NEET -2020 Paper Solution and Analysis by Odisha's Most famous Physics Teacher (RCM Sir)

Paper Code: E3

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136. A cylinder contains hydrogen gas at pressure 249 kPa and temperature 27℃. Its density is: (R=8.3 J $mol^{-1}K^{-1}$)

(1) 0.5 kg/m^3 (2) 0.2 kg/m^3 (3) 0.1 kg/m^3 (4) 0.02 kg/m^3

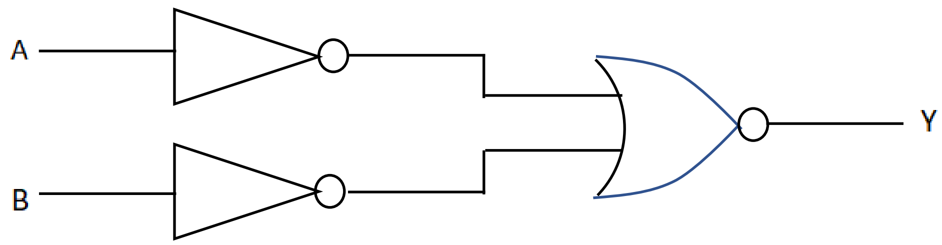
Solution:
P= $\frac{\rho RT}{M_0} \Rightarrow \rho = \frac{PM_0}{RT} = \frac{(249\times10^3)\times(2\times10^{-3})}{(8.3)(273+27)}$ = 0.2 kg/m^3
NOTE: T is in kelvin. M_0= molar mass of hydrogen= 2 gram/mole= 2×10^{-3} kg/mole. All units should be in SI to get proper result.
Ans: (2)

137. When a Uranium isotope U_{92}^{235} is bombarded with a neutron, it generates Kr_{36}^{89} and 3 neutrons and :
(1) Ba_{56}^{144} (2) Zr_{40}^{91} (3) Kr_{36}^{101} (4) Kr_{36}^{103}

Solution:
Let the other daughte4 nucleus be X_Z^A .
In a nuclear reaction, the total charge is conserved and the Baryon Number (i.e. total number of protons and Neutrons together) is conserved.

So, A + 89+3=235 +1⇒ A= 144
(1 Bombarding neutron is added to the left side and 3 neutrons produced is added to the right side for Baryon number conservation)
Z+36=92 ⇒ Z= 56
Ans: (1)

138. For the logic circuits shown, the truth table is:



(1)

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

(2)

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

(3)

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

(4)

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

Solution:
Here A and B are inverted to get $\bar{A}$ and $\bar{B}$ through two NOT gates.
$\bar{A}$ and $\bar{B}$ are the inputs to a NOR gate as shown.
So, Y= $\overline{\bar{A} + \bar{B}}$ = A . B (Applying D' Morgan's Law)
So, the entire gate system is an AND gate.
Ans: (1)

139. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this capillary tube is:

(1) 2.5 g (2) 5.0 g (3) 10.0 g (4) 20.0 g

Solution:
Capillary rise= h= $\frac{2T\cos\theta}{\rho g r} \propto \frac{1}{r}$
So $\frac{H}{h} = \frac{r}{2r} \Rightarrow$ H= $\frac{h}{2}$
Mass of water raised in the capillary tube= $\rho\,\pi r^2 h \propto r^2 h$

So, $\frac{M}{m} = \frac{(2r)^2}{r^2}\frac{\frac{h}{2}}{h} = 2 \Rightarrow$ M =2m=10 gram

Ans: (3)

140. An electron is accelerated from rest through a potential difference of V volt. If the de-Broglie wavelength of the electron is 1.227×10^{-2}pm, the potential difference is:

(1) 10 V (2) $10^2 V$ (3i 10^3V (4) 10^4 V

Solution:

$\lambda = \frac{h}{\sqrt{2meV}} = \frac{12.27}{\sqrt{V}}$ angstrom= $\frac{1227}{\sqrt{V}}$ pm. (Here, V must be in volt)

So, $\frac{1227}{\sqrt{V}}$ pm=1.227 × 10^{-2} pm.

