1. The value of acceleration due to gravity is 980 cm/s^2. What will be its value if the unit of length in kilometer and the time in minute?

   (A) 980 km/min^2 (B) 35.28 km/min^2

   (C) 35.28 cm/s^2 (D) 40.00 km/m^2

2. Which of the following expresses the signal of photon?

   (A) hv (B) $\frac{hv}{c^2}$

   (C) $\frac{h}{\lambda}$ (D) $\frac{h\lambda}{c}$

3. Which of the following is conserved when light waves interfere?

   (A) Intensity (B) Energy

   (C) Amplitude (D) Momentum

4. When a drop of oil is spread on the surface of water, it displays beautiful colours in day light because of

   (A) Dispersion of light (B) Reflection of light

   (C) Polarization of light (D) Interference of light

5. The de-Broglie wavelength of a particle of mass m and kinetic energy E is

   (A) $\frac{2mh}{\sqrt{E}}$ (B) $\frac{h}{2mp}$

   (C) $\frac{h}{\sqrt{2mE}}$ (D) $\frac{\sqrt{2mE}}{h}$

6. Wien's displacement law shows the wavelength that is emitted with the greatest intensity shifts with increase of temperature towards

   (A) Higher wavelength (B) Lower wavelength

   (C) Only intensity increases (D) Does not shift

7. The probability of finding a particle represented by $\psi(r,t)$ in unit volume is

   (A) $|\psi(r,t)|$ (B) $|\psi(r,t)|^2$

   (C) $|\psi(r,t)|^3$ (D) $\psi(r,t)$

8. The lowest kinetic energy of a particle of mass m confined in a one-dimensional box of length L is

(A) Proportional to L
(B) Inversely proportional to L^2
(C) Proportional to L^2
(D) None of these

9. Lorentz transformation reduces to Galilean transformation when

(A) $v << c$
(B) $v = c$
(C) $v > c$
(D) None of these

10. The correct expression for the rate of spontaneous emission is

(A) $R_{SE} = A_{21}N_2$
(B) $R_{SE} = A_{21}N_2\rho(v)$
(C) $R_{SE} = B_{21}N_2$
(D) $R_{SE} = B_{21}N_2\rho(v)$

11. Compton effect is observed if the target electron is

(A) Free
(B) Bound to the nucleus
(C) Binding energy is very small compared to the energy of the incident photon
(D) None of these

12. Which statement is correct?

(A) Group velocity (V_g) = Phase velocity (V_p)
(B) $(V_g) > (V_p)$
(C) $(V_p) > (V_g)$
(D) $(V_p) = \frac{1}{(V_g)}$

13. Expression of Heisenberg's uncertainty principle is given as

(A) $\Delta E.\Delta t \geq \frac{\hbar}{2}$
(B) $\Delta E.\Delta x \geq \frac{\hbar}{2}$
(C) $\Delta E.\Delta p \geq \frac{\hbar}{2}$
(D) $\Delta p.\Delta t \geq \frac{\hbar}{2}$

14. If N_1 and N_2 are the number of atoms in ground and excited state, respectively, then in population inversion

(A) $N_1 < N_2$
(B) $N_1 > N_2$
(C) $N_1 = N_2$
(D) None of these

15. The relativistic relation between momentum and energy is

(A) $E^2 = c^2p^2 + m_0^2c^4$
(B) $E^2 = c^2p^2$
(C) $E^2 = m_0^2c^4$
(D) $E = mc^2$

16. For a normalized wave function ψ, the value of $\int_{-\infty}^{\infty} \psi^* \psi \, d\tau$ will be

(A) 1 (B) 0
(C) 2 (D) ∞

17. Ruby laser is a

(A) One level laser system (B) Two level laser system
(C) Three level laser system (D) None of these

18. The energy of a particle in one dimensional potential box varies with the quantum number n as

(A) n (B) $\frac{1}{n}$
(C) n^2 (D) $\frac{1}{n^2}$

19. The kinetic energy of a body is twice its rest mass energy. Its velocity is

(A) $\frac{2\sqrt{2}}{3}C$ (B) $\frac{2}{3}C$
(C) $2\sqrt{\frac{2}{3}}C$ (D) None of these

20. The apparent length of a meter stick measured by an observer at rest, when the stick is moving along its velocity equals to $\frac{\sqrt{3}}{2}C$ is given by

(A) 1 meter (B) 0.5 meter
(C) 0.75 meter (D) None of these

21. In damped harmonic oscillator, the damping force is proportional to the

(A) Displacement (B) Acceleration
(C) Velocity (D) None of these

22. In case of forced vibration, near about the resonant frequency, the motion is said to be

(A) Stiffness controlled (B) Inertia controlled
(C) Resistance controlled (D) Mass controlled

23. If θ be the polarizing angle, the refractive index μ of the material is given by

(A) $Sin\theta$ (B) $\tan\theta$
(C) $\cos\theta$ (D) None of these

24. In simple harmonic motion the acceleration is

(A) Directly proportional to the displacement from central position
(B) Constant
(C) Inversely proportional to the displacement from central position
(D) Inversely proportional to the square of displacement from central position

