1. A source of sound frequency 600Hz is placed inside water. The speed of sound in water is 1500 m/s and in air it is 300 m/s. The frequency of sound is recorded by an observer, who is standing in the air is?
a) 200 Hz
b) 3000 Hz
c) 120 Hz
d) 600 Hz

2. The ratio of the speed of sound in nitrogen gas to that in the helium gas at 300 K is?
a) $\sqrt{(2/7)}$
b) $\sqrt{(1/7)}$
c) $\sqrt{3/5}$
d) $\sqrt{6/5}$

3. Two monatomic ideal gases 1 and 2 of molecular masses M_1 and M_2 respectively are enclosed in separate containers kept at the same temperature. The ratio of the speed pf spund in gas 1 to that in gas 2 is given by?
a) $\sqrt{(M_1/M_2)}$
b) $\sqrt{(M_2/M_1)}$
c) M_1/M_2
d) M_2/M_1

4. The extension in a string, obeying Hooke's law, is x. The speed of sound in the stretched string is v. If the extension in the spring is increased to 1.5x, the speed of sound will be _____
a) 1.22v
b) 0.16v
c) 1.50v
d) 0.75v

5. A travelling wave in a stretched string is described by the equation y = Asin(kx-ωt). The maximum particle velocity is _____
a) Aω
b) ω/k
c) dω/dk
d) x/t

6. A wave represented by the equation y=acos(kx-ωt) is superposed with another wave to form a stationary wave such that point x=0 is a node. The equation for the other wave is?
a) acos(kx-ωt)
b) -acos(kx-ωt)
c) -acos(kx+ωt)
d) -asin(kx-ωt)

7. Two vibrating springs of the same material but lengths L and 2L have radii 2r and r respectively. They are stretched under the same tension. Both the strings vibrate in their fundamental modes, one of the lengths L with frequency f_1 and the other with frequency f_2. The ration is given by?
a) 2
b) 4
c) 8
d) 1

8. In the experiment to determine the speed of sound using a resonance column _____
a) Prongs of the tuning fork are kept in a vertical plane
b) Prongs of the tuning fork are kept in a horizontal plane
c) In one of the two resonances observed, the length of the resonating air column is close to the wavelength of sound in air
d) In one of the two resonances observed, the length of the resonating air column is close to half of the wavelength of sound in air

9. In a resonance tube with tuning fork of frequency 512Hz, first resonance occurs at water level equal to 30.3cm and second resonance occurs at 63.7cm. The maximum possible error in the speed of sound is?
a) 51.2 cm/s
b) 102.4m/s
c) 204.8cm/s
d) 1536cm/s

10. In the experiment for the determination of the speed of sound in air using the resonance column method, the length of the air column that resonates in the fundamental mode, with a tuning fork is 0.1m. When this length is changed to 0.35m, the same tuning fork resonates with the first overtime. Calculate the end correction.
a) 0.012m
b) 0.025m
c) 0.05m
d) 0.024m

11. The particle executing simple harmonic motion has a kinetic energy $K_0 \cos^2 \omega t$. The maximum values of the potential energy and the total energy are respectively _____
a) $K_c/2$ and K_0
b) K_0 and K_0
c) K_0 and $2K_0$
d) 0 and $2K_0$

12. A linear harmonic oscillator of force constant 2×10^6 N/m and amplitude 0.01m has a total mechanical energy of 160J. Its _____
a) Potential energy is 160 J
b) Potential energy is zero
c) Potential energy is 100J
d) Potential energy is 120J

13. The potential energy of a simple harmonic oscillation when the article is halfway to its end point is _____
a) 2/3 E
b) 1/8 E
c) 1/4 E
d) 1/2 E

14. In a simple harmonic motion, when the displacement is one half the amplitude, what fraction of the total energy is kinetic?
a) 1/2
b) 3/4
c) Zero
d) 1/4

15. A body executes simple harmonic motion with amplitude A. At what displacement from the mean position is the potential energy of the body one fourth of its total energy?
a) A/4
b) A/2
c) 3A/4
d) Some other fraction of A

This set of Engineering Physics written test Questions & Answers focuses on “Interaction of External Energy with the Atomic Energy States”.

