1. If the formula $F = G \cdot (m1 \cdot m2/r^2)$ then dimensional formula for G is :

(a) $M^1L^3T^2$

(b) $M^1L^2T^3$

(c) $M^{-1}L^3T^{-2}$

(d) $M^{-1}L^3T^2$

2. The distance (in metre) of a particle varies with the time (in seconds) according to formula $y = (-2/3)t^2 + 16t + 2$. The time required for the particle come to rest is :

(a) 21 second

(b) 12 second

(c) 10 second

(d) 14 second

3. A 120 m long train is going from east to west with velocity 10 ms^{-1}. A bird flying east with velocity 5 ms^{-1} cross the train. The time taken by the bird to cross the train is :

(a) 6 second

(b) 10 second

(c) 12 second

(d) 8 second

4. A gardener moves a lawn roller through a distance of 50 m by applying a force of 40 N in direction making angle of 60 degree with the horizontal. The work done by him is :

(a) 1000 J

(b) 2000 J

(c) 1500 J

(d) 1200 J

5. A car starting from position of rest moves with the constant acceleration x. Then it moves with constant deceleration y and becomes stationary. If the total time elapsed during this is t, what will be the maximum velocity of the car ?

(a) $(xy/x - y)t$

(b) $(xy/x + y)t$

(c) $(x^2y^2/x^2 + y^2)t$

(d) $(x^2y^2/x^2 - y^2)t$

6. Bullets are fired with the same velocity v in different directions on a plane surface. These bullets would fall on the maximum area of _____ on this surface.

(a) $\Pi v^2/g$

(b) $\Pi v^2/g^2$

(c) $\Pi^2 v^2/g^2$

(d) None of the above

7. 1 kilo watt-hour is equal to :

(a) 3.6×10^4 J

(b) 3.6×10^5 J

(c) 3.6×10^6 J

(d) 3.6×10^7 J

8. Suppose the earth suddenly contracts and its radius becomes R/4 (R = Represents radius of earth) keeping its mass the same. What will be the length of the day then ?

(a) 3/2 hr

(b) 96 hr

(c) 6 hr

(d) 12 hr

9. If the orbital time period and orbital radius of a satellite are T and r respectively, then :

(a) $T^3 \alpha r^2$

(b) $T \alpha r^2$

(c) $T^2 \alpha r$

(d) $T^2 \alpha r^3$

10. The escape speed of the earth is :

(a) 11.2 kms^{-1}

(b) 11.2 kmh^{-1}

(c) 1.12 kms^{-1}

(d) 10.2 kms^{-1}

11. A small sphere of mass m and radius r falls through a viscous medium. Its terminal velocity is proportional to :

(a) Only 1/r

(b) Only m

(c) $\sqrt{(m/r)}$

(d) m/r

12. The weight of a piece of metal in air is 210 g and in water it is 140 g. Hence, the specific density of the metal is _____. (Density of water is 1 g cm^{-3})

(a) 7

(b) 3

(c) 7/4

(d) 7/6

13. Eight rain-drop of equal volume falling with terminal velocity is 10 cms^{-1}, merge while falling and forms a larger drop. The terminal velocity of the larger drop is :

(a) 20 cms^{-1}

(b) 30 cms^{-1}

(c) 40 cms^{-1}

(d) 10 cms^{-1}

14. The identical eggs, one raw and the other boiled, are rotated with same angular speed. Which one of them will come to rest earlier ?

(a) Boiled egg

(b) Raw egg

(c) Both eggs will come to rest simultaneously

(d) Can't say anything

15. What is angular speed of the hour hand of a clock ?

(a) $(\Pi/12)$ (rad/s)

(b) $(\Pi/21600)$ (rad/s)

(c) $(\Pi/24)$ (rad/s)

(d) $(\Pi/43200)$ (rad/s)

16. A second's pendulum (on earth) is taken to some planet. Mass and radiuses of this planet are twice that of earth. Period of the pendulum on this planet will be :

(a) $1/\sqrt{2}$

(b) $\sqrt{2}$

(c) 2

(d) $2\sqrt{2}$

17. Initial amplitude of damped oscillator is 16 cm and it becomes 4 cm. After 12s it becomes 2 cm in :

(a) 18s

(b) 20s

(c) 16s

(d) 8s

18. The mass-energy relation obtained by Einstein is :

(a) $E = mc^2$

(b) $E = m^2c$

(c) $E = m^2c^2$

(d) $E = m^2c^4$

19. The whistle of an engine approaching a hill with a speed of 10 ms^{-1}, produce sound of frequency 660 Hz. The frequency experienced by the driver, of the sound reflected from the hill is _____. (The speed of the sound in air is 340 ms^{-1})