25. The acceleration of particle executing simple harmonic motion when it is at mean position is

(A) Infinite
(B) Varies
(C) Maximum
(D) Zero

26. Velocity of light in vacuum is given by c

(A) $c = \mu_0 \varepsilon_0$
(B) $c^2 = \mu_0 \varepsilon_0$
(C) $\frac{1}{c^2} = \frac{\mu_0}{\varepsilon_0}$
(D) $\frac{1}{c^2} = \mu_0 \varepsilon_0$

27. According to kinetic theory of gases, the temperature of a perfect gas is

(A) Inversely proportional to kinetic energy of the molecules
(B) Directly proportional to kinetic energy of the molecules
(C) Independent kinetic energy of the molecules
(D) None of these

28. At absolute zero temperature

(A) The molecular energy is minimum and not zero
(B) All the molecules come to rest and have zero energy
(C) Molecules travel faster
(D) Potential energy become zero

29. Moon has no atmosphere because

(A) RMS velocity of all gases is more than the escape velocity of moon's surface
(B) Its surface is not smooth
(C) It is quite far away from the earth
(D) It does not have population and planets

30. Root means square (RMS) velocity of a perfect gas is

(A) $\sqrt{\frac{3RT}{M}}$ (B) $\sqrt{3RTM}$

(C) $\sqrt{RTM}$ (D) $\sqrt{\frac{M}{RT}}$

31. Relation between C_p and C_v is

(A) $C_p - C_v = \frac{R}{J}$ (B) $C_p - C_v = NR$

(C) $C_p - C_v = R$ (D) $\frac{C_p}{C_v} = R$

32. If α, β and γ respectively are the coefficients of linear, superficial and the volume expansion of a body, then

(A) $\alpha = 2\beta = 3\gamma$ (B) $\beta = 2\alpha = 3\gamma$

(C) $\gamma = 2\beta = 3\alpha$ (D) $\alpha = \frac{\beta}{2} = \frac{\gamma}{3}$

33. A polyatomic gas with n degrees of freedom has a mean energy per molecule give by

(A) $\frac{nkT}{N}$ (B) $\frac{nkT}{2N}$

(C) $\frac{nkT}{2}$ (D) $\frac{3kT}{2}$

34. If a gas has f degree of freedom, the ratio of $\frac{C_p}{C_v}$ of a gas is

(A) $1+\frac{f}{2}$ (B) $\frac{1+f}{2}$

(C) $\frac{1}{2}+f$ (D) $1+\frac{2}{f}$

35. In an isothermal process

(A) Volume remains constant (B) Pressure remains constant

(C) Temperature remains constant (D) None of these

36. Which of the following phenomena is reversible?

(A) Waterfall (B) Rusting of iron

(C) Charging of battery (D) Electrolysis of water

37. Which of the Carnot's engine has maximum efficiency?

(A) Working between 300 K and 250 K (B) Working between 600 K and 300 K

(C) Working between 800 K and 400 K (D) Working between 100 K and 10 K

38. The first law of thermodynamics is based on the law of conservation of

(A) mass (B) momentum

(C) energy (D) angular momentum

39. Which of the following formula is wrong?

(A) $C_v = \frac{R}{\gamma - 1}$ (B) $C_p = \frac{\gamma R}{\gamma - 1}$

(C) $\frac{C_p}{C_v} = \gamma$ (D) $C_p - C_v = 2R$

40. The efficiency of Carnot's engine operating with reservoir temperature of 100^0C and -23^0C will be

(A) $\frac{100 + 23}{100}$ (B) $\frac{100 - 23}{100}$

(C) $\frac{100 + 23}{273}$ (D) $\frac{100 - 23}{273}$

41. The absorbing power of a perfectly black body is

(A) 1 (B) 0

(C) 0.5 (D) –1

42. According to Wein's displacement law

(A) $\lambda T = \text{constant}$ (B) $\lambda \alpha \frac{1}{T}$

(C) $\frac{\lambda}{T} = \text{constant}$ (D) Only (C) is false

43. A perfect black body emits radiation at temperature $T_1{}^0$K. If it is to radiate 16 times this power, its temperature T_2 will be

(A) $T_2 = 2T_1$ (B) $T_2 = 4T_1$

(C) $T_2 = 6T_1$ (D) $T_2 = 16T_1$

44. A spherical body with a radius 12 cm radiates 450 W. If radius was halved and the temperature doubled, the power radiated in watt would be

(A) 225 (B) 450

(C) 900 (D) 1800

45. In a given process on an ideal gas, $dW = 0$ and $dQ < 0$. Then for the gas

(A) The temperature will decrease (B) The volume will decrease

(C) The pressure will remain constant (D) The temperature will increase

46. The binary number 10101 is equivalent to decimal number

(A) 19 (B) 12

(C) 27 (D) 21

47. The inverter is

(A) NAND gate (B) OR gate

(C) NOT gate (D) AND gate

48. The given Boolean expression is $Y = A\overline{B} + B\overline{A}$. If $A = 1$ and $B = 1$, then $Y =$

(A) 1 (B) 0

(C) Either 1 or 0 (D) None of these

49. A string of eight binary numbers is called

(A) Nibble (B) Byte

(C) 1 Exa byte (1 EB) (D) Bit

50. The Boolean algebra for a NAND gate is

(A) $Y = A + B$ (B) $Y = \overline{A + B}$

(C) $Y = \overline{A \cdot B}$ (D) $Y = A \cdot B$

51. $I_C = \dfrac{\alpha}{1-\alpha} I_B +$ ————.

