MODEL PAPER - 8

PHYSICS

81. "The most comprehensible thing about the world is that is comprehensible". Who said so? ***(Physical world)***
1) Copernicus 2) Newton 3) Einstein 4) H.J Bhabha

82. The dimensions of a/b in the equation P = $\frac{a-t^2}{bx}$ where P is pressure, x is distance and t is time are ***(Units and Mesurement)***
1) M^2LT^{-3} 2) MT^{-2} 3) ML^3T^{-1} 4) LT^{-3}

83. Two cars 1 & 2 starting from rest are moving with speeds V_1 and V_2 m/s ($V_1 > V_2$). car 2 is ahead of car '1' by 'S' meters when the driver of car '1' sees car '2'. What minimum retardation should be given to car '1' avoid collision ***(Motion in a Straight Line)***
1) $\frac{V_1-V_2}{S}$ 2) $\frac{V_1+V_2}{S}$ 3) $\frac{(V_1+V_2)^2}{2S}$ 4) $\frac{(V_1-V_2)^2}{2S}$

84. The maximum height attained by a projectile is increased by 10%. Keeping the angle of projection constant, what is the increase in the time flight? ***(Motion in a Plane)***
1) 5% 2) 20% 3) 10% 4) 40%

85. A player kicks a foot ball obliquely at a speed of 30ms^{-1} so that its range is maximum. Another player at a distance of 30 m away in the direction of kick starts running at that instant to catch the ball. Before the ball hits the ground to catch it, the speed with which the second player has to run is (g=10ms^{-2}) ***(Motion in a Plane)***
1) $5\sqrt{2}$ ms^{-1} 2) $4\sqrt{2}$ ms^{-1} 3) $10\sqrt{2}$ ms^{-1} 4) $3\sqrt{2}$ ms^{-1}

86. A hot air balloon of mass 'M' is rising with a uniform acceleraiton 'a'. On removing a mass 'm' (m < M) the acceleration of the balloon is doubled. Assuming that the buoyancy force is not affected by the removal of the mass, the value of 'm' is (g = acceleration due to gravity) ***(Law of Motion)***
1) $\frac{Ma}{g+a}$ 2) $\frac{Ma}{2g+a}$ 3) $\frac{Ma}{g+2a}$ 4) $\frac{2Ma}{g+a}$

87. An open Knife edge of mass M is dropped from a height 'h' on a wooden floor. If the blade penetrates distance S into the wood, the average resistance offered by the wood to the blade is ***(Law of Motion)***
1) Mg 2) $Mg\left(1-\frac{h}{s}\right)$ 3) $Mg\left(1+\frac{h}{s}\right)$ 4) Mgh

88. A small block of mass 'm' is kept on a rough inclined surface of inclination θ fixed in an elevator. The elevator goes up with a uniform velocity V and the block does not slide on the wedge. The work doen by the force of friction on the block in a time 't' will be ***(Work, Energy, Power)***
1) Zero 2) mgvt $\cos^2\theta$ 3) mgvt $\sin^2\theta$ 4) $\frac{1}{2}$mgvt sin 2θ

89. The displacement of a body of mass 2kg varies with time 't' as S = t^2 + 2t where S is in metres and 't' is in seconds. The work done by all the forces acting on the body during the time interval t = 2s to t = 4s is ***(Work, Energy, Power)***
1) 36 J 2) 64 J 3) 100 J 4) 120 J

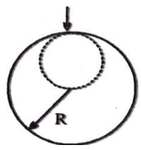
90. A particle tied to a string of negligible weight and length L is rotated in a horizontal circular path with constant angular velocity having time period T. If the string length is shortened by L/2 while the particle is in motion, the time period is ***(System of Particles and RM)***
1) 4T 2) 2T 3) T/2 4) T/4

91. A block of mass 1kg is kept on the surface of a circular disc at a distance of 10 cm form centre of disc, which is rotating in horizontal plane about its own axis. The minimum coefficient of static friction between two surfaces in contact, so that block does not skid if angular velocity of disc is $\frac{150}{\pi}$ rpm. (g = 10ms^{-2}) ***(System of Particles and RM)***
1) 0.2 2) 0.25 3) 0.4 4) 0.5

92. A particle of mass 1kg is revolved along a horizontal circle of radius 1m with the help of a string. if the maximum tension the string can withstand is $16\pi^2$ N, then the maximum frequency with which the particle can revolve is ***(System of Particles and RM)***
1) 3 rps 2) 2 rps 3) 4 rps 4) 5 rps

93. Two simple pendulums of lengths 100 cm and 196 cm are in phase at the mean position at a certain time. If T is the time period of shorter pendulum, the minimum time offer which they will be again in phase ***(Oscillation)***
1) 2.5 T 2) 3.5 T 3) 5T 4) 7T

94. A spherical hole of radius R/2 is excavated from the asteroid of mass M as shown in fig. The gravitational acceleration at a point on the surface of the asteroid just above the excavation is ***(Gravitation)***