(a) 300 Hz

(b) 400 Hz

(c) 500 Hz

(d) 700 Hz

20. Which of the following phenomenon is not possible for sound wave ?

(a) Interference

(b) Diffraction

(c) Polarisation

(d) Reflection

21. Two thin convex lenses of focal lengths 4 cm and 12 cm are seperated by a distance of 8 cm in air. The positions of focal points for the system will be at :

(a) 3 cm and 6 cm

(b) –2 cm and –6 cm

(c) 2 cm and 4 cm

(d) –3 cm and –6 cm

22. If a ray of light is refracted from a medium of refractive index n_1 to a medium of refractive index n_2 by a spherical surface of radius of curvature $R(n_2 > n_1)$, the refraction matrix is given by :

(a) $\begin{vmatrix} 1 & 0 \\ \frac{n_2 - n_1}{n_2 R} & \frac{n_1}{n_2} \end{vmatrix}$

(b) $\begin{vmatrix} 1 & 0 \\ \frac{n_1}{n_2} & \frac{n_2 - n_1}{n_2 R} \end{vmatrix}$

(c) $\begin{vmatrix} \frac{n_2 - n_1}{n_2 R} & 1 \\ 0 & \frac{n_1}{n_2} \end{vmatrix}$

(d) $\begin{vmatrix} 1 & \frac{n_1}{n_2} \\ \frac{n_2 - n_1}{n_2 R} & 0 \end{vmatrix}$

23. In a simple microscope two lenses of powers +24D and +8D are kept in contact. If the image formed at the least distance of distinct vision equal to 0.40 m, the magnifying power of the microscope is :

(a) 6.9

(b) 13.8

(c) 20.7

(d) 27.6

24. For an aplanatic surface of refractive index μ and radius of curvature R, if the image at one aplanatic surface is formed for an object at other aplanatic surface. The lateral magnification will be equal to :

(a) μ

(b) μ^2

(c) μ^3

(d) μ^4

25. The spherical aberration is minimum for a lens for which shape factor has value :

(a) 0.3

(b) 0.7

(c) 1.1

(d) 1.5

26. An astronomical telescope in normal adjustment position has a magnifying power 5. The distance between the objective and the eyepiece is 120 cm. The focal lengths of the objective and eye lenses would be respectively.

(a) 100 and 20 cm

(b) 80 and 40 cm

(c) 90 and 30 cm

(d) 40 and 80 cm

27. In a Young's double slit experiment the distance between the two slits is 2 mm and the distance between slits and screen is 100 cm. If the n^{th} bright fringe for light of wavelength 6000 $\mathring{A}$ coincides with the $n + 1^{th}$ bright fringe for the light of wavelength 4800 $\mathring{A}$, the distance between the central maximum and the n^{th} fringe will be :

(a) 0.03 cm

(b) 0.06 cm

(c) 0.09 cm

(d) 0.12 cm

28. In an experiment with biprism the distances between the slit and biprism and biprism and screen are 50 cm each. If the distance between the successive fringes is 0.0135 mm for the light of wavelength 5890 $\mathring{A}$ and the refractive index for the material of biprism is 1.5, the acute angle of the biprism is :

(a) 0.5^o

(b) 1.0^o

(c) 1.5^o

(d) 2.0^o

29. A plane wave ($\lambda = 6 \times 10^{-5}$ cm) is incident on a circular aperture of radius 0.6 mm, the position of the brightest point on the axis will be at :

(a) 15 cm

(b) 30 cm

(c) 60 cm

(d) 90 cm

30. Two sinusoidal waves

$X_1(t) = a_1\cos(\omega t + \theta_1)$ and

$X_2(t) = a_2\cos(\omega t + \theta_2)$

super impose. The resultant intensity will be :