(A) I_{CEO} (B) I_{CBO}

(C) I_C (D) I_E

52. The collector-base junction in a transistor has

(A) Forward base at all times (B) Reverse base at all times
(C) Low resistance (D) None of these

53. In p-n-p transistor, the current carriers are

(A) acceptor ions (B) donor ions
(C) free electrons (D) holes

54. A zener diode is used as

(A) an amplifier (B) a voltage regulator
(C) a rectifier (D) a multi-vibrator

55. The barrier voltage at a p-n junction for germanium is about

(A) 3.5 V (B) 3 V
(C) 0 (D) 0.3 V

56. A reverse biased p-n junction has

(A) Very narrow depletion layer (B) Almost no current
(C) Very low resistance (D) Large current flow

57. A knee voltage of a crystal diode is approximately equal to

(A) Applied voltage (B) Breakdown voltage
(C) Forward voltage (D) Barrier potential

58. With forward bias to p-n junction, the width of depletion layer

(A) Decreases (B) Increases
(C) Remains the same (D) None of these

59. The given truth table is for

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(A) NAND gate (B) NOR gate
(C) NOT gate (D) AND gate

60. In a transistor, $I_C = 100mA$ and $I_E = 100.5mA$. The value of β is

(A) 100 (B) 50
(C) 1 (D) 200

61. Which of the following have same dimensions?

(A) Momentum and energy
(B) Momentum and angular momentum
(C) Angular momentum and Planck's constant
(D) Force and torque

62. The dimensional formula of Gravitational constant is

(A) $\left[M^{-1}L^{2}T^{-2}\right]$ (B) $\left[M^{-1}L^{-1}T^{-2}\right]$
(C) $\left[M^{-1}L^{3}T^{-2}\right]$ (D) $\left[ML^{3}T^{-2}\right]$

63. Length cannot be measured by

(A) Fermi (B) Debye
(C) Micron (D) Light year

64. The density of wood in cgs system is 0.5 gcm^{-3}. The corresponding value in MKS system is

(A) 500 (B) 5000
(C) 5 (D) 0.5

65. Which is the correct unit for measuring astronomical distances?

(A) Moles (B) Kilometer
(C) Light year (D) Angstrom unit

66. When a carpet is beaten by a stick, the dust particles drops down according to

(A) First law of motion (B) Second law of motion
(C) Third law of motion (D) None of these

67. A diwali rocket is ejecting 0.05 kg of gases per second at a velocity of 400 ms^{-1}. The acceleration force on the rocket is

(A) 20 dyne (B) 20 N
(C) 22 N (D) 4000 N

68. A ball of mass 0.1 kg is thrown against a wall. It strikes the wall normally with a velocity of 30 ms^{-1} and rebounds with a velocity of 20 ms^{-1} in the opposite direction. Then the impulse by the ball on the wall is

(A) 50 Ns (B) 0.5 Ns

(C) 1 Ns (D) 5 Ns

69. The moment of inertia does not depend upon

(A) Mass of the body (B) Distribution of mass

(C) Location of axis of rotation (D) Angular velocity of the body

70. Angular momentum is

(A) Polar vector (B) Axial vector

(C) Scalar (D) None of these

71. Kepler's second law is based on

(A) Newton's first law (B) Newton's second law

(C) Special theory of relativity (D) Conservation of angular momentum

72. With what velocity should a particle be projected so that its height becomes equal to the radius of the earth?

(A) $\sqrt{\frac{GM}{R}}$ (B) $\sqrt{\frac{8GM}{R}}$

(C) $\sqrt{\frac{4GM}{R}}$ (D) $\sqrt{\frac{2GM}{R}}$

73. If both the mass and radius of the earth decreases by 1%

(A) The escape velocity would increase

(B) The acceleration due to gravity would increase

(C) The escape velocity would decrease

(D) The acceleration due to gravity would decrease

74. The mass of a particle at the earth's surface is 40 kg. Its mass at the centre of the earth is

(A) zero (B) infinite

(C) same as the surface (D) greater than at pole

75. The ratio of time-period of a satellite in circular orbits of radii r and 4r is

(A) 6:1 (B) 1:6

(C) 1:8 (D) 1:10

76. A body is projected vertically from the surface of earth with a velocity equal to half of escape velocity. The maximum height reached by the body is

(A) R (B) $\frac{R}{2}$

(C) $\frac{R}{3}$ (D) $\frac{R}{4}$

Where R is the radius of the earth

77. The kinetic energy is required to project a body from the earth's surface to infinity is

(A) ∞ (B) $2mgR$

(C) $\frac{1}{2}mgR$ (D) ngR

Where 'm' is mass of the body, R is the radius of the earth and g is the acceleration due to gravity