16. Photons emitted by spontaneous emission are _____
a) Coherent and Monochromatic
b) Non-coherent and monochromatic
c) Coherent and Non-Monochromatic
d) Non-Coherent and Non-monochromatic

17. In Stimulated Absorption, what is the lifetime of atoms ground state?
a) 1 second
b) 1 minute
c) 1 hour
d) Infinity

18. Phonons are _____
a) Quanta of energy
b) Quanta of light waves
c) Quanta of sound waves
d) Quanta of heat

19. The frequency of incident photon so that the atom makes a transition from E_1 to E_2 should be _____
a) $E_2 – E_1$
b) $E_2 – E_1/c$
c) $E_2 – E_1/h$
d) $E_2 – E_1/\lambda$

20. What is the general lifetime of an atom in an exited state?
a) 10^{-10}
b) 10^{-8}
c) 10^{-6}
d) 10^{-4}

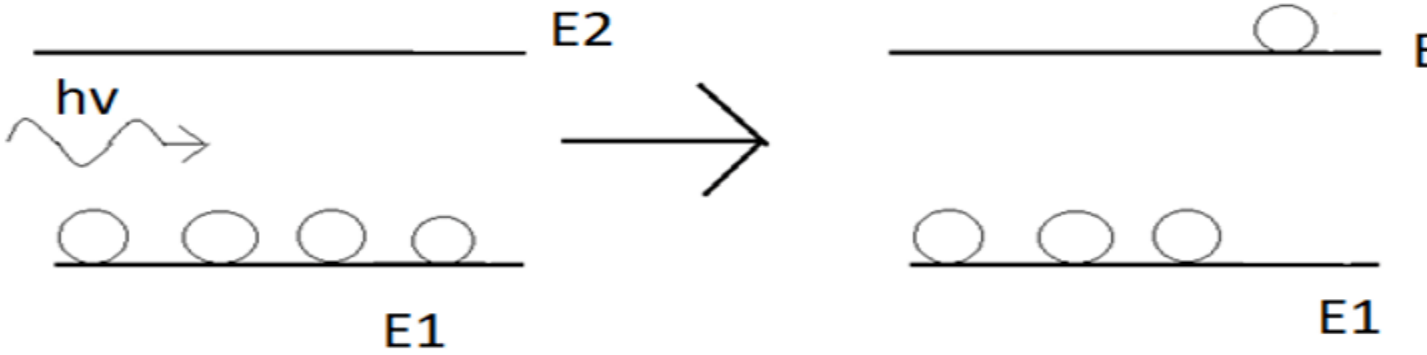
21. The output of a laser has pulse duration of 20 ms and average output power of 1.75 W per pulse. How much energy is released per pulse if wavelength is 5890 Å?
a) 0.011 J
b) 0.024 J
c) 0.035 J
d) 0.047 J

22. Laser light from a 7mW source of aperture diameter 1.5 cm and wavelength 5000 Å is focused by a lens of focal length 10 cm. The intensity of the image is _____
a) 3 X 10^{7} Wm^{-2}
b) 4 X 10^{7} Wm^{-2}
c) 5 X 10^{7} Wm^{-2}
d) 6 X 10^{7} Wm^{-2}

23. For an ordinary light source, the coherence time t = 10^{-10}s. The degree of Monochromaticity for a wavelength of 6000 Å is _____
a) 0.1 X 10^{-4}
b) 0.2 X 10^{-4}
c) 0.3 X 10^{-4}
d) 0.4 X 10^{-4}

24. In Stimulated emission, the emitted photons are _____
a) Coherent and Monochromatic
b) Non-coherent and monochromatic
c) Coherent and Non-Monochromatic
d) Non-Coherent and Non-monochromatic

25. The following graph is pictorial representation of _____



a) Spontaneous emission
b) Spontaneous Absorption
c) Stimulated emission
d) Stimulated Absorption

26. What causes microscopic bend?
a) Uniform pressure
b) Non-uniform volume
c) Uniform volume
d) Non-uniform pressure

27. When more than one mode is propagating, how is it dispersed?
a) Dispersion
b) Inter-modal dispersion
c) Material dispersion
d) Waveguide dispersion

28. What is the possible number of different types of lattices (3D)?
a) 4
b) 8
c) 14
d) 17

29. What is the lattice constant for FCC crystal having atomic radius 1.476 Å?
a) 1.476 Å
b) 4.1748 Å
c) 5.216 Å
d) 0

30. The interplanar spacing of (220) planes of a FCC structure is 1.7458 Å. Calculate the lattice constant.
a) 4.983 Å
b) 2.458 Å
c) 0
d) 5.125 Å

