubbles shows colours because of a. Scattering b. Dispersion c. Interference d. Diffraction	c
83.	Oil floating on water shows coloured fringes due to interference of light. The order of magnitude of thickness of oil film such effect to be visible is a. 100 A^0 b. 1 mm c. 1 m d. 10000 A^0	d
	Interference Newton's rings	
84.	Newton's rings are observed with two different media between the glass surfaces. The ratio of their refractive indices is 9:25, then the ratio of diameter of n^{th} ring will be, a. 81:625 b. 3:5 c. 18:50 d. 5:3	d
85.	Newton's rings are observed with two different media between the glass surfaces. The n^{th} ring have diameters as 10:7, then the ratio of refractive indices is, a. 49:100	a

	b. 100:49 c. 100:70 d. 70:100	
86.	In transmitted light the central fringe of Newton's rings is, a. Dark b. Bright c. Steady d. None of these.	b
87.	In reflected light, the central fringe of Newton's rings is dark because the path difference between reflected rays is, a. $n\lambda$ b. $2n\,\lambda/2$ c. $\lambda/2$ d. $n\lambda/2$	c
88.	The central fringe can be made bright in reflected light if air film between lens and glass plate is replaced by liquid having refractive index a. less that lens and greater than glass plate. b. greater that lens and less than glass plate. c. less that lens and less than glass plate. d. greater that lens and greater than glass plate.	b
89.	The diameters of dark Newton' rings in reflected light are proportional to a. $\sqrt{n}$ b. n^2 c. $\sqrt{2n-1}$ d. $1/\sqrt{n}$	a
90.	The diameters of bright Newton' rings in reflected light are proportional to a. $\sqrt{n}$ b. n^2 c. $\sqrt{2n+1}$ d. $1/\sqrt{n}$	c
91.	The square of diameters of dark Newton' rings in reflected light are proportional to a. $\sqrt{n}$	b

	b. n c. $\sqrt{2n-1}$ d. $1/\sqrt{n}$	
92.	The square of diameters of bright Newton' rings in reflected light are proportional to a. Natural number b. Complex number c. Even natural number d. Odd natural number	d
93.	In Newton' rings experiment if the radius of curvature of a plano-convex lens is increased the angle of wedge a. Increases b. Decreases c. Becomes zero d. None of these	b
94.	If the Newton's rings arrangement is illuminated by white light the central fringe will be a. Violet b. Red c. Dark d. Bright	c
95.	The Newton's ring cannot be practically seen in transmitted light because a. They are not observed in transmitted light. b. The contrast between bright and dark rings is not good. c. The contrast between bright and dark rings is good. d. It is very difficult to make arrangement to see them.	b
96.	In a Newton's rings experiment, the thickness of the air space between the lens and the glass plate is 1.8 x 10^{-6} m for the sixth dark ring. The wavelength of the light used is... a. 1.7 x 10^{-8} m b. 3 x 10^{-8} m c. 6 x 10^{-7} m d. 6 x 10^{-5} m	c
97.	In Newton's rings experiment what is the order of the dark ring produced for wavelength of light 5890 A^0, where the thickness of air space between the lens and the glass plate is 1.8 x 10^{-6} m. a. 6.11 b. 6 c. 5.9 d. 7	b

98.	The diameter of n^{th} dark ring in Newton's rings experiment is 2.5 cm. The diameter of n^{th} dark ring reduces to 2 cm when the air film is replaced by a liquid. What is the refractive index of a liquid? a. 1.59 b. 1.56 c. 1.49 d. 1.5	b
99.	If the air film is replaced by a liquid of refractive index 1.32 in Newton's rings experiment the diameter of n^{th} bright ring a. Decreases. b. Increases. c. Remains same. d. None of above.	a
100.	The Newton's rings experiment is based on the phenomenon of interference of light in a. Non-uniform thickness film. b. Wedge shape film. c. The film having thickness increasing from zero to maximum. d. All above.	d
101.	In Newton's ring arrangement, bright and dark rings are obtained using sodium yellow light. If the entire arrangement is dipped into water then the diameters of rings a. Increases b. Decreases c. Fringe pattern disappears d. Remains unchanged	b
102.	In Newton's ring experiment the diameter of 5^{th} dark ring is reduced to half of its value after placing a liquid between plane glass plate and convex surface. The refractive index of liquid is a. 2.5 b. 5 c. 4 d. None of these	c
103.	In Newton's rings experiment the diameter of 8^{th} dark ring is 0.6139 cm. If the wavelength of light used is 5890 A^0 then the radius of curvature of the plano convex lens used is, a. 199.95 b. 198.95 c. 189.95 d. None of these	a
104.	In Newton's rings experiment the radius of curvature of the plano convex lens used is 200 cm. What is the diameter of 8^{th} dark ring if the wavelength of light used is 5890 A^0.	b

	a. 0.6319 cm b. 0.6139 cm c. 0.6913 cm d. 0.6193 cm	
	Interference Applications	
105.	The loss of intensity due to reflection can be reduced substantially by coating the glass surface with a uniform film of optical thickness a. $\lambda/2$ and μ less than that of glass b. $\lambda/2$ and μ greater than that of glass. c. $\lambda/4$ and μ less than that of glass d. $\lambda/4$ and μ greater than that of glass.	a
106.	The reflectivity of the glass surface can be enhanced by coating it with a uniform film of optical thickness a. $\lambda/2$ and μ less than that of glass b. $\lambda/2$ and μ greater than that of glass. c. $\lambda/4$ and μ less than that of glass d. $\lambda/4$ and μ greater than that of glass.	c
107.	When we test the optical flatness of a glass plate by interference, it is said to be optically flat when a. Fringe widths are same b. Fringe widths reduce gradually towards edge of wedge. c. Fringe widths increase gradually towards edge of wedge. d. None of above	a
108.	The glass surface can be made completely reflecting for a light of particular wavelength when a thin uniform thickness film is coated on it having refractive index a. Greater than glass plate b. Less than glass plate c. Less than glass plate but greater than air d. Greater than glass plate but less than air.	c
109.	A thin film of M_gF_2 of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely reflecting for the light of wavelength 5890 A^0 a. $1.31 \times 10^{-7} m$ b. $2.13 \times 10^{-7} m$	b

	c. $3.21 \times 10^{-7} m$ d. $2.31 \times 10^{-7} m$	
110.	A thin film of M_gF_2 of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely non-reflecting for the light of wavelength 5890 A^0 a. $6.012 \times 10^{-7} m$ b. $7.016 \times 10^{-7} m$ c. $1.067 \times 10^{-7} m$ d. $0.076 \times 10^{-7} m$	c
111.	A thin film of M_gF_2 of thickness $1.067 \times 10^{-7} m$ and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely non-reflective is a. 5089 A^0 b. 5098 A^0 c. 5980 A^0 d. 5890 A^0	d
112.	A thin film of M_gF_2 of thickness $2.13 \times 10^{-7} m$ and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely reflective is a. 5089 A^0 b. 5980 A^0 c. 5890 A^0 d. 5098 A^0	c

Sr. No	**Question**	**Answer**
	Diffraction General	
1.	The phenomenon of diffraction can be observed if the size of the obstacle in the path of the visible light waves is a. 1 mm b. 0.1 mm c. 10-4 mm d. 1 cm	c
2.	To observe diffraction the size of the aperture a. Should be of the order of the wavelength b. Should be an exact multiple of wavelength c. Should be much larger than wavelength d. Has no relation with wavelength	a
3.	Which of the following undergo maximum diffraction a. Radio waves b. α-rays c. γ-rays d. Light waves	a
4.	An obstacle of size 1 cm will diffract a. Sound waves b. Light waves c. X-rays d. Ultrasonic waves	d
5.	The phenomenon of diffraction can be considered interference by n number of coherent sources. The value of n is a. One b. Two c. Zero d. Infinite	d
6.	The ratio of size of obstacle to the wavelength of light to be able to observe diffraction effect is a. 1 b. 100 c. 1000 d. Infinite	a

7.	While both light and sound wave shows wave character, diffraction (bending round corners) is much harder to observe in light. This is because a. Speed of light is far greater b. Wavelength of light is far smaller c. Light does not require a medium d. Waves of light are transverse	b
8.	The fraunhofer's diffraction the incident wave front is often a. Spherical b. Cylindrical c. Plane d. None of these	c
9.	The condition for observing fraunhofer's diffraction at a single slit is that, the incident wave front on the slit is a. Spherical b. Cylindrical c. Plane d. None of these	c
10.	Pick up the correct statement a. Diffraction is exhibited by all electromagnetic waves but not by mechanical waves b. Diffraction cannot be observed with plane polarised light c. The limit of resolution of a microscope decreases with increase with the wavelength of light. d. The width of central maximum in the diffraction pattern due to single slit increases as wavelength increases.	d
11.	The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by a. $\frac{A^2}{2}\frac{\sin\alpha}{\alpha}$ b. $A\frac{\sin\alpha}{\alpha}$ c. $A^2\frac{\sin\alpha}{\alpha}\frac{\sin N\beta}{\sin\beta}$ d. $A^2\frac{\sin\alpha}{\alpha}$	d
12.	The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by, $A^2\frac{\sin\alpha}{\alpha}$ here the value of α is a. $\frac{\pi}{\lambda}a\sin\theta$ b. $\frac{2\pi}{\lambda}a\sin\theta$	a

	c. $\frac{\pi}{2\lambda} a \sin\theta$ d. $\frac{\pi}{\lambda} 2a \sin\theta$	
13.	The first diffraction minimum due to single slit diffraction is at θ = 300 for a light of wavelength 5000 A0. The width of the slit is a. 5 × 10-5 cm b. 10 × 10-5 cm c. 2.5 × 10-5 cm d. 1.25 × 10-5 cm	b
14.	The first diffraction minimum due to single slit of width 10-4 cm is at θ = 300. Then wavelength light used is a. 4000 A0. b. 5000 A0. c. 6000 A0. d. 6250 A0.	b
15.	A single slit fraunhofer diffraction pattern is formed with white light. For what wavelength of light the third secondary maximum in diffraction pattern coincides with the second secondary maximum in the pattern for red light of wavelength 6500A? a. 4400 A0 b. 4100 A0 c. 4642.8 A0 d. 9100 A0	
16.	The diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light? a. No change. b. The diffraction band becomes narrower and crowed together. c. The diffraction band becomes broader and farther apart. d. Diffraction band disappear.	b
17.	Light of wavelength 6328 A0 is incident on a slit having a width of 0.2 mm. The angular width of the central maximum measured from minimum to minimum of the diffraction pattern on the screen which is 9 m away will be about a. 0.360 b. 0.180 c. 0.720 d. 0.090	a
18.	The slit of width ‘a’ is illuminated by white light. The first minimum for red light of wavelength 6328 A0 will fall at angle 300, when ‘a’ will be	c

	a. 3250 A0 b. 6.5 X 10-4 mm c. 1.26 µm. d. 2.6 X 10-6 m.	
19.	Angular width of central maximum is 300 when the slit is illuminated by light of wavelength 6000 A0. Then width of the slit will be approx. a. 12 × 10-6 m. b. 12 × 10-7 m. c. 12 × 10-8 m. d. 12 × 10-9 m.	b
20.	Light of wavelength 6500 A0 is incident on a slit, if first minima of red light is at 300 then the slit width is about a. $1 \times 10^{-6} m$ b. $5.2 \times 10^{-6} m$ c. $1.3 \times 10^{-6} m$ d. $2.6 \times 10^{-6} m$	c
21.	In the diffraction pattern due to single slit, the width of the central maximum, a. With red light is less than violet light. b. With red light is equal to violet light. c. With red light is more than violet light. d. None of these.	c
22.	If white light is used in diffraction at a single slit, the central maximum will be a. White b. Coloured c. Black d. None of these	a
23.	In the diffraction pattern due to single slit the width of central maximum will be a. Greater for narrow slit b. Less for narrow slit c. Greater for wide slit d. Less for wide slit	a
24.	Which one of the following colours will be best suited for obtaining the sharp image of narrow circular aperture on the screen? a. Yellow light	d

	b. Green light c. Red light d. Violet light	
25.	In a diffraction pattern due to single slit of width 'a' if the wavelength of light is doubled the angle of diffraction for first order minima will a. Remain same b. Become half c. Doubled d. None of these	c
26.	In a far field diffraction pattern of a single slit under polychromatic illumination, the first minimum due to wavelength λ1 is found to be coincident with the third minimum due to wavelength λ2. Then the relation between the two wavelengths is a. 3 λ1= λ2 b. 3 λ1= 0.3λ2 c. 0.3 λ1= 3λ2 d. λ1= 3λ2	d
27.	In diffraction at a single slit, the intensity of first secondary maximum is about a. $(1/22)^{th}$ of the intensity of central maximum b. $(1/62)^{th}$ of the intensity of central maximum c. $(1/122)^{th}$ of the intensity of central maximum d. $(1/4)^{th}$ of the intensity of central maximum	a
28.	In diffraction at a single slit, the intensity of second secondary maximum is about a. $(1/22)^{th}$ of the intensity of central maximum b. $(1/62)^{th}$ of the intensity of central maximum c. $(1/122)^{th}$ of the intensity of central maximum d. $(1/4)^{th}$ of the intensity of central maximum	b
29.	In the diffraction pattern at a single slit the condition of minima is, $a \sin\theta = m\lambda$. The value of m for first order minima is a. 0 b. 1 c. $1\frac{1}{2}$ d. $None\ of\ these$	b
30.	In a fraunhofer's diffraction at a single slit the principal maximum will form for the value of angle of diffraction, θ which	a

	is equal to a. 0 b. 1 c. $\frac{\pi}{2}$ d. π	
31.	Parallel monochromatic beam of light is incident on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of incident beam. At the first minimum of diffraction pattern, phase difference between the rays coming from the two edges of the slit is a. 0 b. $\pi/2$ c. π d. 2π	d
32.	At the first minima, path difference between two waves starting from the two ends of the slit in the single slit Fraunhofer diffraction experiment is a. $\lambda/2$ b. λ c. $3/2\lambda$ d. 2λ	b
33.	For a single slit of width d, the first diffraction minimum using light of wavelength λ will occur at an angle of a. $\sin^{-1} \lambda/2d$ b. $\sin^{-1} \lambda/d$ c. $\sin^{-1} d/\lambda$ d. $\sin^{-1} 2d/\lambda$	b
34.	Direction of first secondary maximum in the Fraunhofer's diffraction pattern of a single slit of width 'a' is given by a. $a \sin\theta = {}^{\lambda}/_{2}$ b. $a \cos\theta = {}^{3\lambda}/_{2}$ c. $a \sin\theta = \lambda$ d. $a \sin\theta = {}^{3\lambda}/_{2}$	d
35.	When a single slit fraunhofer's diffraction set up is used with light of wavelength 4000 A0, the distance 'b' between central maximum is found to be 0.3 cm. in the same set up if the light of wavelength 6000 A0 is used the corresponding value of 'd' will	d

	be a. 0.20 cm b. 0.24 cm c. 0.30 cm d. 0.45 cm	
36.	Light of wavelength λ is incident on a slit of width 'd'. The resulting diffraction pattern is observed on the screen at distance 'D'. The linear width of principal maxima is then equal to the width of the slit. D equals a. $d/2\lambda$ b. $3\lambda/d$ c. $d^2/2\lambda$ d. $2\lambda^2/7d$	c
37.	A slit 5 cm wide is irradiated normally with microwaves of wavelength 1 cm. Then the angular spread of the central maximum on either side of the incident light is nearly a. 1/5 radians b. 4 radians c. 5 radians d. 6 radians	a
38.	A parallel beam of light of wavelength 600 nm get diffracted by a single slit of width 0.2 mm. the angular divergence of the first maxima of diffracted light is a. 6 × 10-3 rad b. 3 × 10-3 rad c. 4.5 × 10-2 rad d. 9 × 10-2 rad	c
39.	Yellow light is used in a single slit diffraction experiment with slit width of 0.6 mm. if yellow light is replaced by X rays, then the observed pattern will reveal a. that the central maximum is narrower. b. more number of fringes c. less number of fringes d. no diffraction pattern	a

Engineeing Physics

UNIT 1A

Q. Interference of light is evidence that
A. the speed of light is very large
B. light is a transverse wave
C. light is electromagnetic in character
D. light is a wave phenomenon
Ans. D

Q. Interference occurs when two (or more) waves meet while travelling along the
A. Different medium
B. Same medium
C. Two medium
D. Many medium
Ans. B

Q. During the interference of light, energy is
A. Created at maxima
B. Destroyed at the minima
C. Not conserved
D. Redistributed
Ans. D

Q. In Huygen's wave theory the locus of all points in same phase is
A. A ray
B. A half period zone
C. A wave front
D. A vibration
Ans. C

Q. The wave front originating from a rectilinear slit is called
A. Cylindrical wave front
B. Spherical wave front
C. Circular wave front
D. None of these
Ans. A

Q. The two waves are said to be coherent when the phase difference between them is
A. Constant
B. Zero or constant
C. 90^0
D. Changing continuously.
Ans. B

Q. Which of the following is conserved when light waves interfere?
A. Amplitude
B. Intensity
C. Energy
D. Momentum
Ans. C

Q. Two light sources are said to be coherent if they are obtained from
A. Two ordinary bulbs
B. Two wide sources
C. Two independent point sources
D. A single point source
Ans. D

Q. To demonstrate the phenomenon of interference
A. Two sources which emit radiation of same frequency are required.
B. Two sources which emit radiation of same frequency and have a constant phase difference are required.
C. Two sources which emit radiation are required of nearly same frequency are required.
D. Two sources which emit radiation of different wavelengths
Ans. B

Q. For sustained interference of light, the two sources should
A. be close to each other
B. be narrow
C. have a same amplitude
D. have a constant phase difference
Ans. D

Q. For maxima and minima to be sharp
A. The source must be narrow
B. The source must be broad
C. The distance between the slits and the screen should be large
D. The interfering waves should have equal amplitudes
Ans. D

Q. Intensity of light depends upon
A. Wavelength
B. Amplitude
C. Frequency
D. Velocity
Ans. B

Q. Two waves of same amplitude ‘A’ and same frequency are reaching a point simultaneously. What should be the phase difference between the two waves so that the amplitude of the resultant wave be ‘2A’.
A. 90^0
B. 120^0
C. 0^0
D. 180^0
Ans. C

Q. Two sources of intensities *I* and *4I* are used to produce interference. The resultant intensity of *5I* is obtained where phase difference is
A.
B.
C. /
D. zero
Ans. D

Q. Two sources of intensities *I* and *4I* are used to produce interference. The resultant intensity of *5I* is obtained where phase difference is
A.
B.
C. 0
D. both B and C
Ans. D

Q. The condition that is absolutely necessary/must/unavoidable for producing a steady state interference pattern is
A. Coherence
B. Monochromatic
C. Equal amplitudes
D. Point source
Ans. A

Q. A complete and precise definition of interference where all the necessary conditions are satisfied is
A. Superposition of two waves
B. Superposition of any number of waves
C. Superposition of waves resulting into modification of intensity
D. Superposition of wave fronts and redistribution of intensity into alternate maxima and minima
Ans. D

Q. Two coherent monochromatic light beams of intensities *I* and *4I* are superposed. The maximum and minimum possible intensities in the resultant beam are
A. *5I* and *I*
B. *5I* and *3I*
C. *3I* and *I*
D. *9I* and 3*I*
Ans. B

Q. The two waves of intensity *I* and *4I* are superpose. The ratio of maximum to minimum intensity is
A. 9:1
B. 5:3
C. 5:1
D. 4:1
Ans. B

Q. Ratio of intensities of two waves is 25:4. Then the ratio of maximum to minimum intensity will be
A. 5:2
B. 4:25
C. 25:4
D. 49:9
Ans. D

Q. In an interference pattern energy is
A. Created at position of maxima
B. Destroyed at position of maxima
C. Conserved but redistributed
D. Not conserved
Ans. C

Q. Two coherent sources whose intensity ratio is 81:1 produce interference fringes. What is the ratio of their amplitudes?
A. 10:1
B. 9:1
C. 8:1
D. 9.9:1
Ans. B

Q. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. ( ) /
B. ( ) /
C.
D. ( ) /
Ans. C

Q. For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. ( ) /
B. ( ) /
C.
D. ( ) /
Ans. D

Q. For destructive interference to take place between two monochromatic light waves of wavelength 2λ, the path difference should be,
A.
B. ( )
C. ( )
D. ( )
Ans. C

Q. One beam of coherent light travels path P_1 in arriving at point Q and another coherent beam travels path P_2 in arriving at the same point. If these two beams are to interfere destructively, the path difference $P_1 - P_2$ must be equal to
A. an odd number of half-wavelengths.
B. zero.
C. a whole number of wavelengths.
D. a whole number of half-wavelengths.
Ans. A

Q. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. Very large
B. Very Small
C. Integral multiple of wavelength λ
D. Odd multiple of wavelength λ
Ans. C

Q. For destructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be,
A. Very large
B. Very Small
C. Integral multiple of wavelength λ
D. Odd multiple of half the wavelength λ
Ans. D

Q. Two waves of same frequency and amplitude meet at a point where they are 180° out of phase. Which of the following is incorrect?
A. They superimpose, resulting in zero intensity.
B. Their amplitudes subtract, resulting in zero amplitude.
C. Destructive interference occurs.
D. Their energy at that point disappear and thus the energy of the waves after interference is half that of the original waves.
Ans. D

Q. When interference takes place
A. Only maxima is produced
B. Only minima is produced
C. Maxima and Minima is not produced
D. None of the above
Ans. D

Q. For maxima and minima to be sharp
A. The source must be narrow
B. The source must be broad
C. The interfering waves should have equal amplitudes

D. The distance between the slits and the screen should be large
Ans. C

Q. Two waves originating from sources S_1 and S_2 having zero phase difference and common wavelength λ will show completely destructive interference at a point P if $(S_1P - S_2P)$ is
A.
B.
C.
D.
Ans. D

Q. For two coherent waves and having zero phase difference between them, the resultant intensity due to interference is
A. ( )
B. ( )
C. ( )
D. ( )
Ans. D

Q. For two interfering waves and ( ) destructive interference at the point of observation takes place if *Φ* equals
A.
B. /
C. 0
D. None of these
Ans. A

Q. In which of the following the interference is produced by division of amplitude method
A. Uniform thickness film
B. Non-uniform thickness film
C. Newton's rings
D. All above
Ans. D

Q. In which of the following the interference is produced by division of wave front method.
A. Uniform thickness film
B. Non-uniform thickness film
C. Newton's rings
D. None of these
Ans. D

Q. The thin film interference is based on
A. Division of wavelength
B. Division of wavefront
C. Division of intensity
D. None of the above
Ans. C

Q. The thin film interference is based on
A. Division of amplitude
B. Division of wavelength
C. Division of wavefront
D. Division of frequency
Ans. A

Q. If the path difference between the two interfering waves is *2λ,* the phase difference between them is equal to
A.
B.
C.
D.
Ans. D

Q. If the path difference between the two interfering waves is *λ*, the phase difference between them is equal to
A.
B.
C.
D.
Ans. A

Q. If the path difference between the two interfering waves is / ,the phase difference between them is equal to
A.
B.
C.
D.
Ans. C

Q. If the path difference between the two interfering waves is / ,the phase difference between them is equal to
A.
B.

C.
D.
Ans. B

Q. The phase difference between two points x distance apart of a light wave of wavelength entering a medium of refractive index μ from air is

A. —

B. ( ) —

C. —— —
( )

D. – —

Ans. A

Q. When light wave suffers reflection at the interface between glass and air incident through glass, a change of phase of the reflected wave is,

A. Zero
B. /
C.
D.
Ans. A

Q. When light wave suffers reflection at the interface between glass and air incident through air, a change of phase of the reflected wave is,

A. Zero
B. /
C.
D.
Ans. C

Q. According to Stokes's law the phase of the light is reversed when the light is

A. Reflected from the surface of denser medium
B. Reflected from the surface of rarer medium
C. Transmitted from denser to rarer medium
D. Transmitted from rarer to denser medium
Ans. A

Q. According to Stoke's law the phase of the light is not reversed when

A. Light is reflected from the surface of denser medium
B. Light is reflected from medium from medium of very high refractive index to medium of very low refractive index
C. Light is reflected from denser medium to relatively less denser medium
D. Light is reflected from the surface of rarer medium
Ans. D

Q. The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional path difference between them is

A. /
B. /
C. 2
D. /
Ans. A

Q. The two monochromatic and coherent interfering rays, one originated by reflection at rare medium while the other originated by reflection at denser medium then the additional phase difference between them is

A.
B.
C.
D. /
Ans. B

Q. The two monochromatic and coherent interfering rays, both originated by reflection at rare medium then the additional path difference between them is

A. /
B.
C. 0
D. /
Ans. C

Q. The two monochromatic and coherent interfering rays, both originated by reflection at denser medium then the additional path difference between them is

A. /

B.

C.

D. /

Ans. B

Q. If light travels a distance 't' in a medium of refractive index 'μ' then its equivalent optical path travelled in that medium is given by

A. 2μt

B. μt

C. /

D. /

Ans. B

Q. The optical path covered by a light wave in a particular medium depends upon

A. Refractive index

B. Length of medium

C. Refractive index and length of medium

D. Directly proportional to refractive index and inversely proportional to length of medium

Ans. C

Q. A light wave travels a distance '*d*' in a medium of refractive index 'μ'. When a distance is made half, then the refractive index is,

A. Remains same

B. Doubled

C. Become Half

D. None of these

Ans. A

Q. A light wave travels a distance '*d*' in a medium of refractive index 'μ'. When a distance is reduced to / and the medium is replaced by a medium having refractive index '2μ' then the optical path covered by the light will

A. Remains same

B. Doubled

C. Become Half

D. None of these

Ans. A

Q. When the light is diffracted from the edge of the obstacle it bends in the region of

A. Geotechnical shadow

B. Geographical shadow

C. Geometrical shadow

D. Geological shadow

Ans. C

UNIT 1B

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be present, when

A. one of the ray is reflected from denser medium and another from rarer medium

B. both the rays are reflected from denser medium

C. both the rays are reflected from rarer medium

D. None of the above

Ans. A

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be present, when

A. the medium above the film and below the film is denser than the film

B. the medium above the film is denser and medium below the film is rarer

C. the medium below the film is denser and medium above the film is rarer

D. None of the above

Ans. A

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be present, when

A. the medium above the film is denser and medium below the film is rarer

B. the medium above the film is rarer and medium below the film is denser

C. the medium above the film and below the film is rarer than the film
D. None of the above
Ans. C

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be absent, when
A. When upper ray and lower ray is reflected from denser medium
B. When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
C. When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
D. None of the above
Ans. A

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be absent, when
A. When the upper ray is reflected from denser medium and lower ray is reflected from rarer medium
B. When the upper ray is reflected from rarer medium and lower ray is reflected from the denser medium
C. When the upper ray and lower ray is reflected from rarer medium.
D. None of the above
Ans. C

Q. In the equation for path difference of a thin film for reflected system ( ) the factor ±λ/2 will be absent, when
A. The medium above the film is rarer and medium below the film is rarer
B. When the medium above the film denser and medium below the film is denser
C. When the medium above the film is denser and medium below the film is rarer
D. None of the above
Ans. C

Q. In interference experiment monochromatic light is replaced by white light, we will see
A. uniform illumination of screen
B. uniform darkness on screen
C. equally spaced white and dark bands
D. few colour bands and general illumination
Ans. D

Q. In rainy days the oily films spread on the rod appear colored because
A. The rays entering in the film are reflected back and interfere constructively and destructively.
B. The oily film contains various pigments which are colored
C. Certain colors are reflected and certain colors are absorbed.
D. The thin film acts as a dispersive device like a prism and hence disperses the light into spectrum.
Ans. A

Q. If the days are not rainy then on dry roads the films are not observed colored because
A. The film is maximumly absorbed in the road and the color producing pigments are also absorbed
B. The thickness of the film becomes very much lesser than the wavelength of the light and such films can't produce interference pattern
C. On dry road the thin films becomes excessively rough and hence can't produce the interference pattern
D. The films on the dry road can't reflect the light, the light is completely absorbed in the film
Ans. B

Q. In a uniform thickness thin film all the reflected rays are
A. Parallel
B. Anti-parallel
C. Perpendicular
D. Inclined
Ans. A

Q. In a uniform thickness thin film all the transmitted rays are
A. Anti-parallel
B. Perpendicular
C. Parallel
D. Inclined
Ans. C

Q. In a non-uniform thickness thin film all the reflected rays are
A. Parallel
B. Anti-parallel
C. Not-parallel
D. None of these
Ans. C

Q. In uniform thickness thin film the reflected rays are parallel to each other. They superimpose on each other because
A. The film thickness is comparable with the wavelength of light.
B. The film is very thin
C. Incident light rays are parallel
D. The rays interfere in the eyes of the observer
Ans. D

Q. In reflected light the condition for darkness for uniform thickness film is
A. /
B. /
C. ( ) /
D. ( )
Ans. A

Q. In reflected light the condition for brightness for uniform thickness film is
A. /
B. /
C. ( ) /
D. ( )
Ans. C

Q. In transmitted light the condition for darkness for uniform thickness film is
A. /
B. /
C. ( ) /
D. ( )
Ans. C

Q. In transmitted light the condition for brightness for uniform thickness film is
A. /
B. /
C. ( ) /
D. ( )
Ans. A

Q. In uniform thickness film the conditions for brightness and darkness in reflected light and transmitted light are
A. Same
B. For brightness same but for darkness opposite.
C. Opposite
D. For darkness same but for brightness opposite.
Ans. C

Q. In uniform thickness film the conditions for brightness in reflected light and darkness in transmitted light are
A. Same for all wavelengths
B. Same but only for monochromatic light
C. Opposite for all wavelengths
D. Opposite but only for monochromatic light
Ans. A

Q. The uniform thickness film which appears bright for a light of particular wavelength in reflected light will appear --------- in transmitted light for the same wavelength.
A. Dark
B. Bright
C. Blue
D. Red
Ans. A

Q. When white light is incident normally on a soap film of thickness
having refractive index 1.33, the

wavelength/s of maximum intensity which are reflected are
A. 26600 A^0
B. 3800 A^0
C. Both a and b
D. Neither a nor b
Ans. C

Q. When white light is incident normally on a soap film of thickness having refractive index 1.33, the wavelength/s of maximum intensity which are reflected in visible region are
A. 26600 A^0
B. 3800 A^0
C. 5320 A^0
D. All above.
Ans. C

Q. When white light is incident normally on a soap film of thickness refractive index 1.33, the longest wavelength of maximum intensity which is reflected is
A. 26600 A^0
B. 3800 A^0
C. 5320 A^0
D. None of above
Ans. A

Q. To view colours or fringes on the whole thin film it is necessary to have
A. clean source of light
B. broad source of light
C. point source of light
D. all above
Ans. B

Q. If monochromatic light is incident on the uniform thickness thin film with different angle of incidence, in the reflected light on the film we can see
A. Dark bands
B. Bright bands
C. Alternate Dark and bright bands
D. Half film dark and half film bright.
Ans. C

Q. A thin slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a flat glass plate. The observed interference fringes from this combination shall be
A. Circular
B. Straight
C. Equally spaced
D. None of these
Ans. B

Q. The interfering fringes are formed by a thin film of oil on water are seen in yellow light from a sodium light. The fringes are
A. Black and white
B. Yellow and black
C. Coloured
D. Coloured but without yellow
Ans. A

Q. Oil floating on water looks coloured due to interference of light. The approximate thickness of oil for such effect to be visible is
A. 1000 A^0
B. 10000 A^0
C. 1 mm
D. 1 cm
Ans. B

Q. A very thin film in reflected light appears
A. Coloured
B. Black
C. White
D. Yellow
Ans. B

Q. A thin layer of colour less oil having refractive index 1.4 is spread over water in a container. If the light of wavelength 6400 A^0 is absent in the reflected light, what is the minimum thickness of the oil layer?
A. 2100 A^0
B. 1900 A^0
C. 2285 A^0
D. 100 A^0
Ans. C

Q. A parallel beam of white light falls on a thin film whose refractive index is 1.33.

if the angle of refraction is 30^0 then the thickness of the film for the reflected light to be coloured yellow (λ=6000 A^0) most intensively will be
A. ( )
B. 2.6( )
C. ( )
D. ( )
Ans. C

Q. What is the least thickness of the soap film of refractive index 1.38 which will appear black when viewed with sodium light of wavelength 589.3 nm reflected perpendicular to the film?
A. 10000 A^0.
B. 617 nm
C. 428 nm
D. 213.5 nm
Ans. D

Q. Colours in the thin films are because of
A. Dispersion
B. Diffraction
C. Interference
D. None of them.
Ans. C

Q. When viewed in white light, soap bubbles shows colours because of
A. Scattering
B. Dispersion
C. Interference
D. Diffraction
Ans. C

Q. A stationary thin film observed in white light. The colour of thin film seen at a particular point depends upon the
A. Width of the source
B. Distance of the source
C. Location of the observer
D. None of the above
Ans. C

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 A^0. In the interference pattern of reflected light, which wavelength of light will be absent for second order?
A. 5500 A^0
B. 5000 A^0
C. 4000 A^0
D. 5005 A^0
Ans. B

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 A^0. In the interference pattern of transmitted light, which wavelength of light will be present for second order?
A. 4000 A^0
B. 5000 A^0
C. 6000 A^0
D. 7000 A^0
Ans. B

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 A^0. In the interference pattern of reflected light, which wavelength of light will be present for second order?
A. 5500 A^0
B. 5000 A^0
C. 4000 A^0
D. 5005 A^0
Ans. C

Q. When a monochromatic light falls normally on a thin uniform thickness air film of thickness 5000 A^0. In the interference pattern of transmitted light, which wavelength of light will be absent for second order?
A. 4000 A^0
B. 5000 A^0
C. 6000 A^0
D. 7000 A^0
Ans. A

Q. When monochromatic light falls on a excessively thin film the in the reflected light the film will appear
A. Yellow
B. Dark
C. White

D. Blue
Ans. B

Q. A thin film having thickness t << λ is seen in white light. It will appear
A. White
B. Red
C. Violet
D. Black
Ans. D

Q. The loss of intensity due to reflection can be reduced substantially by coating the glass surface with a uniform film of optical thickness
A. / and μ less than that of glass
B. / and μ greater than that of glass.
C. / and μ less than that of glass
D. / and μ greater than that of glass.
Ans. A

Q. The reflectivity of the glass surface can be enhanced by coating it with a uniform film of optical thickness
A. / and μ less than that of glass
B. / and μ greater than that of glass.
C. / and μ less than that of glass
D. / and μ greater than that of glass.
Ans. A

Q. The reflectivity of the glass surface can be reduced by coating it with a uniform film of optical thickness
A. / and μ less than that of glass
B. / and μ greater than that of glass.
C. / and μ less than that of glass
D. / and μ greater than that of glass.
Ans. C

Q. The loss of intensity due to reflection can be increased substantially by coating the glass surface with a uniform film of optical thickness
A. / and μ less than that of glass
B. / and μ greater than that of glass.
C. / and μ less than that of glass
D. / and μ greater than that of glass.
Ans. C

Q. The glass surface can be made completely reflecting for a light of particular wavelength when a thin uniform thickness film is coated on it having refractive index
A. Greater than glass plate
B. Less than glass plate
C. Less than glass plate but greater than air
D. Greater than glass plate but less than air.
Ans. C

Q. A thin film of M_gF_2 of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely reflecting for the light of wavelength 5890 A^0
A.
B.
C.
D.
Ans. B

Q. A thin film of M_gF_2 of refractive index 1.38 is coated on a glass plate. For what thickness of the film the glass surface will become completely non-reflecting for the light of wavelength 5890 A^0
A.
B.
C.
D.
Ans. C

Q. A thin film of M_gF_2 of thickness and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely non-reflective is
A. 5089 A^0
B. 5098 A^0
C. 5980 A^0
D. 5890 A^0
Ans. D

Q. A thin film of M_gF_2 of thickness and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely reflective is

A. 5887 A^0
B. 5987 A^0
C. 5878 A^0
D. 5898 A^0
Ans. C

Q. A thin film of M_gF_2 of thickness and refractive index 1.38 is coated on a glass plate. The wavelength of light for which the glass plate surface will become completely non-reflective is

A. 8597 A^0
B. 5978 A^0
C. 9785 A^0
D. 7859 A^0
Ans. B

Q. In order to see the brightest reflection of light after passing through the film, coated on the glass, having more refractive index than film, which of the following must be true?

