MODEL PAPER - 1
PHYSICS

81. What is the contribution of S.Chandra Sekhar to Physics *(Physical world)*
1) Cosmic radiation 2) Nuclear model & atom 3) Laser 4) Structure and evolution of stars

82. The length, breadth and thickness of a rectangular sheet of metal are 4.234m, 1.005 and 2.01 cm respectively. The volume of the sheet to correct significant figures is *(Units and Mesurement)*
1) 0.0855 m^3 2) 0.086 m^3 3) 0.08556 m^3 4) 0.08 m^3

83. A ball dropped from a point P crosses a point Q in t seconds. The time taken by it to travel from Q to R, if PQ = QR *(Motion in a Straight Line)*
1) t 2) $\sqrt{2}$ t 3) 2 t 4) $(\sqrt{2}-1)t$

84. A body of mass 'm' is projected horizontally with a velocity 'v' from thetop of a tower of height 'h' and it reaches ground at a distance 'x' from the top of a tower. If a second body of mass'2m' is projected horizontally from the top of a tower of height 2h, it reaches the ground at a distance '2x' from the tower. The horizontal velocity of second body is *(Motion in a Plane)*
1) v 2) 2v 3) $\sqrt{2}$ v 4) v/2

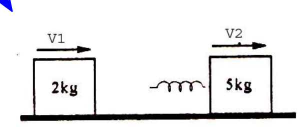
85. A particle is aimed at a mark which is in the same horizontal plane as that of point of projection. If falls 20 m short of the target when it is projected at an angle of 75^0 and falls 20m ahead of the target when it is projected with an elevation of 45^0. The angle of projection for which the particle exactly hits this target is (g = 10 ms^{-2}) *(Motion in a Plane)*
1) $\frac{1}{2}\text{Sin}^{-1}\left(\frac{7}{6}\right)$ 2) $\frac{1}{2}\text{Sin}^{-1}\left(\frac{6}{7}\right)$ 3) $2\sin^{-1}\left(\frac{6}{7}\right)$ 4) $\frac{1}{2}\text{Sin}^{-1}\left(\frac{3}{4}\right)$

86. A 500 kg rocket has to be fired vertically. Exhaust velocity of the gases is 1.96 km/s. Minimum mass of the fuel to be released in kg per second is *(Law of Motion)*
1) 250 kg 2) 25 kg 3) 2.5 kg 4) 50 kg

87. A balloon has 5 gm of air. A small hole is pierced into it. The air escapes at a uniform rate with a velcoity of 4 cms^{-1}. If the balloon shrinks completely in 2.5 second, then the average force acting on the balloon is *(Law of Motion)*
1) 2 dyne 2) 50 dyne 3) 8 dyne 4) 8 N

88. A truck moves up a hill of incline 1 in 50 with a speed of 20 KMPH. If the resistance to the motion of the truck is 4% of its weight, the speed of the truck while moving downhill utilising the same power is *(Work, Energy, Power)*
1) 20 KMPH 2) 40 KMPH 3) 60 KMPH 4) 80 KMPH

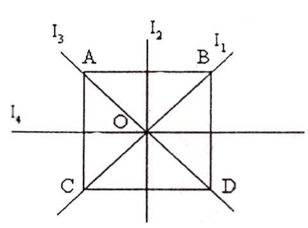
89. A block of mass 2kg slides along a frictionless table iwth a speed of 10 m/sec. Directly infront of it and moving in the same direction is a block of mass 5 kg moving at 3 m/sec. A massless spring of spring constant k= 1120 N/m is attached to the back side of 5 kg mass as shown in figure. When the blocks collides, the maximum compression in the spring (if the spring does not bend) will be *(Work, Energy, Power)*



1) 0.25 m 2) 0.4 m 3) 0.33 m 4) 1.12 m

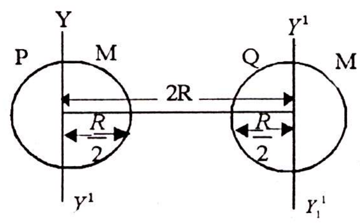
90. The diameter of a fly wheel is R. Its coefficient of linear expansion is α. If its temperature is increased by ΔT the percentage increase in its moment of inertia is *(System of Particles and RM)*
1) 200 x α x ΔT 2) 100 x α x ΔT 3) 50 x α x ΔT 4) 150 x α x ΔT

91. The moment of inertia of a thin square plate ABCD of uniform thickness about an axis passing through the centre O and perpendicular to the plane of the plate is *(System of Particles and RM)*



a) $I_1 + I_3$ b) $I_2 + I_4$ c) $2I_1 + I_3$ d) $I_1 + 2I_3$
1) a, b are true 2) b, c are true 3) c, d are true 4) b, d are true

92. Two spheres each of mass M and radius R/2 are connected with a massless rod of length 2R as shown in the figure. The moment of inertia of the system about an axis passing through the centre of one of the spheres and perpendicular to the rod is *(System of Particles and RM)*



1) $\frac{21}{5}MR^2$ 2) $\frac{2}{5}MR^2$ 3) $\frac{5}{2}MR^2$ 4) $\frac{5}{21}MR^2$

