MODEL PAPER - 7

PHYSICS

81. Neutron was discovered by *(Physical world)*
1) Chardwick 2) J.J Thomson 3) Einstein 4) Newton

82. The value of G is 6.67 x 10^{-11} $\frac{N-m^2}{kg^2}$. Then its value in $\frac{dyne-cm^2}{gm^2}$ is *(Units and Mesurement)*
1) 6.67 x 10^{-10} 2) 6.67 x 10^{-9} 3) 6.67 x 10^{-8} 4) 6.67 x 10^{-11}

83. Two boys are standing at the ends A and B of a ground where AB = a. The boy at B starts running in a direction perpendicular to AB with velocity v_1. The boy at A starts running simultaneously with velocity v and catches the other boy in a time t, where t is *(Motion in a Straight Line)*
1) $\frac{a}{\sqrt{v^2+v_1^2}}$ 2) $\sqrt{a^2/\sqrt{v^2-v_1^2}}$ 3) a / (v - v_1) 4) a / (v + v_1)

84. A tank moves uniformly along x-axis. It fires a shot from origin at an angle of 30^0 with horizontal while moving along positive x-axis and the second shot is also fired similarly except that the tank moves along negative x-axis. If the respective range of the shot are 250 m and 200 m along x-axis, the velocity of tank is *(Motion in a Plane)*
1) 3.9 ms^{-1} 2) 4.9 ms^{-1} 3) 5.9 ms^{-1} 4) 9.4 ms^{-1}

85. It is possible to project a particle with a given speed in two possible ways so that it has the same horizontal range 'R'. The product of time taken by it in the two possibe ways is *(Motion in a Plane)*
1) R/g 2) 2R/g 3) 3R/g 4) 4R/g

86. A ball of mass 100gm falls from 'a' height of 5 cm on to a ground hits it and rebounds with same speed. If the ball is in contact with the ground for 0.02 seconds. The normal reaction offered by the ground on the ball during collision is (g = 10 ms^{-2}) *(Law of Motion)*
1) 1 N 2) 1.1 N 3) 2.1 N 4) 0.9 N

87. A man and a cart move towards each other. The man weighs 64 kg and the cart 32 kg. The velocity of the man is 5.4 km/hr and that of the cart is 1.8 km/hr. When the man approaches the cart, he jumps on to it. The velocity of the cart carrying the man will be *(Law of Motion)*
1) 3 km/hr 2) 30 km/hr 3) 1.8 km/hr 4) zero

88. An engine develops 10 KW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m (g = 10 ms^{-2}) *(Work, Energy, Power)*
1) 4s 2) 5s 3) 8s 4) 10s

89. A rectangular plank of mass 'm_1' and height 'a' is on a horizontal surface. On the top of it another rectangular plank of mass 'm_2' and height 'b' is placed. The potential energy of the system is *(Work, Energy, Power)*
1) $(m_1+m_2)\frac{(a+b)}{2}g$ 2) $\left[\frac{m_1+m_2}{2}a+m_2\frac{b}{2}\right]g$ 3) $\left[\left(\frac{m_1}{2}+m_2\right)a+m_2\frac{b}{2}\right]g$ 4) $\left[\left(\frac{m_1}{2}+m_2\right)a+m_1\frac{b}{2}\right]g$

90. Two point size dense particles of same mass are knotted to a single massless string at different points, are whirled along concentric circles in horizontal plane. The ratio of distances of particles form centre of circles is 1 : 2. If the tension in the string between two particles is 4 N, the tension in the remaining string *(System of Particles and RM)*
1) 2 N 2) 3 N 3) 5 N 4) 6 N

91. A person is in contact with the inner wall of a vertical hollow cylinder of radius 1m, remains in equilibriumn without sipping down as the cylinder is rotated about its own vertical axis withan angular velocity 3.5 rad/s. The minimum coefficient of static friction between person and wall of cylinder such that the person does not slip down is *(System of Particles and RM)*
1) 0.2 2) 0.4 3) 0.6 4) 0.8

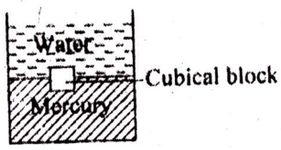
92. A water bucket of mass 'm' is revolved in a verticle circle with the help of a rope of length 'r'. If the velocity of the bucket at the lowest point is $\sqrt{7gr}$. Then the velocity and tension in the rope at the highest point are *(System of Particles and RM)*
1) $\sqrt{3gr}$, 2mg 2) $\sqrt{2gr}$, mg 3) $\sqrt{gr}$, mg 4) zero, zero