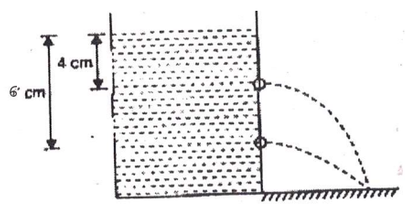


1) GM/R^2 2) $GM/2R^2$ 3) $GM/8R^2$ 4) $7GM/8R^2$

95. Young's modulus of brass and steel are respectively 10×10^{10} N/m^2 and 20×10^{10} N/m^2. A brass wire and a steel wire of same length be extended by 1 mm under the same force, the radii of brass and steel wires are R_B and R_S respectively, then *(Mechanical Properties of Solids)*

1) $R_S = \sqrt{2}\, R_B$ 2) $R_S = R_B / \sqrt{2}$ 3) $R_S = 4R_B$ 4) $R_S = R_B / 4$

96. Fig. shows two holes in a wide tank contain in a liquid common. The water streams coming out of these holes strike the ground at the same point. The height of liquid column in the tank is *(Mechanical Properties of Fluids)*



1) 10 cm 2) 8 cm 3) 9.8 cm 4) 980 cm

97. A lead bullet strikes a steel plate with a velocity of 300 ms^{-1} and completely stopped. If the heat produced is shared equally between the bullet and the target the rise in temperature of the bullet is (Sp.heat of lead 0.03 cal/gm/^{0}C) *(Thermal Properties of Matter)*

1) 89.3 ^{0}C 2) 49.3 ^{0}C 3) 178.6 ^{0}C 4) 357.2 ^{0}C

98. One gram of water on evaporation at atmospheric pressure forms 1671 cm^3 of steam. Heat of vaporisation at this pressure is 540 cal gm^{-1}. The increase in internal energy is *(Thermodynamics)*

1) 250 cal 2) 500 cal 3) 1000 cal 4) 1500 cal

99. A cylinder of fixed capacity 67.2 litres contains helium gas at STP. The amount of heet required to raise the temperature of the gas by 15^{0}C is (R = 8.31 J/mol/K) *(Thermodynamics)*

1) 520 J 2) 560.9 J 3) 620 J 4) 621.2 J

100. Determine the absolute gas temperature at which the root mean square speed of helium molecules exceeds their most probable speed by 200 m/s. *(Kinetic Theory of gases)*

1) 110.2 K 2) 90.2 K 3) 190.2 K 4) 100.2 K

101. A whistle producing sound waves of frequencies 9500 HZ and is approaching a stationery person with speed v ms^{-1}. The velocity of sound in air is 300 ms^{-1}. if the person can hear frequencies upto a maximum of 10,000 Hz. The maximum value of v upto which he can hear the whistle is *(Waves)*

1) 30 ms^{-1} 2) $15\sqrt{2}$ ms^{-1} 3) $14\sqrt{2}$ ms^{-1} 4) 15 ms^{-1}

102. The principle section of a glass prism is an isosceless triangle ABC with AB = AC. The face AC is silvered. A ray incident normally on face AB, after two reflection, emerges from the base BC in a direction perpendicular to it. what is the $\angle BAC$ of the prism? *(Ray Optics and Optical Instruments)*

1) 30^0 2) 36^0 3) 60^0 4) 72^0

103. One face of a glass prism is silver polished. A light ray falls at an angle of 45^0 on the other face.After refraction, it is subsequently reflected from the silvered face and then it retraces its path. The refracting angle of the is 30^0. The refractive index of the material of th prism is *(Ray Optics and Optical Instruments)*

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

104. Interference pattern is obtained with two coherent light sources of intensity ratio 'β'. In the interference pattern the ratio of $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be *(Wave Optics)*

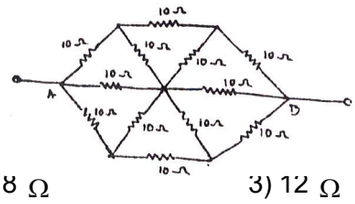
1) $\frac{\sqrt{\beta}}{(\beta+1)}$ 2) $\frac{2\sqrt{\beta}}{(\beta+1)}$ 3) $\frac{\sqrt{\beta}}{(\beta+1)^2}$ 4) $\left(\frac{\sqrt{\beta}+1}{\sqrt{\beta}-1}\right)^2$

105. Two charged balls of the same radius and weight suspended on threads of equal length are immersed into a liquid having density of d_1 and a dielectric constant 'K'. The density 'd' of the material of the balls for the angles of divergence of the threads in the air and in the dielectric to be the same is *(Electric Charges and Fields)*

1) $\frac{Kd_1}{K-1}$ 2) $\frac{K-1}{Kd_1}$ 3) $\frac{d_1}{K-1}$ 4) $\frac{k-1}{d_1}$