So, V=$10^4 V$

Ans: (4)

141. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field intensity in this region is:

(1) 0 (2) 0.5 N/C (3) 0.5 N/C (4) 5 N/C

Solution:

The component of electrostatic field intensity in any direction is equal to the negative of the electrostatic potential gradient in that direction. The gradient represents a directional differential coefficient. Since the potential is constant, its derivative is zero. So the electric field intensity is zero.

Ans: (1)

142. The average internal energy for a mono-atomic gas is: (k_B=Boltzmann constant and T = Absolute temperature)

(1) $\frac{1}{2}k_BT$ (2) $\frac{3}{2}k_BT$ (3) $\frac{5}{2}k_BT$ (4) $\frac{7}{2}k_BT$

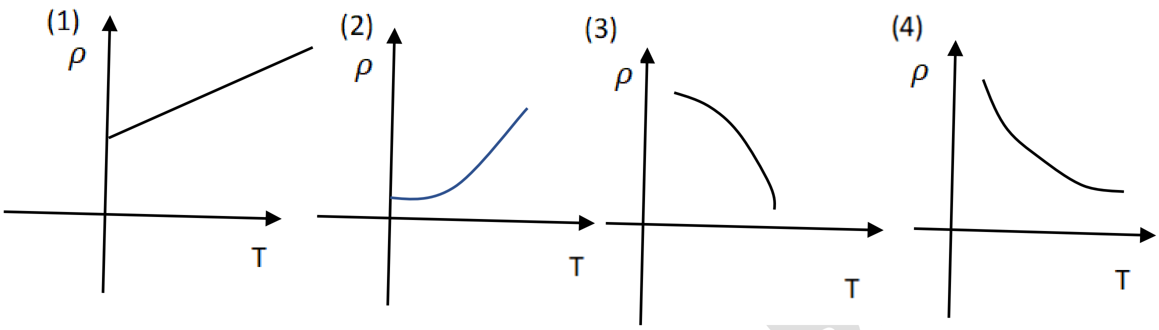
Solution:

This question should be to find the average internal energy per molecule of the gas. So, there is a slip in this question. Let us assume that way.

The average internal energy of one molecule of a gas molecule per one degree of freedom is $\frac{1}{2}k_BT$ as per Equipartition of Energy Theorem. A monoatomic gas molecule has 3 degrees of freedom So its average internal energy is $\frac{3}{2}k_BT$.

Ans: (2)

143. Which of the following graphs represents the variation of resistivity(ρ) with temperatutre T for copper?



Solution:

The equation representing the variation of resistivity with temperature is represented as $\rho = \rho_0$ (1+ $\alpha\,(T - T_0)$. where , ρ_0, α and T_0 are constants having usual meanings for a conductor, As it is a linear equation in ρ and T. the graph is a straight line.

Ans: (1)

144. A short electric dipole has a dipole moment of $16 \times 10^{-9} C\,m$. TRhe electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole , situated on a line making an angle of 60^o with the dipole axis is:

($\frac{1}{4\pi\varepsilon_0}$= 9 × $10^9 Nm^2/C^2$

(1) 50 V (2) 200 V (3) 100 V (4) 0 V

Solution:

The Electrostatic potential V at a point at a distance r from the centre of a short electric dipole situated at angular position θ with axis of the dipole is given by:

V=$\frac{1}{4\pi\varepsilon_0}\frac{p\cos\theta}{r^2}$ = 9 × 10^9 × $\frac{16\times10^{-9}\cos 60^o}{0.6^2}$= 200 V

Ans: (2)

145. Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2. The energy received by the surface during time span of 1 minute is:

(1) 10×10^3 J (2) 12×10^3J (3) 24×10^3J (4) 48$\times 10^3$J

Solution:

I=Intensity= Energy flowing through normal area of cross section(i.e., Area being normal to the direction of travel) per unit area per unit time= 20 W/cm^2. So, E= Total energy received by normal area A in time t = I A t= (20 W/cm^2) x (20 cm^2) (1 minute, i.e 60 seconds)= 20 x 20 x 60 joules=24000 J= 24 $\times 10^3$J.