93. A spring has a length ℓ and force constant k. It is cut into two parts of length ℓ_1 and ℓ_2 such that $\ell_1 = n\ell_2$ (n is an integer) the force constant of spring of length ℓ_1 is *(Oscillation)*

1) k(1+n) 2) $\frac{k}{n}(1+n)$ 3) k 4) $\frac{k}{n+1}$

94. Gravitational potential at the centre of a uniform solid sphere of mass 'M' and radius 'R' is if potential due to the sphere at the infinity is $\frac{GM}{R}$ *(Gravitation)*

1) $-\frac{3GM}{2R}$ 2) $-\frac{GM}{2R}$ 3) $-\frac{GM}{R}$ 4) None

95. The length of a metal wire is ℓ_1 when the tension in it is T_1 and is ℓ_2 when the tension is T_2. Find the actual length of the wire *(Mechanical Properties of Solids)*

1) $\frac{\ell_1 T_1 - \ell_2 T_2}{T_1 + T_2}$ 2) $\frac{\ell_1 T_1 - \ell_2 T_1}{T_1 + T_2}$ 3) $\frac{\ell_1 T_2 - \ell_2 T_1}{T_1 + T_2}$ 4) $\frac{\ell_2 T_1 - \ell_1 T_2}{T_1 - T_2}$

96. Two tanks contain different liquids with density in the ratio 2:1. Holes of cross-section with ratio 2 : 1 are made at heights h_1 and h_2 below the liquid levels in two tanks which have same heights from bottom to tanks. Find the ratio of h_1 and h_2 when mass flux through holes is same. *(Mechanical Properties of Fluids)*

1) 1 : 8 2) 1 : 4 3) 1 : 16 4) 1 : 2

97. A body takes 8 minutes to cool from 90°C to 80°C in a surrounding of temperature 25°C. The time taken by it to cool from 80°C to 70°C in the same surroundings is *(Thermal Properties of Matter)*

1) 10 min 2) 9.6 min 3) 12 min 4) 16 min

98. A carnot's engine operates with a source at 500K & sink at 375 K. The engine takes 600K cal of heat in one cycle, the heat rejected to sink per cycle is *(Thermodynamics)*

1) 250 k cal 2) 350 k cal 3) 450 k cal 4) 550 k cal

99. The coefficient of performance of a carnot refrigeration working between 30°C to 0°C is *(Thermodynamics)*

1) 10 2) 0.1 3) zero 4) 9.1

100. The rms velcoity of H_2 molecules at 27°C is 1930 m/s. The rms velocity of O_2 molecules at 1200 K will be *(Kinetic Theory of gases)*

1) 365 m/s 2) 965 m/s 3) 765 m/s 4) 865 m/s

101. Two trains are moving towards each other at speeds of 144 km/hr and 54 km/hr relative to the ground. The first train sounds a whistle of frequency 600 Hz. Find the frequency of the whistle as heard by a passenger in the second train before the trains meet. (v=340 m/s) *(Waves)*

1) 610 Hz 2) 510 Hz 3) 710 Hz 4) 170 Hz

102. A myopic person can not see objects lying beyond 2m. The focal length and power of the lens required to remove this defect will be *(Ray Optics and Optical Instruments)*

1) 1 m and 0.5 D 2) -2m and -0.5 D 3) 0.5 m and 0.5 D 4) -0.5 m, and 0.5 D

103. A person cannot see an object lying beyond 80 cm, where as a normal person can easily see the object distant 160 m. the focal length and nature of the lens used to rectify this defect will be *(Ray Optics and Optical Instruments)*

1) 160 cm, concave 2) 160 cm, conven 3) 60 cm, concave 4) 60 cm, conven

104. In young's double slit experiment the two slits act as coherent source of equal amplitude and of wavelength λ. In another experiment with the same set up, the two slits are source of equal wavelength and amplitude A and 2A. but are incoherent. The ratio of intensity of light at the mid-point of the screen in the first case to that in the second is *(Wave Optics)*

1) $\frac{4}{\sqrt{5}}$ 2) $\frac{2}{\sqrt{5}}$ 3) $\frac{4}{5}$ 4) $\frac{4}{3}$

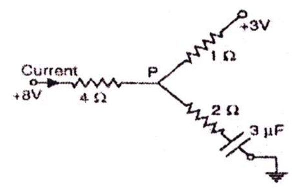
105. AN infinite number of charges each equal to q are placed along the x-axis at x = 1, x = 2, x= 4, x=8 meter.... The electric field at the point x = 0 due to this set of charges is *(Electric Charges and Fields)*

1) $\frac{Q}{4\pi \in_0}$ 2) $\frac{Q}{3\pi \in_0}$ 3) $\frac{Q}{2\pi \in_0}$ 4) $\frac{Q}{\pi \in_0}$

106. The capacity of a parallel plate condenser with air medium is 60 μ F having distance of separation d. If the space between the plates is filled with two slabs each of thickness d/2 and dielectric constants 4 and 8, the effective capacity becomes *(Electrostatic Potential and Capacitance)*