78. Two satellites are moving in orbits, $R_1 > R_2$; then the velocities associate with them is

(A) $v_1 < v_2$ (B) $v_1 > v_2$

(C) $v_1 = v_2$ (D) $v_1 = 2v_2$

79. Newton's law of gravitation is applicable to

(A) Bodies in solar system only (B) Bodies on earth only

(C) Planets only (D) All bodies in the universe

80. The acceleration due to gravity at the surface of the earth is given by

(A) $g = \frac{GM}{R^2}$ (B) $g = \frac{GR^2}{M}$

(C) $g = \frac{M^2}{GR}$ (D) $g = \frac{M}{GR^2}$

Where 'M' is mass of the earth, R is the radius of the earth, and g is the acceleration due to gravity

81. When two capillary tubes of different diameters are dipped vertically in a liquid, the height of the liquid is

(A) More in the tube of larger diameter (B) Less in the tube of smaller diameter

(C) More in the tube of smaller diameter (D) Same in both the tubes

82. Water venture-meter works on the principle of

(A) Hook's law (B) Stoke's law

(C) Bernoulli's theorem (D) Newton's third law of motion

83. Ball pen works on the principle of

(A) Viscosity (B) Boyle's law

(C) Gravitational force (D) Capillarity and surface tension

84. A horizontal tube has radii r_A and r_B ($r_B > r_A$) at two places A and B along its length. The rate of flow of liquid is

(A) At A is more than at B (B) At A is less than at B

(C) At A and B is the same (D) None of these

85. Under a constant pressure head, the rate of flow of orderly volume flow of liquid through a capillary tube is V. If the length of the capillary is doubled and the diameter of the bore is halved, the rate of flow would become

(A) $\frac{V}{4}$ (B) 16 V

(C) $\frac{V}{8}$ (D) $\frac{V}{32}$

86. In streamline flow of liquid, the total energy of liquid is constant at

(A) All points (B) Inner points

(C) Outer points (D) None of these

87. Bernoulli's equation is important in the field of

(A) electrical circuit (B) magnetism

(C) photoelectric effect (D) flow of fluids

88. A flywheel is homogeneous disc of mass 72 kg and radius 50 cm. when it is rotating at the rate of 70 rpm, its kinetic energy is

(A) 484 J (B) 284 J

(C) 242 J (D) 121 J

89. A body of mass m is moving with a constant velocity along a line parallel to the x-axis, away from the origin. Its angular momentum with respect to the origin is

(A) zero (B) remains constant

(C) goes on increasing (D) goes on decreasing

90. A solid cylinder of mass M and radius R rolls without slipping down on a inclined plane of length L and height h. the speed of its centre of mass when it reaches the bottom of the inclined plane

(A) $\sqrt{gh}$ (B) $\sqrt{5gh}$

(C) $\sqrt{\frac{3}{4}gh}$ (D) $\frac{4}{3}gh$

91. A circular disc A of radius R is made from an iron plate of thickness t and another disc B of radius 4R is made from an iron plate of thickness $\frac{t}{4}$. Then the relation between the moment of inertia I_A and I_B is

(A) $I_A = I_B$ (B) $I_B = 32\ I_A$

(C) $I_B = 4\ I_A$ (D) $I_B = 64\ I_A$

92. A body performing uniform circular motion has angular momentum L. If its angular speed become 3 times, its kinetic energy becomes half. What is its new angular momentum?

(A) 6 L (B) $\frac{L}{6}$

(C) 3 L (D) $\frac{L}{3}$

93. Two identical balls each of radius 20 cm are placed touching each other. The distance of their centre of mass from the point of contact is

(A) 10 cm (B) 20 cm

(C) Zero (D) 25 cm

94. When the planet comes near the sun, its angular speed?

(A) increases (B) decreases

(C) remains same (D) become zero

95. An earth satellite is moving around the earth in circular orbit. In such case, which of the following is conserved?

(A) Velocity (B) Linear momentum

(C) Angular momentum (D) None of these

96. Light waves are

(A) Longitudinal (B) Transverse

(C) Neither (A) nor (B) (D) Both (A) and (B)

97. Energy is not carried by

(A) Transverse progressive waves (B) Longitudinal progressive waves

(C) Stationary waves (D) Electromagnetic waves

98. Relation between phase difference and path difference is

(A) $\Delta\phi = \frac{2\pi}{\lambda}\Delta x$ (B) $\Delta\phi = 2\pi\lambda\Delta x$

(C) $\Delta\phi = \frac{2\pi\lambda}{\Delta x}$ (D) $\Delta\phi = \frac{\pi\Delta x}{\lambda}$