(a) $a_1^2 + a_2^2 - 2a_1 a_2 \cos(\theta_1 + \theta_2)$

(b) $a_1^2 + a_2^2 + 2a_1 a_2 \cos(\theta_1 + \theta_2)$

(c) $a_1^2 + a_2^2 - 2a_1 a_2 \cos(\theta_1 - \theta_2)$

(d) $a_1^2 + a_2^2 + 2a_1 a_2 \cos(\theta_1 - \theta_2)$

31. The compensating plate P_2 is introduced in the Michelson interferometer for :

(a) Compensating the changes in phase in plate P_1

(b) To make intensities of light going towards mirrors M_1 and M_2 equal

(c) To make the path travelled through the glass plates equal

(d) To introduce additional phase change of π

32. A zone plate is illuminated by light of wavelength 589 nm from a source 1 m away and the first bright spot is formed 2 m away on the other side. The radius of the first half period zone will be :

(a) 1.0×10^{-6} m

(b) 2.2×10^{-6} m

(c) 4.1×10^{-6} m

(d) 6.1×10^{-6} m

33. The angular dispersive power of a plane transmission grating is :

(a) Independent of the wavelength

(b) Directly proportional to the grating element

(c) Proportional to the number of lines in the grating

(d) Independent of the order of spectrum

34. On immersing a microscope in a liquid of refractive index 2, the resolving power of the microscope will :

(a) Become half

(b) Remain same

(c) Become twice

(d) Become four times

35. Unpolarised light of intensity I_0 passes first through polariser A and then passes through polariser B whose plane of polarisation is inclined at 30° to that of A. The intensity of the emergent light will be (assuming that the polarisers are ideal) :

(a) I_0

(b) $I_0/2$

(c) $3I_0/8$

(d) $I_0/3$

36. 20 cm length of a certain optically active solution causes 38° right-handed rotation and 30 cm of another solution causes 24° left-handed rotation. The optical rotation produced by 30 cm length of the mixture of the above solutions in equal volume ratio will be :

(a) –21.0

(b) –10.5

(c) +10.5

(d) +21

37. A given calcite plate behaves as a half wave plate for a particular wavelength λ. Assuming variation of refractive index with wavelength to be negligible, the plate will behave for wavelength 2λ as :

(a) Half wave plate

(b) Quarter wave plate

(c) Plane plate

(d) Uncertain since the thickness of the plate is not given

38. For the sodium yellow light the coherence length is 3 cm. The coherence time will be :

(a) 10^{-8} sec

(b) 10^{-9} sec

(c) 10^{-10} sec

(d) 3×10^{-10} sec

39. The MKS unit of Einstein coefficient B is :

(a) Joule · sec · (metre^{-3})

(b) Joule (metre^{-3})

(c) Sec^{-1}

(d) Metre^{-3} · Joule^{-1} · sec^{-2}

40. The self focussing phenomenon of laser beams is caused because of :

(a) Anisotropic medium propagation

(b) Refractive index is dependent on the intensity of the laser beams

(c) Interference between various out of phase modes

(d) Polarisation of the laser beams

41. Measurement of temperature is based on which law of thermodynamics ?

(a) Zeroth law of thermodynamics

(b) First law of thermodynamics

(c) Second law of thermodynamics

(d) Third law of thermodynamics

42. The first law of thermodynamics is conservation of :

(a) Momentum

(b) Energy

(c) Both (a) and (b)

(d) None of these

43. The second law of thermodynamics defines :

(a) Heat

(b) Work

(c) Enthalpy

(d) Entropy

44. The critical temperature of carbon dioxide is :

(a) 61.1°C

(b) 51.1°C

(c) 41.1°C

(d) 31.1°C

45. A sample of ideal gas is adiabatically compressed to have its volume reduced to 20% of its initial volume. If the internal energy of the gas is increased by 200 J, the work done on the gas must be :

(a) 40 J

(b) 100 J

(c) 200 J

(d) 400 J

46. The efficiency of a Carnot cycle can be 100% only if sink temperature can be :

(a) 0°C

(b) 0°F

(c) –200°C

(d) 0 K

47. If two molecules in a gas collide, then :

(a) Total momentum is always exchanged

(b) Velocities are always exchanged

(c) Both molecules always speed up

(d) Velocities are always unchanged

48. In the black body radiation spectrum, the maximum intensity shifts towards :

(a) Shorter wavelength

(b) Longer wavelength

(c) No change

(d) None of these

49. The ultraviolet catastrophe was resolved by :

(a) Wien's displacement law

(b) Wien's distribution law

(c) Planck's law

(d) None of these

50. When applied to solar radiation, Planck's law reduces to Wien's law in the :

(a) Ultraviolet region

(b) Microwave region

(c) Infrared region

(d) Visible region

51. What temperature change on the Kelvin scale is equivalent to a 10 degree change on the Celsius scale ?

(a) 283 K

(b) 273 K

(c) 18 K

(d) 10 K

52. According to the Kinetic theory of gases, when the absolute temperature of an ideal gas doubles, the average kinetic energy of molecules of the gas :