A. the thickness of the film must be greater than the wavelength.
B. the wavelength must be equal to half the thickness of the film
C. the wavelength must be equal to 4 times the thickness of the film.
D. the wavelength must be a equal to twice the thickness of the film.
Ans. D

Q. In order to see no reflection of light after passing through the film, coated on the glass, having more refractive index than film, which of the following must be true?

A. the thickness of the film must be greater than the wavelength.
B. the wavelength must be equal to half the thickness of the film
C. the wavelength must be equal to quarter the thickness of the film.
D. the wavelength must be a multiple of twice the thickness of the film.
Ans. C

UNIT 1C

Q. A thin optically flat slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a optically flat glass plate and a piece of paper is inserted from one side between them. The observed interference fringes from this combination shall be

A. Circular
B. Circular and equally spaced
C. Straight
D. Straight and equally spaced
Ans. D

Q. A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width depend upon,

A. Wavelength of light
B. Refractive index of the film
C. Angle of wedge
D. All above
Ans. D

Q. In case of wedge shaped film, the fringes are produced in a plane defined by

A. Edge of the film and the lower surface of the film
B. Edge of the film and upper surface of the film
C. Upper and lower surface of the film
D. None of the above
Ans. A

Q. A wedge shape film is illuminated by monochromatic light then in the pattern observed in the reflected light the fringe width does not depend upon,

A. Wavelength of light
B. Refractive index of the film
C. Thickness of the film
D. Angle of wedge
Ans. C

Q. A wedge shaped film can produce distinct fringes only if the wedge angle is in

A. Degrees
B. Minutes
C. Seconds
D. There is no such condition necessary
Ans. C

Q. A wedge shape film observed in reflected sunlight first through a red glass and then through a blue glass. The number of fringes in later case is
A. Less
B. More
C. Equal in both cases
D. None of these
Ans. B

Q. When illuminated by monochromatic light the interference pattern of non uniform thickness film in reflected light is alternate bright and dark fringes having same fringe width because
A. Each fringe is the locus of the points at which the thickness of the film has a constant value.
B. Fringe width does not depend on the thickness of the film.
C. Both a and b
D. None of these
Ans. C

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the reflected system is
A. ( ) /
B. ( ) ( ) /
C.
D. ( ) /
Ans. B

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for constructive interference by the two interfering rays in the transmitted system is
A. ( ) /
B. ( ) ( ) /
C.
D. ( ) /
Ans. A

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the reflected system is
A. ( ) /
B. ( ) ( ) /
C.
D. ( ) /
Ans. A

Q. When a light of wavelength λ falls on a thin film of air of varying thickness, the essential condition for destructive interference by the two interfering rays in the transmitted system is
A. ( ) /
B. ( ) ( ) /
C.
D. ( ) /
Ans. B

Q. Light of wavelength 6000 A^0 falls normally on a thin wedge shaped film of refractive index 1.35 forming fringes that are 2.0 mm apart. The angle of wedge will be,
A.
B.
C.
D.
Ans. B

Q. When monochromatic light is incident normally on a non uniform thickness air film having very small angle of wedge then the condition of darkness in reflected light is
A.
B.
C.
D. –
Ans. B

Q. When monochromatic light is incident normally on a non uniform

thickness film having very small angle of wedge and refractive index μ then the condition of darkness in reflected light is
A.
B.
C.
D. –
Ans. C

Q. When monochromatic light is incident normally on a non uniform thickness film having very small angle of wedge and refractive index μ then the condition of brightness in reflected light is
A.
B.
C.
D. –
Ans. D

Q. When the wedge angle of the film increases, the fringe width is
A. Decreased
B. Increased
C. There is no change
D. Increased and then decreased
Ans. A

Q. When the wedge angle of the film decreases, the fringe width is
A. Decreased
B. Increased
C. There is no change
D. Increased and then decreased
Ans. B

Q. Which of the following light would produce an interference pattern with the largest separation between the bright fringes?
A. Red
B. Orange
C. Green
D. Blue
Ans. A

Q. Which of the following light would produce an interference pattern with the smallest separation between the bright fringes?
A. Red
B. Orange
C. Green
D. Blue
Ans. D

Q. A wedge shaped film produces an interference pattern. It is immersed in a medium of higher refractive index. Then the fringe width will
A. Decrease
B. Increase
C. There will not be any noticeable change
D. The fringes will become invisible and undefined
Ans. A

Q. A wedge shaped film produces an interference pattern. It is immersed in a medium of lower refractive index. Then the fringe width will
A. Decrease
B. Increase
C. There will not be any noticeable change
D. The fringes will become invisible and undefined
Ans. B

Q. A wedge shaped film is a convenient tool for measuring the diameters of thin wires because
A. The fringe width is directly proportional to the thickness of the wire
B. The fringe width is inversely proportional to the thickness of the wire
C. The fringe width is inversely proportional to length of the wire
D. None of the above
Ans. B

Q. When we test the optical flatness of a glass plate by interference, it is said to be optically flat when
A. Fringe widths are same
B. Fringe widths reduce gradually towards edge of wedge.
C. Fringe widths increase gradually towards edge of wedge.

D. None of above

Ans. A

Q. Newton's rings are observed with two different media between the glass surfaces. The ratio of their refractive indices is 9:25, then the ratio of diameter of n^{th} ring will be,

A. 81:625

B. 3:5

C. 18:50

D. 5:3

Ans. D

Q. Newton's rings are observed with two different media between the glass surfaces. The n^{th} rings have diameters as 49:100, then the ratio of refractive indices is,

A. 10:7

B. 7:10

C. 100:49

D. 49:100

Ans. A

Q. In transmitted light the central fringe of Newton's rings is,

A. Dark

B. Bright

C. Steady

D. None of these.

Ans. B

Q. In reflected light, the central fringe of Newton's rings is dark because the path difference between reflected rays is,

A. nλ

B. /

C. /

D. /

Ans. C

Q. The central fringe can be made bright in reflected light if air film between lens and glass plate is replaced by liquid having refractive index

A. less that lens and less than glass plate.

B. greater that lens and less than glass plate.

C. greater that lens and greater than glass plate.

D. None of these

Ans. B

Q. The diameters of dark Newton' rings in reflected light are proportional to

A. $\sqrt{\ }$

B.

C. $\sqrt{\ }$

D. $/\sqrt{\ }$

Ans. A

Q. The diameters of bright Newton' rings in reflected light are proportional to

A. $\sqrt{\ }$

B.

C. $\sqrt{\ }$

D. $/\sqrt{\ }$

Ans. C

Q. The square of diameters of dark Newton' rings in reflected light are proportional to

A. $\sqrt{\ }$

B.

C. $\sqrt{\ }$

D. $/\sqrt{\ }$

Ans. B

Q. The square of diameters of bright Newton' rings in reflected light are proportional to

A. Natural number

B. Complex number

C. Even natural number

D. Odd natural number

Ans. D

Q. In Newton' rings experiment if the radius of curvature of a plano-convex lens is increased the angle of wedge

A. Increases

B. Decreases

C. Becomes zero

D. None of these

Ans. B

Q. If the Newton's rings arrangement is illuminated by white light the central fringe will be
A. Violet
B. Red C.
Dark D.
Bright
Ans. C

Q. The Newton's ring cannot be practically seen in transmitted light because
A. They are not observed in transmitted light.
B. The contrast between bright and dark rings is not good.
C. The contrast between bright and dark rings is good.
D. It is very difficult to make arrangement to see them.
Ans. B

Q. Newton's rings are formed using white light. Then the central spot will be
A. Violet
B. Dark
C. Bright
D. Red
Ans. B

Q. Newton's rings are formed using white light. Then the colour of the outermost ring will be
A. Violet
B. Yellow
C. Red
D. Indigo
Ans. C

Q. In a Newton's rings experiment, the thickness of the air space between the lens and the glass plate is 1.8×10^{-6} m for the sixth dark ring. The wavelength of the light used is...
A. 1.7×10^{-8} m
B. 3×10^{-8} m
C. 6×10^{-7} m
D. 6×10^{-5} m
Ans. C

Q. In a Newton's rings experiment, the diameter of 15th bright ring was found to be 59×10^{-4} m. If the radius of curvature of plano-convex lens is 1 m, calculate the wavelength of light
A. 6000 A^0
B. 7000 A^0
C. 6500 A^0
D. 7500 A^0
Ans. A

Q. In a Newton's rings experiment, the diameter of 15th ring was 0.625 cm and that of 5th ring was 0.225cm for air film between lens and plate. When the air film is replaced by a liquid these diameters are reduced to 0.529 cm and 0.168 cm respectively. Then the refractive index of liquid is
A. 1.531
B. 1.351
C. 1.135
D. 1.513
Ans. B

Q. In Newton's rings experiment what is the order of the dark ring produced for wavelength of light 5890 A^0, where the thickness of air space between the lens and the glass plate is 1.8×10^{-6} m.
A. 6.11
B. 6
C. 5.9
D. 7
Ans. B

Q. The diameter of nth dark ring in Newton's rings experiment is 2.5 cm. The diameter of nth dark ring reduces to 2 cm when the air film is replaced by a liquid. What is the refractive index of a liquid?
A. 1.59
B. 1.56
C. 1.49
D. 1.5
Ans. B

Q. If the air film is replaced by a liquid of refractive index 1.32 in Newton ring experiment the diameter of n^{th} bright ring
A. Decreases.
B. Increases.
C. Remains same.
D. None of above.
Ans. A

Q. The Newton's rings experiment is based on the phenomenon of interference of light in
A. Non-uniform thickness film.
B. Wedge shape film.
C. The film having thickness increasing from zero to maximum.
D. All above.
Ans. D

Q. In Newton's ring arrangement, bright and dark rings are obtained using sodium yellow light. If the entire arrangement is dipped into water then the diameters of rings
A. Increases
B. Decreases
C. Fringe pattern disappears
D. Remains unchanged
Ans. B

Q. In Newton's ring experiment the diameter of 5^{th} dark ring is reduced to half of its value after placing a liquid between plane glass plate and convex surface. The refractive index of liquid is
A. 2.5
B. 5
C. 4
D. None of these
Ans. C

Q. In Newton's rings experiment the diameter of 8^{th} dark ring is 0.6139 cm. If the wavelength of light used is 5890 A^0 then the radius of curvature of the plano convex lens used is,
A. 199.95 cm
B. 198.95 cm
C. 189.95 cm
D. None of these
Ans. A

Q. In Newton's rings experiment the radius of curvature of the plano convex lens used is 200 cm. What is the diameter of 8^{th} dark ring if the wavelength of light used is 5890 A^0.
A. 0.6319 cm
B. 0.6139 cm
C. 0.6913 cm
D. 0.6193 cm
Ans. B

Q. Monochromatic light wavelength 5000 A.U. is incident on the wedge shape air film having angle of wedge 0.0083 degree. Then the distance between consecutive bright and dark band is,
A. 1.506×10^{-4} m.
B. 1.506×10^{-5} m.
C. 3.012×10^{-5} m.
D. 3.210×10^{-5} m.
Ans. B

Q. Monochromatic light is incident on the wedge shape air film having angle of wedge 0.0083 degree. The distance between consecutive bright and dark band is 1.506×10^{-5} m. Then the wavelength of light is,
A. 5000 A.U.
B. 2500 A.U.
C. 4000 A.U.
D. 3000 A.U.
Ans. A

UNIT 1D

Q. Which of the following undergo maximum diffraction
A. Radio waves
B. α-rays
C. -rays
D. Microwaves
Ans. A

Q. An obstacle of size 1 cm will diffract
A. Sound waves
B. Light waves

C. X-rays
D. Ultrasonic waves
Ans. A

Q. The phenomenon of diffraction can be considered interference by *n* number of coherent sources. The value of *n* is
A. One
B. Two
C. Zero
D. Infinite
Ans. D

Q. The ratio of size of obstacle to the wavelength of light to be able to observe diffraction effect is
A. 1
B. 100
C. 1000
D. Infinite
Ans. D

Q. While both light and sound wave shows wave character, diffraction (bending round corners) is much harder to observe in light. This is because
A. Speed of light is far greater
B. Wavelength of light is far smaller
C. Light does not require a medium
D. Waves of light are transverse
Ans. A

Q.
In which experiment lenses are required
A. Fresnel's diffraction
B. Fraunhofer diffraction
C. Both a and b.
D. None
Ans. B

Q. In which experiment the wave front incident on the slit is not plane
A. Fresnel's diffraction
B. Fraunhofer diffraction
C. Both a and b.
D. None of these
Ans. A

Q. The diffraction pattern is produced due to
A. Reflection of secondary wavelets
B. Polarization of secondary wavelets
C. Refraction of secondary wavelets
D. Interference of secondary wavelets
Ans. D

Q. In Fraunhofer's diffraction the distance between the source and obstacle or obstacle and screen is
A. Finite
B. Not finite.
C. Infinite
D. None of these
Ans. B

Q. In Fresnel's diffraction the distance between the source and obstacle or obstacle and screen is
A. Finite
B. Not finite.
C. Infinite
D. None of these
Ans. A

Q. In Fresnel's diffraction, in the plane of diffraction the all the secondary wavelets are
A. 90^0 out of phase
B. 180^0 out of phase
C. out of phase
D. None of these
Ans. A

Q. In Fraunhofer's diffraction, in the plane of diffraction the all the secondary wavelets are
A. 90^0 out of phase
B. 180^0 out of phase
C. In phase
D. None of these
Ans. C

Q. In the Fraunhofer diffraction the incident wave front is often
A. Spherical
B. Cylindrical
C. Plane
D. None of these

Ans. C

Q. The condition for observing Fraunhofer diffraction at a single slit is that, the incident wave front on the slit is
A. Spherical
B. Cylindrical
C. Plane
D. None of these
Ans. B

Q. In the diffraction pattern due to single slit most of the intensity goes to
A. All secondary maxima
B. Principal maximum
C. First secondary maximum
D. All principal maxima
Ans. B

Q. Pick up the correct statement
A. Diffraction is exhibited by all electromagnetic waves but not by mechanical waves.
B. Diffraction cannot be observed with plane polarized light.
C. Visible light waves can be diffracted by the edge of wall.
D. The width of central maximum in the diffraction pattern due to single slit increases as wavelength increases.
Ans. D

Q. The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by

A. — ——

B. (——)

C. —— ———

D. (——)

Ans. B

Q. The intensity distribution due to Fraunhofer's diffraction at a single slit is represented by, (——) here the value

A. –

B. —

C. —

D. –

Ans. A

Q. The first diffraction minimum due to single slit diffraction is at $\theta = 30^0$ for a light of wavelength 5000 A^0. The width of the slit is
A. 5×10^{-5} cm
B. 10×10^{-5} cm
C. 2.5×10^{-5} cm
D. 1.25×10^{-5} cm
Ans. B

Q. The first diffraction minimum due to single slit of width 10^{-4} cm is at $\theta = 30^0$. Then wavelength light used is
A. 4000 A^0.
B. 5000 A^0.
C. 6000 A^0.
D. 6250 A^0.
Ans. B

Q. A single slit Fraunhofer diffraction pattern is formed with white light. For what wavelength of light the third minimum in diffraction pattern coincides with the second minimum in the pattern for red light of wavelength 6500 A.U.?
A. 4400 A^0
B. 4100 A^0
C. 4333 A^0
D. 9750 A^0
Ans. C

Q. The single slit diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?
A. No change.
B. The diffraction band becomes narrower and crowed together.
C. The diffraction band becomes broader and farther apart.
D. Diffraction band disappear.
Ans. B

Q. Light of wavelength 6328 A^0 is incident on a slit having a width of 0.2 mm. The angular width of the central maximum measured from first minimum to minimum of the diffraction pattern on the screen which is 9 m away will be about
A. 0.36^0
B. 0.18^0
C. 0.72^0
D. 0.09^0
Ans. B

Q. The slit of width 'a' is illuminated by white light. The first minimum for red light of wavelength 6328 A^0 will fall at angle 30^0, when 'a' will be
A. 3250 A^0
B. 6.5×10^{-4} mm
C. 1.26 μm.
D. 2.6×10^{-6} m.
Ans. C

Q. Half angular width of central maximum is 30^0 when the slit is illuminated by light of wavelength 6000 A^0. Then width of the slit will be approx.
A. 12×10^{-6} m.
B. 12×10^{-7} m.
C. 12×10^{-8} m.
D. 12×10^{-9} m.
Ans. B

Q. Light of wavelength 6500 A^0 is incident on a slit, if first minima of red light is at 30^0 then the slit width is about
A.
B.
C.
D.
Ans. C

Q. In the diffraction pattern due to single slit, the width of the central maximum,
A. With red light is less than violet light.
B. With red light is equal to violet light.
C. With red light is more than violet light.
D. None of these.
Ans. C

Q. If white light is used in diffraction at a single slit, the central maximum will be
A. White
B. Coloured
C. Black
D. None of these
Ans. A

Q. In the diffraction pattern due to single slit the width of central maximum will be
A. Greater for narrow slit
B. Less for narrow slit
C. Greater for wide slit
D. Less for wide slit
Ans. A

Q. In diffraction pattern fringe width of various fringes
A. Always equal.
B. Never equal.
C. Can be equalized.
D. None of these
Ans. B

Q. Which one of the following colours will be best suited for obtaining the sharp image of narrow circular aperture on the screen?
A. Yellow light
B. Green light
C. Red light
D. Violet light
Ans. D

Q. Which of the following will exhibit the greatest amount of diffraction?
A. light waves incident on a human hair.
B. light waves incident on a 1 cm hole.
C. sound waves incident on a 1 cm hole.
D. sound waves incident on a doorway.
Ans. C

Q. In a diffraction pattern due to single slit of width 'a', if the wavelength of light is doubled the angle of diffraction for first order minima will
A. Remain same
B. Become half
C. Doubled
D. None of these

Ans. C

Q. In the diffraction pattern due to single slit the first minimum is formed for the order m equal to
A. ± 1
B. 0
C. ± ½
D. ± 3/2
Ans. A

Q. In the diffraction pattern due to single slit the first minima is not possible for the order m = 0 because,
A. For m = 0, the condition of minimum becomes condition of secondary maxima
B. For m = 0, the condition of minimum becomes condition of principal maxima
C. Both a and b
D. None of above
Ans. B

Q. In the diffraction pattern due to single slit the position of secondary maxima is
A. Half a way between two minima
B. Half a way between two principal maxima
C. Half a way between two secondary minima
D. Half a way between principal maximum and first minima.
Ans. A

Q. In the diffraction pattern due to single slit produced on the screen the linear distance between principal maximum and first minimum depends upon
A. Slit width
B. Angle of diffraction
C. Linear distance of screen from the slit
D. All above
Ans. D

Q. In a far field diffraction pattern of a single slit under polychromatic illumination, the first minimum due to wavelength λ_1 is found to be coincident with the third minimum due to wavelength λ_2. Then the relation between the two wavelengths is
A. $3\lambda_1 = \lambda_2$
B. $3\lambda_1 = 0.3\lambda_2$
C. $0.3\lambda_1 = 3\lambda_2$
D. $\lambda_1 = 3\lambda_2$
Ans. D

Q. In diffraction at a single slit, the intensity of first secondary maximum is about
A. (/) of the intensity of central maximum
B. (/) of the intensity of central maximum
C. (/) of the intensity of central maximum
D. (/) of the intensity of central maximum
Ans. A

Q. In diffraction at a single slit, the intensity of second secondary maximum is about
A. (/) of the intensity of central maximum
B. (/) of the intensity of central maximum
C. (/) of the intensity of central maximum
D. (/) of the intensity of central maximum
Ans. B

Q. In the diffraction pattern at a single slit the condition of minima is,
. The value of *m* for first order minima is
A. 0
B. 1
C. –
D.
Ans. B

Q. In a fraunhofer's diffraction at a single slit the principal maximum will form for the value of angle of diffraction *θ*, which is equal to
A. 0
B. 1
C. –

D.
Ans. A

Q. Parallel monochromatic beam of light is incident on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of incident beam. At the first minimum of diffraction pattern, phase difference between the rays coming from the two edges of the slit is
A. 0
B. /
C.
D.
Ans. D

Q. At the first minima, path difference between two waves starting from the two ends of the slit in the single slit Fraunhofer diffraction experiment is
A. /
B. λ
C. /
D. 2λ
Ans. B

Q. For a single slit of width d, the first diffraction minimum using light of wavelength λ will occur at an angle of
A.
B.
C. / /
D. /
Ans. B

Q. Condition of first secondary maximum in the Fraunhofer's diffraction pattern of a single slit of width 'a' is given by

A. /
B. /
C.
D. /
Ans. D

Q. When a single slit Fraunhofer diffraction set up is used with light of wavelength 4000 A^0, the width 'b' of central maximum is found to be 0.3 cm. in the same set up if the light of wavelength 6000 A^0 is used the corresponding value of 'b' will be
A. 0.20 cm
B. 0.24 cm
C. 0.30 cm
D. 0.45 cm
Ans. D

Q. Light of wavelength λ is incident on a slit of width 'd'. The resulting diffraction pattern is observed on the screen at distance 'D'. The linear width of principal maxima is then equal to the width of the slit. D equals
A. /
B. /
C. /
D. /
Ans. C

Q. A slit 5 cm wide is irradiated normally with microwaves of wavelength 1 cm. Then the angular spread of the central maximum on one side of the incident light is nearly equal to
A. 1/5 radians
B. 4 radians
C. 5 radians
D. 6 radians
Ans. A

Q. A parallel beam of light of wavelength 600 nm get diffracted by a single slit of width 0.2 mm. the angular divergence of the principal maxima on both sides of incident light is
A. 6×10^{-3} rad
B. 3×10^{-3} rad
C. 4.5×10^{-2} rad
D. 9×10^{-2} rad
Ans. A

Q. Yellow light is used in a single slit diffraction experiment with slit width of 0.6 mm. If yellow light is replaced by X rays, then the observed pattern will reveal that
A. the central maximum is narrower.
B. the central maximum is broader.

C. less number of fringes
D. no diffraction pattern is observed
Ans. A

Q. How does the width (W) of the central maximum formed from diffraction through a circular aperture (pupil) change with aperture size (D) for a fixed distance away from the aperture?
A. W increases as D increases
B. W decreases as D increases
C. W does not depend upon D
D. None of above
Ans. B

Q. The maximum number of orders of principal maxima present for diffraction of light at a single slit are for the value of angle of diffraction θ equal to
A. 0^0
B. 45^0
C. 90^0
D. 180^0
Ans. C

Q. When the light is diffracted through the circular aperture in the diffraction pattern the radius of central Airy disc can be reduced by
A. Increasing the diameter of circular aperture
B. Decreasing the diameter of circular aperture
C. Increasing the wavelength of light
D. Increasing the focal length of the lens
Ans. A

UNIT 1E

Q. Which one of the following characteristics of electromagnetic wave is needed to explain the spectrum produced when white light falls on diffraction grating? Electromagnetic waves can
A. interfere
B. be linearly polarised
C. change speed in passing from one material to other
D. be reflected with little, if any, loss in energy
Ans. A

Q. In a plane transmission grating the intensity of principal maximum
A. Increases as number of slits increases
B. Decreases as number of slits increases
C. Remains constant
D. None of these.
Ans. A

Q. In a plane diffraction grating the directions of minima are given by
A. ( )
B. ( )
C.
D. None of these.
Ans. B

Q. Light is incident normally on diffraction grating through which first order diffraction is seen at 32^0. The second order diffraction will be seen at
A. 84^0.
B. 48^0.
C. 64^0.
D. None of these
Ans. D

Q. The wavelength of light can be experimentally found using
A. Ripple tank
B. Diffraction grating
C. Plane mirror
D. Glass prism.
Ans. B
Q. The wavelength of light can be experimentally found using
A. Newton's rings
B. Diffraction grating
C. Both a and b
D. None of above
Ans. C

Q. Maximum number of orders available with a grating is
A. Independent of grating element.
B. Directly proportional to grating element.

C. Inversely proportional to grating element.
D. Directly proportional to wavelength.
Ans. B

Q. 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
Ans. A

Q. In the equation of resultant amplitude of waves, when a light is diffracted through diffraction gratings,

—— —— the value of *N* is,

A. Number of lines per cm on the grating
B. Number of lines per m on the grating
C. Total number of lines on the grating
D. Number of lines per unit length
Ans. C

Q. The reciprocal of grating element a+b gives
A. Number of lines per cm on the grating
B. Number of lines per mm on the grating
C. Total number of lines on the grating
D. Number of lines per unit length
Ans. D

Q. In the grating element, a+b,
A. a must be equal to b
B. a must be greater than b
C. a must be less than b
D. none of above
Ans. D

Q. In the equation of resultant amplitude of waves, when a light is diffracted through diffraction gratings,

—— —— the value of β is,

A. –

B. – ( )

C. –

D. ( )

Ans. B

Q. A white light is incident on a diffraction grating and diffraction pattern is produced on the screen placed in front of the grating. If the length of the grating is increased without changing the value of a+b, will the diffraction pattern change?
A. Yes
B. No
C. Partially change
D. None of above
Ans. B

Q. Monochromatic light of wavelength λ is incident normally on a diffraction grating consisting of alternate transparent strips of width 'a' and opaque strips of width 'b'. The angle between emerging zero order and first order spectra depends on
A. *a, b and λ*
B. *a and λ only*
C. *b and λ only*
D. *λ only*
Ans. A

Q. When monochromatic light of wavelength 5×10^{-7} m is incident normally on a plane diffraction grating, the second order diffraction lines are formed at angles of 30^0 to the normal to the grating. What is the number of lines per mm in the grating?
A. 250
B. 500
C. 1000
D. 1500
Ans. B

Q. Monochromatic light shines on the surface of a diffraction grating with 5.3×10^3 lines/cm. The first-order maximum is observed at an angle of 17°. Find the wavelength.
A. 420 nm
B. 530 nm
C. 520 nm
D. 550 nm

Ans. D

Q. Light with a wavelength of 400.0 nm passes through a diffraction grating having 1.00×10^4 lines/cm. What is the second-order angle of diffraction?

A. 21.3°
B. 56.5°
C. 53.1°
D. 72.1°

Ans. C

Q. Light with a wavelength of 500.0 nm passes through a 3.39×10^5 lines/m diffraction grating. The first-order angle of diffraction is

A. 9.73°
B. 36.9°
C. 23.5°
D. 53.1°

Ans. A

Q. The angle between the first-order maximum and the central maximum for monochromatic light of 2300 nm is 27°. Calculate the number of lines per centimeter on this grating.

A. 1600 lines/cm
B. 2500 lines/cm
C. 2000 lines/cm
D. 4500 lines/cm

Ans. C

Q. The light of wavelength 6000 A^0 is diffracted by an angle of 20^0 in first order by diffraction grating then the value grating element is,

A. 1.75×10^{-4} cm
B. 1.95×10^{-4} cm
C. 1.65×10^{-4} cm
D. 1.69×10^{-4} cm

Ans. A

Q. The light of wavelength 6000 A^0 is diffracted by an angle of 20^0 in first order by diffraction grating then the value of number of lines per cm on grating is,

A. 5741 lines/cm
B. 5714 lines/cm
C. 5471 lines/cm
D. 5147 lines/cm

Ans. B

Q. The light of wavelength λ is diffracted by an angle of θ in first order by diffraction grating then the value of number of lines per unit length on grating is,

A. Sinθ/λ
B. λ/sinθ
C. λsinθ
D. none of above

Ans. A

Q. The light of wavelength 6000 A^0 is diffracted by an angle of 20^0 in first order by diffraction grating then the value of total number of lines on the grating if it is 2 cm long is,

A. 5700
B. 11800
C. 11400
D. 11824

Ans. C

Q. What is the highest order spectrum which may be seen with monochromatic light of wave length of 6000 A^0, by means of a diffraction grating with 5000 lines/cm?

A. 5
B. 4
C. 3
D. 2

Ans. C

Q. The number of rulings (*N*) in grating is made larger, then

A. The principal and secondary (all) maxima will become sharp and intense
B. The principal and secondary (all) maxima will become faint and wide.
C. The principal maxima will become sharp and intense while, secondary maxima become weaker
D. The principal maxima will become weaker while, secondary maxima become sharp and intense

Ans. C

Q. When a beam of monochromatic light of wavelength λ is incident normally on a diffraction grating of grating element *d*. If θ is angle between second order diffracted beam and the direction of incident beam, what is the value of $\sin\theta$?

A. /

B. /

C. /

D. /

Ans. C

Q. Light of wavelength λ is incident normally on a diffraction grating for which the slit spacing is 3λ. What is the sine of angle between the second order maximum and the normal?

A. 1/6

B. 1/3

C. 2/3

D. 1

Ans. C

Q. A grating which should be more suitable for constructing a spectrometer for visible and ultraviolet regions should have

A. 100 lines/cm

B. 1000 lines/cm C.
10000 lines/cm D.
100000 lines/cm

Ans. C

Q. Green light of wavelength 5400 A^0 is diffracted by a grating ruled 2000 lines/cm. The angular deviation of third order of image is

A. ( )

B. ( )

C. ( )

D. 82^0

Ans. A

Q. The example of natural diffraction grating is

A. Compact disc

B. Peacock's feather

C. Holohram

D. None of these

Ans. B

Q. The peacock's feather is a natural diffraction grating comes under the category of

A. Reflection grating

B. Refraction grating

C. Transmission grating

D. Deflection grating

Ans. A

Q. The compact disc is a man made diffraction grating comes under the category of

A. Reflection grating

B. Refraction grating

C. Transmission grating

D. Deflection grating

Ans. A

Q. Grating spectrum is produced because of

A. Dispersion of light

B. Scattering of light

C. Diffraction of light

D. Reflection of light

Ans. C

Q. In the diffraction pattern produced by transmission grating as the value of N increases the intensity of central principal maximum increases thereby

A. Intensity of other principal maxima also increases

B. Intensity of other principal maxima decreases

C. Intensity of other principal maxima remains constant

D. None of these.

Ans. B

Q. The condition for principal maximum for diffraction grating is

A. ( )

B. ( )

C.

D.

Ans. A

Q. In the diffraction grating having 15000 lines/inch the slit width is 8.128 × 10^{-5} cm and the distance between the two

slits is 8.805×10^{-5} cm. Then the value of grating element is,
A. 169.33×10^{-4} cm
B. 1.6933×10^{-5} cm
C. 16.933×10^{-4} cm
D. 1.6933×10^{-4} cm
Ans. D

Q. In the diffraction grating the value of grating element is, 1.6666×10^{-4} cm, Then the number of slits/cm is,
A. 6000
B. 1666
C. 5000
D. 6600
Ans. A

UNIT 1F

Q. The transverse nature of light is shown by
A. Interference
B. Refraction
C. Polarization
D. Dispersion
Ans. C

Q. 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
Ans. A

Q. Which of the following cannot be polarized?
A. Radio waves
B. Sound waves
C. Light waves
D. X-rays
Ans. B

Q. When unpolarized light is converted to polarized light its intensity
A. is increased
B. remains same
C. is decreased
D. None of these
Ans. C

Q. For complete polarization, light should be
A. Monochromatic
B. Dichromatic
C. From mercury vapour source
D. None of these
Ans. A

Q. We use sun glasses in the summer season, which acts as a
A. Polarizer
B. Analyzer
C. Both A and B are correct
D. None of these
Ans. A

Q. The device used to produce the polarized light is called as
A. Analyzer
B. Polarizer
C. Prism
D. None of these
Ans. B

Q. 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
Ans. D

Q. 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
Ans. B

Q. 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
Ans. A

Q. 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
Ans. A

Q. 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
Ans. B

Q. 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
Ans. A

Q. 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
Ans. C

Q. 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
Ans. C

Q. 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
Ans. A

Q. 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
D. None of these
Ans. A

Q. According to Brewster'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
Ans. D

Q. 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 polarized
D. Partially and partially polarized
Ans. B

Q. The mathematical statement of Brewster's law is
A. $\mu = \sin i_p$
B. $\mu = \sin r_p$
C. $\mu = \tan i_p$

D. $\mu = \cos i_p$
Ans. C

Q. 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
Ans. B

Q. The refractive index for water is 1.33. The polarizing angle for water (in degree) is
A. 53.06
B. 0.0232
C. 570
D. 52.06
Ans. A

Q. 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 refractive index of refraction of glass is
A. √(3/2)
B. 03
C. 01
D. √3
Ans. D

Q. The method of obtaining plane polarized light by refraction is
A. Brewster method
B. Malus method
C. Piles of plate's method
D. None of these
Ans. C

Q. 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
Ans. A

Q. 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
Ans. A

Q. The intensity of the polarized light transmitted by the analyzer varies as ______________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
Ans. C

Q. 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. $\sec^2\theta$
Ans. B

Q. 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. $I_m\sec^2\theta$
Ans. B

Q. 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
D. None of the above
Ans. C

Q. When the analyzer is rotated through 360^0, 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
Ans. C

Q. 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
Ans. A

Q. 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?
A. 360^0
B. 45^0
C. 90^0
D. 180^0
Ans. B

Q. 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
Ans. D

Q. 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
Ans. B

Q. Two Polaroid 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
Ans. C

Q. 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
Ans. A

Q. 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
Ans. A

Q. 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
Ans. A

MMIT, Lohgaon, Pune - 411047

FE - Engineering Physics

MCQs - Unit 2 - Lasers and Optical Fibers

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	In the ________ emitted radiation are coherent	Stimulated emission of radiations	Stimulated absorption of radiations	Spontaneous emission of radiations	all the above	1
2	There are ___ levels in Carbon Dioxide laser	1	2	3	4	4
3	There are ___ levels in Semiconductor diode laser	1	2	3	4	2
4	The ______ state is required for population inversion	Excited state	Ground state	Active state	Metastable state	4
5	The preferred state for electron is	Excited state	Ground state	Active state	Metastable state	2
6	Monochromaticity and highly directionality properties of laser are because of	Resonant cavity	Pumping	Stimulated absorption	Population inversion	1
7	In holography ________ of the interfering light is recorded.	Intensity	Phase	Both Intensity and phase	None of these	3
8	In semiconductor diode laser, the pumping mechanism is _____	Optical pumping	Thermal pumping	Forward bias	Chemical pumping	3
9	If N1 and N2 are number of atoms in ground state and excited states respectively then in normal state	N1 < N2	N1 > N2	N1 = N2	N1 = 2 x N2	2
10	As the laser beam propogates through space, its angular spread is very less. This property is called ____	Least divergence	More divergence	Less directional	Highly directional	1
11	A system in which population inversion is achieved is known as	Populated system	Active system	Inverted system	Excited system	2
12	Which types of semiconductors are preferred in semiconductor laser	Direct band gap	Indirect band gap	Both options 1 and 2 are true	Both options 1 or 2 are false	1
13	The atoms in a medium, which are responsible for laser transition are called as	Energetic atoms	Active centers	Excited atoms	Populated atoms	2
14	In CO2 laser, the active center is	Carbon dioxide	Nitrogen	Helium	Oxygen	1
15	The life time of metastable state is about	10^{-8} s	10^{-3} s	10^{-12} s	10^{-6} s	2
16	In Carbon Dioxide laser ____ atoms collide with CO_2 atoms to take it to the excited level	Nitrogen	Helium	Both nitrogen and helium	Neither nitrogen nor helium	1
17	Stimulated emission takes place when a photon strikes an electron in _________ energy level and forces electron to move to __________ energy level	Lower, Metastable	Metastable, lower	Metastable, higher	Higher, more higher	2
18	Carbon dioxide laser emits wavelength in	Visible region	Ultravoilet region	Infrared region	None of these	3
19	Which of the following is not a laser property?	Coherence	Directionality	High diversion	Extreme brightness	3
20	Population inversion is responsible for which property in laser?	Least divergence	More intensity	Coherence	Monochromatic	2
21	The principle of working of optical fibers is _____	Total internal refraction	Total internal absorption	Total Internal reflection	Total reflection	3

MMIT, Lohgaon, Pune - 411047
FE - Engineering Physics
MCQs - Unit 2 - Lasers and Optical Fibers