99. The audible frequency range is

(A) 20 Hz to 2000 Hz (B) 10 Hz to 20 Hz

(C) 20 Hz to 20,000 Hz (D) 20 Hz to 100 Hz

100. Velocity of sound varies with density of the air is

(A) Proportional to the density

(B) Proportional to the square root of the density

(C) Independent of the density

(D) None of these

101. Which of the following values of n is not possible in the relation $Q = ne$?

(A) 4 (B) 8

(C) 4.2 (D) 100

102. The value of $\frac{1}{4\pi\varepsilon_0}$ is :

(A) $9 \times 10^9\ Nm^2c^{-2}$ (B) $9 \times 10^{-9}\ Nm^2c^{-2}$

(C) $9 \times 10^{12}\ Nm^2c^{-2}$ (D) $9 \times 10^{-12}\ Nm^2c^{-2}$

103. Electric charges of 1μC, –1 μC and 2μC are placed in air at the corners A, B and C respectively of an equilateral triangle ABC having length of each side 10 cm. The resultant force on the charge at C is

(A) 0.9 N (B) 1.8 N

(C) 2.7 N (D) 3.6 N

104. When the charge of a body becomes half, the electric field becomes

(A) Half (B) Twice

(C) Thrice (D) No change

105. What is the nature of Gaussian surface involved in Gauss's law of electrostatics?

(A) Scalar (B) Electrical

(C) Magnetic (D) Vector

106. Two large metal sheets having surface charge density +σ and –σ are kept parallel to each other at a small separation distance d. The electric field at any point in the region between the plates is

(A) σ/ε_0 (B) $\sigma/2\varepsilon_0$

(C) $2\sigma/\varepsilon_0$ (D) $\sigma/4\varepsilon_0$

107. SI unit of permittivity of free space is

(A) Farad (B) Weber

(C) $C^2N^{-1}m^{-2}$ (D) C^2Nm^{-2}

108. When an electric dipole is placed in a uniform electric field, it experiences

(A) Force as well as torque (B) Torque but no net force

(C) Force but no torque (D) Neither any force nor any torque

109. In a uniform external electric field $\vec{E}$, the torque τ acting on a dipole having dipole moment P is given by

(A) $\tau = \vec{P} \times \vec{E}$ (B) $\tau = \vec{P}.\vec{E}$

(C) $\tau = 2\left(\vec{P} + \vec{E}\right)$ (D) $\tau = \left(\vec{P} + \vec{E}\right)$

110. An electric dipole is placed in an external electric field of 10^5 NC^{-1}, if the charge of each electric dipole is 1.0 μC and the distance between the two charges is 2.0 cm. The maximum torque on the dipole is

(A) 0.2×10^{-3} Nm (B) 1×10^{-3} Nm

(C) 2×10^{-3} Nm (D) 4×10^{-3} Nm

111. Three capacitors of capacitances 3μF, 9μF and 18 μF are connected once in series and then in parallel. The ratio of equivalent capacitances Cs/Cp will be :

(A) 1 : 15 (B) 15 : 1

(C) 1 : 1 (D) 1 : 3

112. In a parallel plate capacitor, the capacity increases if

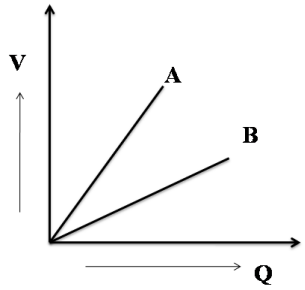
(A) Area of the plate is decreased (B) Distance between the plates increases

(C) Area of the plate is increased (D) Dielectric constantly decreases

113. If a unit positive charge is taken from one point to another over an equipotential surface, then

(A) Work is done on the charge
(B) Work is done by the charge
(C) Work done is constant
(D) No work is done

114. The graph shows the variation of voltage 'V' across the plates of two capacitors A and B versus increase of charge 'Q' stored on them. Which of the two capacitors has higher capacitance?



(A) A
(B) B
(C) Both have same
(D) None of these

115. The electric potential V at any point O (x, y, z all in meters) in space is given by $V = 4x^2$ volt. The electric field at the point (1 m, 0, 2 m) in volt/meter is

(A) 8 along negative x-axis
(B) 8 along positive x-axis
(C) 16 along negative x-axis
(D) 16 along positive z-axis

116. The total polarisation of a material is the

(A) Product of all types of polarisation
(B) Sum of all types of polarization
(C) Orientation directions of the dipoles
(D) Total dipole moments in the material

117. Identify which type of polarisation depends on temperature.

(A) Electronic
(B) Ionic
(C) Orientational
(D) Interfacial

118. Kirchhoff's first law $\left(\sum I = 0\right)$ and second law $\left(\sum iR = \sum E\right)$, where the symbols have their usual meanings, are respectively based on

(A) Conservation of charge, conservation of momentum
(B) Conservation of energy, conservation of charge
(C) Conservation of momentum, conservation of charge
(D) Conservation of charge, conservation of energy

119. The resistance of a conductor is

(A) Inversely proportional to the length

(B) Directly proportional to the square of the radius

(C) Inversely proportional to the square of the radius

(D) Directly proportional to the square root of the length

120. Two wires of the same material have lengths L and 2L and cross-sectional areas 4A and A respectively. The ratio of their specific resistances will be

(A) 1 : 2 (B) 8 : 1

(C) 1 : 8 (D) 1 : 1

121. A wire of resistance R is stretched to twice of its original length. Its new resistance will be

(A) 4R (B) R/9

(C) 3R (D) R/3

122. Biot-Savart law indicates that the moving electrons (velocity $\vec{v}$) produce a magnetic field $\vec{B}$ such that

(A) $\vec{B}$ Perpendicular to $\vec{v}$

(B) $\vec{B} \| \vec{v}$

(C) It obeys inverse cube law

(D) It is along the line joining the electron and point of observation

123. An electron is projected with uniform velocity along the axis of a current carrying long Solenoid. Which of the following is true?