(a) Quadruples

(b) Doubles

(c) Stays the same

(d) Is quartered

53. Value of Planck's constant in eV-sec is :

(a) 6.626×10^{-34}

(b) 4.14×10^{-15}

(c) 4.14×10^{-22}

(d) 1.602×10^{-19}

54. The average speed of the atoms of a gas at 100 K is 200 m/s. What would nearly be the average speed of the atoms at 300 K ?

(a) 67 m/s

(b) 140 m/s

(c) 200 m/s

(d) 350 m/s

55. If the temperature of the black body is halved the wavelength corresponding to the maximum emission of radiation becomes :

(a) 2 times

(b) 4 times

(c) $\frac{1}{2}$ times

(d) $\frac{1}{4}$ times

56. A spherical black body with radius of 16 cm radiates 450 watts at 500 K. If the radius were halved and the temperature doubled, the power radiated in watts would be :

(a) 200

(b) 450

(c) 900

(d) 1800

57. A Carnot engine with Sink's temperature at 17°C has 50% efficiency. By how much should its source temperature be changed to increase its efficiency to 60% ?

(a) 225 K

(b) 128°C

(c) 580 K

(d) 145 K

58. The root-mean-squared speed of methane, CH_4, molecules in a sample at 25°C is :

(a) 6.24 m/s

(b) 10.2 m/s

(c) 21.5 m/s

(d) 681 m/s

59. The mean free path of carbon dioxide molecules having collision cross section 0.52 nm^2 in a sample of gas at standard ambient temperature and pressure is :

(a) 55.9 nm

(b) 559 cm

(c) 4.69 nm

(d) 5.59 mm

60. A Carnot engine takes 800 KJ and 700 KJ heat from two sources at 800 and 700 K respectively. If the sink is at 300 K, then heat rejected and efficiency are :

(a) 400 KJ and 50%

(b) 600 KJ and 60%

(c) 500 KJ and 55%

(d) 400 KJ and 45%

61. In the simple cubic lattice $d_{100} : d_{100} : d_{111}$ is :

(a) 6 : 3 : 2

(b) $\sqrt{6}$: 3 : 2

(c) $\sqrt{6} : \sqrt{3} : 2$

(d) $\sqrt{6} : \sqrt{3} : \sqrt{2}$

62. Hexagonal structure has the crystallographic dimensions :

(a) $a = b \neq c, \alpha = \beta = 90^\circ, \gamma = 120^\circ$

(b) $a \neq b \neq c, \alpha = \beta = \gamma = 120^\circ$

(c) $a = b \neq c, \alpha = \beta = \gamma = 120^\circ$

(d) $a \neq b \neq c, \alpha \neq \beta \neq \gamma$

63. The Bravais lattice, formed by all points with set of integers (n_1, n_2, n_3) when the sum $(n_1 + n_2 + n_3)$ is even, is :

(a) Simple cubic

(b) Body centered cubic

(c) Face centered cubic

(d) Hexagonal closed packed

64. Bragg's angles for the first and second order reflections by a crystals are respectively θ_1 and θ_2. Then $\frac{\sin\theta_1}{\sin\theta_2}$ is :

(a) 0.5

(b) 1

(c) 1.5

(d) 2

65. In an orthorhombic unit cell, a : b : c = 1 : 2 : 3. The magnitude of a is 2Å. The intercepts in A of a plane of Miller indices (2 3 0) is :

(a) $1\text{Å}, 2\text{Å}, \infty$

(b) $1\text{Å}, 1.33\text{Å}, \infty$

(c) $1.33\text{Å}, 2\text{Å}, \infty$

(d) $2\text{Å}, 3\text{Å}, \infty$

66. Which of the following (h k l) lines is allowed for bcc structure ?

(a) (1 0 0)

(b) (1 1 1)

(c) (2 2 2)

(d) (2 3 1)