93. Two simple pendulum of length 100m and 121m start swinging together. They will swing together again after *(Oscillation)*
1) The longer pendulum makes 10 oscillations 2) The shorter pendulum makes 10 oscillations
3) The longer pendulum makes 11 oscillations 4) The shorter pendulum makes 20 oscillations

94. The gravitational field due to a mass distribution is E = $\frac{A}{x^2}$, let potential at infinity by zero and A be a constant, find potential at x: *(Gravitation)*
1) $\frac{2A}{x}$ 2) $\frac{2A}{x^3}$ 3) $\frac{A}{x}$ 4) $\frac{A}{2x^2}$

95. A metal rod ($Y = 2 \times 10^{12}$ dyne/cm^2)of co-efficient of linear expansion $1.6 \times 10^{-5}/^0$C has its temperature raised by 20^0C. The linear compressive stress to prevent the expansion of the rod in dyne/cm^2 is
(Mechanical Properties of Solids)
1) 6.4×10^8 2) 6.4×10^{11} 3) 3.2×10^8 4) 3.2×10^{11}

96. A tank contains water on top of mercury as shown in figure. A cubical block of side 10cm is in equilibrium inside the tank as shown in fig. The depth of block inside the mercury is (R.D of the material of block = 8.56, R.D of mercury = 13.6)
(Mechanical Properties of Fluids)



1) 6 cm 2) 6.3 cm 3) 5.56 cm 4) 5.86 cm

97. A 0.1kg steel ball falls from a height of 10m and bounces to a height of 7m. The rise in temperature of theball is (C = 0.1 kcal/kg/c^0)
(Thermal Properties of Matter)
1) 0.05^0C 2) 0.064^0C 3) 0.06^0C 4) 0.07^0C

98. A container is divided into two equal portions. One portion contains an ideal gas at pressure P, temperature T and volume V. While the other portion of equal volume is vaccum. If a hole is opened between the two portions, the change in internal energy and change in temperature of the gas is
(Thermodynamics)
1) PV, T/2 2) 2PV, 2T 3) $\frac{PV}{2}, \frac{T}{2}$ 4) 0.0

99. A block of ice falls from a height and completely melts. If only 3/4 of the energy is retained by the block, the heigth of the fall in km should be
(Thermodynamics)
1) 48.4 2) 84.4 3) 88.4 4) 44.8

100. The root-mean-square (rms) speed of oxygen molecules (O_2) at a certain absolute temperature is v. If the temperature is doubled and the oxygen gas dissociates into atomic oxygen, the rms speed would be
(Kinetic Theory of gases)
1) v 2) $\sqrt{2v}$ 3) 2v 4) $2\sqrt{2v}$

101. A source of sound, is travelling towards a stationery observer. The frequency of sound heard by the observer is 25% more that the actual frequency. If the speed of sound is v, that of the source is *(Waves)*
1) $\frac{v}{5}$ 2) $\frac{v}{4}$ 3) [illegible] 4) $\frac{v}{2}$

102. A ray of light PQ is incident on an isoscles glass prism placed on a horizontal table. If the prism is in the minimum deviation position for the ray PQ which of the following is true? *(Ray Optics and Optical Instruments)*
1) a = b 2) a > b 3) a < b 4) a+ b=90^0

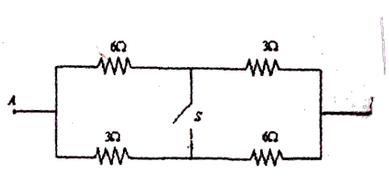
103. A right angled prism is to be made by selecting a proper material and angles A and B ($B \leq A$), as shown in figure. It is desired that a ray of light incident on face AB emerges parallel to the incident direction after two internal reflection. what should be the minimum refractive index n for this to be possible?
(Ray Optics and Optical Instruments)
1) $n_{min} = \frac{1}{\sin A}$ 2) $n_{min} = \frac{1}{\sin B}$ 3) $n_{min} = \frac{\sin A}{\sin B}$ 4) $n_{min} = \sqrt{\sin A \times \sin B}$

104. 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 *(Wave Optics)*
1) 5λ 2) $3\lambda/4$ 3) 2λ 4) $11\lambda/2$

105. Three electric charges +q each are placed at the three corners of a square of side d. The intensity of electric field at the fourth corner is
(Electric Charges and Fields)
1) $\frac{1}{4\pi\epsilon_0}\frac{q}{d^2}\left(2+\frac{1}{\sqrt{2}}\right)$ 2) $\frac{1}{4\pi\epsilon_0}\frac{q}{d^2}\left(\sqrt{2}+\frac{1}{2}\right)$ 3) $\frac{1}{4\pi\epsilon_0}\frac{2Q}{d^2}$ 4) $\frac{1}{4\pi\epsilon_0}\frac{\sqrt{2}q}{d^2}$