Ans: (3)

146. The Brewster angle i_b for an interface should be:

(1) $0^o < i_b < 30^o$ (2) $30^o < i_b < 45^o$ (3) $45^o < i_b < 90^o$ (4) $i_b = 90^o$

Solution:

tan (i_b)= μ. The value of μ is more than 1 and is finite. So, $45^o < i_b < 90^o$, as tan 45^o=1 and tan 90^o is infinite, so to say.

Ans: (3)

147. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and presure. B is completely evacuated. The entire system is thoroughly insulated. The stop cock is suddenly opened.The process is:

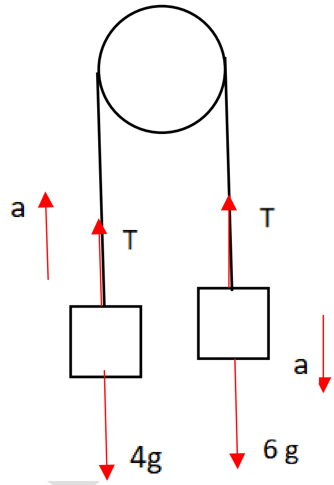
(1) isothermal (2) adiabatic (3) isochoric (4) isobaric

Solution:

Since, the entire syatem is thoroughly insulated , there is no heat transfer between the syaytem and the surroundings. So the process is adiabatic.

Ans: (2)

148. Two bodies of masses 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the syatem in terms of acceleration due to gravity (g) is:



(1) g (2) g/2

(3) g/5 (4) g/10

Solution:

Let us assume that the 6 kg block accelerates downward with acceleration a. So, the 4 kg block will accelerate at the same rate , but upward.

So 6g−T=6a

T−4g=4a

Solving the above two equations, a= $\frac{g}{5}$.

The formula for it is a=$\left(\frac{m_2-m_1}{m_2+m_1}\right) g = \left(\frac{6-4}{6+4}\right)$g=$\frac{g}{5}$

=Ans: (3)

149. In Young's double-slit experiment, if the separation between the coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes:

(1) double (2) half (3) four times (4)one-fourth

Solution:$\beta = \frac{\lambda D}{d} \Rightarrow \frac{\beta'}{\beta} = \frac{\frac{\lambda 2D}{d/2}}{\frac{\lambda D}{d}} = 4$

Ans: (3)

150. For transistor action, which of the following statements is correct?

(1) Base, Emitter and Collector regions have same doping concentrations.

(2) Base, Emitter and Collector should have same size.

(3) Both Emitter junction as well as the Collector junction should be forward-biased.

(4) The Base region must be very thin and lightly doped.

Solution:

The base must be very thin and lightly doped so that the charge -carriers injected by the emission junction mostly pass to the collector junction.

Ans: (4)

151. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is:

(1) 3.66×10^{-7}rad (2) 1.88×10^{-7}rad

(3) 7.32×10^{-7}rad (4) 6.00×10^{-7}rad

Solution:

The Limit of resolution (LR) is given by:

LR=$\frac{1.22\lambda}{d}$ = $\frac{(1.22) \text{ x } (600 \text{ x } 10^{-9})}{2}$ =3.66 x 10^{-7} radians.

Ans: (1)

152. A resistance wire connected in the left gap of a meter brdge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3:2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is:

(1) 1.0 x 10^{-2}m (2) 1.0 x 10^{-1}m (3) 1.5 x 10^{-1}m (4)1.5 x 10^{-2}m

Solution:

The metre bridge works on the principle of Wheatstone bridge.

$\frac{X}{R}$= $\frac{L_1}{L_2}$ $\Rightarrow$ X = R. $\frac{L_1}{L_2}$ = 10 Ω, $\frac{3}{2}$ = 15 Ω.