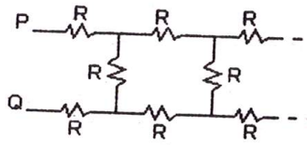
106. There are 10 condensers each of capacity 5 μ F The ratio of minimum to maximum capacity obtained from these condensers will be *(Electrostatic Potential and Capacitance)*
1) 50 : 1 2) 1 : 50 3) 100 : 1 4) 1 : 100

107. 12 resistors each of 10 Ω are connected as shown in figure. The effective resistance between A and B is *(Current Electricity)*



1) 120 Ω 2) 8 Ω 3) 12 Ω 4) 10 Ω

108. The equivalent resistance between the terminals P and Q of infinite network as shown in the figure is *(Current Electricity)*



1) $\sqrt{R}$ 2) $\left(1+\sqrt{3}\right)R$ 3) $\left(2+\sqrt{3}\right)R$ 4) infinite

109. A current of 10 amp, is flowing in awire of length 1.5 meter. A force of 15 newton acts on it 2 tesla. The angle between the magnetic field and the directio of current is *(Moving Charges and Magnetism)*
1) 30^0 2) 45^0 3) 60^0 4) 90^0

110. A deutron of kinetic energy 50 keV is describing a circular orbit of radius 0.5 metre in a plane perpendicular to magnetic field $\vec{B}$. The kinetic energy of the proton that describes a circular orbit of radius 0.5 metre in the same plane with the same $\vec{B}$ is *(Moving Charges and Magnetism)*
1) 25 keV 2) 50 keV 3) 200 keV 4) 100 keV

111. Three identical bar magnets of magnetic moment 'M' are placed in the form of an Equilateral triangle of side 'd' with 'N' pole of one touching the 'S' pole of the other. The net magnetic moment of the system is. *(Magnetism and Matter)*

1) M 2) $\frac{M}{d}$ 3) $\frac{\sqrt{3}}{2}M$ 4) zero

112. The flux linked with a coil is 0.8 wb when a 2A current is flowing through it. If this current begins to increases at the rate of 400 A/s, the induced emf in the coil will be *(Electromagnetic Induction)*
1) 20V 2) 40V 3) 80V 4) 160V

113. A mixer of 100 Ω resistance is connected to an A.C. source of 200 V and 50 cycles/sec. The value of average potential difference across the mixer will be *(Alternating Current)*
1) 308 V 2) 264 V 3) 220 V 4) zero

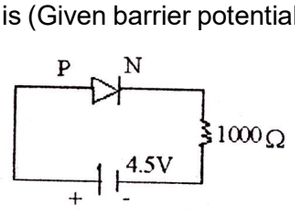
114. A plane electro magnetic wave of frequency 25 MHZ travels in free space along the x-direction. At a particular point in space and time $\vec{E} = 6.3\hat{j}$. The magnetic field $\vec{B}$ at this point is *(Electromagnetic Waves)*
1) $4.2 \times 10^{-8}\ \hat{k}\,T$ 2) $2.1 \times 10^{-8}\ \hat{k}\,T$ 3) $18.9 \times 10^{-8}\ \hat{k}\,T$ 4) $2.1 \times 10^{-8}\ \hat{k}\,T$

115. The λ_{min} of a continous X -Ray spectrum is 0.414 A^0, when it operates at a p.d of 30 KV. The value of planck's constant, h, is (given e = 1.6×10^{-19} C, c = 3×10^8 m/s) *(Dual Nature)*
1) 6.624×10^{-34} Js 2) 6.524×10^{-34} Js 3) 6.674×10^{-34} Js 4) 6.724×10^{-34} Js

116. When Ruther ford scattering experiment, the correct angle of scattering of a - particles for impact parameter equal to zero is *(Atoms)*
1) 90^0 2) 270^0 3) 220^0 4) 180^0

117. $_4H^1$------>$_2He^4 + 2_{+1}\ e^0$ + energy. Energy released in this process is *(Nuclei)*
($_4H^1$ = 4.031300 amu $_2He^4$ = 4.0026603 amu 2_1e^0 = 0.01098 amu)
1) 14 MeV 2) 16.45 MeV 3) 37.2 MeV 4) 32.7MeV

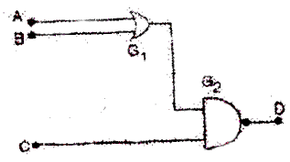
118. The current in the given circuit is (Given barrier potential of the diode = 0.5 V) *(Semiconductors)*



1) 4 m A 2) 4A 3) 4 μA 4) 40 μA

119. For the given combination of glass, if the logic states of inputs A=B=C=0 and A= B=1, C=0 Then the logic states of output D are

(Semiconductors)



1) 0,0 2) 0,1 3) 1,0 4) 1,1

120. The tuned circuit of an oscillator in a simple AM transimitter employs a 250 micro henry coil and 1 nF condenser. If the oscillator output is modulated by audio frequency upto 10 KHz. The frequency occupied by the side bands in KHz is ***(Communication System)***

1) 210 to 230 2) 258 to 278 3) 308 to 328 4) 118 to 128

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