67. The two diagonal on the each face of the Wigner-Seitz cell for the fcc lattice are in the ratio :

(a) $\sqrt{2} : 1$

(b) 2 : 1

(c) $1/\sqrt{2} : 1$

(d) 1/2 : 1

68. For the half wave rectifier, the ripple factor is :

(a) 1.21

(b) 1.57

(c) 0.57

(d) 0.482

69. The density of carriers in an intrinsic semiconductor is proportional to :

(a) $\exp(-E_g/kT)$

(b) $\exp(-E_g/2kT)$

(c) $\exp(-2E_g/kT)$

(d) $\exp(E_g/kT)$

70. For a full wave rectifier :

(a) $f_{out} = f_{in}$

(b) $f_{out} = 2f_{in}$

(c) $2f_{out} = f_{in}$

(d) $f_{out} = 4f_{in}$

71. In a p-n junction diode, the current :

(a) Gets saturated for small forward bias voltage

(b) Never gets saturated for forward bias voltage

(c) Is remained zero for every value of forward bias voltage

(d) Is remained zero for every value of reverse bias voltage

72. BC 147 transistor indicates that it is made of :

(a) Aluminium

(b) Carbon

(c) Silicon

(d) Germanium

73. Suppose the voltage gain of a transistor amplifier increases from 100 to 1000. Then, the increase in db gain will be :

(a) 2 db

(b) 10 db

(c) 20 db

(d) 50 db

74. The binary representation of the decimal 137 is :

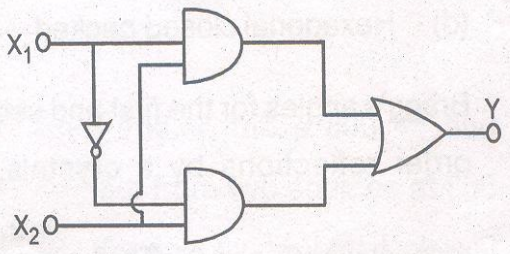
(a) 10001001

(b) 10010011

(c) 11011001

(d) 10110001

75. Which is the correct truth table for the following circuit ?



(a)

X_1	X_2	Y
0	0	1
0	1	0
1	0	1
1	1	0

(b)

X_1	X_2	Y
0	0	1
0	1	0
1	0	0
1	1	1

(c)

X_1	X_2	Y
0	0	0
0	1	1
1	0	0
1	1	1

(d)

X_1	X_2	Y
0	0	0
0	1	1
1	0	1
1	1	0

76. In a logic circuit the output Y in terms of its inputs A, B and C is $Y = ABC + \overline{A}BC + A\overline{B}C$. This circuit can be replaced by another logic circuit having :

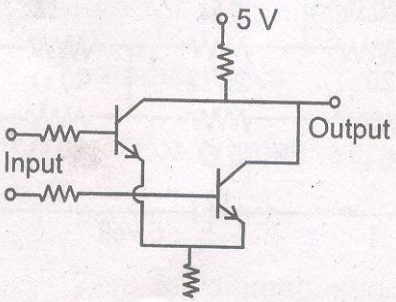
(a) $Y = A(B + C)$

(b) $Y = B(C + A)$

(c) $Y = C(A + B)$

(d) $Y = ABC(A + B + C)$

77. The following circuit acts as :



(a) AND

(b) NAND

(c) XOR

(d) NOR

78. A certain n-p-n transistor has a base current of 80 μA and collector current of 2 mA. What will be its β ?

(a) 40

(b) 160

(c) 25

(d) 250

79. The relation among current gains α, β and γ of a transistor is :

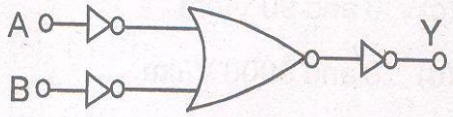
(a) $\gamma = \beta + 1 = \beta/\alpha$

(b) $\gamma = \beta = \alpha$

(c) $\beta = \gamma + 1 = \alpha/(\alpha + 1)$

(d) $\alpha = \beta - 1 = \gamma + 1$

80. What will be the output for the following logic circuit ?



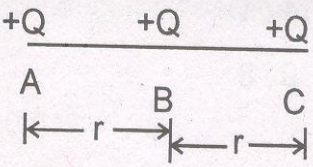
(a) $A + B$

(b) $A \cdot B$

(c) $\overline{A} \cdot \overline{B}$

(d) $\overline{\overline{A} + \overline{B}}$

81. Three point charges, each +Q, are placed at points A, B and C as shown in the figure. The charge at B is displaced towards A and is then released. It will :