So, 1.5 m wire has resistance of 15 Ω. So the length of wire which will have 1Ω resistance is $\frac{1.5}{15}$ m = 0.1 m= 1.0 x 10^{-1}m

Ans: (2)

153. The energy equivalent to 0.5 g of a substance is:
(1) 4.5×10^{16}J (2) 4.5×10^{13}J (3) 1.5×10^{15}J (4) 0.5$\times 10^{15}$J

Solution:

E= m c^2= (0.5 X 10^{-3}kg) x $(3 \text{ x} 10^{8})^2$= 4.5 X 10^{13} J

Ans: (2)

154. The mean free path for a gas with molecular diameter d and density n can be expressed as:

(1) $\frac{1}{\sqrt{2}n\pi d}$ (2) $\frac{1}{\sqrt{2}n\pi d^2}$ (3) $\frac{1}{\sqrt{2}n^2\pi d^2}$ (4) $\frac{1}{\sqrt{2}n^2\pi^2 d^2}$

Solution:

This question has a slip. It should be molecular density in place of density. Molecular density is number of molecules per unit volume. The density is mass per unit volume. So we will assume n as molecular density.

$\lambda = \frac{1}{\sqrt{2}\pi n\, d^2}$ is a standard formula.

Ans: (2)

155. The energy required to break one bond in DNA molecule is 10^{-20} J. The value in eV is nearly:

(1) 6 (2) 0.6 (3) 0.06 (4) 0.006

Solution:

1.6 x 10^{-19} J = 1 eV

$\Rightarrow 10^{-20}$ J= $\frac{1\ eV}{1.6 \times 10^{-19}}$ x 10^{-20} = 0.06 eV

Ans: (3)

156. Find the torque about the origin when a force of 3 $\vec{j}$ N acts on a particle whose position vector is 2 $\vec{k}$ m.

(1) 6 $\vec{i}$ N m (2) 6 $\vec{j}$ N m (3) −6 $\vec{i}$ N m (4) 6 $\vec{k}$ N m

Solution:

Torque= $\vec{r}$ x $\vec{F}$ = (2 $\vec{k}$ m) x (3 $\vec{j}$ N) = 6 m N ($\vec{k}$ X $\vec{j}$)= −6 $\vec{i}$ N m

Ans: (3)

157. The increase in the width of the depletion in a p-n junction diode is due to:

(1) Forward bias only (2) reverse bias only

(3) Both forward and reverse bias (4) Increase in forward current

Solution:

When the p-n junction is reverse-biased, the depletion layer widens as the charge -carriers move away from the junction.

Ans: (2)

158. The ratio of contributions made by the electric filed and magnetic field components to the intensity of an electromagnetic wave is: (c=speed of electromagnetic waves)

(1) c:1 (2) 1:1 (3) 1:c (4) 1: c^2

Solution:

The average electric field energy density and the average magnetic field energy density are equal for an electromagnetic wave. Both the fields travel with the speed of light. So, contributions are equal.

Note: Since, it is the ratio of contributions of similar physical quantities, the ratio should be dimensionless. So only the dimensionless option is (ii).

Ans: (2)

159. A spherical conductor of radius 10 cm has a charge of 3.2 $\times 10^{-7}$ C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere? ($\frac{1}{4\pi\varepsilon_0}$= 9 × $10^9 Nm^2/C^2$)

(1) 1.28 × 10^4 N/C (2) 1.28 × 10^5 N/C (3) 1.28 × 10^6 N/C (4)1.28× 10^7 N/C

Solution:

Let Q = total charge on the spherical conductor. Let R be its radius. Let r be the distance of a point outside the sphere from its centre.

So, V= Electric Field at distance r from centre(r>R) of the sphere= $\frac{kQ}{r^2}$= 9 x 10^9 x $\frac{3.2 \times 10^{-7}}{(0.15)^2}$ = 1.28 × 10^5 N/C

Ans: (2)

160. Dimensions of stress are:

(1) [M L T^{-2}] (2) [M L^2 T^{-2}] (3) [M L^0 T^{-2}] (4) [M L^{-1} T^{-2}]

Solution:

[Stress]=$\left[\frac{force}{area}\right]$ = M $L^{-1}T^{-2}$

Ans: (4)