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
22	In an optical fibers, the refractive index of cladding is _____ than the refractive index of core	Greater	Lower	Equal	Any value	2
23	Inverse of sine of Numerical Aperture is	Acceptance cone	Acceptance angle	Critical angle	Refractive index	2
24	Compared to copper cables, optical fibers has ________ bandwidth	Large	Less	Equal	Cannot be compared	1
25	In optical fiber, acceptance cone is ________ the acceptance angle	Equal	Two times	Half	One third	2
26	The inner and outer parts of the optical fiber are ____ respectively	Core and cladding	Cladding and core	Cladding and sheath	Core and sheath	1
27	Signals are transmitted through optic fiber in the form of	Radio waves	Sound waves	Electrical signal	Visible or infrared light	4
28	In case of graded index fiber Numerical aperture of the fibre	Increases radially	Decreases radially	Remains constant	Cannot be determined	3
29	In optic fiber, if μ(core) is refractive index of core and μ(clad) is refractive index of cladding. What is essential out of following?	μ(core) < μ(core)	μ(core) > μ(core)	μ(core) = μ(core)	μ(core) ~ μ(core)	2
30	For an optic fiber placed in air, if acceptance angle is 52.74 degree, calculate numerical aperture	0.8956	0.7896	0.7958	0.7258	3
31	The graded index fibers are used for	Long distance transmission	Short distance transmission	Both long distance and short distance transmission	None of these	2
32	The attenuation in an optical fiber is measured in	dB/km	Bel/km	Bel	dB	1
33	In step-index optical fiber, the refractive index varies	Step-by-step	Varies with radial distance	Both options 1 and 2 are true	Both options 1 or 2 are false	1
34	In graded-index optical fiber, the refractive index varies	Step-by-step	Varies with radial distance	Both options 1 and 2 are true	Both options 1 or 2 are false	2
35	In an optical fiber the improper cabling gives rise to ___________	Macro-bending	Micro-bending	Light absorption	Light attenuation	2
36	If light incident at an angle greater than the critical angle in optical fiber it gives rise to	Total internal refraction	Total internal absorption	Total Internal reflection	Total reflection	3
37	The light collection ability of an optical fiber is determined by its ___	Numerical Aperture	Numerical Focus	Total Internal reflection	Diameter	1
38	The diameter of multimode optical fiber is ________ than single mode optical fiber	Less	Greater	Equal	None of these	2
39	The sine of acceptance angle is ______	Acceptance angle	Critical angle	Acceptance cone	Critical cone	1
40	A small-scale distortion in an optical fiber localized in a small area gives rise to	Micro-bending	Macro-bending	Absorption of signal	None of these	1

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
		Part I - Lasers					
L1	Basics of Laser	Laser light is possible for which electromagnetic region	Visible	Ultravoilet	Infrared	All of these	4
L2	Spontaneous Absorption	After the process of spontaneous absorption electron moves from ______ energy level to ______ energy level	Lower, higher	Higher, lower	Lower, lower	Higher, ground	1
L3	Spontaneous Emission	After the process of spontaneous emission electron moves from ______ energy level to ______ energy level	Lower, higher	Higher, lower	Lower, lower	None of these	2
L4	Emission of Radiations	If an electron moves from higher energy level to lower energy level, the frequency of photon emitted is given by	= (E2 - E1) / λ	= h / (E2 - E1)	= (E2 - E1) / h	= h / (E1 - E2)	3
L5	Emission of Radiations	If an electron moves from higher energy level to lower energy level, it may emit excess energy in the form of	Photons of visible light	Photons of ultraviolet light	Heat	All of these	4
L6	Emission of Radiations	If an electron moves from higher energy level to lower energy level and emits excess energy in the form of heat. This is known as	Radiative transition	Non radiative transition	Stimulated emission	Spontaneous emission	2
L7	Stimulated emission	A photon incident on an electron that is already in excited state. Which of the following is possible?	Photon is absorbed by electron and electron moves in further excited state	Photon stimulates electron to move into lower energy state	Both (a) and (b) are equally and likely events	None of (a) and (b) are equally and likely events	3
L8	Stimulated emission	In stimulated emission the electrons undergo transition from ______ energy level to ______ energy level	Lower, Metastable	Metastable, lower	Metastable, higher	Higher, more higher	2
L9	Stimulated emission	In stimulated emission, the energy of incident photon should be _______ the energy level difference between two energy states	Equal to	More than	Less than	None of these	1
L10	Stimulated emission	In stimulated emission, the energy of emitted photon is _______ the energy level difference between two energy states	Equal to	More than	Less than	None of these	1
L11	Stimulated emission	In the ________ emitted radiation are coherent	Stimulated emission	Stimulated absorption	Spontaneous emission	all the above	1
L12	Stimulated emission	Which of the following phenomenon is essential for production of laser?	Spontaneous emission	Stimulated emission	Spontaneous absorption	Stimulated absorption	2
L13	Population Inversion	In equilibrium, the preferred state for electron is	Excited state	Ground state	Active state	Metastable state	2
L14	Population Inversion	Lifetime of an excited state is around	Few seconds	Few milliseonds	Few microseconds	Few nanoseconds	4
L15	Population Inversion	Lifetime of metastable state is around	Few seconds	Few milliseonds	Few microseconds	Few nanoseconds	3
L16	Population Inversion	If N1 and N2 are number of atoms in ground state and excited states respectively then in normal state	N1 < N2	N1 > N2	N1 = N2	N1 = 2 x N2	2
L17	Population Inversion	If N1 and N2 are number of atoms in ground state and excited states respectively then in population inversion	N1 < N2	N1 > N2	N1 = N2	N1 = 2 x N2	1
L18	Population Inversion	A system in which population inversion is achieved is known as	Populated system	Active system	Inverted system	Excited system	2

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
L19	Population Inversion	Population inversion in laser can be achieved by the process of	Stimulated emission	Spontaneous emission	Pumping	None of these	3
L20	Active medium	A medium that is used to produce laser is known as	Energetic medium	Active medium	Excited medium	Populated medium	2
L21	Active medium	Which of the following can be used as an active medium to produce lasers?	Solids	Liquids	Gases	All of these	4
L22	Active centers	The atoms in a medium, that are responsible for giving out laser transitions are known as	Energetic atoms	Active centers	Excited atoms	Populated atoms	2
L23	Resonant Cavity	The purpose of resonant cavity is to	Re-circulate the light within the medium	To enhance stimulated emission	Allow the photons traveling along axis of cavity to come out	All of these	4
L24	Basics of Laser	Which of the following is essential for the production of laser?	Pumping	Stimulated emission	Population inversion	All of these	4
L25	Properties of laser	Which of the following is not a laser property?	High Coherence	High Directionality	High diversion	Extreme brightness	3
L26	Properties of laser	High directionality of laser is because of	Resonant cavity	Pumping	Stimulated absorption	Population inversion	1
L27	Properties of laser	As the laser beam propogates through space, its angular spread is very less. This property is called	Least divergence	More divergence	Less directional	Highly directional	1
L28	Population Inversion	Population inversion is responsible for which property in laser?	Least divergence	Extreme brightness	Coherence	Monochromatic	2
L29	Properties of laser	Laser beam is monochromatic, which means all the photons in laser beam have	Same energy	Same phase	Same wavelength	None of these	3
L30	Properties of laser	Laser beam is coherent, which means all the photons in laser beam have	Same energy	Same phase	Same wavelength	None of these	2
L31	Properties of laser	Which of the following is responsible for high directionality of laser beam?	Pumping	Cavity resonator	Population inversion	Stimulated emission	2
L32	Properties of laser	Which of the following is responsible for amplification of light in laser?	Pumping	Stimulated emission	Resonant cavity	Population inversion	2
L33	Properties of laser	Which of the following is responsible for monochromaticity of light in laser?	Pumping	Stimulated emission	Resonant cavity	Population inversion	2
L34	CO2 laser	Which modes of vibrations are possible in carbon dioxide	Symmetric stretching	Assymetric stretchin	Bending or twisting	All of these	4
L35	CO2 laser	The transitions in carbon dioxide corresponding to symmetric stretching are of	10.6 micrometer	9.6 micrometer	Both 1 and 2 are correct	Both 1 and 2 are incorrect	1
L36	CO2 laser	The transitions in carbon dioxide corresponding to bending are of	10.6 micrometer	9.6 micrometer	Both 1 and 2 are correct	Both 1 and 2 are incorrect	2
L37	CO2 laser	In CO2 laser, the perentage of CO2 : N2 : He is	10 : 10 : 80	10 : 80 : 10	80 : 10 : 10	80 : 10 : 80	1
L38	CO2 laser	In CO2 laser, the active center is	Carbon dioxide	Nitrogen	Helium	Oxygen	1
L39	CO2 laser	The pumping mechanism utilized on CO2 laser is	Optical pumping	Electrical pumping	Chemical pumping	None of these	2
L40	CO2 laser	In CO2 laser, the collision between discharge electrons with ____ atoms is necessary to take them to the excited level	Nitrogen	Helium	Both nitrogen and helium	Neither nitrogen nor helium	1
L41	CO2 laser	In CO2 laser the collision of _______ atoms with CO2 molecules is necessary to take CO2 to the excited level	Nitrogen	Helium	Both nitrogen and helium	Neither nitrogen nor helium	1
L42	CO2 laser	There are levels in CO2 laser	1	2	3	4	4
L43	CO2 laser	In CO2 laser, population inversion is required in	Nitrogen	Helium	CO2	All of these	3
L44	CO2 laser	CO2 laser emits wavelength in	Visible region	Ultravoilet region	Infrared region	None of these	3

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
L45	CO2 laser	CO2 laser emits wavelength in	10.6 micrometer	9.6 micrometer	Both 10.6 micrometer and 9.6 micrometer	Both 1 and 2 are incorrect	3
L46	Heterojunction Laser	In direct band gap semiconductors, conduction band electrons recombine with holes in valence band and this recombination gives rise to	Emission of heat	Emission of light	Both 1 and 2 are true	None of these	2
L47	Heterojunction Laser	In indirect band gap semiconductors, conduction band electrons recombine with holes in valence band and this recombination gives rise to	Emission of heat	Emission of light	Both 1 and 2 are true	None of these	1
L48	Heterojunction Laser	The __________ band gap semiconductors are used for manufacturing semiconductor laser diodes	Direct	Indirect	Both 1 and 2 are true	None of these	1
L49	Heterojunction Laser	_________ laser uses same material on boths sides of PN junction	Homojunction	Heterojunction	Both 1 and 2 are true	None of these	1
L50	Heterojunction Laser	_________ laser uses different material on boths sides of PN junction	Homojunction	Heterojunction	Both 1 and 2 are true	None of these	2
L51	Heterojunction Laser	Drawbacks of homojunction laser are	Active region is not well defined	Light diffuse from active layer to surrounding medium	High threshold current is required to operate	All of these	4
L52	Heterojunction Laser	In heterojunction and additional layer of P-GaAlAs is doped over P-GaAs region. The P-GaAlAs layer has	More band gap energy and lower refractive index than P-GaAlAs	More band gap energy and higher refractive index than P-GaAlAs	Less band gap energy and higher refractive index than P-GaAlAs	Less band gap energy and less refractive index than P-GaAlAs	1
L53	Heterojunction Laser	What is referred to the heterojunction?	the boundary between P-GaAs and N-GaAs	the boundary between P-GaAlAs and N-GaAs	the boundary between P-GaAlAs and P-GaAs	None of these	3
L54	Heterojunction Laser	There are ___ levels in single heterojunction laser	1	2	3	4	2
L55	Heterojunction Laser	The pumping mechanism utilized on single heterojuction laser diode is	Optical pumping	Electrical pumping	Forward bias	Chemical pumping	3
L56	Heterojunction Laser	In single heterojunction laser diode, the active region is	p-GaAs	p-GaAlAs	n-GaAs	n-GaAlAs	1
L57	Heterojunction Laser	The advantage of of heterojunction is	photons (laser light) are reflected back into p-GaAs active region	photons (laser light) trapped within the active region improving population inersion	help photons (laser light) travels in one direction	All of these	4
L58	Heterojunction Laser	The advantage of single heterojunction laser over homojunction laser is	High efficiency	Less operating current	Contineous laser output	All of these	4
L59	Heterojunction Laser	In heterojunction laser diode, cavity resonator is	p-GaAs	p-GaAlAs	Waveguide and polished ends	PN junction	3
L60	Heterojunction Laser	In heterojunction laser diode, the role of cavity resonator and polished ends is	To re-circulate the light for stimulated emission	Give direction to the laser beam	To make laser beam less divergent	All of these	4
L61	Heterojunction Laser	In heterojunction laser diode, population inversion is achieved when most of the electrons are in	Heterojunction	PN junction	Valence band	Conduction band	4

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
L62	Heterojunction Laser	In heterojunction laser diode, the role of forward bias is	It increases number of electrons in conduction band and works as pumping	It reduces the band gap energy	It helps for recombination of electrons and holes, which then emits a photon	All of these	4
L63	Heterojunction Laser	In heterojunction laser diode, the role of recirculation of light (reflected photons from polished ends through resonant cavity) is	They strike electrons in conduction band and activate stimulated emission	They are absorbed by electrons in valence band to move them to conduction band	They provide amplification of light due to process (a) and (b)	None of these	3
L64	Holography	In holography ________ of the interfering light is recorded.	Intensity	Phase	Both Intensity and phase	None of these	3
L65	Holography	In holography the information of object in ___ dimensions is recorded	1	2	3	4	3
L66	Holography	Which property of laser is useful for recording and reconstruction of holograms?	High intensity	High coherence	High monochromaticity	None of these	2
L67	Holography	If a hologram is broken into pieces, each piece would contain entire information about the objects.	This statement is true	This statment is false			1
L68	Holography	Holography is based on the principle of	Interference	Diffraction	Polarization	Interferometer	1
L69	Holography	When viewing a hologram, the reconstructed image changes position as you move around	This statement is true	This statment is false			1
L70	Holography	During reconstruction of hologram we get	Real image	Virtual images	Both real and virtual images	None of these	3
L71	Holography	After recording information on a holographic plate, its role is similar to a	interference grating	Diffraction grating	both 1 and 2	None of these	2
L72	Holography	In holography, interference pattern is recorded using	Reference beam	Objecte beam	both 1 and 2	None of these	3
L73	Holography	During reconstruction, the role of a hologram is similar to that of a	Polarizer	Analyzer	Diffraction grating	Single slit	3
L74	Holography	During recording process, the object beam diffracted through every point of the object affects	Entire hologram	Only a specific part of hologram	None of these		1
L75	Holography	If the direction of laser beam that incident on hologram changes	Object will be reconstructed with same information	Object will be reconstructed with different information	Object will not be reconstructed		2
L76	Holography	In the holography recording process, the characteristics of which beam is modified	Object beam	Reference beam	Both 1 and 2	None of 1 and 2	1
L77	Applications of laser	Which of the property of laser is useful in industrial applications such as cutting and welding?	High intensity	High coherence	High monochromaticity	Less divergence	1
L78	Applications of laser	The laser that is preferred in industrial applications such as cutting and welding is	CO2 laser	Single heterojunction laser diode	Both 1 and 2	None of 1 and 2	1
		Part II - Optical Fibers					
O1	Construction of optical fiber	The optical fiber is made of ________ material	Transparent	Opaque	Both 1 and 2	None of 1 and 2	1
O2	Construction of optical fiber	In optical fibers, the purpose of core is to	Transmit the light	Total internal reflection	Both 1 and 2	None of 1 and 2	1
O3	Construction of optical fiber	In optical fibers, the purpose of cladding is to	Transmit the light	Total internal reflection	Both 1 and 2	None of 1 and 2	2

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
O4	Construction of optical fiber	In optic fiber, if μ(core) is refractive index of core and μ(clad) is refractive index of cladding. What is essential out of following?	μ(core) < μ(cladding)	μ(core) > μ(cladding)	μ(core) = μ(cladding)	None of these	2
O5	Construction of optical fiber	In optic fiber, if n1 is refractive index of core and n2 is refractive index of cladding. What is essential out of following?	n1 < n2	n1 > n2	n1 = n2	None of these	2
O6	Construction of optical fiber	In an optical fibers, the refractive index of cladding is than the refractive index of core	Greater	Lower	Equal	Any value	2
O7	Construction of optical fiber	The inner and outer parts of the optical fiber are ____ respectively	Core and cladding	Cladding and core	Cladding and sheath	Core and sheath	1
O8	Construction of optical fiber	Signals are transmitted through optic fiber in the form of	Radio waves	Sound waves	Electrical signal	Visible or infrared light	4
O9	Construction of optical fiber	In optical fibers the data such as voice signal, audio, video, images are send as	Electrical signal	Light signal	Original format	None of these	2
O10	Critical angle	If θ is angle of incidence of laser beam into core and θc is critical angle, if θ < θc then laser beam will undergoe	Partial reflection and partial refraction	Grazing parallel to the surface	Total internal reflection	None of these	1
O11	Critical angle	If θ is angle of incidence of laser beam into core and θc is critical angle, if θ = θc then laser beam will	Partial reflection and partial refraction	Grazing parallel to the surface	Total internal reflection	None of these	2
O12	Critical angle	If θ is angle of incidence of laser beam into core and θc is critical angle, if θ > θc then laser beam will	Partial reflection and partial refraction	Grazing parallel to the surface	Total internal reflection	None of these	3
O13	Critical angle	If θ is angle of incidence of laser beam into core and θc is critical angle, what is essential obtain total internal reflection of laser into core	θ = θc	θ > θc	θ < θc	None of these	2
O14	Critical angle	Critical angle is defined as inverse of sine of ratio of	n1	n2	(n1 / n2)	(n2 / n1)	4
O15	Critical angle	If refractive index of core is increased, it will ______ the critical angle	Increase	Decrease	Remains constant	None of these	2
O16	Critical angle	If refractive index of core is decreased, it will ______ the critical angle	Increase	Decrease	Remains constant	None of these	1
O17	Critical angle	If refractive index of cladding is increased, it will ______ the critical angle	Increase	Decrease	Remains constant	None of these	1
O18	Critical angle	If refractive index of cladding is decreased, it will ______ the critical angle	Increase	Decrease	Remains constant	None of these	2
O19	Critical angle	If refractive index of cladding is made equal to that of core, the critical angle will be	Less than 90 degree	More than 90 degree	Equal to 90 degree	None of these	3
O20	Total internal reflection	The principle of working of optical fibers is _____	Total internal reflection	Total internal refraction	Total external reflection	None of these	1
O21	Total internal reflection	What is essential for an optical fiber?	Total internal reflection	Total internal refraction	Total external reflection	None of these	1
O22	Total internal reflection	When a ray of light incidents at critical angle	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	3
O23	Total internal reflection	When a ray of light incidents at angle less than critical angle	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	1
O24	Total internal reflection	When a ray of light incidents at angle greater than critical angle	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	2
O25	Total internal reflection	If light incident at an angle greater than the critical angle in optical fiber it gives rise to	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	2

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
O26	Acceptance angle	The laser beam incident at an angle less than acceptance angle will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	2
O27	Acceptance angle	The laser beam incident at an angle greater than acceptance angle will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	1
O28	Acceptance angle	The laser beam incident at an angle equal to the acceptance angle will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	3
O29	Acceptance angle	If the refractive index of core is increased, the acceptance angle will	Increase	Decrease	Remains constant	None of these	1
O30	Acceptance angle	If the refractive index of core is reduced, the acceptance angle will	Increase	Decrease	Remains constant	None of these	2
O31	Acceptance cone	In optical fiber, acceptance cone is ________ the acceptance angle	Equal	Two times	Half	One third	2
O32	Acceptance cone	The laser beam enters the core from outside the acceptance cone will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	1
O33	Acceptance cone	The laser beam enters the core grazing the acceptance cone will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	3
O34	Acceptance cone	The laser beam enters the core from inside the acceptance cone will undergoe	It is refracted into the cladding	Total internal reflection into the core	It grazes the surface and moves parallel	None of these	2
O35	Numerical Aperture	The light collection ability of an optical fiber is determined by its	Numerical Aperture	Numerical Focus	Total Internal reflection	Diameter	1
O36	Numerical Aperture	If the diameter of core is incrased, the numerical aperture will	Increase	Decrease	remains constant	None of these	1
O37	Numerical Aperture	The sine of acceptance angle is ______	Numerical aperture	Critical angle	Acceptance cone	Critical cone	1
O38	Numerical Aperture	Inverse of sine of Numerical Aperture is	Acceptance cone	Acceptance angle	Critical angle	Refractive index	2
O39	Numerical Aperture	If refractive index of core is increased, it will ______ the numerical aperture	Increase	Decrease	remains constant	None of these	1
O40	Numerical Aperture	If refractive index of core is reduced, it will ______ the numerical aperture	Increase	Decrease	remains constant	None of these	2
O41	Numerical Aperture	If refractive index of cladding is increased, it will ______ the numerical aperture	Increase	Decrease	remains constant	None of these	2
O42	Numerical Aperture	If refractive index of cladding is reduced, it will ______ the numerical aperture	Increase	Decrease	remains constant	None of these	1
O43	Modes of vibration	In Transverse Electric and Magnetic (TEM) mode _________ vibrations are transverse to the direction of propagation	Electric field	Magnetic field	Both electric and magnetic fields	None of these	3
O44	Modes of vibration	In the ___________, the electric field is transverse to the direction of propagation while the magnetic field is normal to the direction of propagation	Transverse Electric (TE) mode	Transverse Magnetic (TM) mode	In both Transverse Electric (TE) and Transverse Magnetic (TM) modes	None of these	1
O45	Modes of vibration	In the ___________, the magnetic field is transverse to the direction of propagation while the electric field is normal to the direction of propagation	Transverse Electric (TE) mode	Transverse Magnetic (TM) mode	In both Transverse Electric (TE) and Transverse Magnetic (TM) modes	None of these	2
O46	Classification of optical fibers	Based on number of modes transmitted through it, optical fibers are categorized as	Single mode and multimode fibers	Step index and graded index fibers	Both 1 and 2	None of 1 and 2	1

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
O47	Classification of optical fibers	Based on relation between refractive index of core and cladding	Single mode and multimode fibers	Step index and graded index fibers	Both 1 and 2	None of 1 and 2	2
O48	Classification of optical fibers	________ optical fibers transmit one mode	Single mode	Multimode	Both 1 and 2	None of 1 and 2	1
O49	Classification of optical fibers	________ optical fibers transmit more than one mode	Single mode	Multimode	Both 1 and 2	None of 1 and 2	2
O50	Classification of optical fibers	The diameter of multimode optical fiber is ________ than single mode optical fiber	Less	Greater	Equal	None of these	2
O51	Classification of optical fibers	In single mode fibers, the difference in refractive index of core and cladding is	Small	Large	Cannot be defined	Invalid question	1
O52	Classification of optical fibers	In multi mode fibers, the difference in refractive index of core and cladding is	Small	Large	Cannot be defined	Invalid question	2
O53	Classification of optical fibers	__________ optical fibers suffers intermodal dispersion	Single mode	Multimode	Both 1 and 2	None of 1 and 2	2
O54	Classification of optical fibers	________ optical fibers are utilized in longer distance communication with less bandwidth	Single mode	Multimode	Both 1 and 2	None of 1 and 2	1
O55	Classification of optical fibers	________ optical fibers are utilized in short distance communi :ation with less bandwidth	Single mode	Multimode	Both 1 and 2	None of 1 and 2	2
O56	Classification of optical fibers	In ___________ the refractive index of the fiber changes abruptly at the core-cladding boundary	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	1
O57	Classification of optical fibers	In ___________ the refractive index of the fiber changes gradually across the core-cladding boundary	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	2
O58	Classification of optical fibers	In step-index optical fiber, the refractive index varies	Step-by-step	Varies with radial distance	Both options 1 and 2 are true	Both options 1 or 2 are false	1
O59	Classification of optical fibers	In graded-index optical fiber, the refractive index varies	Step-by-step	Varies with radial distance	Both options 1 and 2 are true	Both options 1 or 2 are false	2
O60	Classification of optical fibers	In case of graded index fiber Numerical aperture of the fibre	Increases radially	Decreases radially	Remains constant	Cannot be determined	3
O61	Classification of optical fibers	The difference between refractive indices of core and cladding is ______ in step index fibers	Large	Small	Equal	None of these	1
O62	Classification of optical fibers	The difference between refractive indices of core and cladding is ______ in graded index fibers	Large	Small	Equal	None of these	2
O63	Classification of optical fibers	_________ are used for transmission of single and multimode signals for short distance communication	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	1
O64	Classification of optical fibers	_________ are used for transmission of multimode signals for comparatively longer distance communication	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	2
O65	Classification of optical fibers	Intermodal dispersion is larger in ____	Multimode Step index fibers	Multimode Graded index fibers	Both 1 and 2	None of 1 and 2	1
O66	Classification of optical fibers	Numerical aperture is more in	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	2
O67	Classification of optical fibers	_________ are used to carry signals of more bandwidth	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	2
O68	Classification of optical fibers	In ________ the path of laser beam is zigzag (Meridonial Rays)	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	1
O69	Classification of optical fibers	In ________ the path of laser beam is spherical or helical (SKEW rays)	Step index fibers	Graded index fibers	Both 1 and 2	None of 1 and 2	2

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
O70	Classification of optical fibers	The step index fibers are used for _______ with less bandwidth	Long distance transmission	Short distance transmission	Both long distance and short distance transmission	None of these	1
O71	Classification of optical fibers	The graded index fibers are used for _______ with more bandwidth	Long distance transmission	Short distance transmission	Both long distance and short distance transmission	None of these	2
O72	Classification of optical fibers	Compared to copper cables, optical fibers has ________ bandwidth	Large	Less	Equal	Cannot be compared	1
O73	Attenuation in optical fibers	Because of attenuation, in the optical fibers, the power of signal at output is ______ than the power of signal at input	Greater	Less	Equal	None of these	2
O74	Attenuation in optical fibers	The attenuation in an optical fiber is measured in	dB/km	Bel/km	Bel	dB	1
O75	Attenuation in optical fibers	The attenuation caused by the material of the optical fiber is known as	Intrinsic attenuation	Extrinsic attenuation	Both 1 and 2	None of 1 and 2	1
O76	Attenuation in optical fibers	Intrinsic attenuation in optical fibers is caused due to	Absorption of signal by hydroxyl ions	Absorption of signal by pure glass	Rayleigh's scattering	All of these	4
O77	Attenuation in optical fibers	To control the intrinsic attenuation	Fiber an be designed with pure material	Improvement in manufacturing process	Wavelength of laser is limited to 1700 nm (infrared)	All of these	4
O78	Attenuation in optical fibers	If wavelength of laser light is increased above 1700 nm,	Infrared absorptions due to hydroxyl ions are high	Attenuation will be more	Intrinsic losses are more	All of these	4
O79	Attenuation in optical fibers	The major (around 95%) losses due to intrinsic attenuation are because of	Absorption of signal by hydroxyl ions	Absorption of signal by pure glass	Rayleigh's scattering	Dispersion	3
O80	Attenuation in optical fibers	If wavelength of laser light is decreased below 800 nm,	Infrared absorptions due to hydroxyl ions are high	Rayleigh scattering will be more	Both 1 and 2	None of 1 and 2	2
O81	Attenuation in optical fibers	Intrinsic attenuation in optical fibers will be _____ if wavelength of laser is decreased below 800 nm	More	Less	Remains constant	It does not depen on wavelength	1
O82	Attenuation in optical fibers	In an optical fiber, below 800 nm losses due to ______ and above 1700 nm losses due to _______ would be more	Rayleigh scattering, Internal absorption	Internal absorption, Rayleigh scattering			1
O83	Attenuation in optical fibers	The wavelength region (window) preferred in optical fiber communication is	820 nm – 880 nm	1200 nm – 1320 nm	1550 nm - 1610 nm	None of these	3
O84	Attenuation in optical fibers	In the wavelength region (windows) ________the intrinsic attenuation are minimum	820 nm – 880 nm	1200 nm – 1320 nm	1550 nm - 1610 nm	None of these	3
O85	Attenuation in optical fibers	During the propagation through optical fibers the pulse get widen and there is loss of information. This is known as	Dispersion or pulse distortion	Attenuation	Absorption	External attenuation	1
O86	Attenuation in optical fibers	A small-scale distortion in an optical fiber localized in a small area gives rise to	Micro-bending	Macro-bending	Absorption of signal	None of these	1
O87	Attenuation in optical fibers	In an optical fiber the improper cabling gives rise to	Macro-bending	Micro-bending	Light absorption	Light attenuation	1
O88	Attenuation in optical fibers	In an optical fiber the micro and macro bending results into	Change in critical angle	Rays will not undergo total internal reflection	Rays would refract out of the core and lost	All of these	3

UNIT 2

Q. LASER is a abbreviation of
A. Light amplification by spontaneous emission of radiation
B. Light amplification by stimulated emission of radiation
C. Light absorption by stimulated emission of radiation
D. Light absorption by spontaneous emission of radiation
Ans. B

Q. Laser beam is made of
A. Highly coherent electrons
B. Highly coherent photons
C. Highly coherent phonons
D. None of them
Ans. B

Q. The life time of electron in metastable state is of the order of
A. 10^{-9} S.
B. 10^{-3} S.
C. 10^{-8} S.
D. 10^{-7} S.
Ans. B

Q. The energy state of an atom is said to be metastable when its
A. Life time is of the order of 0.01 sec
B. Life time is of the order of 0.001 sec
C. Life time is of the order of 0.1 sec
D. Life time is of the order of 1 sec
Ans. B

Q. In the population inversion
A. The number of electrons in higher energy state is more than the ground state
B. The number of electrons in lower energy state is more than higher energy state
C. The number of electrons in higher and lower energy state is same
D. None of them
Ans. A

Q. The characteristics of laser beam are
A. Highly directional
B. Highly intense
C. Highly monochromatic
D. All of them
Ans. D

Q. The energy of photon is equal to
A.
B. –
C.
D. None of them
Ans. A

Q. Which event is likely to take place when a photon of energy equal to the difference in energy between two levels is incident in a system?
A. Absorption
B. Emission
C. Absorption and emission
D. None of the above
Ans. C

Q. The first laser was invented in May, 1960 by
A. T.H. Maiman
B. Maxwell
C. Einstein
D. C. V. Raman
Ans. A

Q. When atom is expose to radiation having a stream of photons each with energy ,then the following processes can take place
A. Absorption
B. Spontaneous emission
C. Stimulated emission
D. All A,B and C can take place.
Ans. D

Q. An atom or molecule in the ground state of energy E_1 can absorb photon of energy and go the higher energy state E_2, this process is known as
A. Stimulated radiation
B. Stimulated absorption
C. Stimulated emission
D. Spontaneous absorption
Ans. B

Q. In spontaneous emission the atoms or molecules in the higher energy state E_2 eventually return to the ground state E_1 by emitting their excess energy spontaneously. The rate of spontaneous emission is
A. Directly proportional to population of the excited energy level E_2.
B. Directly proportional to population of the energy level E_1.
C. Inversely proportional to population of the energy level E_2.
D. None of the above
Ans. A

Q. In stimulated emission, a photon having energy E equal to the difference in energy between two levels E_2 and E_1, stimulate an atom in the higher state to make a transition to the
A. Lower energy state with a creation of second photon.
B. Metastable state with creation of second photon.
C. Higher energy state with a creation of two photons.
D. None of the above
Ans. A

Q. The rate of spontaneous emission depends upon the number of atoms in the
A. A Ground state
B. Excited state
C. Metastable state
D. None of the above
Ans. B

Q. The rate of stimulated emission depends both on
A. The energy of external photon and on the number of atoms in the excited state.
B. The energy of external photon and the number of atoms in the ground state.
C. The energy of external photon and on the number of atoms in the metastable state
D. None of the above
Ans. C

Q. The spontaneous emission produces
A. A Coherent light
B. Incoherent light
C. White light
D. None of the above
Ans. B

Q. The material in which population inversion can take place is called _________
A. Active medium
B. Passive medium
C. Gaseous medium
D. Vapour medium
Ans. A

Q. In case of population inversion, the number atoms is________
A. more in higher energy state than in the lower energy state
B. more in higher energy state than in meta-stable state
C. more in lower energy state than in the higher energy state
D. None of them
Ans. A

Q. The state of population inversion is also known as ____
A. positive temperature state
B. Negative temperature state
C. Equilibrium state
D. Infinite temperature state
Ans. B

Q. The process of raising the atoms from a lower energy state to higher, to create population inversion is called
A. Exothermal reaction
B. Endothermic reaction
C. Pumping
D. None of the above
Ans. C

Q. In case of optical pumping, an external optical source like Xenon flash lamp is employed to produce
A. A lower population in the meta stable state of laser medium
B. Low population in the higher energy level of laser medium

C. Higher population in the lower energy level of laser medium
D. High population in the higher energy level of laser medium
Ans. D

Q. Optical pumping is suitable for any medium which is
A. A Transparent to light
B. Not transparent to light
C. Metallic
D. None of the above
Ans. A

Q. Electrical pumping is used for some medium which can conduct electricity
A. affecting the laser activity
B. without affecting the laser activity
C. without affecting excited energy state
D. None of the above
Ans. B

Q. In a semiconductor laser, electrical energy is directly converted to
A. Light energy
B. Sound energy
C. Heat energy
D. Nuclear energy
Ans. A

Q. An optical resonator plays a major role in
A. Stimulating more and more atoms from excited state to ground state
B. Generation of intense laser output
C. Generation of unidirectional beam of photons
D. All of them
Ans. D

Q. Ruby laser is a solid state laser, the active medium is
A. Crystalline substance
B. Non crystalline substance
C. Gaseous substance
D. Amorphous substance
Ans. A

Q. Laser light is produced mainly due to
A. interference phenomenon
B. spontaneous emission of light
C. stimulated emission of radiation.
D. diffraction phenomenon
Ans. C

Q. Which of the following conditions is essential for the production of laser light?
A. Stimulated absorption
B. Stimulated emission process
C. Population inversion process
D. All of them
Ans. D

Q. Which of the following is not a pumping process?
A. Optical pumping
B. Electrical pumping
C. Chemical pumping
D. Thermal pumping
Ans. D

Q. Which of the following is not a laser property?
A. Coherence
B. Divergence
C. Extreme brightness
D. Highly directional
Ans. B

Q. Laser system does not include
A. Active medium
B. Pumping mechanism
C. Optical activity
D. Optical resonator
Ans. C

Q. Which source of light is brightest?
A. Sunlight
B. Laser light
C. Arc light
D. Sodium light
Ans. B

Q. The mathematical expression for existence of stimulated emission was proposed by
A. Einstein
B. de-Broglie
C. Kelvin
D. Heisenberg

Ans. A

Q. The population inversion takes place at __________medium.
A. active
B. passive
C. moderate
D. none of the above
Ans. A

Q. The spontaneous emission means emitting a photon because of………
A. transition of atom from excited state to ground state after completion of life time on its own accord.
B. transition of atom from ground state to excited state after completion of life time on its own accord.
C. transition of atom from excited state to ground state before completion of life time on its own accord.
D. Stimulation of atom from excited state to ground state before completion of life time on its own accord.
Ans. A

Q. The stimulated emission of radiation means ………………
A. before completion of life time, stimulation of an atom from higher state to lower energy state
B. after completion of life time, stimulation of an atom from higher state to lower energy state
C. before completion of life time, stimulation of an atom from lower state to higher energy state
D. none of the above
Ans. A

Q. The condition needed for laser action is…………………..
A. stimulated absorption
B. spontaneous emission
C. stimulated emission
D. population inversion.
Ans. D

Q. The population inversion is to………
A. Depopulate lower energy state
B. Depopulate higher energy state
C. Depopulate metastable state
D. none of the above
Ans. A

Q. In the optical pumping ……………
A. Photons are used to excite the atoms in the medium
B. electrical energy is used to excite the atoms in the medium
C. magnetic energy is used to excite the atoms in the medium
D. All of these
Ans. A

Q. Because of _________ in laser system, laser beam is unidirectional.
A. active medium
B. composition of active medium
C. resonant cavity
D. pumping mechanism
Ans. C

Q. The He-Ne laser is a kind of neutral atom gas laser in which the wavelength of laser is
A. $6443A^0$
B. $6328A^0$
C. $10600A^0$
D. None of the above
Ans. B

Q. Ruby is crystalline substance of Aluminium oxide doped with
A. Approximately 0.005% by weight of Chromium oxide.
B. Approximately 0.5% by weight of Chromium oxide.
C. Approximately 0.05% by weight of Chromium oxide.
D. Approximately 5% by weight of Chromium oxide
Ans. A

Q. In case of Ruby laser, the resultant pink colour is due to presence of Cr^{+3} ions in the appropriate concentration which

A. Replace Na atoms in the crystal lattice

B. Replace Oxide atoms in the crystal lattice
C. Replace Al atoms in the crystal lattice
D. Replace some Al atoms and some Na atoms in the crystal lattice
Ans. C