(a) Move on to A and stick to the charge there

(b) Move back upto C and stick to the charge there

(c) Come back to the point B and stay there

(d) Execute simple harmonic motion about the point B

82. A conducting sphere of radius 7 cm is given a charge of 10^{-8} coulomb. The electric fields at distances of 5 cm and 10 cm from the centre of the sphere will, respectively, be :

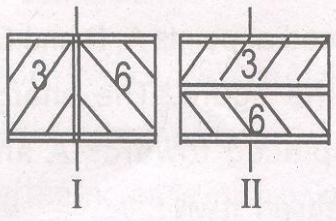
(a) 360 V/cm and 90 V/cm

(b) 36000 V/cm and 9000 V/cm

(c) 0 and 90 V/cm

(d) 0 and 9000 V/cm

83. A parallel plate capacitor is filled with equal volumes of two dielectrics having dielectric constants 3 and 6 in two different ways as shown in the figure. The ratio of the capacitances C_I and C_{II} will be :



(a) 1 : 1

(b) 9 : 8

(c) 8 : 9

(d) 1 : 9

84. The principle of conservation of charge is implied in :

(a) Coulomb's law

(b) Ohm's law

(c) Kirchoff's Voltage law

(d) Kirchoff's Current law

85. The internal resistance of an ideal constant current source is :

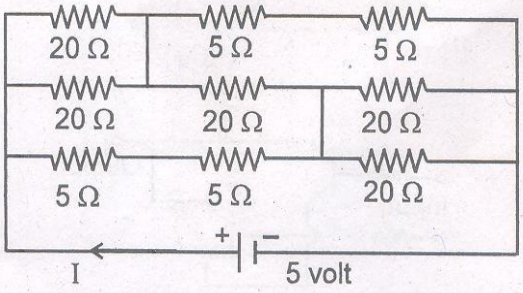
(a) Zero

(b) Infinity

(c) Equal to the resistance of the load connected to it

(d) None of these

86. In the circuit shown in the figure, the current I will be :



(a) 2 amp.

(b) 1 amp.

(c) 0.5 amp.

(d) 0.25 amp.

87. Four 220 volt bulbs having wattages of 40 watt, 60 watt, 100 watt and 200 watt are connected in series across a 440 volt supply. The bulb that will show maximum brightness will be the bulb of :

(a) 40 watt

(b) 60 watt

(c) 100 watt

(d) 200 watt

88. The inference from the equation $\vec{\nabla} \cdot \vec{B} = 0$ is that :

(a) Magnetic monopoles do not exist

(b) Magnetic field is always radial

(c) Magnetic field is irrotational

(d) Magnetic dipole moment is zero everywhere

89. The magnetic susceptibility is :

(a) –ve for diamagnetics, +ve for paramagnetics

(b) +ve for diamagnetics, –ve for paramagnetics

(c) Zero for diamagnetics, +ve for paramagnetics

(d) –ve for diamagnetics, zero for paramagnetics, +ve for ferro-magnetics

90. Which one of the following statements is not true for ferromagnetic materials ?

(a) They have a non-zero atomic magnetic moment

(b) They retain a non-zero magnetisation even after the magnetising field has been removed

(c) They become paramagnetic below a critical temperature

(d) They show irreversible magnetisation

91. If R is the radius of the D's used in a cyclotron, the maximum particle energy obtainable from it, varies as :

(a) R

(b) R^2

(c) 1/R

(d) $1/R^2$

92. The polarity of an induced e. m. f. is given by :

(a) Faraday's Law

(b) Lenz's Law

(c) Biot-Savart Law

(d) Ampere's Law

93. The self inductances of the primary and secondary coils of an ideal transformer are 0.8 H and 5.0 H respectively. The mutual inductance between them must be :

(a) 0.8 H

(b) 2.0 H

(c) 2.9 H

(d) 5.0 H

94. An alternating voltage $v(t) = 5 \sin(1000t + \pi/2)$ volt is applied across a series combination of a capacitor of 0.33 μF and a resistance of 4 kΩ. The peak value of current i(t) through the circuit will be :

(a) 1 mA

(b) 5/7 mA

(c) 1 amp

(d) 5/7 amp

95. The current in a circuit containing two elements lags behind the voltage applied across it by an angle of 45°. The circuit must be an :