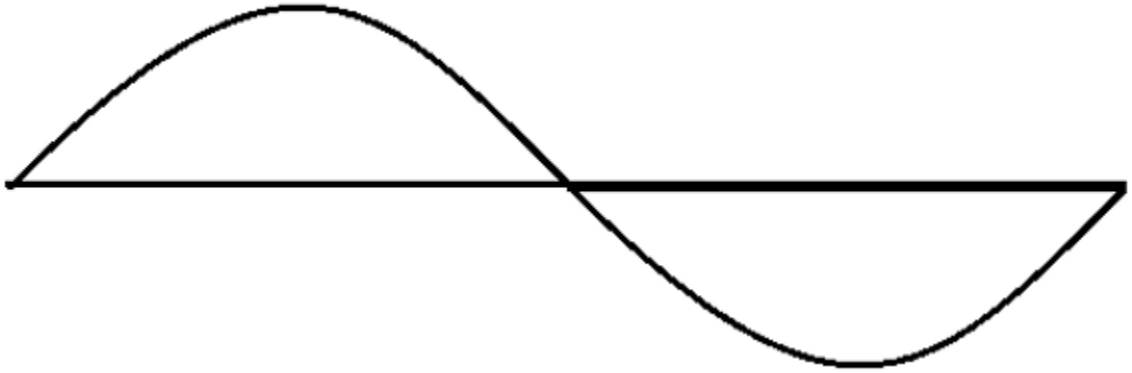
31. For a particle inside a box, the potential is maximum at x = _____
a) L
b) 2L
c) L/2
d) 3L

32. The Eigen value of a particle in a box is _____
a) L/2
b) 2/L
c) L/2−−−√
d) 2/L−−−√

33. What is the minimum Energy possessed by the particle in a box?
a) Zero
b) π2ℏ22mL2
c) π2ℏ22mL
d) π2ℏ2mL

34. The wave function of a particle in a box is given by _____
a) 2L−−√sinnxL
b) 2L−−√sinnπxL
c) 2L−−√sinxL
d) 2L−−√sinπxL

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



a) 1
b) 2
c) 3
d) 4

36. Calculate the Zero-point energy for a particle in an infinite potential well for an electron confined to a 1 nm atom.
a) 3.9 X 10^{-29} J
b) 4.9 X 10^{-29} J
c) 5.9 X 10^{-29} J
d) 6.9 X 10^{-29} J

37. The Steady-state form of Schrodinger wave equation is _____
a) Linear
b) Quadratic
c) Differential equation
d) Derivable

38. 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

39. The Energy levels are proportional to _____
a) n
b) n^{-1}
c) n2
d) n-2

40. Which quantity is said to be degenerate when $H\Psi_n = E_n\Psi_n$?
a) Eigen Vectors
b) Eigen Values
c) Eigen Functions
d) Operators

41. For a box with infinitely hard walls, the potential is maximum at _____
a) L
b) 2L
c) L/2
d) 3L

42. The Schrodinger wave equation is _____
a) Linear
b) Quadratic
c) Differential equation
d) Derivable

43. 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) $\Psi_1 + \Psi_2$

44. The intensity of pattern observed when wave functions are super positioned is similar to _____
a) Interference
b) Fraunhofer Diffraction
c) Fresnel Diffraction
d) Edge Diffraction

45. The expectation value of which measurement cannot be calculated using the typical method?
a) Energy
b) Speed
c) Position
d) Momentum

46) Zero order fringe can be identified using_____
a)white light
b)Achromatic light
c) Yellow light
d) Monochromatic light.

47) The shape of a interference pattern depends on
a) distance between the slits.
b)Distance between slit f screen
c)wavelength of light
d)shape of slit

48) The shape of fringes obtained in interference is
a) straight
b) Circular
c) Hyperbolic
d) Elliptical.

49) Two sources of monochromatic light are said to be Cohorent, if light waves produced by them have same
a)Amplitude only.
b) frequency only
c) frequency of constant phase difference.
d) amplitude & same wavelength.

50) which of the following is not true about light wares?
a) light waves can travel long distances.
b) light waves require a medium to travel,
c) light waves are electromagnetic wave:
d) Variation in frequency of ware gives different colors

51) How many lenses are used in freshened diffraction
a) Two convex lens
b)Two concave leas.
c)one convex lens
d) No lens used.

52.The obliquity factor in Fresnel diffraction is-
a)Cosθ
b)Sin θ
c) 1+Cosθ
d)1+Sinθ

53.The radius of half period zone is proportional to a_____
a)Wavelength of light.
b)Square root of frequency of light.
c)square root of wavelength of light
d)frequency of light.