Q. The main advantage of gas lasers is that
A. They can operate in the pulse mode

B. They cannot be operated continuously
C. They can operate continuously
D. None of the above
Ans. C

Q. Advantages of semiconductor diode laser are
A. Efficiency is more than 10%
B. They can have a continuous wave output or pulsed output.
C. Highly economical, and the arrangement is compact
D. All of them
Ans. D

Q. The applications of laser in communication are the laser beams are used to transmit thousands of TV programs and simultaneous telephone conversation at
A. time
B. The communication between the planets has been made possible using laser beams
C. The laser light waves are not absorbed by water and hence it can be successfully employed to establish under water communication between submarines
D. All of them
Ans. D

Q. Which laser was invented first?
A. Semiconductor laser
B. Ruby laser
C. He-Ne laser
D. CO2 laser
Ans. B

Q. Which of the following is a gas laser?
A. He-Ne laser
B. Ruby laser
C. Semiconductor laser
D. Nd-YAG laser
Ans. A

Q. Pulsed laser light is produced from a
A. Ruby laser
B. CO_2 laser
C. Semiconductor laser
D. He-Ne laser
Ans. A

Q. In Ruby laser which ions give rise to the laser action?
A. Al_2O_3
B. Al^{+3}
C. Cr^{+3}
D. O^{+3}
Ans. C

Q. Example of solid-state laser is
A. He-Ne laser
B. Ruby laser
C. CO_2 laser
D. none of the above
Ans. B

Q. In a Ruby laser, the active medium consist of aluminum-oxide doped with 0.005 wt. of
A. chromium oxide
B. carbon oxide
C. iron oxide
D. Silver oxide
Ans. A

Q. In a Ruby laser, the laser action is achieved by …………
A. gas discharge
B. electrical pumping
C. optical pumping
D. Molecular collision
Ans. C

Q. Ruby laser radiates an intense pulse laser of wavelength …………
A. $6328A^0$
B. $6938\ A^0$

C. 6943 A^0
D. 6334 A^0
Ans. C

Q. The light source used for optical pumping in Ruby laser is…………..
A. Neon
B. Xenon
C. Argon
D. none of these.
Ans. B

Q. The active medium of a helium-neon laser is made up of .... ratio of helium-neon.
A. 10:2
B. 10:1
C. 10:3
D. 10:49
Ans. B

Q. Complete the following reaction for helium-neon laser reaction He* + Ne → He + _________
A. Ne*
B. He*
C. Ne
D. He
Ans. A

Q. In a He-Ne laser, helium is used to decrease the population in …………
A. higher level of Ne
B. lower level of Ne
C. metastable level of Ne
D. Intermediate level of Ne
Ans. B

Q. Diode laser consists of …........... doped in a single crystal.
A. p-n junction
B. p type
C. n-type
D. n-p-n transistor
Ans. A

Q. LED is converted into a laser diode employing a………………
A. low current
B. high current
C. medium current
D. none of the above
Ans. B

Q. This is not a type of laser
A. solid state lasers
B. gas lasers
C. semiconductor lasers
D. liquid laser
Ans. D

Q. The advantages of using laser drilling in industries is/are
A. it generates very low heat in the material during drilling
B. it is possible to drill at different angles
C. its accuracy and consistency are very high
D. all of them
Ans. D

Q. The advantages of gas cutting laser is/are
A. very fast and accurate
B. very simple and cost effective
C. it is used to cut materials of any thickness with high precision
D. all of them
Ans. D

Q. The condition of total internal reflection is that ……………
A. the angle of incidence exceeds the critical angle
B. the angle of incidence is less than critical angle
C. the angle of incidence is equal to critical angle
D. none of the above
Ans. A

Q. The critical angle is defined as
A. the refraction at which the total internal reflection occurs
B. the reflection at which the total internal reflection occurs
C. the angle of incidence at which total internal reflection occurs
D. none of the above
Ans. C

Q. The main principle of optical fiber is
A. total internal reflection
B. total internal refraction
C. total internal dispersion
D. none of the above
Ans. A

Q. The application of laser beam in computer peripherals is/are …………
A. optical disks
B. optical wave guide
C. CD ROM disk
D. all of them
Ans. D

Q. The method of producing 3D image of an object due to the ……………… is known as holography.
A. interference of non coherent light waves on a photographic plate
B. interference of coherent light waves on a photographic plate
C. only reflection of coherent light waves
D. none of the above
Ans. B

Q. In holography
A. Only phase of a wave reflected from the object is recorded on the film
B. Only amplitude of a wave reflected from the object is recorded on the film
C. Amplitude as well as phase of a wave reflected from the object is recorded on the film
D. Neither amplitude nor phase of a wave reflected from the object is recorded on the film
Ans. C

Q. When hologram is reconstructed we get the 3D image of the object because
A. Only phase of a wave reflected from the object is recorded on the hologram
B. Only amplitude of a wave reflected from the object is recorded on the hologram
C. Amplitude as well as phase of a wave reflected from the object is recorded on the hologram
D. Neither amplitude nor phase of a wave reflected from the object is recorded on the hologram
Ans. C

Q. The basic principle of holography is that
A. to create the interference pattern of object wave and reference wave
B. to create the interference pattern of object wave only
C. to create the interference pattern of reference wave only
D. none of the above
Ans. A

Q. Holography was invented by
A. C.K.N.Patel in 1948
B. Leith and Upatnicks in 1962
C. Dennis Gabour in 1948
D. Ali-Jawan
Ans. C

Q. The applications of holography are
A. Holographic storage (mainly used in ROM devices)
B. Three dimensional display of an object
C. Used to determine Young's modulus of metallic rods.
D. all of them
Ans. D

Q. Lasers are used in fibre optic communication because
A. lasers are unidirectional
B. lasers are coherent
C. both A and B
D. neither A nor B
Ans. C

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FE - Engineering Physics
MCQs - Unit 3 - Quantum Mechanics

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	The light waves shows wave particle duality.	This statement is true	This statement is false	This statement may be true or false depending on certain conditions	None of these	1
2	The de Broglie wavelength for a proton would ________ if its kinetic energy is increased	Increase	Decrease	Increase or decrease depending on certain conditions	None of these	2
3	A baseball of mass 150 g is thrown with a velocity of 10 m/s. What is true regarding the de Broglie wavelength of this baseball?	The baseball would exhibit wave particle duality	The baseball would have significant de Broglie wavelength	The baseball would have de Broglie wavelength, but it would not be significant	None of these	3
4	The probability of finding the position of a subatomic particle within the wave packet is determined by	The wave function of the particle	The mass of the particle	The charge of the particle	The velocity of the particle	1
5	Which statement is true for de Broglie wavelength	The de Broglie wavelength is directly proportional to the mass	The de Broglie wavelength is inversely proportional to the mass	The de Broglie wavelength is directly proportional to both the	The de Broglie wavelength is inversely proportional to both the	4
6	The neutrons would undergoe diffraction from a narrow slit if the width of the slit is approximately	A few milimeter	A few centimeter	A few angstrom	A few meter	3
7	The Heiseinberg Uncertainity Principle states that	It is possible to determine exact position and momentum	It is not possible to determine exact position and momentum	It is possible to determine exact position and momentum	It is not possible to determine exact position and momentum	2
8	de Broglie hypothesis is true for	Matter particles	Photons	Either matter particles or photons	Both matter particles or photons	1
9	The square of absolute value of a wave function is known as	Probability	Probability function	Probability volume	Probability density	4
10	For an accelerating particle, the de Broglie wavelength is inversely proportional to the square root of its energy.	This statement is true	This statement is false	This statement may be true or false depending on the energy of the	None of these	1
11	Normalization condition for a wave function states that	Within an individual wave sum of probabilities for finding	Within a wave packet sum of probabilities for finding a particle is unity	Both options 1 and 2 are true	Both options 1 or 2 are false	2
12	Single value condition for a wave function states that	At a given location and time the wave function can have only one value	At a given location and time the wave function can have more than	Both options 1 and 2 are true	Both options 1 or 2 are false	1

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
13	For an accelerating electron or proton, the de Broglie wavelength is inversely proportional to the square root of accelerating potential.	This statement is true	This statement is false	This statement may be true or false depending on the accelerating potential	None of these	3
14	If a wave function is finite, single valued and normalizable it is called as _____	Well behaved function	Probability function	Fermi function	None of these	1
15	The de Broglie wavelength for electrons would be ______ than a proton	Less	Greater	Equal	Cannot be determined	1
16	A particle in ________ shows wave particle duality	Motion	Rest	Either in motion or at rest	Both in motion or at rest	1
17	Wavelength of matter waves would be least for	An electron moving with 1% velocity of light	A carbon atom moving with 1% velocity of light	A hydrogen atom moving with 1% velocity of light	A nitrogen atom moving with 1% velocity of light	1
18	de Broglie waves are associated with motion of a ______ particle	Positively charged	Negatively charged	Neutral particle	All of the above	4
19	The ________ of a particle does depend on time in Schrodinger's time independent equation	Energy	Kinetic Energy	Wave function	All of the above	3
20	An electron and a proton are accelerated by the same potential difference. Which one of them will have maximum de Broglie wavelength?	Electron	Proton	Both will have same wavelengths	Cannot be compared	2
21	The ________ of a particle does not dependent of time in Schrodinger's time independent equation	Energy	Kinetic Energy	Wave function	All of the above	3
22	If a proton and neutron has same kinetic energies. The de Broglie wavelength of proton would be _____ de Broglie wavelength of neutron.	Less	Greater	Equal	Cannot be compared	3
23	Heisenberg Uncertainty Principle is the product of __________ of position and momentum	Difference	Uncertainties	Addition	Subtraction	2
24	Matter waves are	Electromagnetic waves	Mechanical waves	Sometimes electromagnetic and sometimes mechanical waves	Probability waves	4

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
Q1	de Broglie Hypothesis	Which of the phenomenon could not be explained considering only the wave nature of the light?	Polarization	Interference	Diffraction	Compton effect / Photoelectric effect	4
Q2	de Broglie Hypothesis	Which of the phenomenon could not be explained considering only wave nature of the light?	Compton effect	Photoelectric effect	Black body radiations	All of these	4
Q3	de Broglie Hypothesis	Which of the phenomenon could not be explained considering only particle nature of the light?	Polarization	Interference	Diffraction	All of these	4
Q4	de Broglie Hypothesis	If a light wave can show wave-particle duality in some conditions, then particles such as electrons should also act as waves at some times. This is known as	Max Plank hypothesis	de Broglie hypothesis	Heisenberg's uncertainty principle	None of these	2
Q5	de Broglie Hypothesis	According to de Broglie hypothesis, a particle _______ always has a wave associated with it	At rest	In motion	Either in motion or at rest	None of these	2
Q6	de Broglie Hypothesis	A particle in ________ shows wave particle duality	Motion	Rest	Either in motion or at rest	Both in motion or at rest	1
Q7	de Broglie Hypothesis	de Broglie hypothesis $\lambda = h/mv$ is true for	Matter particles	Photons	Either matter particles or photons	Both matter particles or photons	1
Q8	de Broglie Hypothesis	The nature of matter waves is	Electromagnetic waves	Mechanical waves	Sometimes electromagnetic and sometimes mechanical waves	Probability waves	4
Q9	de Broglie Hypothesis	The de Broglie wavelength is ____ proportional to mass of the particle and _____ proportional to velocity of the particle	Directly, directly	Inversely, inversely	Directly, inversely	Inversely, directly	2
Q10	de Broglie Hypothesis	A baseball of mass 150 g is thrown with a velocity of 10 m/s. What is true regarding the de Broglie wavelength of this baseball?	The baseball would exhibit wave particle duality	The baseball would have significant de Broglie wavelength	The value of de Broglie wavelength of baseball would be very insignificant	None of these	3
Q11	de Broglie Hypothesis	Wavelength of matter waves would have least value for moving with 1% of velocity of light	An electron	A carbon atom	A hydrogen atom	A nitrogen atom	4
Q12	de Broglie Hypothesis	If accelerated by the same velocity, the de Broglie wavelength for electrons would be than a proton	Less	Greater	Equal	Cannot be determined	2
Q13	de Broglie Hypothesis	de Broglie waves are associated with motion of a ______ particle	Positively charged	Negatively charged	Neutral particle	All of these	4
Q14	de Broglie Hypothesis	The neutrons would undergoe diffraction from a narrow slit if the width of the slit is approximately	A few milimeter	A few centimeter	A few angstrom	A few meter	3
Q15	de Broglie Hypothesis	The light waves shows wave particle duality.	This statement is true	This statement is false	This statement may be true or false depending on certain conditions	None of these	1
Q16	de Broglie Hypothesis	The de Broglie wavelength for matter waves of a particle is to its mass	Directly	Inversely	Does not depend	None of these	2
Q17	de Broglie Hypothesis	The de Broglie wavelength for matter waves of a particle is to its velocity	Directly	Inversely	Does not depend	None of these	2
Q18	de Broglie Hypothesis	The de Broglie wavelength for matter waves of a particle is to its momentum	Directly	Inversely	Does not depend	None of these	2
Q19	de Broglie Hypothesis	The matter wave have significance for	A particle in motion	A particle at rest	A particle either in motion or at rest	None of these	1
Q20	de Broglie Hypothesis	When a subatomic particle is accelerated with velocities comparable with velocity of light,	It is localized at a point	It cannot be detected	It spreads into space and introduces uncertainity	None of these	3
Q21	de Broglie Hypothesis	When a subatomic particle such as ________ is accelerated, it will exhibit wave particle duality	A charged particle	A neutral particle	Both charged and neutral particle	None of these	3
Q22	de Broglie Hypothesis	Matter waves are exhibited by a particle when it is accelerated in vacuum	This statement is true	This statement is false			1
Q23	de Broglie Hypothesis	Matter waves are not exhibited by a particle when it is accelerated in vacuum	This statement is true	This statement is false			2
Q24	de Broglie Hypothesis	Which of the following is not a variable in the de Broglie equation?	wavelength	velocity	Planck's constant	location	3
Q25	de Broglie Hypothesis	The de-Broglie hypothesis is associated with	Wave nature of electrons only	Wave nature of alpha-particles only	Wave nature of radiations	Wave nature of all material particles	4
Q26	de Broglie Hypothesis	Of the following, which is the best evidence for the wave nature of matter?	The interference pattern obtained when electrons pass through a two-slit system.	The photoelectric effect	The compton effect	Blackbody radiation	1
Q27	de Broglie Wavelength	If a proton and neutron has same kinetic energies. The de Broglie wavelength of proton would be _____ de Broglie wavelength of neutron.	Less	Greater	Equal	Cannot be compared	3
Q28	de Broglie Wavelength	An electron and a proton are accelerated by the same potential difference. Which one of them will have maximum de Broglie wavelength?	Electron	Proton	Both will have same wavelengths	Cannot be compared	1
Q29	de Broglie Wavelength	An electron and a neutron are accelerated by the same potential difference. Which one of them will have maximum de Broglie wavelength?	Electron	Neutron	Both will have same wavelengths	Cannot be compared	1
Q30	de Broglie Wavelength	For an accelerating particle, the de Broglie wavelength is proportional to the of its energy.	Inversely, square	Inversely, square root	Directly, square	Directly, square root	2
Q31	de Broglie Wavelength	For an accelerating electron or proton, the de Broglie wavelength is ___ proportional to the _____ of its accelerating potential.	Inversely, square	Inversely, square root	Directly, square	Directly, square root	2
Q32	de Broglie Wavelength	The de Broglie wavelength for a subatomic particle would ________ if its kinetic energy is increased	Increase	Decrease	Increase or decrease depending on certain conditions	None of these	2
Q33	de Broglie Wavelength	Matter waves would be more significant for particles moving at velocity	~ 1 m/s	~ 10 km/s	~ 100 km/s	~ 100000 m/s	4
Q34	de Broglie Wavelength	Matter waves would be more significant for particles having mass	~ 100 g	~ 1 mg	~ 1E-20 g	1 g	3
Q35	Heisenberg Uncertainty Principle	Heisenberg Uncertainty Principle is the product of __________ of position and momentum	Difference	Uncertainties	Addition	Subtraction	2
Q36	Heisenberg Uncertainty Principle	The Heiseinberg Uncertainity Principle states that	It is possible to determine exact position and momentum of a subatomic particle	It is not possible to determine exact position and momentum of a subatomic particle	It is possible to determine exact position and momentum of a subatomic particle under certain conditions	It is not possible to determine exact position and momentum of a subatomic particle under certain conditions	2

Q37	Heisenberg Uncertainty Principle	The Heisenberg uncertainty principle is concerned with what two properties?	mass and velocity	momentum and position	Position and Velocity	Momentum and mass	2
Q38	Heisenberg Uncertainty Principle	The Heisenberg uncertainty principle states that	$\Delta x.\Delta p > h$	$\Delta x.\Delta p < h$	$\Delta x.\Delta p \geq h$	$\Delta x.\Delta p \leq h$	3
Q39	Heisenberg Uncertainty Principle	Simultaneous determination of position and momentum is	Possible	Impossible	Sometimes possible and sometimes impossible	None of these	2
Q40	Heisenberg Uncertainty Principle	If uncertainty in position is zero, the uncertainty in momentum would be	Zero	> h	< h	Infinity	4
Q41	Heisenberg Uncertainty Principle	If uncertainty in position is equal to Plank's constant, the uncertainty in momentum would be	Zero	> h	< h	One	4
Q42	Heisenberg Uncertainty Principle	In a broad wave packet of de Broglie wavelength _____ of a particle cannot be predicted accurately	Position and momentum	Position	Momentum	None of these	2
Q43	Heisenberg Uncertainty Principle	In a broad wave packet of de Broglie wavelength _____ of a particle can be predicted correctly	Position and momentum	Position	Momentum	None of these	3
Q44	Heisenberg Uncertainty Principle	In a narrow wave packet of de Broglie wavelength _____ of a particle cannot be predicted accurately	Position and momentum	Position	Momentum	None of these	3
Q45	Heisenberg Uncertainty Principle	In a narrow wave packet of de Broglie wavelength _____ of a particle can be predicted correctly	Position and momentum	Position	Momentum		2
Q46	Heisenberg Uncertainty Principle	In a broad wave packet of the probability of finding the particle in the given region is	Non uniform	Uniform	Cannot be predicted		2
Q47	Heisenberg Uncertainty Principle	In a narrow wave packet of the probability of finding the particle in the given region is	Maximum at more amplitude	Minimum at more amplitude	Cannot be predicted		1
Q48	Heisenberg Uncertainty Principle	Heisenberg Uncertainty Principle is true for	Position and momentum only	Energy and time only	Both 1 and 2	Any pair of canonical conjugate variables	4
Q49	Heisenberg Uncertainty Principle	If uncertainty in position is 1 AU, uncertainty in momentum would be	6.63 x 10^{-34}	6.63 x 10^{-44}	6.63 x 10^{-24}	None of these	3
Q50	Heisenberg Uncertainty Principle	If uncertainty in position is 10 AU, uncertainty in momentum would be	6.63 x 10^{-35}	6.63 x 10^{-45}	6.63 x 10^{-25}	None of these	3
Q51	Heisenberg Uncertainty Principle	Heisenberg Uncertainty Principle is significant for	Daily life objects	Subatomic particles	Both 1 and 2	None of these	2
Q52	Heisenberg Uncertainty Principle	An electron and proton are both enclosed in a box of width 1 AU. Which one of them would have more uncertainty in momentum?	Electron	Proton	Both will have same uncertainty	Cannot be compared	1
Q53	Heisenberg Uncertainty Principle	An electron and neutron are both enclosed in a box of width 1 AU. Which one of them would have more uncertainty in momentum?	Electron	Neutron	Both will have same uncertainty	Cannot be compared	1
Q54	Heisenberg Uncertainty Principle	A proton and neutron are both enclosed in a box of width 1 AU. Which one of them would have more uncertainty in momentum?	Proton	Neutron	Both will have same uncertainty	Cannot be compared	3
Q55	Heisenberg Uncertainty Principle	Two electrons are enclosed in a box of width 1 AU and 10 AU. In which case there would be more uncertainty in the momentum?	1 AU	10 AU	Both will have same uncertainty	Cannot be compared	1
Q56	Heisenberg Uncertainty Principle	Heisenberg Uncertainty Principle is significant for subatomic particles because	Their mass is small	Their velocity is large	They show wave particle duality		3
Q57	Heisenberg Uncertainty Principle	Heisenberg Uncertainty Principle is not significant for daily life objects because	The value of Plank's constant is insignificant for daily life objects	They do not show wave particle duality	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	3
Q58	Wave Function and Probability Density	Which quantity oscilates to generate matter waves for a moving particle	Charge	Oscillation	Quantity is not known but is represented by a mathematical function ψ	None of these	3
Q59	Wave Function and Probability Density	The wave function ψ represents	Charge of the particle	Vibration of the particle	Mathematical function that represents oscillation of Quantity that generates matter wave	None of these	3
Q60	Wave Function and Probability Density	The wave function ψ represents the wave as a function of	Space	Time	Both space and time	None of these	3
Q61	Wave Function and Probability Density	Greater is the amplitude of wave function, ________ is the probability of finding the particle at that position and time	Greater	Minimum	Cannot be determined		1
Q62	Wave Function and Probability Density	The negative amplitude of wave function is meaningless as	Amplitude cannot be negative	Negative amplitude corresponds to negative probability	None of these		2
Q63	Wave Function and Probability Density	The wave function ψ is a complex mathematical quantity as	It is not a real quantity	It corresponds to negative probability	It can be expressed as a+ib	None of these	2
Q64	Wave Function and Probability Density	The wave function ψ does not have any direct physical significance as	It is not a real quantity	It corresponds to negative probability	It can be expressed as a+ib	None of these	2
Q65	Wave Function and Probability Density	The probability interpretation of wave function is suggested by	de Broglie	Heisenberg	Max Plank	Max Born	4
Q66	Wave Function and Probability Density	the square of the magnitude of the wave function |ψ|2 gives _____ of finding the particle in that region.	Exact position	Probability	Probability density	None of these	3
Q67	Wave Function and Probability Density	the square of the magnitude of the wave function |ψ|2 is termed as ____	Probability volume	Probability	Probability density	None of these	3
Q68	Wave Function and Probability Density	In a given tiny volume, the position of a subatoic particle	Can be determined with more accuracy	Can be determined with less accuracy	Can be calculated only in terms of probability	None of these	3

Q69	Wave Function and Probability Density	The probability of finding the position of a subatomic particle within the wave packet is determined by	The wave function of the particle	The mass of the particle	The charge of the particle	The velocity of the particle	1
Q70	Wave Function and Probability Density	The wave function must be finite. This implies that	At a given location and time the wave function can have only one value	It is a contineous function	It is a single value function	It is a normalizable function	1
Q71	Wave Function and Probability Density	Single value condition for a wave function states that	At a given location and time the wave function can have only one value	It is a contineous function	It is a single value function	It is a normalizable function	1
Q72	Wave Function and Probability Density	In a given tiny volume, the wave function can have only one value.This mathematical condition is known	Contineous function	Single value function	Normalization	Finite function	2
Q73	Wave Function and Probability Density	In a given tiny volume, the wave function has a finite value.This mathematical condition is known	Contineous function	Single value function	Normalization	Finite function	4
Q74	Wave Function and Probability Density	In a given tiny volume, the wave function and its space derivatives are contineous. This mathematical condition is known	Contineous function	Single value function	Normalization	Finite function	1
Q75	Wave Function and Probability Density	In a given tiny volume, the sum of probabilities for finding a particle is unity. This mathematical condition is known	Contineous function	Single value function	Normalization	Finite function	3
Q76	Wave Function and Probability Density	Normalization condition for a wave function states that	Within a wave packet sum of probabilities for finding a particle is zero	Within a wave packet sum of probabilities for finding a particle is unity	Both options 1 and 2 are true	Both options 1 or 2 are false	2
Q77	Wave Function and Probability Density	If a wave function is finite, single valued, contineous and normalizable it is called as _____	Well behaved function	Probability function	Fermi function	None of these	1
Q78	Phase and group velocity	The phase velocity is defined as the rate at which _____ of a wave propagates	Phase (Crest)	Phase (Trough)	Anyone of 1 and 2	None of these	2
Q79	Phase and group velocity	According to mathematical calculations, the value of phase velocity comes out to be ___ velocity of light. Hence it is meaningless.	Equal	Less than	Greater than	None of these	3
Q80	Phase and group velocity	The superposition of very large number of harmonic waves associated with a particle will produce	A single wave	A wave packet	A unit wave	None of these	2
Q81	Phase and group velocity	According to mathematical calculations, the velocity of a wave packet is to the velocity of the particle	Equal	Less than	Greater than	None of these	1
Q82	Phase and group velocity	The concept of phase velocity of a particle is	Significant as gives correct relation between phase of matter wave and particle velocity	Insignificant as velocity of waves comes out to be greater than particle velocity			2
Q83	Phase and group velocity	The concept of group velocity of a particle is	Significant as gives correct relation between velocity of wave group and particle velocity	Insignificant as velocity of wave group is different than particle velocity			1
Q84	Schrodinger Equation	The laws of Newtonian mechanics are applicable to	Only particles	Only waves	Particles showing wave-particle duality	All of these	1
Q85	Schrodinger Equation	The laws of Quantum mechanics are applicable to	Only particles	Only waves	Particles showing wave-particle duality	All of these	3
Q86	Schrodinger Equation	Schrodinger's equation is a fundamental equation that can not be derived from any other equation	TRUE	FALSE			1
Q87	Schrodinger Equation	Schrodinger equation is required for explaining behavior of subatomic particles because	Subatomic particles show wave particle duality	Matter wave is associated with subatomic waves	Newton's laws of motion cannot be applied to matter waves	All options are correct	4
Q88	Schrodinger Equation	Schrodinger's equation is a differential equation	TRUE	FALSE			1
Q89	Schrodinger Equation	The operator ∇2 is known as	Heisenberg Operator	Schrodinger Operator	Laplace Operator	De Broglie opereator	3
Q90	Schrodinger Equation	The ________ of a particle does not dependent of time in Schrodinger's time independent equation	Energy	Kinetic Energy	Wave function	All of these	3
Q91	Schrodinger Equation	The ________ of a particle does depend on time in Schrodinger's time dependent equation	Energy	Kinetic Energy	Wave function	All of these	3
Q92	Energy of particle in rigid box	For a particle enclosed in a rigid box, the wave function of the particle lies in which region?	$x > 0$	$x < 0$	$0 < x < L$	$0 > x > L$	3
Q93	Energy of particle in rigid box	For a particle enclosed in a rigid box, the wave function of the particle for $x < 0$ and $x > L$ would be	Zero	One	Any value	None of these	1
Q94	Energy of particle in rigid box	For a particle enclosed in a rigid box, the energy of a particle is _____ the mass of the particle	Inversely proportional	Inversely proportional to square of	Directly proportional	Directly proportional to square of	1
Q95	Energy of particle in rigid box	For a particle enclosed in a rigid box, the energy of a particle is _____ the width of the box	Inversely proportional	Inversely proportional to square of	Directly proportional	Directly proportional to square of	2
Q96	Energy of particle in rigid box	For a particle enclosed in a rigid box, the energy of a particle is _____ to the Plank's constant	Inversely proportional	Inversely proportional to square of	Directly proportional	Directly proportional to square of	4
Q97	Energy of particle in rigid box	For a particle enclosed in a rigid box, the energy of a particle is _____ to the quantum number 'n'	Inversely proportional	Inversely proportional to square of	Directly proportional	Directly proportional to square of	4
Q98	Energy of particle in rigid box	For a particle enclosed in a rigid box, if length is doubled, its energy	Increased by a factor of 2	Decrease by a factor of 2	Increase by a factor of 4	Decrease by a factor of 4	4
Q99	Energy of particle in rigid box	According to classical mechanics, for a particle enclosed in a rigid box, the value of energy	Can have any values between 0 to ∞	Minimum energy can be zero	Particle can be at any location irrespective of its energy	All of these	4
Q100	Energy of particle in rigid box	According to quantum mechanics, for a particle enclosed in a rigid box, the value of energy	Can have only discrete values of energy	Minimum energy can not be zero	Depending on the energy, probability of its location changes	All of these	4
Q101	Energy of particle in rigid box	For a particle enclosed in a rigid box, the value of energy are known as	Energy values	Energy probability values	Wave function	Energy eigen values	4
Q102	Energy of particle in rigid box	For a particle enclosed in a rigid box (of length L), for the energy of particle for quantum number (n=1) can probably found	At the left corner of the box	At the right corner of the box	At the middle of the box (L/2)	At any location	3

Q103	Energy of particle in rigid box	For a particle enclosed in a rigid box (of length L), for the energy of particle for quantum number (n=2) can probably found	At the left corner of the box	At the right corner of the box	At the location L/4, 3L/4	At any location	3
Q104	Tunneling	If a particle of energy E is less than the barrier potential energy (E<U), classically	particle can overcome the barrier	particle cannot overcome the barrier	there is small probability that particle will overcome the barrier	there is large probability that particle will overcome the barrier	2
Q105	Tunneling	If a particle of energy E is less than the barrier potential energy (E<U), quantum mechanically	particle can overcome the barrier	particle cannot overcome the barrier	there is small probability that particle will overcome the barrier	there is large probability that particle will overcome the barrier	3
Q106	Tunneling	The binding energy of α particle inside the nucleus is around 25 MeV. It means its is enclosed in a ________ of nucleus with energy 25 MeV.	Potential well	Potential box	Total energy well	None of these	1
Q107	Tunneling	The binding energy of α particle inside the nucleus is around 25 MeV. However, when escaped, α particle has energy 4 MeV only. α particle escapes from the nuclues because	α particle shows wave particle duality	There is a small non-zero probability that α particle will escape the potential well	The wave function of the particle outside the nuclues is non-zero	All of these	4
Q108	Tunneling	The binding energy of α particle inside the nucleus is around 25 MeV. However, when escaped, α particle has energy 4 MeV only. α particle escapes from the nuclues because of	α particle tunnel through the barrier of the nuclues and escapes into space	There is a small non-zero probability that α particle will escape the potential well of nucleus	The wave function of the particle outside the nuclues is non-zero	All of these	4
Q109	Tunneling	Compared to regular diodes, tunnel diodes are	Very lightly doped	Highly doped	Normally doped	None of these	2
Q110	Tunneling	In normal diode, electrons cannot overcome the potential barrier of depletion region. This is because	The depletion region is wide	Electrons do not have sufficient energy to overcome the potential barrier of depletion region	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	3
Q111	Tunneling	In tunnel diode, electrons can overcome the potential barrier of depletion region. This is because	The depletion region is narrow	Electrons show wave particle duality	There is small and non-zero probability that electrons will tunnel through barrier	All of these	4
Q112	Tunneling	For a tunnel diode, in regular resistance region, if external potental difference is increase, current across depletion region	Increases	Remains constant	Decreases	None of these	1
Q113	Tunneling	For a tunnel diode, in negative resistance region, if external potental difference is increase, current across depletion region	Increases	Remains constant	Decreases	None of these	3
Q114	Tunneling	A tunnel diode is usually operated in	Normal resistance mode	Negative resistance mode			2
Q115	Tunneling	The advantages of tunnel diode are	very fast switching	high-speed operation	low power consumption	All of these	4
Q116	Tunneling	The tunnel diodes has applications in	logic memory storage devices	ultra high-speed switch	FM Receivers	All of these	4
Q117	Tunneling	The tunnel diodes has applications in	logic memory storage devices	ultra high-speed switch	FM Receivers	All of these	4
Q118	Tunneling	The regular optical microscopes, the resolving power is to the wavelength	Directly proportional	Inversely proportional			2
Q119	Tunneling	The regular optical microscopes, the maximum resolving power is obtained for color region	Red	Green	Blue	Yellow	3
Q120	Tunneling	In STM, a small potential difference is applied to the tip of the needle and sample. The electrons _____ through the gap between tip of needle and sample.	Pass easily	Pass with difficulty	Tunnel	None of these	3
Q121	Tunneling	In STM, electrons tunnel through the gap between tip of the needle and sample. This is because	Electrons show wave particle duality	Quantum mechanically matter waves are associated with electrons that has a small probability of tunneling the barrier	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	3
Q122	Tunneling	In STM, if the distance between tip and the surface is reduced, tunnel current	Decreases exponentially	Increases exponentially	Remains constant	None of these	2
Q123	Tunneling	The STM is useful in	Study of arrangements of atoms on the solid surface	study of characteristics of material surface	For studying surface defects	All of these	4
Q124	Quantum computing	In conventional computers, the processing power has limitation because	Size of the transistors cannot be reduced below certain value	If more transisotrs are packed in small region, uncertainty principle comes into play	Tunneling effects come into play at nano level	All of these	4
Q125	Quantum computing	In quantum computer, the unit that is used to store information is known as	Quantum unit	Bit	Q-bit	Information bit	3
Q126	Quantum computing	Principles of quantum computing are	Superposition	Entanglement	Both options 1 and 2 are correct		3
Q127	Quantum computing	In quantum computer, a qbit may be	A photon	An electron	A nucleus	All of these	4
Q128	Quantum computing	In quantum computer, which information is manipulated to distinguish between 0 and 1	Charge	Spin	Polariztion	All of these	4
Q129	Quantum computing	In a Q-Bit, superposition means	Either 1 or 0 can be stored at a time on a qbit	Both values 1 and 0 are stored with different probability on a qbit			2
Q130	Quantum computing	If there are "n" number of q-bits in a quantum computers, the computing power is proportional to	n	2n	square of n	nth power of 2	4
Q131	Quantum computing	If spin of one particle is changed, the spin of other particle is also changed, even if they are far away. This is known as	Superposition	Entanglement	Tunneling	QBit	2
Q132	Quantum computing	In quantum computing, superposition principle is used to	Store information	Process information in parallel	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	1
Q133	Quantum computing	In quantum computing, entanglement principle is used to	Store information	Process information in parallel	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	2

MCQ on Group Velocity, Wave Packet

1. Which of the following is the correct expression for the group velocity?
   a) υ λ
   b) dω /dυ
   c) dE/dk
   d) dE/ħdk
   Answer: [d]

2. Planck's constant has unit s of
   a) J
   b) s
   c) J/s
   d) J.s
   Answer: [d]

3. $v_p = v_g$ suggests that,
   a) Particle is lagging behind the wave packet
   b) Particle is travelling with the wave packet,
   c) particle is travelling ahead of wave packet
   d) Particle & wave packet have independent motion
   Answer: [b]

4. The motion of a wave packet is similar to ______________
   a) Photons
   b) Waves
   c) Classical Particle
   d) Quantum Particle
   Answer: [c]

MCQ on De Broglie Wavelength.