(A) The electron will be accelerated along the axis

(B) The electron path will be circular about the axis

(C) The electron will experience a force at 45° to the axis and hence execute a helical path

(D) The electron will continue to move with uniform velocity along the axis of the solenoid

124. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon

(A) Area of loop (B) Value of current

(C) Magnetic field (D) None of these

125. If a current I is flowing in a straight wire parallel to x axis and magnetic field is there along the y axis then

(A) The wire experiences force in x direction

(B) The wire experiences force in y direction

(C) The wire experiences no force

(D) The wire experiences force in z direction

126. Two wires of same length are shaped into a square and a circle if they carry same current, ratio of magnetic moment is

(A) $2:\pi$ (B) $\pi:2$

(C) $4:\pi$ (D) $\pi:4$

127. Current sensitivity of a galvanometer can be increased by decreasing

(A) Magnetic field B (B) Number of turns N

(C) Area A (D) Spring constant K

128. Magnetic field due to a current carrying toroid is independent of

(A) Its number of turns (B) Current

(C) Radius (D) None of these

129. How can you increase the magnetic field inside a toroid?

(A) By increasing the radius

(B) By decreasing the current

(C) By introducing a soft iron core inside a toroid

(D) By decreasing the total number of turns

130. A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity of 0.5 Weber/m². The magnetic dipole moment of the coil is

(A) 0.15 Am^2 (B) 0.3 Am^2

(C) 0.45 Am^2 (D) 0.6 Am^2

131. The angle between Magnetic meridian and the geographic meridian is known as

(A) Angle of dip (B) Magnetic field inclination

(C) Tilt angle (D) Angle of magnetism

132. When current in a coil change from 5 A to 2 A in 0.1 s, average voltage of 50 V is produced. The self-inductance of the coil is

(A) 1.67 H (B) 6 H

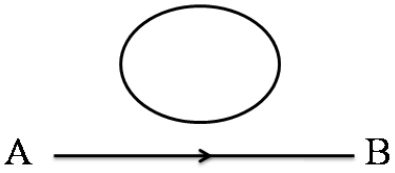
(C) 3 H (D) 0.67 H

133. Lenz's law of electromagnetic induction is as per law of conservation of

(A) Energy (B) Angular momentum

(C) Charge (D) Mass

134. The current flows from A to B are as shown in the figure. The direction of the induced current in the loop is



(A) Clockwise (B) Anti clockwise

(C) Straight line (D) None of these

135. If number of turns in primary and secondary coils is increased to two times each, the mutual Inductance

(A) Becomes 4 times (B) Becomes 2 times

(C) Becomes $\frac{1}{4}$ times (D) Remains unchanged

136. Two inductors of inductance L each are connected in series with opposite magnetic fluxes. The resultant inductance is (Ignore mutual inductance)

(A) Zero (B) L

(C) 2L (D) 3L

137. In an LCR-series a.c. circuit, the voltage across each of the component L, C and R is 50 V. The voltage across the LC-combination will be

(A) 50 V (B) $50\sqrt{2}\,V$

(C) 100 V (D) Zero

138. In an LCR circuit, capacitance is changed from C to 2C. For resonant frequency to remain unchanged, the inductance should be changed from L to

(A) 4 L (B) 2 L

(C) L/2 (D) L/4

139. Reciprocal of impedance is

(A) Susceptance (B) Conductance

(C) Admittance (D) None of these

140. In the case of an inductor

(A) Voltage lags the current by $\pi/2$

(B) Voltage leads the current by $\pi/2$

(C) Voltage leads the current by $\pi/3$

(D) Voltage leads the current by $\pi/4$

141. In a pure capacitive circuit if the frequency of a.c. source is doubled, then its capacitive reactance will be

(A) Remains same (B) Doubled

(C) Halved (D) Zero

142. In series LCR circuit, the phase angle between supply voltage and current is

(A) $\tan\varphi = \frac{X_L - X_C}{R}$ (B) $\tan\varphi = \frac{R}{X_L - X_C}$

(C) $\tan\varphi = \frac{R}{X_L + X_C}$ (D) $\tan\varphi = \frac{X_L + X_C}{R}$

143. At resonance the impedance of a series circuit is

(A) Maximum (B) Minimum

(C) Zero (D) Depends on the frequency of circuit

144. In an a.c. circuit consisting of a coil and a bulb, how will the brightness of the bulb change if the frequency of source is increased?

(A) No change (B) Increases

(C) Decreases (D) First decreases then increases

145. What is the value of inductance L for which the current is maximum in a series LCR- circuit with C = 10 μF and ω = 1000 rad/s?