161. The phase difference between displacement and acceleration of a particle in SHM is:

(1) $\pi\ rad$ (2) $\frac{3\pi}{2}$ rad (3) $\frac{\pi}{2}$ rad (4) zero

Solution:

Displacement= x= A sin (ωt)

$\Rightarrow$ a= $-\omega^2 x$= $-\omega^2$A sin (ωt)= ω^2A sin $(\omega t + \pi)$

Now both x and a are expressed as sine functions with positive coefficients. Thus, phase difference between them = $(\omega t + \pi) - (\omega t)$= π

Ans: (1)

162. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead, C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is:

(1) Zero (2) 0.5 (3) 1.0 (4) -1.0

Solution:

Let ∅ be the phase difference between current and voltage. Let R= resistance, X_L=inductive reactance, X_C = capacitive reactance.

Case1: |tan ∅| = $\frac{R}{\sqrt{R^2+X_C{}^2}}$

Case2: |tan ∅| = $\frac{R}{\sqrt{R^2+X_L{}^2}}$

From the above, $X_L = X_C$

Power factor of the original circuit= $\frac{R}{\sqrt{R^2+(X_L-X_C)^2}} = \frac{R}{R}$ =1

Ans: (3)

163. A 40 μF capacitor is connected toa 200 V, 50 Hz ac supply. The rms value of the current in the circuit is nearly:

(1) 1.7 A (2) 2.05 A (3) 2.5 A (4) 25.1 A

Solution:

Z= $X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi\,(50)(40\,x\,10^{-6})}$ = 80 Ω approximately

So, $I_{rms} = \frac{V_{rms}}{Z} = \frac{200}{80}$ A= 2.5 A

Ans: (3)

164. In a guitar, two strings A and B made of the same material are slightly out of tune and produce beats of frequency 6 Hz. when tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be:

(1) 523 Hz (2) 524 Hz (3) 536 Hz (4) 537 Hz

Solution:

f= frequency of vibrations= $\frac{n}{2l}\ x\ \sqrt{\frac{F}{\mu}}$, symbols having their usual meanings.

Thus, increase in tension (F) increases frequency (f) of vibrations. There is a very small increase in frequency and hence, the frequency of B must be greater than that of A, as beat frequency is increasing with increase in frequency of B.

So, $f_B - f_A$=6 $\Rightarrow f_B$= f_A+ 6 = 530+6 = 536 Hz

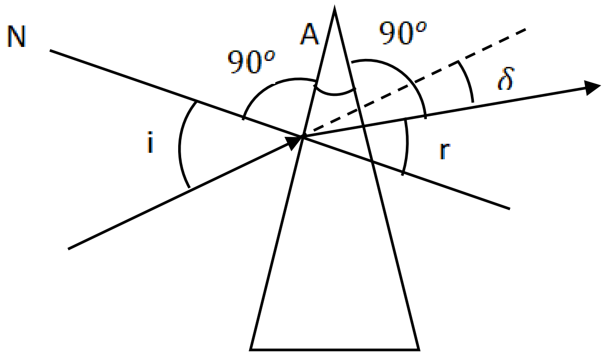
Ans: (3)

165. A ray of light at an angle of incidence I on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to:

(1) $\frac{A}{2\mu}$ (2) $\frac{2A}{\mu}$ (3) μA 4v) $\frac{\mu A}{2}$

Solution:

The given situation is shown in the diagram.



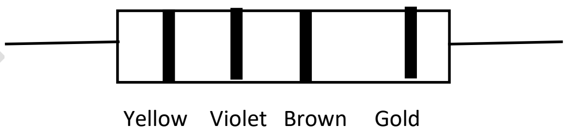
$r = A$

μ= $\frac{\sin i}{\sin r} \approx \frac{i}{r} \Rightarrow$ r= $\frac{i}{\mu}$

So , i = $\mu\, r$ = $\mu\, A$

Ans: (3)

166. The color code of a resistance is given below. The value of resistance and tolerance respectively are:



(1) 470 kΩ, 5% (2) 47 kΩ, 1 (3) 4.7 kΩ, 5% (4) 470 Ω, 5%

The mnemonic used for this is **"B B ROY of Great Britain had a Very Good Wife wearing Gold and Silver ornaments."**