5. Which of the following is not a variable
   a) Wavelength
   b) Velocity
   c) Planck's Constant
   d) Location
   Answer: [c]

6. The concept of matter wave was suggested by__________
   a) Heisenberg
   b) de Broglie
   c) Schrodinger

d) Laplace
Answer: [b]

7. if kinetic energy of electron doubles, its de-Broglie wavelength changes by a factor
a) 0.5
b) 2
c) 3
d) 0.707
Answer: [d]

8. What is the main point of the de Broglie equation?
a) the position of light cannot be precisely determined
b) matter has wave-like properties
c) matter only behaves like a particle
d) Einstein's theory of relativity was incorrect
Answer: [b]

9. Among the following particles, which one will be have smallest wavelength associated with it for same velocity
a) Proton
b) Electron
c) Alpha particle
d) Cricket ball
Answer: [d]

10. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately
a) 0.03 nm
b) 0.04 nm
c) 0.12 nm
d)0.06 nm
Answer: [d]

11. The electron is accelerated from rest between two points which has potential of 20V and 40 V respectively. Associated De-Broglie wavelength is
a) 7.5 A°
b) 2.75 A°
c) 0.75 A°
d) 2.75 m
Answer: [b]

12. If the kinetic energy of a free electron doubles, its de Broglie wavelength changes by the factor of
   a) 2
   b) 1/2
   c)
   $\sqrt{2}$
   d)
   $1/\sqrt{2}$
   Answer: [d]

13. Which of the following is not a characteristic of wave function?
   a) Continuous
   b) Single valued
   c) Differentiable
   d) Physically Significant
   Answer: [d]

14. Which two characteristics are variables in Heisenberg's uncertainty principle?
   a) wavelength and distance
   b) position and momentum
   c) charge and displacement
   d) atomic radius and frequency
   Answer: [b]

15. Calculate the minimum uncertainty in the momentum of a ^4He atom confined to 0.40 nm.
   a) 2.02×10^{-25} kg m/s
   b) 2.53×10^{-25} kg m/s
   c) 2.64×10^{-25} kg m/s
   d) 2.89×10^{-25} kg m/s
   Answer: [c]

16. The uncertainty in the location of a particle moving with velocity 7.28×10^7m /s is two times its de-Broglie wavelength. What is the uncertainty in measuring the velocity?
   a) 5.79×10^6 m/s
   b) 6.12×10^6 m/s
   c) 7.63×10^6 m/s
   d) 8.45×10^6 m/s
   Answer: [a]

17. Energy of a wave divided by its momentum gives ______________
   a) Group velocity
   b) Classical Velocity
   c) Phase Velocity
   d) Wave velocity
   Answer: [c]

MCQ on Wave Function

18. Which of the following can be a wave function?
    a) tan x
    b) sin x
    c) cot x
    d) sec x
    Answer: [b]

19. Wave function Ψ of a particle is
    a) a real quantity
    b) a complex quantity
    c) an imaginary quantity
    d) none of these
    Answer: [b]

20. Which of the following is not a physical requirement for a wave valid wave function?
    a) single valued;
    b) continuous in a given region;
    c) can be infinite;
    d) none of these;
    Answer: [c]

21. Which of the following quantities is proportional to the probability density at a point?
    a) the wavefunction
    b) the square of the wave function
    c) the de Broglie wavelength
    d) the reciprocal of the de Broglie wavelength
    Answer: [b]

22. The total probability of finding the particle in space must be ___________
    a) zero
    b) unity
    c) infinity
    d) double
    Answer: [b]

23. The probability density of a particle is
    a) negative.
    b) can be negative or positive.
    c) always positive
    d) Complex quantity
    Answer: [c]

24. The square of the magnitude of the wave function is called ________
   a) current density
   b) probability density
   c) zero density
   d) volume density
   Answer: [b]

25. If Ψ is the wave function, the probability density function is given by ____________
   a) $|\Psi|$
   b) $|\Psi|^2$
   c) $|\Psi|^3$
   d) $|\Psi|^4$
   Answer: [b]

26. Which of the following is not a characteristic of wave function?
   a) Continuous
   b) Single valued
   c) Differentiable
   d) Physically Significant
   Answer: [d]

Schrodinger's Time Independent Wave Equation

27. Which of the following is the correct expression for the Schrödinger wave ?
   a) $i\hbar (d\Psi/dt) = -i(\hbar/2m) \partial\Psi/\partial x + V\Psi$
   b) $i\hbar (d\Psi/dt) = -i(\hbar/2m) \partial^2\Psi/\partial x^2 + V\Psi$
   c) $i\hbar (d\Psi/dt) = -i(\hbar^2/2m) \partial\Psi/\partial x + V\Psi$
   d) $i\hbar (d\Psi/dt) = -i(\hbar^2/2m) \partial^2\Psi/\partial x^2 + V\Psi$
   Answer: [d]

28. Schrodinger's equation described the
   a) procedure for splitting an atom
   b) complement of the wave function
   c) behaviour of "matter" waves
   d) motion of light
   Answer: [c]

29. If the particle moving in a _____ potential then the solution of the wave equation are described as a stationary states
   a) time independent
   b) time dependent

c) velocity dependent
d) velocity independent
Answer: [a]

30. The operator ∇^2 is called _______ operator
a) Hamiltonian
b) Laplacian
c) Poisson
d) vector
Answer: [b]

31. For a quantum wave particle, E = ______________
a) $\hbar$
k
b) $\hbar$
ω
c) $\hbar$
ω/2
d) $\hbar$
k/2
Answer: [b]

32. The Schrodinger wave equation is _______
a) Linear
b) Quadratic
c) Differential equation
d) Derivable
Answer: [a]

33. If Ψ_1 and Ψ_2 are two solutions of Schrodinger Wave equation then which of the following is also a solution?
a) Ψ_1/Ψ_2
b)
$\Psi_1\Psi_2$ c)
Ψ_2/Ψ_1
d) Ψ_1 +
Ψ_2
Answer: [d]

34. How is information extracted from a wave function?
a) Expectation value
b) Operators
c) Differential
d) Partial differential
Answer: [a]

35. Which function is considered independent of time to achieve the steady state form?
a)

Ψ

b) dΨ/dt
c) $d^2\Psi/dx^2$
d) V
Answer: [d]

36. The values of Energy for which Schrodinger's steady state equation can be solved is called as _____________
a) Eigen Vectors
b) Eigen Values
c) Eigen Functions
d) Operators
Answer: [b]

37. For a box with infinitely hard walls, the potential is maximum at _____________
a) L
b) 2L
c) L/2
d) 3L
Answer: [a]

38. Which of the following is known as the Schrodinger equation?
a) E = hv
b) $E = mc^2$
c) λ = h/p
d) Hψ = Eψ
Answer: [d]

MCQ on Particle In a Box

39. The walls of a particle in a box are supposed to be ____________
a) Small but infinitely hard
b) Infinitely large but soft
c) Soft and Small
d) Infinitely hard and infinitely large
Answer: [d]

40. The energy of a particle in a infinite potential box is _
a) Proportional to length of box
b) Inversely proportional to Square of length of box
c) Inversely proportional to length of box
d) None of these

Answer: [b]

41. If width of infinite potential box is reduced by factor 2, energy of particle will be_
    a) Increased by 2 times
    b) Decreased by 2 times
    c) Increased by 4 times
    d) Decreased by 4 times
    Answer: [c]

42. If width of infinite potential box is increased by factor 3, energy of particle will be_
    a) Increased by 9 times
    b) Decreased by 3 times
    c) Increased by 3 times
    d) Decreased by 9 times
    Answer: [d]

43. The wave function for a particle must be normalizable because:_
    a) the particle's charge must be conserved
    b) the particle's momentum must be conserved
    c) the particle must be present somewhere
    d) the particle's angular momentum must be conserved
    Answer: [c]

44. The wave function of the particle lies in which region?
    a) $x > 0$
    b) $x < 0$
    c) $0 < X < L$
    d) $x > L$
    Answer: [c]

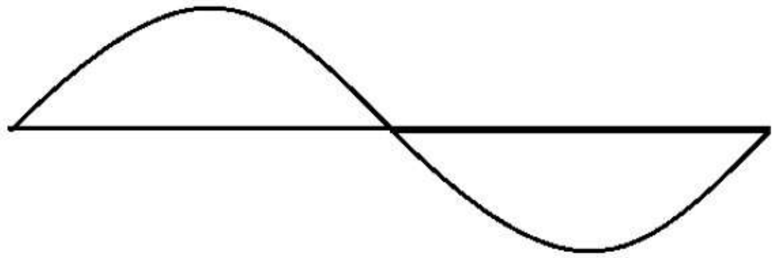
45. The Eigen value of a particle in a box is ___________
    a) L/2
    b) 2/L
    c) $\sqrt{(L/2)}$
    d) $\sqrt{(2/L)}$
    Answer: [d]

46. What is the minimum Energy possessed by the particle in a box?
    a) Zero
    b) $\pi^2\hbar^2/2mL^2$
    c) $\pi^2\hbar^2/2mL$
    d) $\pi^2\hbar/2mL$

Answer: [b]

47. The wave function of a particle in a box is given by ____________
   a) √ (2/L) Sin(nπ x/L)
   b) √ (2/L) Sin(nx/L)
   c) √ (2/L) Sin(x/L)
   d) √ (2/L) Sin(π x/L)
   Answer: [a]

48. The wave function for which quantum state is shown in the figure?



   a) 1
   b) 2
   c) 3
   d) 4
   Answer: [b]

49. Calculate the Zero-point energy for a particle in an infinite potential well for an electron confined to a 1 nm atom.
   a) 3.5 X 10^{-20} J
   b) 4.0 X 10^{-20} J
   c) 6.0 X 10^{-20} J
   d) 5.0 X 10^{-20} J
   Answer: [c]

50. An electron is in an infinite potential well that is 9.6- nm wide. The electron makes the transition from the n=14 to the n=11 state. The wavelength of the emitted photon is closest to:
   a) 3400 nm
   b) 4100 nm
   c) 2800 nm
   d) 4700 nm
   Answer: [b]

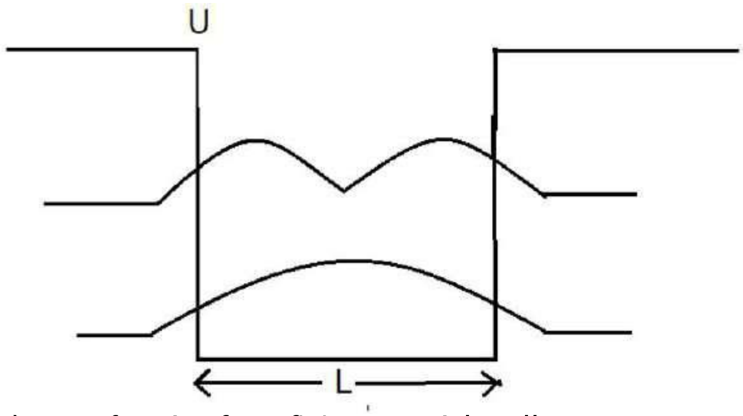
51. The ground state energy level for a proton trapped in an infinite potential well of length $5x10^{-15}$ m is
a) 0 MeV
b) $4.1x10^{-8}$ MeV
c) 8.2 MeV
d) 32.3 MeV
Answer: [c]

MCQ on Finite Potential Well

52. In a finite Potential well, the potential energy outside the box is ____________
a) Zero
b) Infinite
c) Constant
d) Variable
Answer: [c]

53. The wave function of a particle in a box is given by ___________
a) A sin(kx)
b) A cos(kx)
c) Asin(kx) + Bcos(kx)
d) A sin(kx) – B cos(kx)
Answer: [c]

54. What does the following figure shows?



a) Wave function for Infinite Potential Well
b) Wave function for Finite Potential Well
c) Probability Density function for Infinite Potential Well
d) Probability Density function for Finite Potential Well
Answer: [d]

55. For a particle inside a box of finite potential well, the particle is most stable at what position of x?
a) x > L
b) x < 0
c) 0 < x < L
d) Not stable in any state
Answer: [c]

MCQ on Tunnelling Effect

56. The transmission based on tunnel effect is that of a plane wave through a ___________
a) Circular Barrier
b) Opaque Object
c) Rectangular Barrier
d) Infinitely small barrier
Answer: [c]

57. The particle has a finite, non-zero, potential for the region ___________
a) x > 0
b) x < 0
c) 0 < X < a
d) x > a
Answer: [c]

58. Tunnel effect is notably observed in the case of ___________
a) X-rays
b) Gamma rays
c) Alpha Particles
d) Beta Particles
Answer: [c]

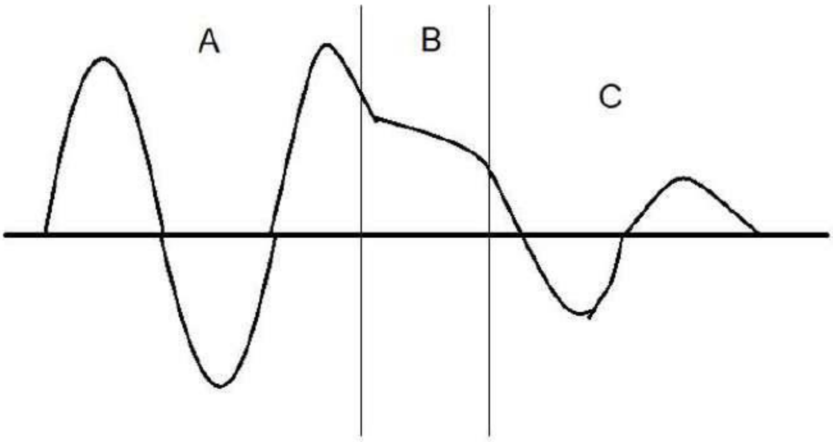
59. 4 MeV alpha particle crosses the 25 MeV potential barrier inside the nucleus due to
a) Tunnelling Effect
b) Compton Effect
c) Photoelectric effect
d) Uncertainty principle.
Answer: [a]

60. The solution of Schrodinger wave equation for Tunnel effect is of the form ___________
a) $Ae^{ikx} + Be^{ikx}$
b) $Ae^{ikx} - Be^{ikx}$
c) $Ae^{ikx} + Be^{-ikx}$
d) $Ae^{ikx} - Be^{-ikx}$

Answer: [c]

61. The particle with wave function $Ae^{kx} + Be^{-kx}$ represents ____________
a) Oscillating particle
b) Moving Particle
c) Probable Particle
d) No such wave function
Answer: [c]

62. In which of the following regions is E<V?



a) A
b) B
c) C
d) None of the regions
Answer: [b]

63. What happens to a tunnel diode when the reverse bias effect goes beyond the valley point?
a) it behaves as a normal diode
b) it attains increased negative slope effects
c) reverse saturation current increases
d) becomes independent of temperature
Answer: [a]

64. If 'X' corresponds to a tunnel diode and 'Y' to an avalanche diode, then___________
a) X operates in reverse bias and Y operates in forward bias
b) X operates in reverse bias and Y operates in reverse bias
c) X operates in forward bias and Y operates in forward bias
d) X operates in forward bias and Y operates in reverse bias
Answer: [d]

65. Tunnel diode has a very fast operation in_________
a) gamma frequency region
b) ultraviolet frequency region
c) microwave frequency region
d) radio frequency region
Answer: [c]

66. The depletion layer of tunnel diode is very small because _____
a) its abrupt and has high dopants
b) uses positive conductance property
c) its used for high frequency ranges
d) tunneling effect
Answer: [a]

67. With interments of reverse bias, the tunnel current also increases because_________
a) electrons move from valance band of p side to conduction band of n side
b) fermi level of p side becomes higher than that of n side
c) junction current decreases
d) unequality of n and p band edge
Answer: [a]

68. Tunnel diodes are made up of_________
a) Germanium and silicon materials
b) AlGaAs
c) AlGaInP
d) ZnTe
Answer: [a]

69. The tunneling involves_______
a) acceleration of electrons in p side
b) movement of electrons from n side conduction band to p side valance band
c) charge distribution management in both the bands
d) positive slope characteristics of diode
Answer: [b]

70. The range of tunnel diode voltage V_D, for which slope of its V-I characteristics is negative would be? (The V_P is the peak voltage and V_V is the valley voltage).
a) $V_D > 0$
b) $0 < V_D < V_p$
c) $V_V > V_D > V_p$
d) $V_V > V_D$
Answer: [c]

71. The use of a scanning tunnelling microscope places a conducting tip
   a) 0.5 to 0.8 nm from the surface
   b) 0.4 to 0.7 nm from the surface
   c) 0.4 to 0.9 nm from the surface
   d) 0.3 to 0.5 nm from the surface
   Answer: [b]

72. In STM, Surface being imaged must be,
   a) Magnetic in nature
   b) Dielectric in nature
   c) Able to conduct electricity
   d) None of above
   Answer: [c]

73. The scanning tunnelling microscope works due to
   a) Interference
   b) Tunnelling effect shown by electrons
   c) Diffraction of electrons
   d) None of above
   Answer: [b]

74. How does a scanning tunnelling microscope map a surface?
   a) by measuring the size of each individual electron
   b) by measuring the voltage created by electron transfer
   c) by measuring the size of each atom of the surface
   d) by measuring the current due to tunnelling electrons
   Answer: [d]

75. Lateral resolution of STM is,
   a) 0.1 nm
   b) 1 nm
   c) 10 nm
   d) 0.01 nm
   Answer: [a]

MCQ on Quantum Computing

76. Quantum Computing involves ________ of qubits,
   a) Superposition
   b) Entanglement

c) Superposition & entanglement
d) De-coherence
Answer: [c]

77. Qubits can be made of using,
   a) Electron's spin & photon's polarization
   b) Electron's motion
   c) Photon's frequency
   d) Photon's momentum
   Answer: [a]

78. Qubits can hold,
   a) Only 0 state
   b) Only 1 state
   c) Superposition of 0 & 1 state
   d) None of above
   Answer: [c]

79. High speed of quantum computing is possible due to __________ of qubits
   a) Superposition
   b) Entanglement
   c) Superposition & entanglement
   d) De-coherence
   Answer: [c]

80. The difference between digital & quantum computing,
   a) Strict discrete nature of 0 & 1 state in digital computing
   b) Superposition of 0 & 1 in qubits
   c) Entanglement of qubits
   d) All of above
   Answer: [d]

MCQs - Unit 4 - Semiconductor Physics

Sr.	Topic	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	Free electron theory	The free electron theory could explain these effects	Electrical conductivity of metals	Thermal conductivity of metals	Relation between electrical and thermal conductivity (Wiedemann-Franz Law) at high temperature	All of these	4
2	Free electron theory	The free electron theory could not explain these effects	Why di and trivalent atoms have more conductivity than monovalent atoms	classifications of solids into conductors, semiconductors and insulators	Mismatch between theoretical and experimental values of specific heats	All of these	4
3	KP Model	Kroning & Penney model is based on	Motion of electron in the periodic potential of atoms	Boundary conditions of interatomic spacing	Using Schrodinger equation to solve boundry conditions	All of these	4
4	KP Model	If E (Energy) vs K (Momentum) graph is plot for an electron moving in periodic potential of atoms, it shows discontinuity at certain regions. These are called as	KP Zone	Schrodinger Zone	Brillioun Zone	None of these	3
5	Formation of Bands	In an isolated atom, the energy levels are	Well defined and discrete	Not well define and discrete	Well defined and contineous	Not well defined and contineous	1
6	Formation of Bands	The formation of energy band is a observed in	Gases	Liquids	Solids	All of above	3
7	Formation of Bands	_________ is collection of energies of all the electrons in valence orbit	Fermi energy	Valence band	Conduction band	Band gap energy	2
8	Formation of Bands	_________ is collection of energies of all the free electrons	Fermi energy	Valence band	Conduction band	Band gap energy	3
9	Formation of Bands	Forbidden energy gap contains electrons that	Belong to outermost orbit of an atom	Belong to innermost orbit of an atom	It do not contain electrons	Belong to any orbit	3
10	Formation of Bands	In a metal, at absolute zero temperature (T=0K), all electrons occupy the ____________	Valence band	Conduction band	Any position between Valence and Conduction band	None of these	1
11	Formation of Bands	In metals, at absolute zero (T = 0 K) valence band would be	Fully occupied	Completely empty	Partially occupied	None of these	1
12	Formation of Bands	In metals, at absolute zero (T = 0 K) conduction band would be	Fully occupied	Completely empty	Partially occupied	None of these	2
13	Formation of Bands	In metals, above absolute zero temperature (T>0K), the conduction band would be	Fully occupied	Completely empty	Partially occupied	None of these	3
14	Formation of Bands	In metals, above absolute zero temperature (T>0K), conduction band and valence band are	Fully occupied	Completely empty	Partially occupied	Overlap	4
15	Formation of Bands	The band gap energy (or forbidden energy gap) for metals is equal to	0 eV	0.7 eV	1.12 eV	> 5eV	1
16	Formation of Bands	Which is the correct ordering of the band gaps energy?	Diamond < silicon < copper	Diamond > silicon > copper	Diamond < silicon > copper	Diamond < silicon < copper	2
17	Formation of Bands	For metals, above T>0K, conduction band and valence bands overlap. This means its bandgap energy is	Zero	of the order of 1-2 eV	of the order of 5 eV	of the order of 10 eV	1
18	Formation of Bands	Which is these represents the correct ordering for the band gaps energy?	Metal > Semiconductor > Insulator	Metal < Semiconductor < Insulator	Metal < Semiconductor > Insulator	Metal > Semiconductor < Insulator	2
19	Formation of Bands	In semiconductor the band gap energy / forbidden energy gap is equal to	0.7 eV	1.1 eV	Either 0.7 eV or 1.1 eV	the width of the forbidden energy gap	4
20	Formation of Bands	In insulators the band gap energy / forbidden energy gap is equal to	0 eV	1.1 eV	0.7 eV	> 10 eV	4
21	Effective mass of electron	Depending on the position, the mass of electron within solid is	Variable	Remain constant			1
22	Effective mass of electron	Depending on the position, the mass of the electron within the solid is variable. This is known as ___ of electron	Variable mass	Location mass	Effective mass	Actual mass	3
23	Effective mass of electron	The effective mass of electron is	Positive near the bottom of conduction band	Negative near the top of valence band	Both options 1 and 2 are correct	Both options 1 and 2 are incorrect	3
24	Density of states	The number of available energy states per unit volume per unit energy interval centered around E are known as	Energy probability	Energy states	Volume of states	Density of states	4
25	Resistivity & Conductivity	The resistance of conductor of unit length and unit area of cross section is known as	Resistivity	Conductance	Unit resistance	Unit conductance	1
26	Resistivity & Conductivity	The resistivity has unit _____	Ohm - m	Ohm	Ohm / m	Ohm / cm	1
27	Resistivity & Conductivity	The conductivity has unit _____	mho	mho / m	mho - m	mho / cm	2
28	Resistivity & Conductivity	For metals, if the number of charge carriers are increased, the conductivity will	Increase	Decrease	Remains constant	None of above	1
29	Resistivity & Conductivity	If a copper wire has length 1 cm and area of cross section 1 square centimeter, its resistance would be called as	Specific resistance	Unit resistance	Resistivity	Absolute resistance	1
30	Resistivity & Conductivity	The conductivity in metals will _____ with ______ in number of charge carriers	Increase, increase	Decrease, increase	Remains constant, increase	Remains constant, decrease	1
31	Resistivity & Conductivity	The electrical conductivity of a metal is given by	$\sigma = ne\mu$	$\sigma = 1/ne\mu$	$\sigma = ne/\mu$	$\sigma = n/e\mu$	1
32	Resistivity & Conductivity	The electrical conductivity of an intrinsic semiconductor is given by	$\sigma i = en(\mu e + \mu p)$	$\sigma n = ne\mu e$	$\sigma p = ne\mu p$	None of these	1
33	Resistivity & Conductivity	The electrical conductivity of a p type semiconductor is given by	$\sigma i = en(\mu e + \mu p)$	$\sigma n = ne\mu e$	$\sigma p = ne\mu p$	None of these	3
34	Resistivity & Conductivity	The electrical conductivity of a n type semiconductor is given by	$\sigma i = en(\mu e + \mu p)$	$\sigma n = ne\mu e$	$\sigma p = ne\mu p$	None of these	2
35	Resistivity & Conductivity	In the equation of electrical conductivity, $\sigma = ne\mu$, the mobility of electron or hole (μ) is defined as	μ = drift velocity / electric field	μ = drift velocity x electric field	μ = electric field / drift velocity	μ = electric field + drift velocity	1
36	Intrinsic & Extrinsic SC	An intrinsic semiconductor is referred to	P type semiconductor	N type semiconductor	Both N and P type semiconductors	A pure semiconductor	4
37	Intrinsic & Extrinsic SC	Extrinsic semiconductor is referred to	Both N and P type semiconductors	A pure semiconductor	N type semiconductor	P type semiconductor	1
38	Intrinsic & Extrinsic SC	The dopant impurity of valancy ____ is added in an intrinsic semiconductor to create n-type semiconductor	5	2	3	1	1
39	Intrinsic & Extrinsic SC	The dopant impurity of valancy ____ is added in an intrinsic semiconductor to create p-type semiconductor	5	2	3	1	3
40	Intrinsic & Extrinsic SC	The absence of electron in a semiconductor gives rise to	Positive ion	Hole	Negative ion	Vacancy	2
41	Intrinsic & Extrinsic SC	What is true regarding the charge on an electron and a hole	Charge on hole > Charge on electron	Charge on hole < Charge on electron	Charge on hole = Charge on electron	Cannot be compared	3

42	Intrinsic & Extrinsic SC	The bond that exists in a semiconductor is	Ionic bond	Covalent bond	Metallic bond	None of these	2
43	Intrinsic & Extrinsic SC	To form P-type semiconductor, the impurity of valency is added to intrinsic semiconductor	3	5	6	7	1
44	Intrinsic & Extrinsic SC	To form N-type semiconductor, the impurity of valency is added to intrinsic semiconductor	3	5	6	7	2
45	Intrinsic & Extrinsic SC	In an intrinsic semiconductor	(No. of free electrons) = (No. of holes)	(No. of free electrons) > (No. of holes)	(No. of free electrons) < (No. of holes)	Cannot be determined	1
46	Intrinsic & Extrinsic SC	If ne is concentration of electrons and np is concentration of holes, then in intrinsic semiconductors	ne = np	ne > np	ne < np	ne ~ np	1
47	Intrinsic & Extrinsic SC	In an intrinsic semiconductor, conduction is because of	Only free electrons	Only holes	Both free electrons and holes	Either free electrons or holes	3
48	Intrinsic & Extrinsic SC	In a semiconductor hole is referred to	Positive ion	Negative ion	Absence of electron	Presence of electron	3
49	Intrinsic & Extrinsic SC	Fermi level for a metal is highest energy level occupied by electrons at	Zero degree Farenheit	Zero degree Celcius	Zero Kelvin	Centre of the forbidden energy gap	3
50	Fermi energy	For an intrinsic semiconductor, Fermi level is	Highest energy level occupied by electrons at 0 degree celsius	Highest energy level occupied by electrons at 0 degree Fahrenheit	Highest energy level occupied by electrons at 0 Kelvin	Reference energy level at the centre of the forbidden energy gap	4
51	Fermi energy	At T=0 K Fermi level for an intrinsic semiconductors is	Above the Fermi level	At any position between conduction band and valence band	Below the Fermi level	Midway of the forbidden energy gap	4
52	Fermi energy	Fermi Dirac statistics is applicable to electrons because they show	Electrons obey Pauli's exclusion principle	Electrons are indistinguishable	The spin of electron is half integral	All of these	4
53	Fermi energy	Fermi-Dirac Distribution Function gives _____ that the energy state E will be occupied by electron at temperature T	Exact nature	Probability			2
54	Fermi energy	Fermi-Dirac Distribution Function gives probability that the _________ will be occupied by electron at temperature T	Any energy states	Energy states less than Fermi energy	Energy states greater than Fermi energy	Fermi energy	1
55	Fermi energy	At T=0 K, the probability that electron occupy an energy level $E<E_f$ is	1	0	Anything between 0 and 1	0.5	1
56	Fermi energy	At T=0 K, the probability that electron occupy an energy level $E>E_f$ is	1	0	Anything between 0 and 1	0.5	2
57	Fermi energy	At T=0K, the probability that electron will occupy an energy level E=Ef is	1	0	Anything between 0 and 1	0.5	3
58	Fermi energy	At T>0K, the probability that electron will occupy an energy level E=Ef is	1	0	Anything between 0 and 1	0.5	4
59	Fermi energy	Above T > 0 K, Fermi level for an n-type semiconductor is	At any position between conduction band and valence band	Near to the valence band	Near to the conduction band	Midway of the forbidden energy gap	3
60	Fermi energy	Above T > 0 K, Fermi level for a p-type semiconductor is	At any position between conduction band and valence band	Near to the valence band	Near to the conduction band	Midway of the forbidden energy gap	2
61	PN Junction Diode	In a PN junction semiconductor diode, under equilibrium	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	2
62	PN Junction Diode	In a PN junction semiconductor diode, under forward bias	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	3
63	PN Junction Diode	In a PN junction semiconductor diode, under reverse bias	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	1
64	Solar Cell	A solar cell works on the principle of	Photoelectric effect	Photoluminescence effect	Photovoltaic effect	Photo Combustion effect	3
65	Solar Cell	A solar cell converts ______	heat energy into electrical energy	heat energy into light energy	light energy into electrical energy	light energy into heat energy	3
66	Solar Cell	The solar cell works for	Infra-red light rays	Ultra-violet light rays	Visible light rays	For entire range of electromagnetic spectrum	4
67	Solar Cell	In solar cells, the unit of fill factor is	Ampere	Volt	It does not have unit	Ohm	3
68	Solar Cell	In a solar cell, if the load resistance is minimum it gives rise to	Short circuit current	Open circuit voltage	Both options 1 and 2 true	None of options 1 or 2 are true	1
69	Solar Cell	In a solar cell, if the load resistance is maximum it gives rise to	Short circuit current	Open circuit voltage	Both options 1 and 2 true	None of options 1 or 2 are true	2
70	Solar Cell	In a solar cell short circuit current refers to _________ current when load resistance is	Maximum, minimum	Minimum, maximum	Minimum, minimum	Maximum, maximum	1
71	Solar Cell	In a solar open circuit voltage refers to ________ voltage when load resistance is	Maximum, minimum	Minimum, maximum	Minimum, minimum	Maximum, maximum	4
72	Solar Cell	The efficiency of solar cell can be increased by	Proper orientation of solar panel	Solar panel glazing	Installing light concentrators	All of the above	4
73	Solar Cell	For a solar cell, the fill factor is the ratio of	Actual power output to theoretical maximum power	Theoretical maximum power to actual power output	Actual power output to incident power	Theoretical maximum power to incident power	1
74	Solar Cell	For a solar cell, efficiency is the ratio of	Actual power output to theoretical maximum power	Theoretical maximum power to actual power output	Actual power output to incident power	Theoretical maximum power to incident power	3
75	Solar Cell	If anti-reflection coating is made over the solar cell	It will increase reflection of light rays and efficiency of solar cell will decrease	It will increase reflection of the light rays and efficiency of solar cell will increase	It will reduce the reflection of light rays and efficiency of solar cell will increase	It will reduce the reflection of light rays and efficiency of solar cell will decrease	3
76	Solar Cell	In a solar cell, the unit of fill factor is	watts	ampere-volt	ohm	No unit	4
77	Solar Cell	The ratio of actual power output to theoretical maximum power is known as	Fill factor	Efficiency	Performance of solar cell	Power ratio	1
78	Solar Cell	The ratio of actual power output to incident power is known as	Fill factor	Efficiency	Performance of solar cell	Power ratio	2
79	Hall effect	Hall effect is true for	Semiconductors only	For N-type semiconductors only	For metals only	For both metals and semiconductors	4
80	Hall effect	Hall effect is more sensetive in case of	Metals	Semiconductors	Both metals and semiconductors		2
81	Hall effect	In a semiconductor slab, the current flows along the length. The magnetic field applied along its thickness. Then the Hall voltage would be developed	Along the thickness of the semiconductor	Along the width of the semiconductor	Along the length of the semiconductor	None of the above	2
82	Hall effect	In the setup of Hall effect if the strength of magnetic field is reduced, the Hall voltage will be	Remains constant	Decreases	Increases	Changes the direction	2

83	Hall effect	In the setup of Hall effect if the current within the semiconductor is increased, the Hall voltage will be	Remains constant	Decreases	Increases	Changes the direction	3
84	Hall effect	In the setup of Hall effect if the direction of magnetic field is reversed, the Hall voltage will be	Decreases	Increases	Is produced in opposite direction	Becomes unstable	3
85	Hall effect	The resistivity of a semiconductor is found to be 0.003 Ohm-m. If the mobility is 0.05, what would be the Hall coefficient?	0.00015	0.0015	0.015	0.15	1
86	Hall effect	Calculate the energy gap of Germanium in eV, given that it is transparent to radiation of wavelength greater than 17760 Å[Given: Planks constant = 6.63 x 10E-34 J.s, Velocity of light = 3 x 10E8 m/s.	1.13 eV	0. 5 eV	0.7 eV	1.2 eV	3
86	Drift current	the motion of charge carriers under the influence of an external electric field gives rise to	Drift current	Diffiusion current	Semiconductor current	Ideal current	1
86	Drift current	the motion of charge carriers due to unqual distribution of charge carriers gives rise to	Drift current	Diffiusion current	Semiconductor current	Ideal current	2

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FE - Engineering Physics
MCQs - Unit 4 - Semiconductor Physics

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	Above T > 0 K, Fermi level for an n-type semiconductor is	At any position between conduction band and valence band	Near to the valence band	Near to the conduction band	Midway of the forbidden energy gap	3
2	In a PN junction semiconductor diode, under reverse bias	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	1
3	In the setup of Hall effect if the current within the semiconductor is increased, the Hall voltage will be	Remains constant	Decreases	Increases	Changes the direction	3
4	In a PN junction semiconductor diode, under forward bias	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	3
5	In a semiconductor slab, the current flows along the length. The magnetic field applied along its thickness. Then the Hall voltage would be developed	Along the thickness of the semiconductor	Along the width of the semiconductor	Along the length of the semiconductor	None of the above	2
6	Hall effect is true for	Semiconductors only	For N-type semiconductors only	For metals only	For both metals and semiconductors	4
7	Fermi level for an intrinsic semiconductor is the	Highest energy level occupied by electrons at 0 degree celsius	Highest energy level occupied by electrons at 0 degree Fahrenheit	Highest energy level occupied by electrons at 0 Kelvin	Reference energy level at the centre of the forbidden energy gap	4
8	The ratio of actual power output to theoretical maximum power is known as ___	Fill factor	Efficiency	Performance of solar cell	Power ratio	1
9	Above T > 0 K, Fermi level for a p-type semiconductor is	At any position between conduction band and valence band	Near to the valence band	Near to the conduction band	Midway of the forbidden energy gap	2
10	If a copper wire has length 1 cm and area of cross section 1 square centimeter, its resistance would be called as	Specific resistance	Unit resistance	Resistivity	Absolute resistance	1
11	A solar cell works on the principle of	Photoelectric effect	Photoluminescence effect	Photovoltaic effect	Photo Combustion effect	3
12	The valence band and conduction band would be observed in	Solids only	Liquids only	Gases Only	All - solids, liquids and gases	1
13	In an intrinsic semiconductor	(No. of free electrons) = (No. of holes)	(No. of free electrons) > (No. of holes)	(No. of free electrons) < (No. of holes)	Cannot be determined	1
14	The ratio of actual power output to incident power is known as ___	Fill factor	Efficiency	Performance of solar cell	Power ratio	2
15	For metals, above T>0K, conduction band and valence bands overlap. This means its bandgap energy is	Zero	of the order of 1-2 eV	of the order of 5 eV	of the order of 10 eV	1

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FE - Engineering Physics
MCQs - Unit 4 - Semiconductor Physics

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
16	The conductivity in metals will _____ with ______ in number of charge carriers	Increase, increase	Decrease, increase	Remains constant, increase	Remains constant, decrease	1
17	In solar cells, the unit of fill factor is _____	Ampere	Volt	It does not have unit	Ohm	3
18	At T=0 K Fermi level for an intrinsic semiconductors is	Above the Fermi level	At any position between conduction band and valence band	Below the Fermi level	Midway of the forbidden energy gap	4
19	In the setup of Hall effect if the strength of magnetic field is reduced, the Hall voltage will be	Remains constant	Decreases	Increases	Changes the direction	2
20	In the setup of Hall effect if the direction of magnetic field is reversed, the Hall voltage will be	Decreases	Increases	Is produced in opposite direction	Becomes unstable	3
21	_________ is collection of energies of all the electrons in valence orbit	Fermi energy	Valence band	Conduction band	Band gap energy	2
22	Fermi level for a metal is highest energy level occupied by electrons at _____	Zero degree Farenheit	Zero degree Celcius	Zero Kelvin	Centre of the forbidden energy gap	3
23	The efficiency of solar cell can be increased by	Proper orientation of solar panel	Solar panel glazing	Installing light concentrators	All of the above	4
24	Calculate the energy gap of Germanium in eV, given that it is transparent to radiation of wavelength greater than 17760 Å[Given: Planks constant = 6.63 x 10E-34 J.s, Velocity of light = 3 x 10E8 m/s.	1.13 eV	0. 5 eV	0.7 eV	1.2 eV	3
25	In a solar cell, if the load resistance is minimum it gives rise to	Short circuit current	Open circuit voltage	Both options 1 and 2 true	None of options 1 or 2 are true	1
26	The unit of conductivity is	Ohm	Ohm / m	Ohm - m	mho / m	2
27	Extrinsic semiconductor is referred to	Both N and P type semiconductors	A pure semiconductor	N type semiconductor	P type semiconductor	1
28	Which is these represents the correct ordering for the band gaps energy?	Metal > Semiconductor > Insulator	Metal < Semiconductor < Insulator	Metal < Semiconductor > Insulator	Metal > Semiconductor < Insulator	2
29	The dopant impurity of valancy ____ is added in an intrinsic semiconductor to create p-type semiconductor	5	2	3	1	3
30	The dopant impurity of valancy ____ is added in an intrinsic semiconductor to create n-type semiconductor	5	2	3	1	1
31	The resistivity of a semiconductor is found to be 0.003 Ohm-m. If the mobility is 0.05, what would be the Hall coefficient?	0.00015	0.0015	0.015	0.15	1
32	What is true regarding the charge on an electron and a hole	Charge on hole > Charge on electron	Charge on hole < Charge on electron	Charge on hole = Charge on electron	Cannot be compared	3