(a) LR circuit having inductive reactance equal to R

(b) LR circuit having inductive reactance equal to $\sqrt{2}$ R

(c) RC circuit having capacitive reactance equal to R

(d) LC circuit having inductive reactance equal to the capacitive reactance

96. An alternating voltage $v(t) = 15 \sin(3140t - 30^{\circ})$ volt applied across a circuit, results in a current $i(t) = 2\sin(3140t + 30^{\circ})$ amp. The average power consumed in the circuit will be :

(a) 30 watt

(b) 15 watt

(c) 8.5 watt

(d) 7.5 watt

97. A series circuit has an inductance of 1 mH in series with a capacitance of 0.1 μF and a resistance of 25 Ω. An alternating voltage $v(t) = 6 \sin 10^5 t$ volt is applied across it. The peak value of the voltage across the inductance will be :

(a) 2 volt

(b) 3 volt

(c) 12 volt

(d) 24 volt

98. Maxwell modified the equation $\vec{\nabla} \times \vec{H} = \vec{J}$ because it violated the :

(a) Biot-Savart Law

(b) Law of conservation of energy

(c) Law of conservation of charge

(d) Ohm's law

99. The speed of electromagnetic waves in a dielectric medium varies as :

(a) ϵ_r

(b) $1/\epsilon_r$

(c) $1/\sqrt{\epsilon_r}$

(d) $\sqrt{\epsilon_r}$

100. For an electromagnetic wave propagating through an unbounded isotropic dielectric, which one of the following statements is not true ?

(a) It is transverse in nature

(b) The direction of the Poynting's vector is along the direction of propagation

(c) The electric field and the magnetic field are mutually perpendicular

(d) The electric and magnetic fields have a phase difference of $\pi/2$

101. Lithium has a work function of 2.3 eV. It is exposed to light of wavelength 4.8×10^{-7} m. The maximum kinetic energy with which the electron leaves the surface is ($h = 6.6 \times 10^{-34}$ J-s) :

(a) 0.18 eV

(b) 0.45 eV

(c) 1.2 eV

(d) 0.28 eV

102. According to Bohr's theory, the orbital energy E_n of an electron revolving in n^{th} o rbit of hydrogen atom is proportional to :

(a) $\frac{1}{n^4}$

(b) $\frac{1}{n}$

(c) $\frac{1}{n^2}$

(d) $\frac{1}{n^3}$

103. Spin angular momentum of an electron is :

(a) $\frac{\sqrt{5}}{2}\hbar$

(b) $\frac{\sqrt{7}}{2}\hbar$

(c) $\frac{1}{2}\hbar$

(d) $\frac{\sqrt{3}}{2}\hbar$

104. According to Pauli exclusion principle, quantum numbers n, l, m_l, m_s associated to each electron is :

(a) Different

(b) Equal

(c) Zero

(d) One

105. If the radius of the 1st orbit of hydrogen atom is 5.29×10^{-11} m, the radius of the 2nd orbit will be :

(a) 21.16×10^{-11}m

(b) 01.87×10^{11}m

(c) 10.58×10^{-11}m

(d) 02.64×10^{-11}m

106. The splitting of spectral lines of an atom by a magnetic field is called :

(a) Thomson effect

(b) Stark effect

(c) Zeeman effect

(d) Peltier effect

107. The frequency of X-ray line whose wavelength is 0.180 nm is :

(a) 1.67×10^{18} Hz

(b) 2.5×10^{15} Hz

(c) 7.01×10^{12} Hz

(d) 12.1×10^{3} Hz

108. X-rays of wavelength 10.0 pm are scattered from the target of electron. The maximum wavelength present in the scattered X-ray is (Compton wavelength of electron is 2.426 pm) :

(a) 10.312 pm

(b) 14.852 pm

(c) 20.056 pm

(d) 12.915 pm

109. de-Broglie wavelength of a 0.046 kg golf ball with a velocity of 30 m/s is :

(a) $\lambda = 4.8 \times 10^{-34}$ m

(b) $\lambda = 6.1 \times 10^{-30}$ m

(c) $\lambda = 1.7 \times 10^{-35}$ m

(d) $\lambda = 3.4 \times 10^{-31}$ m

110. The average period that elapses between the excitation of an atom and the time it radiates is 1.0×10^{-8} s. The photon energy is uncertain by the amount :