Yellow=4, Violet=7, Brown=1 Gold=5%

So, R= 47 x $10^1 \pm 5\%$ = 470 Ω $\pm 5\%$

Ans: (4)

167. The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is: ($\varepsilon_0 = 8.85 \times 10^{-12}\, C^2N^{-1}m^{-2}$)

(1) $0.44 \times 10^{-13}\, C^2N^{-1}m^{-2}$ (2) $1.77 \times 10^{-12}\, C^2N^{-1}m^{-2}$

(3) $0.44 \times 10^{-10}\ C^2N^{-1}m^{-2}$ (4) $5.00\ C^2N^{-1}m^{-2}$

Solution:

$C_0 = \frac{\varepsilon_0 A}{d}$, C = $\frac{k\,\varepsilon_0 A}{d}$ $\Rightarrow$ k= $\frac{C}{C_0}$ = $\frac{30}{6}$ = 5 $\Rightarrow \varepsilon = k\,\varepsilon_0 =$ 5 x 8.85 $\times 10^{-12}\ C^2N^{-1}m^{-2}$

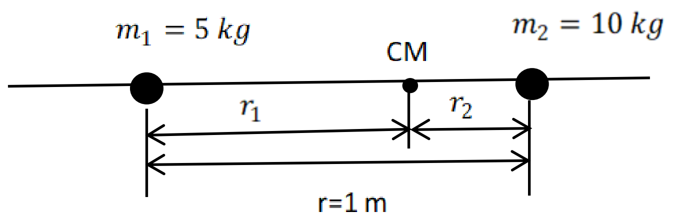
= $0.44 \times 10^{-10}\ C^2N^{-1}m^{-2}$

Ans: (3)

168. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass. The centre of mass of the system from the 5 kg particle is nearly at a distance of:

(1) 33 cm (2) 50 cm (3) 67 cm (4) 80 cm

Solution:



The standard relations are:

$m_1r_1 = m_2r_2$ and $r_1 + r_2$ = r

$\Rightarrow r_1 = \frac{m_2\, r}{m_1+m_2} = \frac{10\ x\ 1}{5+10}$ = 0.67 m= 67 cm

Ans: (3)

169. A charged particle having drift velocity of 7.5 $\times 10^{-4}$ m s^{-1} in an electric field of 3 $\times 10^{-10}$ V m^{-1}, has a mobility in $m^2V^{-1}s^{-1}$ of:

(1) 2.25 $\times 10^{15}$ (2) 2.5 $\times 10^{6}$ (3) 2.5 $\times 10^{-6}$ (4)2.25$\times 10^{-15}$

Solution:

$\mu = \frac{v}{E}$, where v= drift velocity and μ= mobility, E = electric field.

So, $\mu = \frac{7.5\ x\ 10^{-4}}{3x\ 10^{-10}}$ = 2.5 $\times 10^{6} m^2V^{-1}s^{-1}$

Ans: (2)

170. A ball is thrown vertically downward with velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is: (g=10 m/s^2).

(1) 360m (2) 340 m (3) 320 m (4) 300 m

Solution:

$V^2 - u^2$=2 g h $\Rightarrow$ h =$\frac{V^2-u^2}{2\,g}$ = $\frac{80^2-20^2}{2\,x\,10}$= 300 m

Ans: (4)

171. The solids which have the negative temperature coefficient of resistance are:

(1) metals (2) insulators only

(3) semi-conductors only (4) Insulators and semi-conductors.

Solution: In insulators, there are no free electrons. But when the temperature is increased, some bonds may braeak . causing a little conduction. In semi-conductors, there are few free electrons and holes. On increasing the temperature, more bonds break, causing more conduction. The coillision effect is negligible here. So as conductivity, increases. The resistivity and resiatance decrease in insulators and semi-conductors.

Ans: (4)

172. Light of frequency 1.5 times the threshhold frequency is incident on a photosensitive material. What will be the photoelectric current, if the frequency is halved and intensity is doubled?