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
33	__________ is collection of energies of all the free electrons	Fermi energy	Valence band	Conduction band	Band gap energy	3
34	In a PN junction semiconductor diode, under equilibrium	(Fermi level of P region) > Fermi level of N region)	(Fermi level of P region) = Fermi level of N region)	(Fermi level of P region) < Fermi level of N region)	None of the above	2
35	The absence of electron in a semiconductor gives rise to _____	Positive ion	Hole	Negative ion	Vacancy	2
36	An intrinsic semiconductor is referred to	P type semiconductor	N type semiconductor	Both N and P type semiconductors	A pure semiconductor	4
37	In a solar cell, if the load resistance is maximum it gives rise to	Short circuit current	Open circuit voltage	Both options 1 and 2 true	None of options 1 or 2 are true	2

UNIT IVA

Q. At absolute zero, Si acts as?
A. non-metal
B. metal
C. insulator
D. none of these
Ans.C

Q. Carbon, Silicon and Germanium atoms have four valence electrons each. Their valence and conduction bands are separated by energy band gaps represented by (Eg)C, (Eg)Si and (Eg)Ge respectively. Which one of the following relationship is true in their case?
A. (Eg)C> (Eg)Si
B. (Eg)C<(Eg)Si
C. (Eg)C=(Eg)Si
D. (Eg)C<(Eg)Ge
Ans. A

Q. The forbidden energy gap in an insulator is
A. > 6 eV
B. < 6 eV
C. 1 eV
D. 4 Ev
Ans.B

Q. In an insulator, the number of electrons in the valence shell in general is
A. lessthan 4
B. more than 4
C. equal to 4
D. none of these
Ans.C

Q. Energy band gap size for semiconductors is in the range __________ eV.
A. 1-2
B. 2-3
C. 3-4
D. >4
Ans.A

Q. Energy band gap size for insulators is in the range _____ eV.
A. 1-2
B. 2-3
C. 3-4
D. 3-6
Ans.D

Q. Not an example for intrinsic semiconductor
A. Si
B. Al
C. Ge
D. Sn
Ans.B

Q. Which is the correct ordering of the band gaps within the group 14 elements?
A. Diamond>silicon<germanium
B. Diamond>silicon >germanium
C. Diamond<silicon>germanium
D. Diamond<silicon<germanium
Ans.B

Q. Energy bandformation is prominent in
A. Solids
B. Liquids
C. Gases
D. All the above
Ans.A
Q. Elements in gaseous state give rise to
A. band spectrum
B. line spectrum
C. continuous spectrum
D. all the above
Ans.B

Q. Elements in crystalline solid give rise to
A. band spectrum
B. line spectrum
C. continuous spectrum
D. all the above
Ans.A

Q. In solids there is significant interaction between ______ electrons orbit of different atoms.
A. innermost
B. outermost
C. both A and B

D. neither A nor B
Ans.B

Q. The band which contains free electrons is
A. Valence band
B. Conduction band
C. Forbidden band
D. Both valence and conduction bands
Ans.B

Q. The band which contains valence electrons is
A. Valence band
B. Conduction band
C. Forbidden band
D. Both valence and conduction bands
Ans.A

Q. ___________band does not contain electrons.
A. Valence
B. Conduction
C. Forbidden
D. Both valence and conduction
Ans.C

Q. Electrons can exist in
A. Valence band
B. Conduction band
C. Forbidden band
D. Both valence and conduction band
Ans.D

Q. If N atoms are brought close together to form a solid, the s energy band can accommodate
A. Nelectrons
B. 2N electrons
C. 6N electrons
D. 8N electrons
Ans.B

Q. If N atoms are brought close together to form a solid, the p energy band can accommodate
A. N electrons
B. 2Nelectrons
C. 6N electrons
D. 8Nelectrons
Ans.C

Q. If the outermost energy band in a solid is partially filled, the solid will be
A. Insulator
B. Semiconductor
C. Good conductor
D. Any of the above
Ans.C

Q. If the outermost energy band in a solid is completely filled, the solid will be
A. Insulator
B. Semiconductor
C. Good conductor
D. Either insulator or semiconductor
Ans.D

Q. If the outermost energy band in a solid is completely filled and the energy difference with the next energy band is small, the solid will be
A. Insulator
B. Semiconductor
C. Good conductor
D. Any of the above
Ans.B

Q. If the outermost energy band in a solid is completely filled and the energy difference with the next energy band is large, the solid will be
A. Insulator
B. Semiconductor
C. Good conductor
D. Any of the above
Ans.A

Q. An energy band is
A. A set of continuous energies
B. A set of closely spaced allowed energy levels
C. A set of widely spaced allowed energy levels
D. None of the above
Ans.B

Q. The origin of energy bands in solids is
A. Atomic mass
B. Temperature

C. Closely packed periodic structure of solid
D. Atomic number of atoms in solid
Ans.C

Q. Which of the following decides electrical properties of a solid?
A. Electronic configuration
B. Interatomic distance
C. Both Electronic configuration and Interatomic distance
D. Neither Electronic configuration nor Interatomic distance
Ans.C

Q. Valence band in a metal contains ………..
A. Free electrons
B. Holes
C. Valence electrons
D. Both holes and valence electrons
Ans.A

Q. Valence band in a semiconductor contains
A. Electrons
B. Holes
C. Valence electrons
D. Both holes and valence electrons
Ans.D

Q. Conduction band in a metal contains
A. Free electrons
B. Holes
C. Valence electrons
D. Both holes and valence electrons
Ans.A

Q. Conduction band in a semiconductor contains
A. Free electrons
B. Holes
C. Valence electrons
D. Both holes and valence electrons
Ans.A

Q. The energy gap in good conductors is
A. 0
B. ~1 eV
C. ~5 eV
D. None of the above
Ans.A

Q. The energy gap in insulators is
A. 0
B. ~ 1 eV
C. ~ 5 eV
D. None of the above
Ans.C

Q. The energy gap in semiconductors is
A. 0
B. ~ 1 eV
C. ~ 5 eV
D. None of the above
Ans.B

Q. Which of the following has maximum band gap energy?
A. Tin
B. Silicon
C. Germanium
D. Carbon in diamond form
Ans.D

Q. Which of the following has minimum band gap energy?
A. Tin
B. Silicon
C. Germanium
D. Carbon in diamond form
Ans.A

Q. Pure semiconductors are known as
A. Intrinsic
B. Doped
C. Extrinsic
D. Compound
Ans.A

Q. Impure semiconductors are known as
A. Intrinsic
B. wide band
C. Extrinsic
D. Compound
Ans.C

Q. When number of electrons in conduction band is equal to number of

holes in valance band at particular temperature the semiconductor is
A. Intrinsic
B. Doped
C. Extrinsic
D. Compound
Ans. A

Q. When number of electrons in conduction band is greater than number of holes in valance band at particular temperature the semiconductor is
A. Intrinsic
B. Extrinsic p type
C. Extrinsic n type
D. Compound
Ans. C

Q. When number of electrons in conduction band is less number of holes in valance band at particular temperature the semiconductor is
A. Intrinsic
B. Extrinsic p type
C. Extrinsic n type
D. Compound
Ans. B

Q. The donor impurity level lie
A. Just above the valence band
B. Just below the conduction band
C. At the centre of forbidden band
D. Just above the conduction band
Ans.B

Q. The acceptor impurity level lie
A. Just above the valence band
B. Just below the conduction band
C. At the centre of forbidden band
D. Just above the conduction band
Ans.A

Q. There is no forbidden band in
A. Good conductor
B. Semiconductor
C. Insulators
D. Both semiconductors and insulators
Ans.A

Q. The band gap energy in Silicon is
A. 0eV
B. 0.7 eV
C. 1.1 eV
D. 5 eV
Ans.C

Q. The band gap energy in Germanium is
A. 0eV
B. 0.7 eV
C. 1.1 eV
D. 5 eV
Ans.B

Q. Which of the following is not a semiconductor?
A. Silicon
B. Germanium
C. GaAs
D. Carbon
Ans.D

Q. Valence band of a semiconductor at 0 K will be
A. Completely filled
B. Partially filled
C. Completely empty
D. Either completely filled or completely empty
Ans.A

Q. Valence band of a semiconductor at temperatures above 0 K will be
A. Completely filled
B. Partially filled
C. Completely empty
D. Either completely filled or completely empty
Ans.B

Q. Conduction band of a semiconductor at 0 K will be
A. Completely filled
B. Partially filled
C. Completely empty
D. Either completely filled or completely empty
Ans.C

Q. Conduction band of a semiconductor at temperatures above 0 K will be
A. Completely filled

B. Partially filled
C. Completely empty
D. Either completely filled or completely empty
Ans.B

Q. Which of the following, when added as an impurity, into the Silicon, produces n-type semi conductor
A. Phosphorous
B. Aluminum
C. Magnesium
D. Both ‘B’ and ‘C’
Ans.A

Q. When arsenic is added as an impurity to Silicon, the resulting material is
A. n-type semiconductor
B. p-type semiconductor
C. n-type conductor
D. Insulator
Ans.A

Q. To obtain a p-type germanium semiconductor, it must be doped with?
A. Arsenic
B. Antimony
C. Indium
D. Phosphorus
Ans.C

Q. Which of the following when added acts as an impurity into silicon produced n-type semi-conductor?
A. P
B. Al
C. B
D. Mg
Ans.A

Q. A semiconductor is doped with donor impurity is
A. p-type
B. n-type
C. npn type
D. pnp type
Ans.B

Q. One serious drawback of semiconductors is
A. they are costly
B. they pollute the environment
C. they do not last for long time
D. they can’t withstand high voltage
Ans.D

Q. In a p type semiconductor, the acceptor level is
A. Just above the conduction band of the host crystal
B. Just below the conduction band of the crystal
C. Just above the valence band of the crystal
D. Just below the valance band of the crystal
Ans.C

Q. In intrinsic semiconductors, number of free electrons is ______________number of holes.
A. Equal to
B. Greater than
C. Less than
D. Can not define
Ans.A

Q. In n-type semiconductors, number of holes is __________ number of free electrons.
A. Equal to
B. Greater than
C. Less than
D. Can not define
Ans.C

Q. In p-type semiconductors, number of holes is__________number of free electrons.
A. Equal to
B. Greater than
C. Less than
D. Twice
Ans.B

Q. n-type semiconductors is
A. pure semiconductor
B. produced when Indium is added as an impurity to Germanium

C. produced when phosphorous is added as an impurity to silicon
D. None of the above
Ans.C

Q. p-type semiconductors are
A. Negatively charged
B. Produced when Indium is added as an impurity to Germanium
C. Produced when phosphorous is added as an impurity to silicon
D. None of the above
Ans.B

Q. A long specimen of p-type semiconductor material:
A. Is positively charged
B. Is electrically neutral
C. Has an electric field directed along its length
D. None of the above
Ans.B

Q. When N-type semiconductor is heated,
A. Number of free electrons increases while that of holes decreases
B. Number of holes increases while that of electrons decreases
C. Number of electrons and holes remain same
D. Number of electron and holes increases equally
Ans.D

Q. A piece of copper and other of germanium are cooled from the room temperature to 80K, then
A. Resistance of each will increase
B. Resistance of copper will decrease
C. The resistance of copper will increase while that of germanium will decrease
D. The resistance of copper will decrease while that of germanium will increase
Ans.D

Q. The intrinsic semiconductor becomes an insulator at
A. 0°C
B. 0K
C. 300K
D. 27°C
Ans.B

Q. In semiconductors at a room temperature
A. The conduction band is completely empty
B. The valence band is partially empty and the conduction band is partially filled
C. The valence band is completely filled and the conduction band is partially filled
D. The valence band is completely filled
Ans.B

UNIT IVB

Q. Choose the only false statement from the following.
A. In conductors the valence and conduction bands overlap.
B. Substances with energy gap of the order of 5 eV are insulators.
C. The resistivity of a semiconductor increases with increase in temperature.
D. The conductivity of a semiconductor increases with increase in temperature.
Ans. C

Q. What is the conductivity of semiconductor if free electron density = $5x10^{12}/cm^3$ and hole density = $8x10^{13}/cm^3$? [μ_e = 2.3 and μ_h = 0.01 in SI
units]
A. 5.634
B. 1.968
C. 3.421
D. 8.964
Ans. B

Q. The difference in the variation of resistance with temperature in semiconductor arises essentially due to the difference in
A. type of bonding
B. crystal structure
C. scattering mechanism with temperature

D. number of charge carriers with temperature
Ans. D

Q. Resistance of a semiconductor
A. Increases with temperature
B. Decreases with temperature
C. Remains unaffected with temperature
D. None of these
Ans. B

Q. The temperature coefficient of the resistance of semiconductors is always
A. Positive
B. Negative
C. Zero
D. Infinite
Ans. B

Q. Electrical conductivity of insulators is of the order of
A. $10^{-10}(\Omega\text{-mm})^{-1}$
B. $10^{-10}(\Omega\text{-cm})^{-1}$
C. $10^{-10}(\Omega\text{-m})^{-1}$
D. $10^{-8}(\Omega\text{-m})^{-1}$
Ans. A

Q. Unit for electric field strength is
A. A/cm2
B. mho/meter
C. cm^2/V.s
D. V/cm
Ans. D

Q. Flow of electrons is affected by the following
A. Thermal vibrations
B. Impurity atoms
C. Crystal defects
D. all
Ans. D

Q. Mobility of holes is________mobility of electrons in intrinsic semiconductors.
A. Equal to
B. Greater than
C. Less than
D. Can not define
Ans. C

Q. The conductivity of an intrinsic semiconductor is given by (symbols have the usual meanings):
A. $\sigma_i = en_i2 (\mu_n - \mu_p)$ B. $\sigma_i = en_i (\mu_n - \mu_p)$ C. $\sigma_i = en_i (\mu_n + \mu_p)$
D. None of the above
Ans. C

Q. In an intrinsic semiconductor, the mobility of electrons in the conduction band is:
A. Less than the mobility of holes in the valence band
B. Zero
C. Greater than the mobility of holes in the valence band
D. None of the above
Ans. C

Q. If the drift velocity of holes under a field gradient of 100 V/m is 5m/s, the mobility (in the same SI units) is
A. 0.05
B. 0.55
C. 500
D. None of the above
Ans. A
Q. The electron and hole concentrations in aintrinsic semiconductor are $n_i$and p_i respectively. When doped with a p-type material, these change to n and p, respectively. Then:
A. $n + p = n_i + p_i$
B. $n + n_i = p + p_i$
C. $np = n_ip_i$
D. None of the above
Ans. D

Q. If the temperature of an extrinsic semiconductor is increased so that the intrinsic carrier concentration is doubled, then:
A. The minority carrier density doubles
B. The majority carrier density doubles
C. Both majority and minority carrier densities double
D. None of the above
Ans. A

Q. At room temperature, the current in an intrinsic semiconductor is due to
A. Holes
B. Electrons
C. Holes and electrons
D. None of the above
Ans. C

Q. The mobility is given by (notations have their usual meaning:
A. $\mu = v_d/E$
B. $\mu = v_d/2E$
C. $\mu = v_d/E^2$
D. None of the above
Ans. A

Q. In a p-type semiconductor, the conductivity due to holes (σ_p) is equal to (e
is the charge of hole, μ_p is the hole mobility, ρ_0 is the hole concentration):
A. $\rho_0.e/\mu_p$
B. $\mu_p/\rho_0.e$
C. $\rho_0.e.\mu_p$
D. None of the above
Ans. C

Q. Near room temperature, resistivity is maximum for
A. Good conductors
B. Semiconductors
C. Insulators
D. Both semiconductors and insulators
Ans. C

Q. Near room temperature, resistivity is minimum for
A. Good conductors
B. Semiconductors
C. Insulators
D. Both semiconductors and insulators
Ans. A

Q. Resistivity increases with increase in temperature for
A. Good conductors
B. Semiconductors
C. Insulators
D. Both semiconductors and insulators
Ans. A

Q. Resistivity decreases with increase in temperature for
A. Good conductors
B. Semiconductors
C. Insulators
D. Both semiconductors and insulators
Ans. D

Q. If a semiconductor is transparent to light of wavelength greater than λ, the band gap energy will be
A. $\frac{h\lambda}{c}$
B. $\frac{hc}{\lambda}$
C. $\frac{h}{\lambda}$
D. $\frac{\lambda c}{h}$
Ans. B

Q. If the band gap energy of a semiconductor is E_g,the material will be
A. transparent to wavelength greater than $\frac{hc}{E_g}$
B. opaque to wavelength greater than $\frac{hc}{E_g}$
C. transparent to wavelength less than $\frac{hc}{E_g}$
D. none of the above
Ans. A

Q. Which of the following have a positive temperature coefficient of resistance?
A. Good conductor
B. Semiconductor
C. Insulators
D. Both semiconductors and insulators
Ans. A

Q. Conduction in intrinsic semiconductors is due to
A. Only free electrons
B. Only holes
C. Both free electrons and holes

D. Positive and negative ions
Ans. C

Q. If a free electron moves towards right and combines with a hole, the hole
A. Moves towards right
B. Moves towards left
C. Remains at the same place
D. is neutralized
Ans. D

Q. If a bound electron moves towards right and combines with a hole, the hole
A. Moves towards right
B. Moves towards left
C. Remains at the same place
D. is neutralized
Ans. B

Q. In an electric field, an electron initially at rest will move
A. In the direction of electric field
B. Opposite to the direction of electric field
C. Perpendicular to the direction of electric field
D. None of the above
Ans. B

Q. In an electric field, a hole initially at rest will move
A. In the direction of electric field
B. Opposite to the direction of electric field
C. Perpendicular to the direction of electric field
D. None of the above
Ans. A

Q. Mobility of holes is _____ that of free electrons.
A. More than
B. Less than
C. Equal to
D. Can be more or less than
Ans. B

Q. The charge carriers in intrinsic semiconductors are
A. Free electrons
B. Holes
C. Both free electrons and holes
D. Neither free electrons nor holes
Ans. C

Q. The charge carriers in p - type semiconductors are
A. Free electrons
B. Holes
C. Both free electrons and holes
D. Neither free electrons nor holes
Ans. C

Q. The charge carriers in n - type semiconductors are
A. Free electrons
B. Holes
C. Both free electrons and holes
D. Neither free electrons nor holes
Ans. C

Q. The majority charge carriers in p - type semiconductors are
A. Free electrons
B. Holes
C. Both free electrons and holes
D. Neither free electrons nor holes
Ans. B

Q. The majority charge carriers in n - type semiconductors are
A. Free electrons
B. Holes
C. Both free electrons and holes
D. Neither free electrons nor holes
Ans. A

Q. The resistance of a conductor of unit length and unit cross section area is known as
A. Resistivity
B. Conductivity
C. Resistance
D. Conductance
Ans. A

Q. The reciprocal of resistivity is
A. Resistivity

B. Conductivity
C. Resistance
D. Conductance
Ans. B

Q. The reciprocal of resistance is
A. Resistivity
B. Conductivity
C. Resistance
D. Conductance
Ans. D

Q. The amount of charge flowing through unit cross section area per unit time is known as
A. Current
B. Current density
C. Conductance
D. Resistance
Ans. B

Q. The amount of charge flowing through any cross section area per unit time is known as
A. Current
B. Current density
C. Conductance
D. Resistance
Ans. A

Q. Current in a semiconductor can be due to
A. Electric field
B. Density gradient of charge carriers
C. Both electric field and density gradient of charge carriers
D. Either electric field or density gradient of charge carriers
Ans. C

Q. The unit for resistivity is
A. ohm
B. Ohm/m
C. Ohm-m
D. mho/m
Ans. C

Q. The unit for conductivity is
A. Ohm
B. Ohm/m
C. Ohm-m
D. mho/m
Ans. D

Q. Which of the following equations for mobility is correct?
A. $\mu = \frac{v_d}{E}$
B. $\mu = \frac{\sigma}{ne}$
C. $\mu = \frac{1}{ne\rho}$
D. All the above
Ans. D

Q. If I_e is the current due to electrons and I_h is the current due to holes in a semiconductor under the influence of an external electric field, the total current is
A. $I_e + I_h$
B. $I_e - I_h$
C. I_e / I_h
D. I_h / I_e
Ans. A

Q. The equation for current density 'J' is
A. n e v_d
B. n e a v_d
C. n e a
D. None of the above
Ans. A

Q. The equation for current I is
A. nev_d
B. $neav_d$
C. nea
D. None of the above
Ans. B

Q. If an electric field of 10 V/m is applied to n-type Germanium in which the mobility of free electrons is 3800 cm^2 / V.sec, the drift velocity of electrons will be
A. 38000 m/s
B. 38 m/s
C. 3.8m/s

D. 0.38m/s
Ans. C

Q. If an electric field of 10 V/m applied to p-type Germanium gives rise to a drift velocity of 1.7 m/s for the holes, the mobility of holes is
A. 1.7 cm^2 / V.sec.
B. 17 cm^2 / V.sec.
C. 170 cm^2 / V.sec.
D. 1700cm^2 / V.sec.
Ans. D

Q. A small concentration of minority carriers is injected into a homogeneous semiconductor crystal at one point. An electric field of 10 V/cm is applied across the crystal and this moves the minority carrier a distance of 1 cm in 20 μsec. The mobility (in cm^2/V.sec) is:
A. 10000
B. 5000
C. 50
D. 100
Ans. B

Q. What will the mobility of charge carriers moving with velocity 3 x 10^5 m/s when electric field of 10^3 V/m is applied to it?
A. 300m^2/V.sec
B. 3000m^2/V.sec
C. 30000m^2/V.sec
D. 300000m^2/V.sec
Ans. A

Q. What will the mobility of charge carriers moving with velocity 3 x 10^6 m/s when electric field of 10^3 V/m is applied to it?
A. 300m^2/V.sec
B. 3000m^2/V.sec
C. 30000m^2/V.sec
D. 300000m^2/V.sec
Ans. B

Q. If the electrical resistivity of T_i is 4.3 × 10^{-7} Ω m, what is the resistance of a 0.85 m long piece of wire of cross section 2.0 × 10^{-6} m^2?
A. 0.18 Ω
B. 5.47 Ω
C. 0.25 Ω
D. 3.95 Ω
E. A

UNIT IVC

Q. The Fermi-Dirac probability distribution function is
A. $P(E) = \frac{1}{1+e^{(E-E_f)/KT}}$
B. $P(E) = \frac{1}{1+e^{(E_F-E)/KT}}$
C. $P(E) = \frac{1}{e^{(E-E_f)/KT}}$
D. $P(E) = \frac{1}{1-e^{(E-E_f)/KT}}$
Ans. A
Q. The value of Fermi Function at 0K for $E < E_F$ is
A. 0
B. 1
C. 0.5
D. 0.75
Ans. B

Q. The value of Fermi Function at 0K for $E > E_F$ is
A. 0
B. 1
C. 0.5
D. 0.75
Ans. A

Q. The value of Fermi Function at T > 0K for $E = E_F$ is ………….
A. 0
B. 1
C. 0.5
D. 0.75
Ans. C

Q. The probability that an electron in a metal occupies the Fermi-level, at any temperature (>0 K) is:
A. 0
B. 1

C. 0.5
D. None of the above
Ans. C

Q. The value of Fermi-distribution function at absolute zero (T = 0K) is 1, i.Ans. P(E) = 1, under the condition
A. $E > E_F$
B. $E < E_F$
C. $E = E_F$
D. $E >> E_F$
Ans. B

Q. Fermi energy level for intrinsic semiconductors lies
A. At middle of the band gap
B. Close to conduction band
C. Close to valence band
D. None
Ans. A

Q. Fermi energy level for p-type semiconductors lies
A. At middle of the band gap
B. Close to conduction band
C. Close to valence band
D. None
Ans. C

Q. Fermi energy level for n-type extrinsic semiconductors lies
A. At middle of the band gap
B. Close to conduction band
C. Close to valence band
D. None
Ans. B

Q. Fermi level for extrinsic semiconductor depends on
A. Donor element
B. Impurity concentration
C. Temperature
D. All
Ans. D

Q. When we increase the temperature of extrinsic semiconductor, after a certain temperature it behaves like
A. an insulator
B. an intrinsic semiconductor
C. a conductor
D. a superconductor
Ans. B

Q. In a n-type semiconductor, the Fermi level at 0K is
A. between valence band and acceptor levels
B. between acceptor levels and intrinsic Fermi level
C. between intrinsic Fermi level and donor level
D. between donor level and conduction band
Ans. D

Q. In a p-type semiconductor, the Fermi level at 0 K is
A. between valence band and acceptor levels
B. between acceptor levels and intrinsic Fermi level
C. between intrinsic Fermi level and donor level
D. between donor level and conduction band
Ans. A

Q. In a n-type semiconductor, the Fermi level at T > 0 K is
A. between valence band and acceptor levels
B. between acceptor levels and intrinsic Fermi level
C. between intrinsic Fermi level and donor level
D. between donor level and conduction band
Ans. C

Q. In a p-type semiconductor, the Fermi level at T > 0K is
A. between valence band and acceptor levels
B. between acceptor levels and intrinsic Fermi level
C. between intrinsic Fermi level and donor level

D. between donor level and conduction band
Ans. B

Q. The Fermi level shifts ______ in p-type semiconductor with increase in temperature.
A. upwards
B. downwards
C. neither upward nor downward
D. none of the above
Ans. A

Q. The Fermi level shifts ______ in n-type semiconductor with increase in temperature.
A. upwards
B. downwards
C. neither upward nor downward
D. none of the above
Ans. B

Q. The Fermi level shifts ________ in intrinsic semiconductor with increase in temperature.
A. upwards
B. downwards
C. neither upward nor downward
D. none of the above
Ans. C

Q. The Fermi level shifts ________ in n-type semiconductor with increase in impurity concentration.
A. upwards
B. downwards
C. neither upward nor downward
D. none of the above
Ans. A

Q. The Fermi level shifts _________ in p-type semiconductor with increase in impurity concentration.
A. Upwards
B. downwards
C. neither upward nor downward
D. none of the above
Ans. B

Q. When the current flows in semiconductor due to the influence of external electric field it is called as
E. diffusion current
F. drift current
G. ac current
H. dc current
Ans. B

Q. When the current flows from one place to other in semiconductor due to the concentration gradient it is called as
I. diffusion current
J. drift current
K. ac current
L. dc current
Ans. A

Q. In a semiconductor the charge carriers (electrons or holes) have a tendency to move from the region of higher concentration to the region of lower concentration of same type of charge carriers resulting a current called as
A. diffusion current
B. drift current
C. ac current
D. dc current
Ans. A

UNIT IVD

Q. p-n junction is said to be forward biased, when
A. The positive pole of the battery is joined to the p-semiconductor and negative pole to the n-semiconductor
B. The positive pole of the battery is joined to the n-semiconductor and negative pole of the battery is joined to the p-semiconductor
C. The positive pole of the battery is connected to n- semiconductor and p-semiconductor
D. A mechanical force is applied in the forward direction
Ans. A

Q. The depletion layer in the P-N junction region is caused by?
E. Drift of holes
F. Diffusion of charge carriers
G. Migration of impurity ions
H. Drift of electrons
Ans. B

Q. A semi-conducting device is connected in a series circuit with a battery and a resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed, the current drops to almost zero. The device may be
A. A p-n junction
B. An intrinsic semi-conductor
C. A p-type semi-conductor
D. An n-type semi-conductor
Ans. A

Q. The cause of the potential barrier in a p-n diode is
A. Depletion of positive charges near the junction
B. Concentration of positive charges near the junction
C. Depletion of negative charges near the junction
D. Concentration of positive and negative charges near the junction
Ans. D

Q. In forward bias, the width of potential barrier in a p-n junction diode
A. increases
B. decreases
C. remains constant
D. first increases then decreases
Ans. B

Q. A depletion layer consists of
A. electrons
B. protons
C. mobile ions
D. immobile ions
Ans. D

Q. The part of depletion layer in the p-type contains
A. holes
B. positive ions
C. free electrons
D. negative ions
Ans. D

Q. The part of depletion layer in the n-type contains
A. holes
B. positive ions
C. free electrons
D. negative ions
Ans. B

Q. In a junction diode, the holes are due to
A. protons
B. extra electrons
C. neutrons
D. missing electrons
Ans. D

Q. In an unbiased p-n junction
A. The potential of the p and n sides becomes higher alternately
B. The p side is at higher electrical potential than the n side
C. The n side is at higher electrical potential than the p side
D. Both the p and n sides are at the same potential
Ans. B

Q. Reverse bias applied to a junction diode
A. increases the minority carrier current
B. lowers the potential barrier
C. raises the potential barrier
D. increases the majority carrier current
Ans. C

Q. Application of a forward bias to a pn junction
A. Widens the depletion zone.
B. Increases the potential difference across the depletion zone.
C. Increases the number of donors on the n side.
D. Increases the electric field in the depletion zone.
Ans. C

Q. On increasing the reverse bias to a large value in pn junction diode, the current
A. Increases slowly
B. remains fixed
C. Suddenly increases
D. decreases slowly
Ans. C

Q. The number of _________ charge carriers increases with increase in temperature in n-type semiconductor.
A. minority
B. majority
C. both minority and majority
D. neither minority nor majority
Ans. C

Q. The number of ________ charge carriers increases with increase in temperature in p-type semiconductor.
A. minority
B. majority
C. both minority and majority
D. neither minority nor majority
Ans. C

Q. The electrical resistance of depletion layer is large because
A. it has no charge carriers
B. it has large number of charge carriers
C. it contains electrons as charge carriers
D. it has holes as charge carriers
Ans. A

Q. In forward biased p-n junction the current is of the order of
A. ampere
B. milliampere
C. microampere
D. nanoampere
Ans. B

Q. When p-n junction diode is reverse biased the flow of current across the junction is mainly due to
A. diffusion of charges
B. depends on nature of material
C. drift of charges
D. both drift and diffusion of charges
Ans. C

Q. The number of ______ charge carriers increases with increase in light incident on n-type semiconductor.
A. minority
B. majority
C. both minority and majority
D. neither minority nor majority
Ans. C

Q. The number of _______ charge carriers increases with increase in light incident on p-type semiconductor.
A. minority
B. majority
C. both minority and majority
D. neither minority nor majority
Ans. C

Q. Application of forward bias to the p-n junction
A. increases the number of donors on n side
B. increases electric field in depletion region
C. increases potential difference across the depletion region
D. widens the depletion zone
Ans. B

Q. Within depletion region of the p-n junction diode
A. p side is positive and n side is negative
B. p side is negative and n side is positive
C. both sides are either positive or negative
D. both sides are neutral
Ans. B

Q. Barrier potential of p-n junction does not depend on
A. temperature
B. forward bias
C. reverse bias
D. diode design
Ans. D

Q. For the same electric field and density of doping in two identical semiconductors,

one p-type and the other n-type, the current will be
A. more in n-type
B. more in p-type
C. same in both
D. none of the above
Ans. B

Q. The potential difference across an open circuited p-n junction is known as
A. knee voltage
B. cut-in-voltage
C. barrier potential
D. none of the above
Ans. C

Q. The dominant mechanism for motion of charge carriers in forward and reverse biased silicon p-n junction are
A. drift in both forward and reverse bias
B. diffusion in both forward and reverse
C. diffusion in forward and drift in reverse
D. drift in forward and diffusion in reverse
Ans. A

Q. If V_B is the barrier potential, the energy difference between the conduction bands of n-type and p-type in open circuited (unbiased) p-n junction diode is
A. eV_B
B. $\frac{V_B}{e}$
C. $e+V_B$
D. $e-V_B$
Ans. A

Q. If V_B is the barrier potential and V is the applied voltage, the energy difference between the conduction bands of n-type and p-type in forward biased p-n junction diode is
A. eV_B
B. eV_B+eV
C. eV_B-eV
D. $V-V_B$
Ans. C

Q. If V_B is the barrier potential and V is the applied voltage, the energy difference between the conduction bands of n-type and p-type in reverse biased p-n junction diode is
A. eV_B
B. eV_B+eV
C. eV_B-eV
D. $V-V_B$
Ans. B

Q. Under equilibrium conditions in a p-n junction, the Fermi level in n-type is at ______ level than/as that in p-type.
A. higher
B. lower
C. same
Ans. none of the above
D. C

Q. When forward bias is applied to a p-n junction diode, the Fermi level in n-type ______ with respect to the Fermi level in p-type.
A. rises
B. falls
C. remains at the same level
D. initially rises and then falls
Ans. A

Q. When reverse bias is applied to a p-n junction diode, the Fermi level in n-type _______ with respect to the Fermi level in p-type.
A. rises
B. falls
C. remains at the same level
D. initially rises and then falls
Ans. B

Q. When forward bias voltage is applied to a p-n junction diode, the width of the depletion layer
A. increases
B. decreases
C. remains constant
D. initially increases and then decreases
Ans. B

Q. When reverse bias voltage is applied to a p-n junction diode, the width of the depletion layer
A. increases
B. decreases
C. remains constant
D. initially increases and then decreases
Ans. A

Q. In a forward biased diode, the conduction is mainly due to
A. electrons
B. holes
C. electrons in p-type and holes in n-type
D. holes in p-type and electrons in n-type
Ans. D

Q. In a reverse biased diode, the conduction is mainly due to
A. electrons
B. holes
C. electrons in p-type and holes in n-type
D. holes in p-type and electrons in n-type
Ans. C

Q. The recombination of electron hole pairs in a forward biased GaAs diode gives rise to _______ radiation.
A. visible
B. infra red
C. ultra violet
D. microwave
Ans. A

Q. The depletion layer opposes the flow of
A. majority charge carriers
B. minority charge carriers
C. both minority and majority charge carriers
D. neither minority nor majority charge carriers
Ans. A

Q. The part of a transistor, which is heavily doped to produce large number of majority carriers, is
A. emitter
B. base
C. collector
D. any of the above depending upon the nature of transistor
Ans. A

Q. When a n-p-n transistor is used as an amplifier then
A. the electrons flow from emitter to collector
B. the holes flow from emitter to collector
C. the electrons flow from collector to emitter
D. the electrons flow from battery to emitter
Ans. A

Q. If a transistor is to work as an amplifier, the emitter-base junction must be
A. forward biased
B. reversed biased
C. not be biased
D. any of the above
Ans. A
Q. If a transistor is to work as an amplifier, the collector-base junction must be
A. forward biased
B. reversed biased
C. not be biased
D. any of the above
Ans. B

Q. In an n-p-n transistor, _____ electrons from emitter get neutralized in base.
A. a large number of
B. very few
C. all
D. none of the
Ans. B

Q. The concentration of impurities in a transistor are
A. equal for emitter, base and collector
B. least for emitter region
C. largest for emitter region
D. largest for collector region
Ans. C

Q. In an n-p-n transistor, _____ electrons from emitter cross over to collector.
A. a large number of
B. very few

C. all
D. none of the
Ans. A

Q. In a biased n-p-n transistor, the Fermi level of emitter ________ with respect to that in base.
A. remains at the same level
B. shifts upwards
C. shifts downwards
D. first shifts up and then down
Ans. B

Q. In a biased n-p-n transistor, the Fermi level of collector ______ with respect to that in base.
A. remains at the same level
B. shifts upwards
C. shifts downwards
D. first shifts up and then down
Ans. C

Q. The base of transistor is made thin and lightly doped because
A. about 95% of the charge carriers may cross
B. about 100% of the charge carriers may cross
C. the transistors can be saved from large currents
D. none of these
Ans. A

Q. The Hall voltage in intrinsic silicon is
A. Positive
B. Zero
C. None of the above
D. Negative
Ans. B

Q. In Hall-effect, the magnetic field is applied
A. in the direction of current
B. opposite to direction of current
C. either in or opposite to direction of current
D. perpendicular to direction of current
Ans. D

Q. In Hall effect voltage is developed
A. in the direction of current
B. opposite to direction of current
C. either in or opposite to direction of current
D. perpendicular to direction of current
Ans. D

Q. If an electron moves along positive X axis and a magnetic field is applied in positive Y direction, the electron will experience a force along
A. positive Z
B. negative Z
C. positive X
D. negative X
Ans. B

Q. If a hole moves along positive X axis and a magnetic field is applied in positive Y direction, the hole will experience a force along
A. positive Z
B. negative Z
C. positive X
D. negative X
Ans. A

Q. The Hall voltage is given by V_H =
A. $\frac{IBd}{nqa}$
B. $\frac{Bd}{Inqa}$
C. $\frac{IqBd}{na}$
D. $\frac{IBad}{nq}$
Ans. A

Q. The Hall coefficient is given by R_H =
A. nq
B. $\frac{1}{nq}$
C. $\frac{n}{q}$

D. $\frac{q}{n}$

Ans. B

Q. The Hall-Effect is used to determine

A. polarity of majority charge carriers

B. density of charge carriers

C. mobility of charge carriers

D. all the above

Ans. D

Q. The Hall coefficient of an intrinsic semiconductor is

A. Positive under all conditions

B. Negative under all conditions

C. Zero under all conditions

D. None of the above

Ans. C

Q. If the Hall coefficient of a material is 1.25×10^{-11} m^3/C and charge of an electron is 1.6×10^{-19} C, the density of electron is __________ per m^3.