(A) 100 mH
(B) 1 mH
(C) 10 mH
(D) Cannot be calculated unless R is known

146. A coil of self-inductance L is connected in series with a bulb B and an a.c. source. Brightness of the bulb decreases when

(A) Frequency of the ac source is decreased
(B) Number of turns in the coil is reduced
(C) A capacitance of reactance $X_C = X_L$ in included
(D) An iron rod is inserted in the coil

147. If coil is open, then L and R becomes

(A) Infinity, zero
(B) Zero, infinity
(C) Infinity, infinity
(D) Zero, zero

148. Which quantity is increased in a step-down transformer?

(A) Current
(B) Voltage
(C) Power
(D) Frequency

149. A transformer is used to light a 100 W and 110 V lamp from 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is approximately

(A) 30%
(B) 50%
(C) 90%
(D) 10%

150. The core of any transformer is laminated so as to

(A) Reduce the energy loss due to eddy currents
(B) Make it light weight
(C) Make it robust and strong
(D) Increase the secondary voltage

151. The numerical aperture of an optical fibre is

(A) $n_1\sqrt{2\Delta}$ (B) $\frac{n_1}{n_2}\sqrt{2\Delta}$

(C) $\frac{n_1}{\sqrt{2\Delta}}$ (D) $n_2\sqrt{2\Delta}$

152. Total internal reflection takes place when light travels from

(A) Rarer to denser medium (B) Denser to rarer medium

(C) Air to glass (D) Glass to air

153. The numerical aperture of an optical fibre depends on

(A) Core refractive index (B) Critical angle

(C) Both (A) and (B) (D) None of these

154. The main energy loss in optical fibres consists of

(A) Material loss (B) Scattering loss

(C) Bending loss (D) All of the above

155. The reduction in the amplitude and the intensity of a signal as it is guided through an optical fibre is known as

(A) Dispersion (B) Attenuation

(C) Diffraction (D) Diffusion

156. Attenuation losses in optical fibres are generally measured in terms of

(A) Nanosecond (B) Picoseconds

(C) Decibel (D) Dyne

157. Polarization cannot occur in

(A) Light waves (B) X-rays

(C) Radio waves (D) Sound waves

158. A polarized light falls on a Nicol prism such that its optical axis makes an angle θ with the elective vector of incident polarized beam. The intensity of emergent light is

(A) I_0 (B) $\frac{I_0}{2}$

(C) $I_0 \cos^2\theta$ (D) $I_0 \sin\theta$

159. According to Brewster's law, the refractive index of transparent material is given by

(A) $\mu = \tan i_p$ (B) $\mu = \sin i_p$

(C) $\mu = \cos i_p$ (D) $\mu = \cot i_p$

160. Unpolarised light can be converted into partially polarized or plane polarized by several processes. Which of the following does not do that?

(A) Reflection (B) Diffraction

(C) Double refraction (D) Scattering

161. Polaroid glass is used in sun glasses because

(A) It reduces the light intensity to half

(B) It is fashionable

(C) It has good colour

(D) None of these

162. The phenomenon of rotation of plane polarized light is called

(A) Kerr effect (B) Double refraction

(C) Optical activity (D) Dichorism

163. The superposition of two plane polarized lights in two mutually perpendicular directions given by

$$x = 4\sin\left(\omega t + \frac{\pi}{4}\right)$$

$$y = 5\sin\left(\omega t + \frac{3\pi}{4}\right)$$

will result in

(A) Plane polarized light (B) Unpolarized light

(C) Elliptically polarized light (D) Circularly polarized light

164. Circularly light is produced if the amplitudes of the O- and E- rays are equal and there is a phase difference of

(A) π (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$ (D) Zero

165. The planes of vibration and polarization are

(A) Orthogonal (B) Parallel

(C) Non-existent (D) Orthogonal and parallel

166. Nicol prism is based on the phenomenon of

(A) Refraction (B) Reflection

(C) Double refraction (D) Scattering

167. If a wave can be polarized, it must be

(A) An electromagnetic wave (B) A longitudinal wave

(C) A sound wave (D) A transverse wave

168. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit must be

(A) Spherical (B) Cylindrical

(C) Plane (D) Elliptical

169. If N is the total number of rulings on the grating, n is order of spectrum, and λ is the wavelength of light used, then the resolving power of the grating is given by