(1) double (2) 4 times (3) one fourth (4) zero

Initially the frequency incident was 1.5 ν_0. Finally , the frequency is half of 1.5 ν_0, i.e. 0.75 ν_0. Since the incident frequency is less than the threshhold frequency, no photo-electrons will be emitted and thre will be no photoelectric current.

Ans: (4)

173. The quantities of heat required to raise the temperature of two solid copper spheres of radii $r_1$and r_2 (r_1=1.5 r_2) through 1 K are in the ratio:

(1) $\frac{27}{8}$ (2) $\frac{9}{4}$ (3) $\frac{3}{2}$ (4) $\frac{5}{3}$

ΔQ= m s ΔT= ρ $\frac{4\,\pi\,r^3}{3}$ s $\Delta T \propto r^3$, other values being constant as the materials are the same and the temperature rise is the same.

So, $\frac{\Delta Q_1}{\Delta Q_2} = \frac{{r_1}^3}{{r_2}^3} = \frac{27}{8}$

Ans: (1)

174. A body weighs 72 N on the surface of the earth. What is the gravitational force on it at a height equal to half the radius of the earth?

(1) 48 N (2) 32 N (3) 30 N (4) 24 N

Solution:

$\frac{g'}{g} = \frac{r^2}{(r+h)^2} = \frac{4}{9}$, putting h = $\frac{r}{2}$

$\Rightarrow$ mg' = $\frac{4}{9}$ mg= $\frac{4}{9}$ x 72 N= 32 N

Ans: (2)

175. Taking into account of the significant figures, what is the value of 9.99 m–0.0099 m?

(1) 9.9801 m (2) 9.98 m (3) 9.980 m (4) 9.9 m

Solution:

Since 9,99 has its doubtful digit in the second place after decimal point, the number 0.0099 should be rounded to the 2nd place after decimal point. So on rounding, it becomes 0.01 m.

So, 9.99 m –0.0099 m= 9.99 m–0.01 m= 9.98 m

Ans: (2)

176. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale. The pitch of the screw gauge is:

(1) 0.01 m (2) 0.25 mm (3) 0.5 mm (4) 1.0 mm

Solution:

Pitch= N C = 50 x 0.01 mm= 0.5 mm

Ans: (3)

177. For which one of the following , Bohr model is not valid?

(1) Hydrogen atiom (2) Singly ionised helium atom (He^+)

(3) Deuteron atom (4) Singly ionised neon atom(Ne^+)

Solution:

Bohr Model is applicable for atoms or ions having only one electron left. It is not applicable to multiu-electron atoms/ions. A Neon atom has 10 electrons. If one is removed from it, it will have 9 electrons.

Ans: (4)

178. A wire of length L , area of cross section A is hanging from a fixed support. The length of the wire changes to L_1, when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\frac{MgL_1}{AL}$ (2) $\frac{Mg(L_1-L)}{AL}$ (3) $\frac{MgL}{AL_1}$ (4) $\frac{MgL}{A(L_1-L)}$

Solution: stress= $\frac{F}{A}$ and strain = $\frac{\Delta L}{L}$ amd Y= $\frac{stress}{strain}$

So, $\Delta L = \frac{F\,L}{Y\,A}$ $\Rightarrow$ Y = $\frac{F\,L}{A\,\Delta L}$ = $\frac{Mg\,L}{A\,(L_1-L)}$

Ans: (4)

179. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is: ($\mu_0 = 4\pi \times 10^{-7} T\,m\,A^{-1}$)

(1) $6.28 \times 10^{-4}\,T$ (2) $3.14 \times 10^{-4}\,T$ (3) $6.28 \times 10^{-3}\,T$) (4) $3.14\times 10^{-3}\,T$

Solution:

B= $\mu_0 \frac{N}{L}\,I$ = $4\pi \times 10^{-7}$ x $\frac{100}{0.50}$ x 2.5 = $6.28 \times 10^{-4}\,T$

Ans: (1)

180. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeabilty of the material of the rod is: ($\mu_0 = 4\pi \times 10^{-7} T\,m\,A^{-1}$)