A. 2×1029

B. 4×1029

C. 5×1029

D. 2×1024

Ans. C

Q. Hall-Effect is observed in a specimen when it (metal or a semiconductor) is carrying current and is placed in a transverse magnetic field. The resultant electric field inside the specimen will be in

A. direction normal to both current and magnetic field

B. direction of current

C. direction anti parallel to magnetic field

D. None of the above

Ans. A

Q. When n_e and n_h are electron and hole densities, and μ_e and μ_h are the carrier mobility, the Hall coefficient is positive when

A. $n_h \mu_h > n_e \mu_e$

B. $n_h \mu_h^2 > n_e \mu_e^2$

C. $n_h \mu_h < n_e \mu_h$

D. None of the above

Ans. A

Q. Measurement of Hall coefficient in a semiconductor provides information on the

A. Sign and mass of charge carriers

B. Mass and concentration of charge carriers

C. Sign of charge carriers alone

D. Sign and concentration of charge carriers

Ans. D

Q. Hall coefficient is given by the relation

A. $R_H = -neJ$

B. $R_H = \frac{1}{ne}$

C. $R_H = -\frac{1}{Jne}$

D. $R_H = \frac{-1}{ne}$

Ans. D

Q. The Hall coefficient of sample A at room temperature is $4\times10^{-4} m^3$ $coulomb^{-1}$. The carrier concentration in sample A at room temperature is

A. ~ 1021 m^{-3}

B. ~ 1020 m^{-3}

C. ~ 1022 m^{-3}

D. None of the above

Ans. C

Q. The generation of an e.m.f. across an open circuited p-n junction when light is made incident on it is known as ______ effect.

A. photo emissive

B. photoconductive

C. photovoltaic

D. none of the above

Ans. C

Q. The output from a solar cell is

A. a.c.

B. d.c.

C. can be either a.c. or d.c.

D. none of the above

Ans. B

Q. A solar cell consists of

A. alkali metal
B. pure semiconductor
C. intrinsic semiconductor
D. p-n junction
Ans. D

Q. When the load resistance connected across the solar cell is infinite, we get
A. open circuit current
B. open circuit voltage
C. short circuit current
D. short circuit voltage
Ans. B

Q. When the load resistance connected across the solar cell is zero, we get
A. open circuit current
B. open circuit voltage
C. short circuit current
D. short circuit voltage
Ans. C

Q. The Hall coefficient of a n type semiconductor sample is 2.083×10^{-4} m^3/C, then number of electrons in it are
A. 2×10^{22} m^{-3}
B. 3×10^{22} m^{-3}
C. 4×10^{22} m^{-3}
D. 2×10^{21} m^{-3}
Ans. B

Q. The Hall coefficient of a p type semiconductor sample is 3.125×10^{-5} m^3/C, then number of electrons in it are
A. 2×10^{22} m^{-3}
B. 3×10^{23} m^{-3}
C. 4×10^{23} m^{-3}
D. 2×10^{23} m^{-3}
Ans. D

Q. The number of electrons of in n type semiconductor sample is 3×10^{22} m^{-3}, then Hall coefficient is
A. 2.083×10^{-4} m^3/C
B. 2.083×10^{-3} m^3/C
C. 3.083×10^{-4} m^3/C
D. 4.083×10^{-4} m^3/C
Ans. A

Q. The electric field applied across the semiconductor of length 2 cm is 200 V/m. The voltage applied across it is
A. 5 Volt
B. 3 Volt
C. 4 Volt
D. 2 Volt
Ans. C

Q. The voltage applied across the semiconductor of length 2 cm is 5 V. Then the electric field developed across it is
A. 520 Volt/m
B. 350 Volt/m
C. 400 Volt/m
D. 250 Volt/m
Ans. D

Q. The semiconductor is transparent to the radiation of wavelength 11000 A.U. The energy gap of that semiconductor is
A. 1.310 eV
B. 1.013 eV
C. 1.130 eV
D. 1.113 eV
Ans. C

Q. The energy gap of a semiconductor is 0.7 eV. Then it will absorb the light of wavelength
A. 17750 A.U.
B. 17870 A.U.
C. 17780 A.U.
D. 17760 A.U.
Ans. D

Q. The highest possible level at absolute zero temperature is called as
A. fermo level
B. fermi level
C. Dirac level
D. imaginary level
Ans. B

Q. The fermi level in semiconductor
A. is energy level of electron
B. need not be the energy level of electron
C. can be energy level of electron
D. is always energy level of electron
Ans. B

Q. The ratio of actual output power to ideal power of solar cell is called as

A. solar cell factor
B. fill factor
C. field factor
D. feel factor
Ans. B

Q. In the solar cell the light energy incident on the solar cell must be ________ than the energy gap of a semiconductor.

A. smaller
B. equal
C. greater
D. None of above
Ans. C

Q. We do not get the ideal power ($I_{sc}V_{oc}$) from the solar cell because

A. I_{sc} and V_{oc} are not measurable.
B. I_{sc} and V_{oc} cannot be measured simultaneously.
C. I_{sc} can be measured but not V_{oc}.
D. V_{oc} can be measured but not I_{sc}.
Ans. B

MMIT, Lohgaon, Pune - 411047
FE - Engineering Physics
MCQs - Unit 5 - Magnetism and Superconductivity

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	Below ___________ temperature, superconducting material shows zero resistivity	Inversion	Conversion	Superconducting	Critical	4
2	Current is passed into a superconductor below its critical temperture. The voltage measured across it would be _____	Zero	Have certain value	Unstable	Fluctutate rapidly	1
3	In a superconducting ring, a current is setup and its temperature is maintained below the critical temperature. The current in the ring would _________	Increase gradually	Decrease gradually	Remain constant without reducing	Fluctutate rapidly	3
4	There is (are) ______ states in Type II superconductors	Four	Three	Two	One	3
5	If the temperature of a superconductor is reduced below its critical temperature, its resistivity _______	Decreases	Increases	Becomes zero	Fluctutate rapidly	3
6	If the application of external magnetic field of 18 T destroys the superconductivity of a superconductor, it would be a ______ superconductor	Type II	Type I	A mixed superconductor	None of the above	1
7	When two superconductors are joined with a thin insulating layer in between, a small tunneling current would flow across the junction. If a small dc current is applied across the superconductors, then _________	More DC current would flow	The current is reversed	The tunneling current oscillates with certain frequency	Less DC current would flow	3
8	The Meissner effect is _________ of magnetic flux from within the superconductor below Critical temperature	Expulsion	Attraction	Addition	Subtraction	1
9	Current is passed into a superconductor above its critical temperture. The voltage measured across it would be _____	Zero	Have certain value	Unstable	Fluctutate rapidly	2
10	The output of SQUID changes depending on the variation in the ____ across the Josephson junction	Superconducting current	Applied magnetic field	Applied voltage	Resistance	2
11	Below the critical temperature, the magnetic susceptibility of a superconductor would be ___	0	-1	1	> 1	2
12	In Superconducting Quantum Interference Devices (SQUID), works on the principle of intereference of ________	Light	Sound waves	Wave properties of Cooper pair	Magnetic fields	3
13	If the application of external magnetic field of 0.2 T destroys the superconductivity of a superconductor, it would be a ______ superconductor	Type II	Type I	A mixed superconductor	None of the above	2
14	In a Josephson junction, two superconductors are joined by a _______ of a few angstrom thickness	Superconductor material	Insulating material	Conducting material	Magnetic material	2

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
15	If the external magnetic field applied to a superconductor is exceed above ________, its superconductivity vanishes	Transition magnetic field	Critical magnetic field	Superconducting magnetic field	Meissner magnetic field	2
16	Above the lower critical magnetic field, the transition from superconducting state to normal state in Type II superconductors is _________	Sudden	Gradual	Gradual increase	Not defined	2
17	Superconductivity is characterised by a state of ______	Finite resistivity	Infinite resistivity	Zero resistivity	Zero conductivity	3
18	Below its Critical temperature, a superconductor is _________	Perfect magnetic	Perfect diamagnetic	Perfect ferromagnetic	Perfect paramagnetic	2
19	Above the critical magnetic field, the transition from superconducting state to normal state in Type I superconductors is _________	Sudden	Gradual	Gradual increase	Not defined	1
20	When two superconductors are joined with a thin insulating layer in between, a small tunneling current would flow across the junction. This effect is known as ______	DC Josephson effect	AC Josephson effect	Meissner effect	Tunneling effect	1
21	_________ materials are wekly repelled when placed in the external magnetic field	Paramagnetic materials	Diamagnetic materials	Ferromagnetic materials	Ferrimagnetic materials	2
22	In diamagnetic materials, the magnetic susceptibility is	Less than 1 and negative	Less than 1 and positive	Greater than 1 and positive	None of these	1
23	In the diamagnetic materials, relative permeability is	Less than 1	Just greater than 1	Significantly greater than 1	None of these	1
24	Magnetic dipole moment represents ______ of magnetic dipole	Unit	Strength	Direction	Value	2
25	The contribution of magnetic field due to ________ is maximum in the total magnetism generated by an atom	Spin motion of electron	Spin motion of nucleus	Orbital motion of nucleus	Orbital motion of electron	4
26	In paramagnetic materials, the magnetic susceptibility is	Less than 1 and negative	Less than 1 and positive	Greater than 1 and positive	None of these	2
27	Magnetic flux density is defined as _____	The number of lines of force per unit volume	The number of lines of force through given area of cross section	The number of lines of force passing through given volume	The number of lines of force through a unit area of cross section	4
28	Bohr magneton is defined as ____	Maximum magnetic field produced by an electron due to orbital	Smallest magnetic field produced by an electron due its spin motion	Smallest magnetic field produced by an electron due to orbital motion	Maximum magnetic field produced by an electron due to orbital	3
29	_________ materials are strongly attracted when placed in the external magnetic field	Paramagnetic materials	Diamagnetic materials	Ferromagnetic materials	Ferrimagnetic materials	3

MMIT, Lohgaon, Pune - 411047

FE - Engineering Physics

MCQs - Unit 5 - Magnetism and Superconductivity

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
30	Ampere-turns per meter (A/m) is the unit of	Magnatic field strength (H)	Magnetization (M)	Both Magnetic field strength and Magnetization	None of the above	3
31	Magnetic susceptibility is defined as _____	Magnetization developed in the material (M) / Applied Magnetic Field (H)	Magnetization developed in the material (M) x Applied Magnetic Field (H)	Applied Magnetic Field (H) x Magnetization developed in the material (M)	Applied Magnetic Field (H) / Magnetization developed in the material (M)	1
32	The unit of magnetic susceptibility is ______	Weber	Weber / m	Ampere - turns / meter	It has no unit	4
33	In the paramagnetic materials, relative permeability is	Less than 1	Just greater than 1	Significantly greater than 1	None of these	2
34	In ferromagnetic materials, the magnetic susceptibility is	Less than 1 and negative	Less than 1 and positive	Greater than 1 and positive	None of these	3
35	In the ferromagnetic materials, relative permeability is	Less than 1	Just greater than 1	Significantly greater than 1	None of these	3
36	The magnetic materials having ________ permeability are used to prepare a transformer core	Zero	High	Low	None of these	2
37	A combination of laser and magnetic field is used in	Magnetic recording	Magneto-optical recording	Magnetic imaging	All of these	2
38	The contribution of magnetic field due to ________ is least in the total magnetism generated by an atom	Spin motion of electron	Spin motion of nucleus	Orbital motion of nucleus	Orbital motion of electron	2
39	When the external magnetic field applied to a material, magnetic field is developed within the material. This is known as	Magnetization (M)	Magnetic field strength within material	Magnetic susceptibility	Magnetic dipole	1
40	A magnetic dipole is ______	a tiny magnet of microscopic to subatomic dimensions	a magnetic unit of macroscopic dimensions	A bar magnet having north and south pole	A current loop having north and south pole	1
41	For magnetic recording devices the ________ materials are used	Ferromagnetic	Diamagnetic	Paramagnetic	Ferrimagnetic	1
42	_________ materials are wekly attracted when placed in the external magnetic field	Paramagnetic materials	Diamagnetic materials	Ferromagnetic materials	Ferrimagnetic materials	1

Engineering Physics [107002]
Unit No. V: Magnetism and Superconductivity
Multiple Choice Question Bank

Q. No.	Question	Answer	Marks
1	When was superconductivity discovered? (a) 1932 (b) 1926 (c) 1893 (d) 1911	d	1
2	When does all resistance disappear? (a) Critical temperature (b) Important temperature (c) Favorable temperature (d) Pivotal temperature	a	1
3	What is the threshold temperature for a superconductor to switch from normal conduction to superconductivity? (a) Conduction temperature (b) Transition temperature (c) Switch temperature (d) Conversion temperatur	b	1
4	In superconductivity, the conductivity of a material becomes (a) Zero (b) Finite (c) Infinite (d) None of the above	c	1
5	In superconductivity, the electrical resistance of material becomes (a) Zero (b) Infinite (c) Finite (d) All of the above	a	1
6	The temperature at which conductivity of a material becomes infinite is called (a) Critical temperature (b) Absolute temperature (c) Mean temperature (d) Crystallization temperature	a	1
7	In superconductors, the Fermi energy level is (a) Below the ground state (b) Midway between the ground state and first excited state (c) Above first excited state (d) At first excited state	b	1

8	The superconducting state is perfectly _____ in nature. (a) Diamagnetic (b) Paramagnetic (c) Ferromagnetic (d) Ferromagnetic	a	1
9	Which of the following are the properties of superconductors? (a) They are diamagnetic in nature (b) They have zero resistivity (c) They have infinite conductivity (d) All of the above	d	1
10	The minimum amount of current passed through the body of superconductor in order to destroy the superconductivity is called (a) Induced current (b) Critical current (c) Eddy current (d) Hall current	b	1
11	Electrons grouped together that travel in pairs are called (a) Rutherford Pairs (b) Coulomb Pairs (c) Adam Pairs (d) Cooper Pairs	d	1
12	The energy required to break a cooper pair is ___ of the energy gap of superconductor. (a) One half (b) Equal to (c) Twice (d) Thrice	b	1
13	The copper pair has i. Equal and opposite momenta ii. Equal and opposite spin iii. Unequal and same spin Which of the above are true? (a) Only i (b) Only ii (c) i & ii (d) i & iii	c	1
14	The binding energy for a cooper pair is (a) 10^-2 eV (b) 10^-4 eV (c) 10^-6 eV (d) 10^-8 eV	b	1
15	The magnetic lines of force cannot penetrate the body of a	c	1

	superconductor, a phenomenon is known as (a) Isotopic effect (b) BCS theory (c) Meissner effect (d) London theory		
16	Which of the following conductor has highest critical temperature? (a) Aluminium (b) Zinc (c) Molybdenium (d) Tin	d	1
17	What type of superconductor displays perfect diamagnetism (a) Type 1 (b) Type 2 (c) Type A (d) Type B	a	1
18	The first high temperature superconductor was invented by (a) Sir Alex Muller (b) Sir Johannes Bednorz (c) Sir Walter Wingfield (d) both a and b	d	1
19	The first high temperature superconductor was invented in (a) 1987 (b) 1958 (c) 1986 (d) 1930	c	1
20	What are superconductors used for? (a) Toasters (b) Washing Machine (c) Magnetic Resonance Imaging (d) Water Parks	c	1

Engineering Physics [107002]
Unit No. VI: Non destructive testing & Physics of nano particles
Multiple Choice Question Bank

Q. No.	Question	Answer	Marks
1	Compared with microparticles, surface to volume ratio, for nanoparticles is- (a) Same (b) Smaller (c) Larger (d) None	c	2
2	Nanotechnology is related with material particles of the size of the order of (a) 10^{-9}m (b) 10^{-6}m (c) 10^{-3}m (d) 10^{-1}m	a	1
3	Due to quantum confinement energy levels of electron in a nanoparticle are (a) Discrete (b) Continuous (c) Higher (d) Lower	a	2
4	Who in the history is known to made first nanoparticle solution? (a) Newton (b) Thomas Alva Edison (c) Michel Faraday (d) Feynman	c	1
5	Properties of nanoparticles are different because of (a) Physical structure of material (b) Chemical composition of material (c) Nuclear structure (d) Atomic arrangement	d	1
6	Color of nanoparticles is different than bulk material because of (a) Chemical property (b) Surface to volume ration (c) Quantum confinement (d) Density of nanoparticles	c	1
7	As the particle size decreases, surface to volume ratio (a) Increases (b) Decreases (c) No change occurs (d) Depends on chemical nature	a	1
8	In old churches, color in window glasses is because of	c	1

	(a) Metal particles (b) Metal microparticles (c) Metal nanoparticles (d) Tree leaves		
9	For nanowire compared to bulk material, electrical resistance is (a) Low (b) High (c) Same (d) Independent of size	b	1
10	If we increase diameter of nanowire, its resistance will (a) Increase (b) Decrease (c) Remain same (d) None of above	a	1
11	In case of nanowire Coulomb staircase is (a) Zigzag shape of nanowire (b) Graph of voltage vs current (c) Graph of current vs resistance (d) Graph of voltage vs resistance	b	2
12	In case of nanowire Coulomb blockade is a (a) Resistance of nanowire (b) Region of graph where current remains zero when voltage is applied. (c) Staircase form of current vs voltage graph (d) Surface of wire	b	1
13	For nano object important condition is (a) At least one dimension should be 1nm to 100nm (b) At least one dimension should be 10nm to 1000nm (c) At least two dimension should be 1nm to 100nm (d) At least two dimension should be 10nm to 1000nm	a	1
14	If size of nanoparticle decreases band gap (a) Decreases (b) Remains constant (c) Increases (d) Becomes zero	c	2
15	In G. Mie formula μ is________of glass. (a) Refractive index (b) Extinction coefficient (c) Extinction cross section (d) Density	b	2
16	Extinction coefficient is independent of (a) Number of particles in medium (b) Volume of colloidal particles	b	1

	(c) Extinction cross-section of particle (d) Density of particles		
17	The electrons are transferred through nanowire when voltage is (a) ±e/2C (b) ±e/C (c) ±C/e (d) ±2C/e	a	2
18	The materials having nanosized grains have _____number of grain boundaries than polycrystalline materials. (a) 1 (b) 2 (c) Larger (d) Smaller	c	1
19	Nano crystals are (a) Highly impure and free of imperfections (b) Highly pure but with imperfections (c) Highly pure and free of imperfections (d) Highly impure and free of imperfections	c	2
20	The difference between Young's modulus of nanocrystal and polycrystal is (a) Big (b) Small (c) Zero (d) Infinite	a	1
21	In nanomaterials (a) Hardness decreases linearly with the grain size. (b) Hardness increases linearly with the grain size. (c) Hardness decreases exponentially with the grain size. (d) Hardness increases exponentially with the grain size.	b	1
22	Nanoparticles are useful in (a) Targeted drug delivery (b) Body implants (c) Diagnostic tests (d) All above	d	1
23	In targeted drug delivery medicine is delivered to specific part of body using (a) Laser (b) Nanocapsule (c) Nonowire (d) Quantum dot	b	1
24	Nanoparticles are having application in (a) Spin FET (b) Spin LED (c) Spin RTD (d) All off above	d	1

25	Nano particles are not useful in making (a) Display devices (b) Memory devices (c) Single electron transistor (d) None of above	d	1
26	Aerogels are (a) Heavy and strong (b) Light weight and strong (c) Highly flammable (d) Heavy and hard	b	1
27	Nanoparticles can be used in solar cells to (a) Reduce size of solar cell (b) Reduce weight of solar cell (c) Increase efficiency of solar cell (d) All of above	d	1
28	Self cleaning glass can be made by mixing small amount of (a) MgO_2 (b) TiO_2 (c) SnO_2 (d) SiO_2	b	1
29	Nanoparticles are useful in making (a) Body of car (b) Tyres (c) Fuel storage units (d) All of above	d	1
30	To check defect in a material or object which type of test is conducted? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	b	1
31	To find mechanical properties of material or object which type of test is conducted? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	a	1
32	In which type of test we can not use material after test? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	a	1

33	Which of the following is not a NDT method? (a) Visual inspection (b) Ultrasonic test (c) Tensile test (d) Radiography	c	2
34	Which of the following are advantages of NDT methods? (a) Affordability (b) Safety (c) Reliability (d) All of above	d	1
35	In which type of testing we can examine material when it is in working state? (a) Radiography (b) Tensile test (c) Acoustic Emission Testing (d) Ultrasound testing	c	2
36	In which type of test elastic waves are used? (a) Radiography (b) AET (c) US (d) Thermal method	b	1
37	Earthquake can be detected using (a) Radiography (b) AET (c) US (d) Thermal method.	b	1
38	In which testing method we don't have to provide external energy? (a) Radiography (b) Tensile test (c) Acoustic Emission Testing (d) Ultrasound testing	c	2
39	For bridge monitoring which is best and widely used method? (a) Acoustic Emission Testing (b) Radiography (c) Ultrasound (d) Magnetic method	a	1
40	Acoustic Emission Testing is useful in (a) Weld monitoring (b) Tanker monitoring (c) Bridge monitoring (d) All of above	d	1
41	Frequency range of ultrasonic waves is	c	1

	(a) < 20 Hz (b) 20 Hz to 20K Hz (c) >20K Hz (d) 20 KHz to 2MHz		
42	Which of the following is not characteristic of Ultrasound waves? (a) High directionality (b) High energy concentration (c) Travels longer distance than audible sound waves (d) They can travel in vacuum	d	2
43	For thickness measurement which technique is suitable? (a) Radiography (b) Ultrasound (c) AET (d) Magnetic	b	1
44	Advantage of Ultrasound thickness measurement is (a) Thickness can be measured from one side of object (b) Takes less time (c) Its cost effective (d) All of above	d	1
45	Echo sound principle is used in (a) Acoustic Emission Testing (b) Ultrasound Testing (c) Radiography (d) Tensile test	b	1
46	Which type of NDT method is used for wide variety of material, size and shape? (a) Radiography (b) AET (c) Ultrasound (d) Electrical	c	2
47	Flaw detection test using Ultrasound can be done using (a) Echo sounding only (b) Transmission of sound only (c) Both a) and b) (d) None of above	c	1
48	Which type of radiation is used in radiography testing? (a) X ray only (b) Gamma ray only (c) Ultraviolet rays only (d) Both (a) and (b)	d	1
49	The disadvantage of radiography is that	d	1

	(a) Radiations are dangerous (b) Its costly (c) Requires both side of object (d) All of above		
50	In radiography image of object using X rays can be produced on (a) Photographic film (b) Fluorescent screen (c) Electronic sensing equipment (d) All of above	d	1
51	The principle used in radiography testing is (a) Echo (b) Intensity variation (c) Impulsive waves (d) Scattering	b	2
52	Which of the following elements give gamma radiation (a) Caesium 137 (b) Cobalt 60 (c) Iridium 192 (d) All of above	d	1
53	For thin objects and small defects which radiography technique is used? (a) X-ray (b) Gamma ray (c) Gamma ray from Co60 (d) None of above	a	2
54	To test thick objects or casting which radiography technique is used? (a) X-ray (b) Gamma ray (c) Both (a) and (b) (d) None of above	b	2
55	The shortest wavelength in electromagnetic spectrum is of (a) X-rays (b) Gamma rays (c) UV rays (d) Microwaves	b	1
56	Following is the advantage of radiography testing (a) Can be used to inspect virtually all materials. (b) High accuracy in locating defect, irregularities or flaw. (c) Ability to inspect complex shapes and multi-layered structures without disassembly (d) All of above	d	2
57	Following is the advantage of radiography testing	d	2

	(a) Small defects can also be found. (b) Provides permanent record. (c) Works well on thin samples. (d) All of above		
58	Sound pulse get reflected from interface of two different media and time duration of transmitted and received pulse indicates presence of flaw-this is the principle of (a) Radiography testing (b) Acoustic Emission Testing (c) US testing (d) Magnetic method	c	2
59	Demerits of AET are (a) High Initial cost. (b) Requires skilled person to operate and understand signals (c) Difficult for outdoor use (d) All of above	d	2
60	When a crack or some deformation occurs in the material, it results in a rapid release of energy, transmitting in the form of an elastic wave, namely (a) Acoustic Emission (b) Ultrasound emission (c) Phonon emission (d) All of above	a	1
61	___________ is the study and practical use of elastic waves generated by a material subjected to an external stress. (a) Ultrasonic testing (b) AET (c) Radiography (d) Visual inspection	b	2

-sbs

Unit:- V Magnetism and Superconductivity

Q.1	Tesla is a unit of			
	A	Field strength	**B**	Inductance
	C	**Flux density**	**D**	Flux
Q.2	A permeable substance is one			
	A	Which is a good conductor	**B**	Which is a bad conductor
	C	Which is a strong magnet	**D**	**Through which the magnetic lines of forces can pass very easily**
Q.3	A magnetic field exists around			
	A	Iron	**B**	Copper
	C	Aluminum	**D**	**Moving charges**
Q. 4	The direction of magnetic lines of force is			
	A	From south pole to north pole	**B**	**From north pole to south pole**
	C	From one end of the magnet to another	**D**	None of the above
Q. 5	Which of the following is a vector quantity?			
	A	Relative permeability	**B**	**Magnetic flux intensity**
	C	Flux density	**D**	Magnetic potential
Q. 6	A magnetic material which is slightly repelled by a magnetic field is known as			
	A	Ferromagnetic material	**B**	**Diamagnetic material**
	C	Paramagnetic material	**D**	Conducting material
Q. 7	**The ratio of intensity of magnetism to the magnetization force is known as**			
	A	Flux density	**B**	**Susceptibility**
	C	Relative permeability	**D**	None of the above
Q. 8	The unit of relative permeability			
	A	Henry / meter	**B**	Henry
	C	Henry /squere meter	**D**	**It is dimensionless**
Q. 9	In a magnetic core -------------is used			
	A	**Ferromagnetic material**	**B**	Diamagnetic material
	C	Paramagnetic material	**D**	Conducting material
Q. 10	For a magnetic core material it permeability is------			
	A	Slightly less than unity	**B**	Equal to unity
	C	Slightly more than unity	**D**	**Very large than unity**

Q. 11	Paramagnetic material have relative permeability			
	A	Slightly less than unity	B	Equal to unity
	C	**Slightly more than unity**	D	Very large than unity
Q. 12	ferromagnetic material have relative permeability			
	A	Slightly less than unity	B	Equal to unity
	C	Slightly more than unity	D	**Very large than unity**
Q. 13	diamagnetic material have relative permeability			
	A	**Slightly less than unity**	B	Equal to unity
	C	Slightly more than unity	D	Very large than unity
Q. 14	The substances which have permeability less than the permeability of free space are known as			
	A	Ferromagnetic material	B	**Diamagnetic material**
	C	Paramagnetic material	D	Bipolar material
Q. 15	Which of the following is a ferromagnetic material?			
	A	Tungsten	B	Aluminum
	C	Copper	D	**Nickel**
Q. 16	Which or the following is the unit of magnetic flux density?			
	A	Weber	B	Lumens
	C	**Tesla**	D	None of the above
Q. 17	One tesla is equal to			
	A	1 Weber/mm^2	B	1 Weber/m
	C	**1 Weber/m^2**	D	1 henry/m
Q. 18	Susceptibility is positive and greater than unity for			
	A	**Ferromagnetic material**	B	Diamagnetic material
	C	Paramagnetic material	D	Nonmagnetic material
Q. 19	Susceptibility is positive and less than unity for			
	A	Ferromagnetic material	B	Diamagnetic material
	C	**Paramagnetic material**	D	Nonmagnetic material
Q. 20	Susceptibility is negative for			
	A	Ferromagnetic material	B	**Diamagnetic material**
	C	Paramagnetic material	D	Nonmagnetic material
Q. 21	The unit of flux is the same as that of			

	A	Reluctance	B	Resistance
	C	Permeance	D	**Pole strength**
Q. 22	Magnetic moment is a			
	A	Pole strength	**B**	Universal constant
	C	Scalar quantity	**D**	**Vector quantity**
Q. 23	The bar magnet has			
	A	**The dipole moment**	**B**	Monopole moment
	C	(A) And (B) both	**D**	None of the above
Q. 24	The magnetic materials exhibit the property of magnetization because of			
	A	Orbital motion of electron	**B**	Spin of electrons
	C	Spin on nucleus	**D**	**All of the above**
Q. 25	Basic source of magnetism			
	A	Charged particles alone	**B**	**Movement of charged particles**
	C	Magnetic dipoles	**D**	Magnetic domains
Q. 26	Absolute permeability has units as			
	A	Tesla	**B**	Henry
	C	Tesla / m	**D**	**Henry / m**
Q. 27	Example for dia-magnetic materials			
	A	**super conductors**	**B**	alkali metals
	C	transition metals	**D**	Ferrites
Q. 28	Example for para-magnetic materials			
	A	super conductors	**B**	**alkali metals**
	C	transition metals	**D**	Ferrites
Q. 29	Example for ferro-magnetic materials			
	A	super conductors	**B**	alkali metals
	C	**transition metals**	**D**	Ferrites
Q. 30	Example for magnetic material used in data storage devices			
	A	Perm alloy	**B**	**CrO_2**
	C	Cunife	**D**	Alnico
Q. 31	The unit of relative permeability is			
	A	Henry / metre	**B**	Henry
	C	Henry/sq. m	**D**	**It is dimensionless**

Q. 32	A_________is the smallest unit of information that can be read from or written to the disk.			
	A	Track	**B**	Spindle
	C	**Sector**	**D**	Platter
Q. 33	The disk's surface is divided into a number of invisible concentric circles called			
	A	Drives	**B**	**Tracks**
	C	Slits	**D**	References
Q. 34	Generally there are___________bytes in a sector			
	A	64	**B**	128
	C	256	**D**	**512**
Q. 35	Which is a very thin strip of plastic coated in a magnetic layer?			
	A	**Magnetic Tap**	**B**	Electric Dipole Tap
	C	Floppy Disk	**D**	Hard Disk
Q. 36	Which storage type is used in the modern digital cameras, mobile phones, Mp3 players etc..?			
	A	Pen drive	**A**	**Flash memory card**
	C	Optical drive	**C**	Floppy drive
Q. 37	Magnetic storage devices includes			
	A	compact disk	**B**	hard disk
	C	audio tapes	**D**	**all of these**
Q. 38	The electron magnetic moment is given by---------------------(Value of Bohr Magneton)			
	A	[illegible]	**B**	$9.28\ x\ 10^{-22}\ A.m^2$
	C	$5.05\ x\ 10^{-27}\ A.m^2$	**D**	$5.05\ x\ 10^{-25}\ A.m^2$
Q. 39	The magnetic moment of atoms due to magnetic field produced by protons is given by			
	A	$9.28\ x\ 10^{-24}\ A.m^2$	**B**	$9.28\ x\ 10^{-22}\ A.m^2$
	C	[illegible]	**D**	$5.05\ x\ 10^{-25}\ A.m^2$
Q. 40	The magnetic moment of the nucleus is about----------- times of the magnetic moment of the electron.			
	A	**1/1837**	**B**	1837
	C	1/1637	**D**	None of these
Q. 41	The value of gyromagnetic ratio (g-factor) for electron is given by ---------			
	A	-1.0023	**B**	1.0023
	C	**-2.0023**	**D**	2.0023

Q. 42	Magnetic materials which are easily magnetized and demagnetized are known as ---------			
	A	**Soft magnetic materials**	**B**	Hard magnetic materials
	C	Both of the above	**D**	None of the above
Q. 43	The materials which retain their magnetism and are difficult to demagnetize is known as -----			
	A	Soft magnetic materials	**B**	**Hard magnetic materials**
	C	Both of the above	**D**	None of the above
Q. 44	Which of the following statement is correct for soft magnetic material?			
	A	Susceptibility and permeability are low	**B**	**Susceptibility and permeability are high**
	C	Susceptibility is high and permeability is low	**D**	Susceptibility is low and permeability is high
Q. 45	Which of the following statement is correct for hard magnetic material?			
	A	**Susceptibility and permeability are low**	**B**	Susceptibility and permeability are low
	C	Susceptibility is high and permeability is low	**D**	Susceptibility is low and permeability is high
Q. 46	A magnetic core is a piece of magnetic material usually made up of ------------ materials which have high permeability.			
	A	Diamagnetic	**B**	Paramagnetic
	C	**Ferromagnetic**	**D**	None of the above
Q. 47	In the magnetic storage devices, the region where data is to be stored is magnetized can be read as ---------			
	A	0	**B**	**1**
	C	2	**D**	None of the above
Q. 48	In the magnetic storage devices, the region where data is to be stored is unmagnetized can be read as ---------			
	A	**0**	**B**	1
	C	2	**D**	None of the above
Q. 49	Magneto-optical recording is a method of storing and retrieving data using -------------			
	A	a laser	**B**	a magnet
	C	**Both of the above**	**D**	None of the above
Q. 50	In magneto optical devices to erase the data magnetic field is applied to the material ---------			
	A	In the same direction.	**B**	**In the opposite direction.**
	C	In the perpendicular direction.	**D**	None of the above

Q.1 The magnitude of the force experienced by a unit north pole at any point in the field is called _______________.

A Magnetic Induction

B Intensity of Magnetization

C Magnetic field strength

D None

Ans Magnetic field strength

Q.2 CGS unit of Magnetic field is __________.

A Gauss

B N/A-m

C Nm

D Weber/m^2

Ans Gauss

Q.3 MKS unit of Magnetic field is _________.

A Gauss

B N/A-m

C Nm

D N/m^2

Ans N/A-m

Q.4 Magnetic flux lines passing normally through unit area is known as _____________.

A Magnetic field strength

B Magnetic Induction

C Magnetic Susceptibility

D None

Ans Magnetic Induction

Q.5 Unit of Magnetic Induction is_______________.

A Tesla

B Nm

C N/m^2

D None

Ans Tesla

Q.6 Magnetic moment per unit _____________ _is called Intensity of Magnetization.

A Area

B Volume

C Length

D None

Ans Volume

Q.7 The ratio of intensity of magnetization to the magnetic field strength is called as _______.
A Magnetic Permeability
B Magnetic Induction
C Magnetic Susceptibility
D None

Ans Magnetic Susceptibility

Q.8 Permeability of free space is equal to________.
A $4\pi \times 10^{-9}$ H/m
B $4\pi \times 10^{-7}$ H/m
C $4\pi \times 10^{-10}$ H/m
D $4\pi \times 10^{-19}$ H/m

Ans $4\pi \times 10^{-7}$ H/m

Q.9 The ratio of magnetic induction(B) produced in the material to the magnetizing field (H) is called _________________.
A Magnetic Permeability
B Magnetic Induction
C Magnetic Susceptibility
D None

Q.10 The substance for which value of χ is negative is called___________.
A Paramagnetic
B Diamagnetic
C Ferromagnetic
D Ferrimagnetic

Ans Diamagnetic

Q.11 Which of the following is **not** a Paramagnetic substance?
A Platinum
B Bismuth
C Solutions of salts of iron
D Oxygen

Ans Bismuth

Q.12 Which of the following is a Diamagnetic substance?
A Platinum
B Manganese
C Antimony
D Steel

Ans Antimony

Q.13 Which of the following is **not** a Ferromagnetic substance?
A Iron

B Nickel
C Cobalt
D Zink

Ans Zink

Q.14 Currie-Weiss law is represented by _________.
A α ——

B α —

C α –

D α ———

Ans α ——

Q.15 The material with lack of permanent magnetic dipoles are called____________.
A Paramagnetic
B Diamagnetic
C Ferromagnetic
D None

Ans Diamagnetic

Q.16 Superconductivity based on phenomenon____________.
A Magnetism
B Electrostatic
C Electrical
D None

Ans Magnetism

Q.17 BCS theory explains superconductivity based on____________.
A Pairing of electron
B Pairing of proton
C Pairing of neutron
D None

Ans Pairing of electron

Q.18 In superconductivity resistivity of conductor becomes _____________at critical temperature.
A Zero

B Infinity
C One
D Thousand

Ans Zero

Q.19 Critical temperature of Mercury is
A 4.15
B 8.12
C 5.9
D 3.2

Ans 4.15

Q.20 Meissener Effect is __________________.
A Penetration of flux lines in material when cooled below critical temperature.
B Expulsion of magnetic flux lines from specimen when cooled below critical temperature.
C Expulsion of magnetic flux lines from specimen when heated above critical temperature.
D None

Ans Expulsion of magnetic flux lines from specimen when cooled below critical temperature.