106. Two capacitors of 0.5 μ F and 1 μ F are connected in parallel across a battery, if the charges on 0.5 μ F is 50 μ C, the charge on the other capacitor is
(Electrostatic Potential and Capacitance)
1) 100 μ C 2) 50 μ C 3) 25 μ C 4) zero

107. The ratio of resistance between A and B before and after the switch 'S' is closed.
(Current Electricity)



1) 9 : 8 2) 7 : 8 3) 2 : 3 4) 1 : 2

108. Four wires made of same material have different lengths and radii. The wire having more resistance in the following is *(Current Electricity)*
1) l = 100 cm r = 1 mm 2) l = 50 cm r = 2 mm
3) l = 100 cm r = 1/2 mm 4) l = 50 cm r = 1/2 mm

109. Two particles X and Y having equal charges, after being accelerated through the same potential differences enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. the ratio of masses of X to that of Y is *(Moving Charges and Magnetism)*
1) $(R_1/R_2)^{1/2}$ 2) (R_2/R_1) 3) $(R_1/R_2)^2$ 4) (R_1/R_2)

110. A charged particle moving at right angles to a uniform magnetic field and starts moving along a circular arc of radius of curvature 'r'. In the field it now penetrates a layer of lead and loses 3/4th of its initial kinetic energy.The radius of curvature of its path now will be *(Moving Charges and Magnetism)*
1) 4r 2) 2r 3) r/4 4) r/2

111. The force between two magnetic poles reduces to 'a' newtons, if distance between them is increased to 'n' times and it increases to 'b' newtons if the distance between them is l/n the of the original value. Then a : b is *(Magnetism and Matter)*
1) l : n^2 2) n^2 : l 3) n^4 : l 4) l : n^4

112. A solenoid of self inductance 1.2 H is in series with a tangent galvanometer of reduction factor 0.9 A. They are connected to a battery and the tangent galvanometer shows a deflection of 53^0. The energy stored in the magnetic field of the solenoid is ($\tan 53^0 = 4/3$) *(Electromagnetic Induction)*
1) 0.864 J 2) 0.72 J 3) 0.173 J 4) 1.44 J

113. A 220 V. 50 Hz AC supply is connected across a resistor of 50 $K\Omega$. The current at time t seconds, assuming that it is zero at t = 0, is *(Alternating Current)*
1) 4.4 sin (314 t) mA 2) 6.2 sin (314 t) mA 3) 4.4 sin(157 t) m A 4) 6.2 sin (157 t) m A

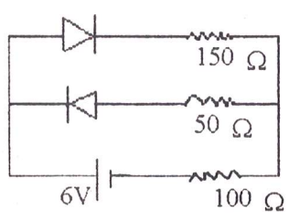
114. In an apparatus the electric field was found to oscillate with an amplitude of 18 Vm^{-1}. The rms of the oscillating magnetic field is *(Electromagnetic Waves)*
1) 6×10^{-8} T 2) 4.23×10^{-8} T 3) 9×10^{-8} T 4) 7×10^{-8} T

115. An X-ray tube produces a continuous spectrum of radiation with its shortest wavelength of 45×10^{-2} A^0. The maximum energy of photon in the radiation is. *(Dual Nature)*
1) 2.77×10^4 eV 2) 1.64×10^4 eV 3) 3.8×10^4 eV 4) 4.7×10^4 eV

116. 1 M e V α- particle is scattered 60^0 by gold (z = 79)foil. The impact parameter is *(Atoms)*
1) 2.07×10^{-3} m 2) 10^{-13} m 3) 10^{-13} m 4) Zero

117. The masses of neutron and proton are 1.0087 and 1.0073 amu respectively. If the neutrons and protons combine to form a helium nucleus of mass 4.0015 amu, the binding energy of the Helium nucleus will be *(Nuclei)*
1) 28.4 MeV 2) 20.8 MeV 3) 27.3 MeV 4) 14.2 MeV

118. Current through 100 Ω resistor is (given forward resistance of diode = 50 Ω, reverse bias resistance = ∞) *(Semiconductors)*



1) 0.01A 2) 0.02A 3) 0.03A 4) 0.04A

119. The Boolen expression for the gate circuit shown below is *(Semiconductors)*

1) $A + \overline{A} = 1$ 2) A + 1 = 1 3) A + A = A 4) A + 0 = A

120. An audio signal of vm = 5 sin $6\pi \times 10^3$ t is to be modulated on a carrier wave given by V_c = 15 sin $2\pi \times 10^5$ t. The frequencies of side bands and band width *(Communication System)*
1) 103 KHz; 97 KHz; 6 KHz 2) 130 KHz; 70 KHz; 6 KHz
3) 130 KHz; 97 KHz; 3KHz 4) 103 KHz; 97 KHz; 3 KHz

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