(1) $2.4\pi \times 10^{-4} T\,m\,A^{-1}$ (2) $8.0\times 10^{-5} T\,m\,A^{-1}$

(3) $2.4\pi \times 10^{-5} T\,m\,A^{-1}$ (4) $2.4\pi \times 10^{-7} T\,m\,A^{-1}$

Solution:

μ_r= 1 +× = 1+599=600

So, μ= $\mu_r . \mu_0$= 600 x $4\pi \times 10^{-7} T\,m\,A^{-1}$= $2.4\pi \times 10^{-4} T\,m\,A^{-1}$

Ans: (1)

Chapter-Wise Break-Up of Questions

Q No	Corresponding Chapter	Branch of Physics
136	Kinetic Theory of Gases	Heat and Thermodynamics
137	Nuclear Physics	Modern Physics
138	Semiconductor Electronics	Modern Physics
139	Properties of Matter	Mechanics
140	Photoelectric Effect and dual nature	Modern Physics
141	Electric Field & Potential	Electricity & Magnetism
142	Kinetic Theory of Gases	Heat & Thermodynamics
143	Semi-conductor Electronics	Modern Physics
144	Electric Field and Potential	Electricity & Magnetism
145	Electromagnetic Waves	Electricity & Magnetism
146	Wave Optics	Optics
147	Thermodynamics	Heat & Thermodynamics
148	Newton's Laws of Motion	Mechanics
149	Wave Optics	Optics
150	Semiconductor Electronics	Modern Physics
151	Eye & Optical Instruments	Optics
152	Current Electricity	Electricity & Magnetism
153	Nuclear Physics	Modern Physics
154	Kinetic Theory of Gases	Heat & Thermodynamics
155	Physical World & Measurement	Mechanics
156	Scalars and Vectors	Mechanics
157	Semi-Conductor Electronics	Modern Physics
158	Electromagnetic Waves	Electricity & Magnetism
159	Electric Field and Potential	Electricity & Magnetism
160	Physical world & Measurement	Mechanics
161	Simple Harmonic Motion	Waves and Oscillations
162	A C Circuits	Electricity & Magnetism
163	A C Circuits	Electricity & Magnetism
164	Transverse Waves on a string	Waves and Oscillations
165	Geometrical Optics	Optics
166	Current Electricity	Electricity & Magnetism
167	Capacitance	Electricity & Magnetism
168	Centre of Mass and Momentum	Mechanics
169	Current Electricity	Electricity & Magnetism
170	Kinematics	Mechanics
171	Current Electricity	Electricity & Magnetism
172	Photoelectric Effect and dual nature	Modern Physics
173	Thermal Properties of materials	Heat & Thermodynamics
174	Gravitation	Mechanics
175	Physical world and Measurement	Mechanics
176	Physical world and Measurement	Mechanics
177	Bohr's Theory	Modern Physics
178	Properties of Matter	Mechanics
179	Magnetic Effect of Current	Electricity & Magnetism
180	Magnetic Properties of materials	Electricity & Magnetism

Summary of Marks distribution among different Branches of Physics

S.No	Branch of Physics	No of questions	%age of questions
1	Mechanics	11	24.4%
2	Waves & Oscillations	2	4.4%
3	Heat & Thermodynamics	5	11.1%
4	Electricity & Magnetism	15	33.4%
5	Optics	3	6.7%
6	Modern Physics	9	20%
	Total	**45**	**100%**

REMARKS:

1) In the History of NEET/ AIPMT, this Physics paper is the easiest. It may be to give hopes to students in this pandemic situation. However, it is a competitive examination and the seats are limited. Many good students commit silly mistakes, when the questions are very easy. This aspect should be noted carefully.
2) Almost all questions are based on direct concepts from NCERT book and these are standard questions in any reliable author's book.
3) It is needless to mention that study materials and Lecture Notes of www.rcmphysics.com contain almost all these questions as per previous track records and History has been repeated.
4) A student must study and understand with all concepts and must have his fundamentals very clear. The difficulty level of questions can vary from year to year.