Q.21 The magnetic field strength at which superconductivity get destroyed is called as______.
A Critical magnetic field
B Applied magnetic field
C External magnetic field
D None

Ans Critical magnetic field

Q.22 The variation of critical magnetic field with temperature is given by reletation ____.
A

B

C

D

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Ans	—
Q.23	Material can be converted from superconducting state to normal state when ________.
A	T < Tc & H ≥ Hc
B	T < Tc & H < Hc
C	T < Tc & H << Hc
D	None
Ans	T < Tc & H ≥ Hc
Q.24	A steady current induced in superconducting ring held below critical temperature is called __________________.
A	Persistent current
B	Alternating current
C	Direct current
D	None
Ans	Persistent current
Q.25	Persistent current remains in superconductor for ______________.
A	10^5 years
B	10 years
C	10^2 years
D	10^3 years
Ans	10^5 years
Q.26	When a superconducting material is placed in external magnetic field then magnetic induction inside the specimen is _____________.
A	B = 0
B	$B = \infty$
C	B = 100
D	B = 10
Ans	B = 0
Q.27	When a superconducting material is placed in external magnetic field then the susceptibility of the material becomes ______________.
A	$\chi = 1$
B	$\chi = -1$
C	$\chi = 0$
D	$\chi = 100$
Ans	$\chi = -1$

Q.28	When a superconducting material is placed in external magnetic field then the susceptibility of the material becomes _____.
A	Perfect diamagnet
B	Paramagnet
C	Ferromagnet
D	None
Ans	Perfect diamagnet
Q.29	Which of the following is Type I superconductor?
A	Nb_3Sn
B	Nb -Ti
C	Al
D	None
Ans	Al
Q.30	Which of the following is Type II superconductor?
A	Nb_3Sn
B	Lead
C	Al
D	Indium
Ans	Nb_3Sn
Q.31	Low temperature superconductors that have temperature______________.
A	Below 20 K
B	Above 20 K
C	Above 77 K
D	None
Ans	Below 20 K
Q.32	High temperature superconductors that have temperature______________.
A	Below 20 K
B	Above 20 K
C	Above 77 K
D	None
Ans	Above 77 K
Q.33	Type II superconductors has __________critical field.
A	One
B	Two
C	Three
D	Four

Ans	Two
Q.34	In AC Josephson Effect frequency of alternating current is given by .
A	2 —
B	—
C	—
D	–
Ans	2 —
Q.35	Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.2 K. The critical temperature for lead is7.18 K and =6.5 x 10^4 A/m.
A	
B	
C	
D	
Ans	
Q.36	The transition temperature for lead is 7.2K. However, at 5K it loses the superconducting property if subjected to magnetic field of 3.3x10^4 A/m. Find the maximum value of H which will allow the metal to retain its superconductivity at 0K.
A	
B	
C	
D	
Ans	
Q.37	The critical field of niobium is 1x10^5 A/m at 8 K and 2x10^5 at 0 K. Calculate the transition temperature of the element.
A	
B	
C	
D	

Ans	
Q.38	The transition temperature for lead is 7.26 K. The maximum critical field for the material is $8x10^5$ A/m. Lead has to be used as a superconductor subjected to a magnetic field of $4x10^4$ A/m. At what maximum temperature it can be operated.
A	
B	
C	
D	
Ans	

Unit 6 Non Destructive Testing and Nanotechnology

[illegible]
[illegible] A [illegible]
[illegible] B [illegible]
[illegible] C [illegible]
[illegible] D [illegible]
[illegible] C

Question 2	Non-destructive testing is used to determine
Option A	location of defects
Option B	chemical composition
Option C	corrosion of metal
Option D	All of these
Answer	D

Question 3	Which among the following is not a type of Non-destructive testing?
Option A	compression test
Option B	visual testing
Option C	ultrasonic testing
Option D	eddy current testing
Answer	A

Question 4	Identify the type of destructive testing
Option A	Radiographic test
Option B	Dye penetrant test
Option C	Creep test
Option D	All of the above.
Answer	C

Question 5	Which among the following is the last step in magnetic particle test method?
Option A	observation and inspection
Option B	circular magnetization
Option C	demagnetization
Option D	magnetization
Answer	C

Question 6	Which of the following statements is/are true for ultrasonic test?
Option A	Equipment used for ultrasonic testing is portable
Option B	Complicated shapes can be easily scanned
Option C	Waves generated are health hazardous
Option D	All the above statements are true
Answer	A

Question 7	During radiography test, which region absorbs less radiation and transmits more?
Option A	Lowa nd high density regions absorb and transmit same amount of radiation
Option B	High density region
Option C	Lowd ensity region
Option D	None of the a bove

Answer C

Question 8 Which test is used to determine dimensions of any object?
Option A Ultrasonic test
Option B Torsion test
Option C Eddy current test
Option D All of these tests can be used to determine dimensions of any object
Answer C

Question 9 Eddy current test is used to detect
Option A cracks
Option B hardness
Option C conductivity
Option D All of the above
Answer D

Question 10 Which test can be performed without skilled labour?
Option A Dye penetrant testing
Option B Visual testing Option
C Ultrasonic testing Option D
Magnetic particle test Answer
A

Question 11 In non-destructive testing, sound test used is a very fine and accurate method of detecting flaws in the castings.
Option A True
Option B False
Answer B

Question 12 Impact test for detection of defects in the casting is the most crude and unreliable method of non-destructive testing.
Option A True
Option B False
Answer A

Question 13 Which of the following methods of NDT requires leak proofing of casting before inspection?
Option A Impact test
Option B Visual inspection
Option C Sound test
Option D Pressure test
Answer D

Question 1 Which of the following types of rays is used in radiography for the inspection of castings?
Option A X- rays

Option B	Infrared rays
Option C	Ultraviolet rays
Option D	Visible rays
Answer	A

Question 15	In radiography, the penetration of rays is much easier with the less density of metal or casting.
Option A	True
Option B	False
Answer	A

Question 16	In penetrant testing of NDT, a liquid is penetrated into the cracks of metal by the application of pressure.
Option A	True
Option B	False
Answer	B

Question 17	Which of the following methods of inspection uses high frequency of sound waves for the detection of flaws in the castings?
Option A	Penetrant test
Option B	Radiography
Option C	Pressure test
Option D	Ultrasonic inspection
Answer	D

Question 18	In ultrasonic inspection, a signal processing technique is used for the accurate indication of porosity in the castings.
Option A	True
Option B	False
Answer	A

Question 19	Which of the following terms changes in the eddy current testing method for the detection of defects in the castings?
Option A	Resistance
Option B	Impedance
Option C	Conductivity
Option D	Capacitance
Answer	B

Question 20	There are no restrictions in the eddy current testing method; it can detect defects up to high depth in the castings.
Option A	True
Option B	False
Answer	B

Question 21 Eddy current testing method can also be used for the evaluation of heat damage to the metal alloys.
Option A True
Option B False
Answer A

Question 22 Acoustic emission testing method is basically employed for the detection of surface discontinuities on the castings.
Option A True
Option B False
Answer B

Question 23 Who first used the term Nanotechnology?
Option A Richard Feymann
Option B Norio Taniguichi
Option C Eric Drexler
Option D Sumio Lijima
Answer B

Question 24 How many oxygen atoms lined up in a row would fit in a one nanometre space?
Option A None
Option B One
Option C Seven
Option D Seventy
Answer C

Question 25 Which of these statements is NOT true?
Option A Gold at the nanoscale is red
Option B Copper at the nanoscale is transparent
Option C Silicon at the nanoscale is an insulator
Option D Aluminium at the nanoscale is highly combustible
Answer C

Question 26 Which of the following is an example of top-down approach for the preparation of nanomaterials?
Option A Gas phase agglomeration
Option B Molecular self-assembly
Option C Mechanical grinding
Option D Molecular beam epitaxy
Answer C

Question 27 Which of the following is an example of bottom-up approach for the preparation of nanomaterials?
Option A Etching
Option B Dip pen nano-lithography

Option C Lithography
Option D Erosion
Answer B

Question 28 What is the generalname for the class of structures made of rolled up carbon lattices?
Option A Nanorods
Option B Nanotubes
Option C Nanosheets
Option D Fullerods
Answer B

Question 29 what ratio decides the efficiency of nanosubstances?
Option A Weight/Volume
Option B Surface area/Volume
Option C Volume/Weight
Option D Pressure/Volume
Answer B

Question 30 “There is plenty of room at the bottom”. This was stated by
Option A Eric Drexler
Option B Richard Feymann
Option C Harold Croto
Option D Richard Smalley
Answer B

Question 31 ___________is the field in which the nanoparticles are used with silica coated iron oxide
Option A Magnetic applications
Option B Electronics
Option C Medical diagnosis
Option D Structural and mechanical materials
Answer C

Question 32 Coating the nano crystals with the ceramics is carried that leads to_________
Option A Corrosion
Option B Corrosion resistant
Option C wear and tear
Option D Soft
Answer B

Question 33 Which of the ceramic components are easier through nano structuring?
Option A Lubrication
Option B Coating
Option C Fabrication

Option D Wear
Answer C

Question 34 __________ contains nano particles prepared by using biologically processed metal ores
Option A Homeopathic medicines
Option B Modern antibioitics
Option C Ayurvedic “Bhasmas”
Option D Modern cosmetics
Answer C

Question 35 The cut-off limit of human eye is _______ nm
Option A 2.000
Option B 5,000
Option C 10,000
Option D 50,000
Answer C

Question 36 The _________ to the ceramics are superior coatings.
Option A Nano particles
Option B Nano powder
Option C Nano crystals coating
Option D Nano gel
Answer C

Question 37 How is nanotechnology used in the medical community?
Option A Testing and diagnosis
Option B Tissue engineering
Option C Drug delivery
Option S All the above
Answer D

Question 38 Nano science can be studied with the help of __________
Option A Quantum mechanics
Option B Newtonian mechanics
Option C Macro-dynamics
Option B Geophysics
Answer A

Question 39 Carbon atoms make _________type of bond with other carbon atoms
Option A Covalent
Option B Ionic
Option C Metallic

Option D Hydrogen
Answer A

Question 40 The size of nano particle is between ______ nm
Option A 100 to 1000
Option B 0.1 to 10
Option C 1 to 100
Option D 0.01 to 1
Answer C

Question 41 The compressive strength of a nanotube _______ its tensile strength
Option A is less than
Option B is greater than
Option C is equal to
Option D may be greater than
Answer A

Question 42 The nanomaterials are used in the light emitted electron luminescent devices.
Option A True
Option B False
Answer A

Question 43 The nano materials are used in the light emitted electro luminescence devices.
Option A True
Option B False
Answer A.

Question 44 The nano particles from iron and palladium are used to produce _______
Option A Magnets
Option B Magnetic lens
Option C Magneto meters
Option D Magnetic storage devices
Answer D

Question 45 Nano particles target the rare ______ causing cells and remove them from blood.
Option A Tumour
Option B Fever
Option C Infection
Option D Cold
Answer A

Question 46 The ____ ____ to the ceramics are superior coatings.

Option A Nano particles
Option B Nano powder
Option C Nano crystals coating
Option D Nano gel
Answer A

Question 47 ________ of ceramic components are easier through nano structuring.
Option A [illegible]
Option B [illegible]
Option C [illegible]
Option D Wear
Answer A

Question 48 [illegible]
Option A High
Option B Low
Option C Moderate
Option D No
Answer A

Question 49 [illegible]
Option A Silver
Option B Copper
Option C [illegible]
Option D [illegible]
Answer C

Question 50 10 nm = _____ m
Option A 10^{-8}
Option B 10^{-7}
Option C 10^{-9}
Option D 10^{-10}
Answer C

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Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
1	X ray or gamma rays are passed through a material and their absorbtion and scattering are analyzed in ________	Acoustic emission technique	Ultrasonic testing	Radiographic techniques	All of the above	3
2	An ultrasonic wave of frequency 100 kHz is sent through a material and echo is received after 2 microseconds. If the velocity of ultrasonic wave in the material is 6000 m/s, its wavelength is	6 cm	0.6 cm	0.06 cm	60 cm	1
3	After performing non-destructive destructive testing the material under the test is	Destroyed and cannot be used further	Destroyed but can be used further	Not destroyed and cannot be used further	Not destroyed and can be used further	4
4	The ultrasonic waves of velocity 'v' are passed into a material of thickness 'd' and the echo is received after time 't'. The thickness of the material is calculated as	d = 2vt	d = 2v/t	d = vt/2	d = 2t/v	2
5	________ testing is used to locate voids, cracks, flaws present inside the material	Destructive testing	Non-destructive testing	Both destructive and non-destructive testing	None in destructive and non-destructive testing	2
6	The ultrasonic waves are send through a material. If there are no cracks or void within the material, the ultrasonic waves would ________	Pass through the material without reflecting back	Reflected back from the cracks or voids	Both options 1 and 2 are possible depending on the frequency of ultrasonic waves	None of these	1
7	When destructive testing is performed on the materials its structural properties are	Changed	Does not changed	May change or may not change	None of these	1
8	After performing destructive testing the material under the test is	Destroyed and cannot be used further	Destroyed but can be used further	Not destroyed and cannot be used further	Not destroyed and can be used further	1
9	Ultrasonic waves are passed through a sample of a material. The ultrasonic waves are reflected from the bottom of the material. This implies that the sample of the material ____	Does contains void or cracks	Does not contains void or cracks	Both 1 and 2 can be true	difficult to predict	2
10	________ testing is used to determine the properties of the material such as bending, tensile strength, compression, etc	Destructive testing	Non-destructive testing	Both destructive and non-destructive testing	None in destructive and non-destructive testing	1
11	When non-destructive testing is performed on the materials its structural properties are	Changed	Does not changed	May change or may not change	None of these	2
12	The ultrasonic waves have frequency	Greater than 20 Hz	Greater than 20 MHz	Greater than 20 kHz	Within the range 20 Hz - 20 kHz	3
13	Ultrasonic waves of velocity 6000 m/s are passed into a sample. The echo is received after 10 microseconds. The tickness of the sample would be	3 cm	0.3 cm	0.003 cm	0.6 cm	2

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Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
14	In ____________ the rapidly varying pressure, temperautre or stress is applied over the material and are analyzed	Acoustic emission technique	Ultrasonic testing	Radiographic techniques	All of the above	1
15	Echo sounding principle is used in ________	Echo sounding	Ultrasonic sounding	Echo cancelling	All of the above	2
16	Ultrasonic waves of velocity 5000 m/s are passed in a sample having uniform thickness. The echo is received after 5 microseconds at location X and at 2.3 microseconds at location Y. This indicates that	The flaw is present at location X	The flaw is present at location Y	Both locations X and Y are having flaws	Both locations X and Y are do not hav flaw	2
17	The ultrasonic waves are send through a material. If cracks or void are present within the material, the ultrasonic waves would _________	Pass through the material without reflecting back	Reflected back from the cracks or voids	Both options 1 and 2 are possible depending on the frequency of ultrasonic waves	None of these	2
18	Ultrasonic waves are passed through a sample of a material. The ultrasonic waves are reflected from a certain location within the material and do not go to the bottom of the material. This implies that the sample of the material ____	Does contains void or cracks	Does not contains void or cracks	Both 1 and 2 can be true	difficult to predict	1
1	A quantum well has ____ dimensions less than 100 nanometer	0	1	2	3	4
2	When the potential difference is applied across the quantum dots and current is measured, the current varies in steps. This is because of	Tunneling of electrons	Drifting of electrons	Diffusion of electrons	Jumping of electrons	1
3	A quantum well has ____ dimensions less than 100 nanometer	0	1	2	3	3
4	If the size of the particles of material is reduced from a few micrometer to a few nanometer, its hardness will	Remains constant	Increases	Decreases	Cannot be determined	2
5	Nanoparticles are used in automobile sector for	Sturdy structural parts	Smooth and non-scratch Paints	Better tires	all the above	4
6	The spintronic devices uses the property of spin of the electrons. This has advantage that	Spin cannot be destroyed easily by scattering of electrons	Spin cannot be destroyed easily by collision of electrons	Spin cannot be destroyed easily by presence of impurities or defects	all the above	4
7	Nanoparticles are used in space and defense for	Reduction of weight of space vehicles	Improving efficiency of solar cells	Insulation of space vehicles	all the above	4
8	Nanotechnology is the study of the material particles of the size	10 to 100 nanometers	1 to 100 nanometers	1 to 10 nanometers	Greater than 100 nm	2

Sr.	Question	Option 1	Option 2	Option 3	Option 4	Correct Option
9	A bulk material has ____ dimensions greater than 100 nanometer	0	1	2	3	3
10	In the spintronic devices, the ________ property is taken into consideration	Spin of the electrons	Charge of the electrons	Both spin and charge of the electrons	None of these	3
11	A quantum wire has ____ dimensions less than 100 nanometer	0	1	2	3	1
12	In the targeted drug delivery, the drug is encapsuled in a nanoparticles. The motion of the nanoparticles within the body is controlled by	External magnetic field	External electric field	Infrared light	Any of 1, 2 or 3 depending on the type of nanoparticles and technique	4
13	When the potential difference in the multiples of ____ is applied across the quantum dots and current is measured, the current varies in steps. This is called Coulomb staircase.	2e/C	2C/e	e/2C	C/2e	3
14	If the size of the particles of material is increased from a few nanometer to a few micrometer, its hardness will	Remains constant	Increases	Decreases	Cannot be determined	3
15	A nanoparticle has dimensions in the range	10 to 100 nanometers	1 to 100 nanometers	1 to 10 nanometers	Greater than 100 nm	2
16	The properties bulk material are different than their nanoparticles. This is because of	Decrease in the volume at nanoscale	Decrease in the surface area at nanoscale	Decrease in the surface to volume ratio at nanoscale	Increase in the surface to volume ratio at nanoscale	4
17	The energy levels of the quantum dots are ______ at nanoscale	Discrete	Remains constant	Contineous	Cannot be determined	1
18	When the potential difference is applied across the quantum dots and current is measured, around the zero voltage there is a region where current is zero. This region is known as	Coulomb blocked region	Coulomb staircase	Zero current region	Zero voltage region	1
19	The color of bulk gold is yellow. However, it changes to red at nanoscale. This is because	Decrease in the volume at nanoscale	Decrease in the surface area at nanoscale	Decrease in the surface to volume ratio at nanoscale	Increase in the surface to volume ratio at nanoscale	4

Engineering Physics [107002]
Unit No. VI: Non destructive testing & Physics of nano particles
Multiple Choice Question Bank

Q. No.	Question	Answer	Marks
1	Compared with microparticles, surface to volume ratio, for nanoparticles is- (a) Same (b) Smaller (c) Larger (d) None	c	2
2	Nanotechnology is related with material particles of the size of the order of (a) 10^{-9}m (b) 10^{-6}m (c) 10^{-3}m (d) 10^{-1}m	a	1
3	Due to quantum confinement energy levels of electron in a nanoparticle are (a) Discrete (b) Continuous (c) Higher (d) Lower	a	2
4	Who in the history is known to made first nanoparticle solution? (a) Newton (b) Thomas Alva Edison (c) Michel Faraday (d) Feynman	c	1
5	Properties of nanoparticles are different because of (a) Physical structure of material (b) Chemical composition of material (c) Nuclear structure (d) Atomic arrangement	d	1
6	Color of nanoparticles is different than bulk material because of (a) Chemical property (b) Surface to volume ration (c) Quantum confinement (d) Density of nanoparticles	c	1
7	As the particle size decreases, surface to volume ratio (a) Increases (b) Decreases (c) No change occurs (d) Depends on chemical nature	a	1
8	In old churches, color in window glasses is because of	c	1

	(a) Metal particles (b) Metal microparticles (c) Metal nanoparticles (d) Tree leaves		
9	For nanowire compared to bulk material, electrical resistance is (a) Low (b) High (c) Same (d) Independent of size	b	1
10	If we increase diameter of nanowire, its resistance will (a) Increase (b) Decrease (c) Remain same (d) None of above	a	1
11	In case of nanowire Coulomb staircase is (a) Zigzag shape of nanowire (b) Graph of voltage vs current (c) Graph of current vs resistance (d) Graph of voltage vs resistance	b	2
12	In case of nanowire Coulomb blockade is a (a) Resistance of nanowire (b) Region of graph where current remains zero when voltage is applied. (c) Staircase form of current vs voltage graph (d) Surface of wire	b	1
13	For nano object important condition is (a) At least one dimension should be 1nm to 100nm (b) At least one dimension should be 10nm to 1000nm (c) At least two dimension should be 1nm to 100nm (d) At least two dimension should be 10nm to 1000nm	a	1
14	If size of nanoparticle decreases band gap (a) Decreases (b) Remains constant (c) Increases (d) Becomes zero	c	2
15	In G. Mie formula μ is________of glass. (a) Refractive index (b) Extinction coefficient (c) Extinction cross section (d) Density	b	2
16	Extinction coefficient is independent of (a) Number of particles in medium (b) Volume of colloidal particles	b	1

	(c) Extinction cross-section of particle (d) Density of particles		
17	The electrons are transferred through nanowire when voltage is (a) ±e/2C (b) ±e/C (c) ±C/e (d) ±2C/e	a	2
18	The materials having nanosized grains have _____number of grain boundaries than polycrystalline materials. (a) 1 (b) 2 (c) Larger (d) Smaller	c	1
19	Nano crystals are (a) Highly impure and free of imperfections (b) Highly pure but with imperfections (c) Highly pure and free of imperfections (d) Highly impure and free of imperfections	c	2
20	The difference between Young's modulus of nanocrystal and polycrystal is (a) Big (b) Small (c) Zero (d) Infinite	a	1
21	In nanomaterials (a) Hardness decreases linearly with the grain size. (b) Hardness increases linearly with the grain size. (c) Hardness decreases exponentially with the grain size. (d) Hardness increases exponentially with the grain size.	b	1
22	Nanoparticles are useful in (a) Targeted drug delivery (b) Body implants (c) Diagnostic tests (d) All above	d	1
23	In targeted drug delivery medicine is delivered to specific part of body using (a) Laser (b) Nanocapsule (c) Nonowire (d) Quantum dot	b	1
24	Nanoparticles are having application in (a) Spin FET (b) Spin LED (c) Spin RTD (d) All off above	d	1

25	Nano particles are not useful in making (a) Display devices (b) Memory devices (c) Single electron transistor (d) None of above	d	1
26	Aerogels are (a) Heavy and strong (b) Light weight and strong (c) Highly flammable (d) Heavy and hard	b	1
27	Nanoparticles can be used in solar cells to (a) Reduce size of solar cell (b) Reduce weight of solar cell (c) Increase efficiency of solar cell (d) All of above	d	1
28	Self cleaning glass can be made by mixing small amount of (a) MgO_2 (b) TiO_2 (c) SnO_2 (d) SiO_2	b	1
29	Nanoparticles are useful in making (a) Body of car (b) Tyres (c) Fuel storage units (d) All of above	d	1
30	To check defect in a material or object which type of test is conducted? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	b	1
31	To find mechanical properties of material or object which type of test is conducted? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	a	1
32	In which type of test we can not use material after test? (a) Destructive (b) Non destructive (c) Both destructive and non-destructive (d) None	a	1

33	Which of the following is not a NDT method? (a) Visual inspection (b) Ultrasonic test (c) Tensile test (d) Radiography	c	2
34	Which of the following are advantages of NDT methods? (a) Affordability (b) Safety (c) Reliability (d) All of above	d	1
35	In which type of testing we can examine material when it is in working state? (a) Radiography (b) Tensile test (c) Acoustic Emission Testing (d) Ultrasound testing	c	2
36	In which type of test elastic waves are used? (a) Radiography (b) AET (c) US (d) Thermal method	b	1
37	Earthquake can be detected using (a) Radiography (b) AET (c) US (d) Thermal method.	b	1
38	In which testing method we don't have to provide external energy? (a) Radiography (b) Tensile test (c) Acoustic Emission Testing (d) Ultrasound testing	c	2
39	For bridge monitoring which is best and widely used method? (a) Acoustic Emission Testing (b) Radiography (c) Ultrasound (d) Magnetic method	a	1
40	Acoustic Emission Testing is useful in (a) Weld monitoring (b) Tanker monitoring (c) Bridge monitoring (d) All of above	d	1
41	Frequency range of ultrasonic waves is	c	1

	(a) < 20 Hz (b) 20 Hz to 20K Hz (c) >20K Hz (d) 20 KHz to 2MHz		
42	Which of the following is not characteristic of Ultrasound waves? (a) High directionality (b) High energy concentration (c) Travels longer distance than audible sound waves (d) They can travel in vacuum	d	2
43	For thickness measurement which technique is suitable? (a) Radiography (b) Ultrasound (c) AET (d) Magnetic	b	1
44	Advantage of Ultrasound thickness measurement is (a) Thickness can be measured from one side of object (b) Takes less time (c) Its cost effective (d) All of above	d	1
45	Echo sound principle is used in (a) Acoustic Emission Testing (b) Ultrasound Testing (c) Radiography (d) Tensile test	b	1
46	Which type of NDT method is used for wide variety of material, size and shape? (a) Radiography (b) AET (c) Ultrasound (d) Electrical	c	2
47	Flaw detection test using Ultrasound can be done using (a) Echo sounding only (b) Transmission of sound only (c) Both a) and b) (d) None of above	c	1
48	Which type of radiation is used in radiography testing? (a) X ray only (b) Gamma ray only (c) Ultraviolet rays only (d) Both (a) and (b)	d	1
49	The disadvantage of radiography is that	d	1

	(a) Radiations are dangerous (b) Its costly (c) Requires both side of object (d) All of above		
50	In radiography image of object using X rays can be produced on (a) Photographic film (b) Fluorescent screen (c) Electronic sensing equipment (d) All of above	d	1
51	The principle used in radiography testing is (a) Echo (b) Intensity variation (c) Impulsive waves (d) Scattering	b	2
52	Which of the following elements give gamma radiation (a) Caesium 137 (b) Cobalt 60 (c) Iridium 192 (d) All of above	d	1
53	For thin objects and small defects which radiography technique is used? (a) X-ray (b) Gamma ray (c) Gamma ray from Co60 (d) None of above	a	2
54	To test thick objects or casting which radiography technique is used? (a) X-ray (b) Gamma ray (c) Both (a) and (b) (d) None of above	b	2
55	The shortest wavelength in electromagnetic spectrum is of (a) X-rays (b) Gamma rays (c) UV rays (d) Microwaves	b	1
56	Following is the advantage of radiography testing (a) Can be used to inspect virtually all materials. (b) High accuracy in locating defect, irregularities or flaw. (c) Ability to inspect complex shapes and multi-layered structures without disassembly (d) All of above	d	2
57	Following is the advantage of radiography testing	d	2

	(a) Small defects can also be found. (b) Provides permanent record. (c) Works well on thin samples. (d) All of above		
58	Sound pulse get reflected from interface of two different media and time duration of transmitted and received pulse indicates presence of flaw-this is the principle of (a) Radiography testing (b) Acoustic Emission Testing (c) US testing (d) Magnetic method	c	2
59	Demerits of AET are (a) High Initial cost. (b) Requires skilled person to operate and understand signals (c) Difficult for outdoor use (d) All of above	d	2
60	When a crack or some deformation occurs in the material, it results in a rapid release of energy, transmitting in the form of an elastic wave, namely (a) Acoustic Emission (b) Ultrasound emission (c) Phonon emission (d) All of above	a	1
61	___________ is the study and practical use of elastic waves generated by a material subjected to an external stress. (a) Ultrasonic testing (b) AET (c) Radiography (d) Visual inspection	b	2

-sbs

Unit VI Non - Destructive testing & Nanotechnology

1	1. In non-destructive testing, sound test used is a very fine and accurate method of detecting flaws in the castings. a) True b) False	a
2	Impact test for detection of defects in the casting is the most crude and unreliable method of non-destructive testing. a) True b) False	b
3	Which of the following methods of NDT requires leak proofing of casting before inspection? a) Impact test b) Visual inspection c) Sound test d) Pressure test	c
4	Which of the following types of rays is used in radiography for the inspection of castings? a) X- rays b) Infrared rays c) Ultraviolet rays d) Visible rays	a
5	In radiography, the penetration of rays is much easier with the less density of metal or casting. a) True b) False	a
6	In penetrant testing of NDT, a liquid is penetrated into the cracks of metal by the application of pressure. a) True b) False	b

7	Which of the following methods of inspection uses high frequency of sound waves for the detection of flaws in the castings? a) Penetrant test b) Radiography c) Pressure test d) Ultrasonic inspection	d
8	In ultrasonic inspection, a signal processing technique is used for the accurate indication of porosity in the castings. a) True b) False	a
9	Acoustic emission testing method is basically employed for the detection of surface discontinuities on the castings. a) True b) False	b
10	Total Energy is quantized but not angular momentum of the quantum particle. a) True b) False	b
11	In ultrasonic inspection, a signal processing technique is used for the accurate indication of porosity in the castings. a) True b) False	a
12	Which of the following terms changes in the eddy current testing method for the detection of defects in the castings? a) Resistance b) Impedance c) Conductivity d) Capacitance	b
13	There are no restrictions in the eddy current testing method; it can detect defects up to high depth in the castings. a) True b) False	b

14	. Destructive tests are generally much easier to interpret than the non-destructive tests. a) True b) False	a
15	Destructive testing is not economical for mass production as this method destroys material for the inspection. a) True b) False	b
16	In destructive testing, all the operations are performed manually, thus it does not require any technologies or electronic devices. a) True b) False	b
17	Destructive testing method can also be economical for large casting or structure. a) True b) False	b
18	Which of the following tests is not the type of destructive testing of materials? a) Stress test b) Crash test c) Hardness test d) Pressure test	d
19	Radiographic inspection use __________ a) Sound waves b) AC c) X-rays d) Visible light	c
20	The dark areas represent an object with _________ a) Lower density b) High density c) Porosity d) Grain boundaries	a

Unit VI Non - Destructive testing & Nanotechnology

21	he film in radiographic inspection is called ___________ a) Plate b) Radiograph c) Micrograph d) X-ray sheet	b
22	Radiography don't give _________ a) Thickness of material b) Hardness c) Blow holes in casting d) Pores in weldment	b
23	Planar defects can't be detected by radiography.(on the surface) a) True b) False	b
24	he amount of absorption of rays depends on the density and thickness of the material. a) True b) False	a
25	What is the wavelength of X-rays? a) 10 picometers b) 0.01 to 10 nanometers c) 10 to 400 nanometers d) 400 to 700 nanometers	b
26	The prefix "nano" comes from a ... a) French word meaning billion b) Greek word meaning dwarf c) Spanish word meaning particle d) Latin word meaning invisible	b

27	Who first used the term nanotechnology and when? a) Richard Feynman, 1959 b) Norio Taniguchi, 1974 c) Eric Drexler, 1986 d) Sumio Iijima, 1991	b
28	Which of these historical works of art contain nanotechnology? a) Lycurgus cup b) Medieval stained glass windows in churches c) Damascus steel swords d) All of the above	d
29	Which one of these statements is NOT true? a) Gold at the nanoscale is red b) Copper at the nanoscale is transparent c) Silicon at the nanoscale is an insulator d) Aluminum at the nanoscale is highly combustible	c
30	Which of these consumer products is already being made using nanotechnology methods? a) Fishing lure b) Golf ball c) Sunscreen lotion d) All of the above	d
31	Nano-robots (nanobots)... a) Do not exist yet b) Exist in experimental form in laboratories c) Are already used in nanomedicine to remove plaque from the walls of arteries d) Will be used by NASA in the next unmanned mission to Mars	a

32	What exactly is a quantum dot? a) A semiconductor nanostructure that confines the motion of conduction band electrons, valence band holes, or excitons in all three spatial directions. b) The sharpest possible tip of an Atomic Force Microscope c) A fictional term used in science fiction for the endpoints of wormholes d) Unexplained spots that appear in electron microscopy images of nanostructures smaller than 1 nanometer	a
33	The properties like melting point, solubility, color, etc changes on varying the ____________ a) Size b) Composition c) Surface properties d) None of the mentioned	a
34	The properties like dispersibility, conductivity, etc changes on varying the ____________ a) Size b) Composition c) Surface properties d) None of the mentioned	c
35	Quantum confinement results in ____________ a) Energy gap in semiconductor is proportional to the inverse of the square root of the size b) Energy gap in semiconductor is proportional to the inverse of the size c) Energy gap in semiconductor is proportional to the square of size d) Energy gap in semiconductor is proportional to the inverse of the square	d

36	Which of the following is the principal factor which causes the properties of nanomaterials to differ significantly from other materials? a) Size distribution b) Specific surface feature c) Quantum size effects d) All of the mentioned	d
37	Select the incorrect statement from the following options. a) Self-assembly is a top-down manufacturing technique b) In self-assembly, weak interactions play very important role c) Self-assembling molecules adopt an organised structure which is thermodynamically more stable than the single, unassembled components d) Compared to the isolated components, the self-assembled structure has a	a
38	Which of the following is the application of nanotechnology to food science and technology? a) Agriculture b) Food safety and biosecurity c) Product development d) All of the mentioned	d
39	What are the advantages of nano-composite packages? a) Lighter and biodegradable b) Enhanced thermal stability, conductivity and mechanical strength c) Gas barrier properties d) All of the mentioned	d
40	The efficiency of today's best solar cell is about ____________ a) 15-20% b) 40% c) 50% d) 75%	b

41	Nano particles target the rare________causing cells and remove them from blood. a) Tumour b) Fever c) Infection d) Cold	a
42	___________is the field in which the nano particles are used with silica coated iron oxide iron oxide. a) Magnetic applications b) Electronics c) Medical diagnosis d) Structural and mechanical materials	c
43	The extensively used nano particles as catalyst is__________ a) Silver b) Copper c) Gold d) Cerium	c
44	10 nm =______m a) 10^{-8} b) 10^{-7} c) 10^{-9} d) 10^{-10}	a
45	The size of nanoparticles is between______nm. a) 100 to 1000 b) 0.1 to 10 c) 1 to 100 d) 0.01 to 1	c

46	1 m =______nm. a) 10^{-9} b) 10^{-8} c) 10^{9} d) 10^{8}	c
47	Who coined the word 'nanotechnology'? a) Eric Drexler b) Richard Feynmann c) Sumio Tijima d) Richard Smalley	a
48	Nanoscience can be studied with the help of... a) quantum mechanics b) Newtonian mechanics c) macro-dynamics d) geophysics	a
49	Who was the first scientist to describe that substances having nanodimensions possess altogether different and unique properties? a) Richard Feynmann b) Eric Drexler c) Archimedes d) Michael Faraday	a
50	Which ratio decides the efficiency of nanosubstances? [A] Weight/volume [B] Surface area/volume [C] Volume/weight [D] Pressure/volume	b

Unit VI Non - Destructive testing & Nanotechnology

51	The surface area to volume ratio of a sphere with radius 1 cm is R_1 and that of a sphere with radius 5 cm is R_2. Then R_1 =_____R_2. a) 3 b) 1/3 c) 5	c
52	Which of the following statement/s is are true? i.Volume to surface area ratio is very large for nanomaterials. ii.The cut-off limit of human eye is 10^{-5} m. iii.Hardness of a SWNT is about 63 x 10^9 Pa. iv.Carbon nanotubes are cylindrical fullerenes.	a
53	The size of a quantum dot is_____nm. a) 5 b) 10 c) 50 d) 100	b
54		
55		