(a) $\Delta E \leq 10 \times 10^{-42}$ J

(b) $\Delta E \leq 5.3 \times 10^{-27}$ J

(c) $\Delta E \geq 10 \times 10^{-42}$ J

(d) $\Delta E \geq 5.3 \times 10^{-27}$ J

111. Zero point energy E_0 of a harmonic oscillator with classical frequency of oscillation 'υ', is given by :

(a) $E_0 = \frac{1}{2} h\upsilon$

(b) $E_0 = \frac{5}{2} h\upsilon$

(c) $E_0 = \frac{1}{4} h\upsilon$

(d) $E_0 = 4\, h\upsilon$

112. A particle limited to the X-axis has the wave function $\Psi = ax$ between $x = 0$ and $x = 1$; $\Psi = 0$ elsewhere. The probability that the particle can be found between $x = 0.45$ and $x = 0.55$ is :

(a) $25.1321\ a^2$

(b) $0.1251\ a$

(c) $0.0251\ a^2$

(d) $9.1758\ a^3$

113. The wave function of a particle trapped in one dimensional box of width L is $\Psi = \frac{\sqrt{2}}{L} \sin \frac{n\pi x}{L}$. The expectation value of the momentum <p> of the particle is :

(a) 0

(b) $\frac{L^2}{2}$

(c) L^3

(d) $\frac{L}{4}$

114. An eigenfunction of the operator $\frac{d^2}{dx^2}$ is $\Psi = Ae^{2x}$. The corresponding eigenvalue is :

(a) 8

(b) 4

(c) 3

(d) 7

115. When electrons with energy of 1.0 eV incident on a barrier of 10.0 eV high and 0.50 nm wide, it's approximate transmission probability is e^{-16}. If the width of the barrier is doubled, its transmission probability T_2 will be :

(a) $T_2 = 10^{-32}$

(b) $T_2 = 10^{32}$

(c) $T_2 = 10^{-14}$

(d) $T_2 = 10$

116. The traditional unit of radioactivity is curie and one curie is equal to :

(a) 7.2×10^{10} decays/sec

(b) 3.7×10^{10} decays/sec

(c) 1.1×10^{12} decays/sec

(d) 0.5×10^{15} decays/sec

117. The binding energy of the neon isotope $^{20}_{10}Ne$ is 160.647 MeV. Its atomic mass will be :

(a) 19.992 u

(b) 21.123 u

(c) 18.987 u

(d) 02.213 u

118. The radiant energy of the sun results from :

(a) Nuclear fission

(b) Nuclear fusion

(c) Combustion

(d) Cosmic radiation

119. If 3.6 gm of uranium be completely converted into energy, energy obtained will be :

(a) 32.4×10^{13} J

(b) 81.1×10^{16} J

(c) 10.52×10^{-13} J

(d) 05.7×10^{15} J

120. The compositions of proton and neutron according to quark model are respectively :

(a) (uud) and (ddu)

(b) (udb) and (usb)

(c) (uds) and (bds)

(d) (ssd) and (bbu)

ANSWER KEY

Subject:-PHYSICS

Q.NO	ANSWER
1	c
2	b
3	d
4	a
5	b
6	d
7	c
8	a
9	d
10	a
11	d
12	b
13	c
14	a
15	b
16	d
17	a
18	a
19	d
20	c

Q.No.	Answer a,b,c,and d
21	b
22	a
23	b
24	b
25	b
26	a
27	d
28	b
29	c
30	d
31	c
32	d
33	a
34	c
35	c
36	b
37	b
38	c
39	a
40	b
41	a
42	b
43	d
44	d
45	c
46	d
47	a
48	a
49	c
50	a
51	d
52	b
53	b
54	d
55	a
56	d
57	d
58	d
59	a
60	b

Q. No.	Answer
61	d
62	a
63	c
64	a
65	d
66	d
67	a
68	a
69	b
70	b
71	b
72	c
73	c
74	a
75	c
76	a
77	d
78	c
79	a
80	d

ANSWER KEY

Subject....PHYSICS.....

Q. No.	Answer a, b, c & d.
81	(d)
82	(c)
83	(b)
84	(d)
85	(b)
86	(c)
87.	(a)
88.	(a)
89	(a)
90	(c)
91	(b)
92	(b)
93	(b)
94	(a)
95	(a)
96	(d)
97	(d)
98	(c)
99	(c)
100	(d)

Q. No.	Answer a, b, c & d
101	d
102	c
103	d
104	a
105	a
106	c
107	a
108	b
109	a
110	d
111	a
112	c
113	a
114	b
115	a
116	b
117	a
118	b
119	a
120	a