(A) $Nn\lambda$ (B) Nn

(C) $\frac{N\lambda}{n}$ (D) $\frac{N}{n}$

170. The bending of light rays around the corners of an obstacle is called

(A) Interference (B) Diffraction

(C) Dispersion (D) Polarization

171. In double slit experiment the fringe width varies with distance between two sources as

(A) Directly proportional (B) Inversely proportional

(C) Inversely square (D) None of these

172. Formation of interference fringes is in accordance with

(A) Law of conservation of momentum (B) Constant amplitude

(C) Law of conservation of energy (D) None of these

173. X-rays are the electromagnetic radiations having its wavelength range

(A) 0.01 Å - 10 Å (B) 10 Å - 100 Å

(C) 10 Å - 10^3 Å (D) None of these

174. X-rays are used for diffraction studies in crystal because

(A) Order of X-rays wavelength is in the range of inter-atomic spacing

(B) X-rays can penetrate the crystal

(C) X-rays are polarized after their interaction with crystal

(D) None of these

175. According to Bragg's law, the diffraction of n^{th} order is given by

(A) $2d\sin\theta = n\lambda$ (B) $2d\sin\theta = \frac{\lambda}{n}$

(C) $2\lambda\sin\theta = nd$ (D) $2n\sin\theta = \lambda d$

176. The work function of a photosensitive material is 3.3 eV. The threshold frequency will be

(A) 8×10^{14} *Hz* (B) 8×10^{10} *Hz*

(C) 5×10^{36} *Hz* (D) 4×10^{11} *Hz*

177. The photoelectric emission depends on

(A) The work function of the emitter (B) Frequency of the incident light

(C) Intensity of the incident light (D) Velocity of the incident light

178. Bohr's atomic model is based on the quantization of

(A) Energy (B) Spin

(C) Angular momentum (D) Linear momentum

179. In hydrogen atom, the angular momentum of an electron can be integral multiple of

(A) $\frac{h}{4\pi}$ (B) $\frac{h}{2\pi}$

(C) $\frac{h}{\pi}$ (D) $\frac{2\pi}{h}$

180. If the radius of the first Bohr orbit is 5.29 Å, then the radius of the second orbit will be

(A) 1.87 Å (B) 10.58 Å

(C) 2.64 Å (D) 21.16 Å

181. The spin motion of electron was first proposed by

(A) Schrödinger (B) Bohr

(C) Pauli (D) Uhlenbeck and Goudsmit

182. For a particular value of angular momentum quantum number l, the possible orientations of the electron orbit in space are

(A) l (B) $(l+1)$

(C) $(2l+1)$ (D) $(2l-1)$

183. Anomalous Zeeman effect is observed if the source is placed in

(A) Strong magnetic field (B) No magnetic field

(C) Weak magnetic field (D) Non-uniform magnetic field

184. The Zeeman splitting of spectral lines is proportional to

(A) Magnetic field B (B) Lande splitting factor g

(C) The principal quantum number n (D) The specific charge e/m of the electron

185. In Stern-Gerlach experiment, the atomic beam is passed through a

(A) Uniform magnetic field (B) Uniform electric field

(C) Non-uniform magnetic field (D) Vacuum

186. Stern-Gerlach experiment proved

(A) The idea of space quantization and spinning electron

(B) The idea of spinning electron

(C) The idea of space quantization

(D) Spin magnetic moment

187. Quantum mechanically, the energy states of a simple harmonic oscillator are

(A) Continuous
(B) Partially continuous
(C) Discrete
(D) None of these

188. Zener diode has

(A) Sharp breakdown voltage
(B) Varying breakdown voltage
(C) Constant breakdown voltage
(D) None of these

189. The unit of Hall coefficient is

(A) Ω-m^3/Wb
(B) Ω^{-1}-m^3/Wb
(C) Ω-m/Wb
(D) Ω-m^2/Wb

190. The direction of Hall voltage is

(A) Perpendicular to both applied electric field and magnetic field
(B) Parallel to applied electric field
(C) Perpendicular to applied magnetic field only
(D) Perpendicular to applied electric field only

191. The Poynting vector signifies

(A) The flow of magnetostatic lines of force
(B) The flow of electromagnetic power
(C) The flow of electrostatic lines of force
(D) None of these

192. Which of the following is not the part of Maxwell's equation in free space?

(A) $div\,\vec{E} = \frac{\rho}{E}$
(B) $div\,\vec{B} = 0$
(C) $curl\,\vec{E} = -\mu_0 \frac{\partial \vec{H}}{\partial t}$
(D) $curl\vec{B} = -\mu_0 \varepsilon_0 \frac{\partial \vec{E}}{\partial t}$

193. The equation of continuity states about

(A) Conservation of charge and its flow
(B) Flow of electrostatic lines or forces
(C) Conservation of magnetic field
(D) Electromagnetic power flow

194. The susceptibility of paramagnetic substance is

(A) Negative (B) Positive

(C) Zero (D) None of these

195. In a ferromagnetic material, the temperature at which the hysteresis loop merges into straight lines is called

(A) Debye temperature (B) Critical temperature

(C) Fermi temperature (D) Curie temperature

196. The variation of magnetic susceptibility (χ) of a diamagnetic material with absolute temperature T is given by

(A) $\chi = T^0$ (B) $\chi = T$

(C) $\chi = T^{-1}$ (D) $\chi = T^{3/2}$

197. The unit of intensity of magnetization is

(A) ampere/metre (B) ampere $\times$ metre^2

(C) ampere $\times$ metre (D) Weber/metre

198. Which of the following are Fermions?

(A) Neutrino (B) μ-mesons

(C) π-mesons (D) Electrons

199. Photons obey

(A) Classical statistics (B) Bose-Einstein statistics

(C) Fermi-Dirac statistics (D) None of these

200. Fermions have

(A) Half integral spin (B) Obey exclusion principle

(C) Obey Fermi-Dirac statistics (D) Obey Bose-Einstein statistics

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ROUGH WORK

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