54. light of 5000 Å wavelength is incident on a circulars hole,of radius 1cm How many half period zones are contained in the circle of the screen is placed at a distance of 1m?
a) 20
b) 200
c)2000
d)20000

55. what is the effective distance between source of light and screen in frauhoffer diffraction.
a) focal length of convex lens.
b) Less than focal length of convex lens
c) greater than focal length of convex lens and less than infinite,
d) Infinite

56. If the separation between two slits in Double slit fraunhoffer diffraction is changed, what change will be Observed in diffraction pattern
a)No change
b)fringe length will increase .
c)fringe length will decrease
d) fringes will be coloured

57. The surface over which the phase of waves are constant are called
a) ware plane
b) wave space
c) Wave surface
d) wave front

58. The wave from sources must have some_____in interference to be obtained.
a) Amplitude
b) Time period
c) frequency
d) Displacement

59 Area of a half period zone plate is dependent on_____ of light.
a) Frequency
b)wavelength
c) Intensity
d)Source.

60.Miller indices of a material in a plane proportional to_____
a) sum of all Lattice vectors.
b) Angle of lattice vectors.
c) Reciprocal. of numerical parameters of intercept
d. none of these

61. The divergence theorem for a surface consisting of a sphere is computed in which coordinate system?
a) Cartesian
b) Cylindrical
c) Spherical
d) Depends on the function

62. Find the Gauss value for a position vector in Cartesian system from the origin to one unit in three dimensions.
a) 0
b) 3
c) -3
d) 1

63. The divergence theorem value for the function $x^2 + y^2 + z^2$ at a distance of one unit from the origin is
a) 0
b) 1
c) 2
d) 3

64. If a function is described by F = ($3x + z$, $y^2 - \sin x^2 z$, $xz + ye^{x^5}$), then the divergence theorem value in the region $0<x<1$, $0<y<3$ and $0<z<2$ will be
a) 13
b) 26
c) 39
d) 51

65. Find the divergence theorem value for the function given by (e^z, $\sin x$, y^2)
a) 1
b) 0
c) -1
d) 2

66. For a function given by F = 4x i + 7y j +z k, the divergence theorem evaluates to which of the values given, if the surface considered is a cone of radius $1/2\pi$ m and height $4\pi^2$ m.
a) 1
b) 2
c) 3
d) 4

67. Find the value of Stoke's theorem for A = x i + y j + z k. The state of the function will be
a) Solenoidal
b) Divergent
c) Rotational
d) Curl free

68. The Stoke's theorem can be used to find which of the following?
a) Area enclosed by a function in the given region
b) Volume enclosed by a function in the given region
c) Linear distance
d) Curl of the function

69. The energy stored in an inductor 2H and current 4A is
a) 4
b) 8
c) 12
d) 16

70. The voltage of a capacitor 12F with a rating of 2J energy is
a) 0.57
b) 5.7
c) 57
d) 570

71. Find the power, given energy E = 2J and current density J = x^2 varies from x = 0 and x = 1.
a) 1/3
b) 2/3
c) 1
d) 4/3

72. The conductivity of a material with current density 1 unit and electric field 200 μV is
a) 2000
b) 3000
c) 4000
d) 5000

73. The resistivity of a material with resistance 200 ohm, length 10m and area twice that of the length is
a) 200
b) 300
c) 400
d) 500

74. Differential form of Gauss's law in magneto statics is _____
a) div B = ρ/ε_o
b) div B = 0
c) div B = -dB/dT
d) div B = μJ

75. Magnetic field can be produced by _____
a) Conduction current
b) Displacement current
c) Both conduction and displacement current
d) It is produced naturally

Answer

1.(d) 2.(c) 3.(b) 4.(a) 5.(a) 6.(c) 7.(d) 8.(a) 9.(a) 10.(b) 11.(b) 12.(c) 13.(c) 14.(b)

15.(b) 16.(d) 17.(d) 18.(c) 19.(c) 20.(b) 21.(c) 22.(c) 23.(b) 24.(a) 25.(d) 26.(d) 27.(b)

28.(c) 29.(b) 30.(a) 31.(a) 32.(d) 33.(b) 34.(b) 35.(b) 36.(c) 37.(a) 38.(b) 39.(d) 40.(c)

41.(a) 42.(a) 43.(d) 44.(b) 45.(d) 46.(a) 47.(d) 48.(c) 49.(c) 50.(b) 51.(c) 52.(c)

53.(c) 54.(b) 55.(d) 56.(a) 57.(d) 58.(c) 59.(b) 60.(c) 61.(d) 62.(b) 63.(d) 64.(c)

65.(b) 66.(b) 67.(d) 68.(a) 69.(d) 70.(a) 71.(b) 72.(d) 73.(c) 74.(b) 75.(c)