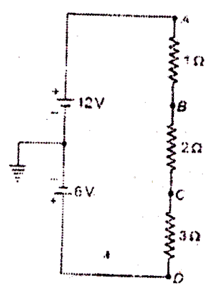
1) 160 μ F 2) 320 μ F 3) 640 μ F 4) 360 μ F

107. The energy stored in the capacitor is *(Current Electricity)*



1) 12 μ J 2) 24 μ J 3) 36 μ J 4) 48 μ J

108. In the circuit shown in figure, the potentials of B, C and D are : *(Current Electricity)*



1) V_B = 6V; V_C = 9V; V_D=11V 2) V_B = 11V; V_C = 9V; V_D= 6V
3) V_B = 9V; V_C = 11V; V_D= 6V 4) V_B = 9V; V_C = 6V; V_D=11V

109. A straight conductor carrying a current is kept in a uniform magnetic field so as to experience maximum force. If now the conductor is turned in its own plane such that the force acting on it is half of the maximum force, Then the angle made by the conductor in the final position with respect to the field is *(Moving Charges and Magnetism)*

1) 60^0 2) 45^0 3) 30^0 4) 90^0

110. Due to a straight vertical current carrying conductor, a null point occured at P on east of the conductor. The net magnetic induction at a point 'Q' which is at same distance on north of the conductor is *(Moving Charges and Magnetism)*

1) 0 2) $\sqrt{3}B_H$ 3) B_H 4) $\sqrt{2}B_H$

111. A bar Magnet of pole strength 2 amp - m is kept in a magnet field of induction 4 x 10^{-5} web/m^2 such that the axis of magnet makes on angle 30^0 with the direction of the field. The couple acting on the magnet is found to be 80 x 10^{-7} N-m Then the distance between the two poles of the magnet is *(Magnetism and Matter)*

1) 20 m 2) 2 m 3) 3 cm 4) 20 cm

112. A step - down transformer has primary voltage 1100 V. The transformation ratio is 1 : 5 If the primary current is 10 A then the secondary voltage secondary current assuming the transformer to be an ideal transformer *(Electromagnetic Induction)*

1) 220 V, 50 A 2) 220 V, 5A 3) 22 V, 50 A 4) 22 V, 5A

113. The instantaneous value of emf and current in an A.C circuit are; $E = 1.414 \sin\left(100\pi t - \frac{\pi}{4}\right)$, $I = 0.707 \sin(100\pi t)$. The RMS value of current will be *(Alternating Current)*

1) 1 A 2) $\frac{1}{\sqrt{2}}$A 3) $\sqrt{2}$A 4) $\frac{1}{2}$A

114. In an electromagnetic wave, the amplitude of electric field is 1 V/m. The frequency of wave is 5 x 10^{14} Hz. The wave is propagating along z-axis. The average energy density of electric field, in Joule/m^3, will be *(Electromagnetic Waves)*

1) 1.1 x 10^{-11} 2) 2.2 x 10^{-12} 3) 3.3 x 10^{-13} 4) 4.4 x 10^{-14}

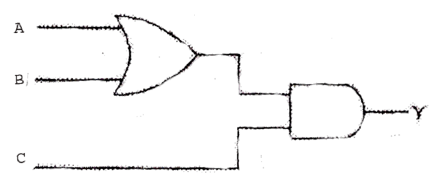
115. Light of wavelength 4000 A^0 is incident on a metal surface of work function 2.5 eV. Given h=6.62 x 10^{-34} Js, c= 3 x 10^8 m/s, the maximum KE of photoelectrons emitted and the corresponding stopping potential are respectively *(Dual Nature)*
1) 0.6 eV, 0.6 V 2) 2.5 eV, 2.5 V 3) 3.1 eV, 3.1 V 4) 0.6 eV, 0.3 V

116. In the lowest orbit, the binding energy of an electron in hydrogen atom is 13.6 eV. The enrgy required to take out the electron from the lower three orbits in (ev) will be : *(Atoms)*
1) 13.6, 6.8, 8.4 2) 13.6, 10.2, 3.4 3) 13.6, 27.2, 40.8 4) 13.6, 3.4, 1.5

117. The half - life of a cobalt - 60 isotope is 5.2 years. if 1.0 g of cobalt - 60 decays with time, the amount (in grams) remaining after 20.8 years is *(Nuclei)*
1) 0.25 2) 0.50 3) 0.125 4) 0.0625

118. In a transistor β = 50, the change in the voltage across $5K\Omega$ resistor which is connected in collector circuit is 5V. The change is base current is *(Semiconductors)*
1) 10 μA 2) 20 μA 3) 50 μA 4) 100 μA

119. The get an output Y = 1 from circuit of fig. below the input must be *(Semiconductors)*



1) A-0, B-1, C-0 2) A-1, B-0, C-0 3) A-1, B-0, C-1 4) A-1, B-1, C-0

120. 1% of 10^{12} Hz of a satellite link was used for telephony. The number of channels or subscribers if each channel is of 8 KHz are *(Communication System)*
1) 2.5 x 10^7 2) 1.25 x 10^6 3) 2.5 x 10^8 4) 1.25 x 10^8