JEE Main March 2021

Question Paper With Text Solution

18 March. | Shift-1

PHYSICS

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

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JEE MAIN MARCH 2021 | 18TH MARCH SHIFT-1

SECTION – A

1. An AC source rated 220 V, 50 Hz is connected to a resistor. The time taken by the current to change from its maximum to the rms value is :

(1) 25 ms

(2) 2.5 ms

(3) 2.5 s

(4) 0.25 ms

Ans. Official Answer by NTA (2)

Sol. In AC-Resistance circuit , $I = I_0 \sin(\omega t)$

$$\omega = 2\pi f = 2\pi(50) = 100\pi$$

$$I = I_0 \sin(100\pi t) = \frac{I_0}{\sqrt{2}}$$

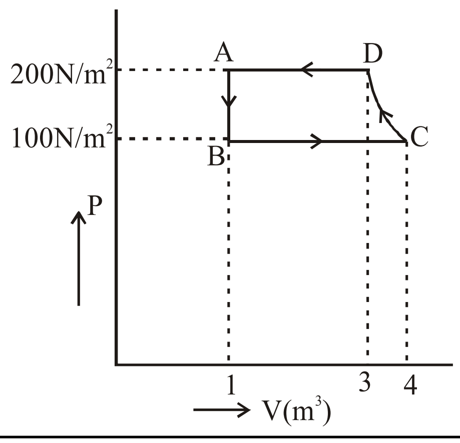
$$\Rightarrow \sin(100\pi t) = \frac{1}{\sqrt{2}}$$

$$\Rightarrow 100\pi t = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) = \frac{\pi}{4}$$

$$\Rightarrow t = \frac{1}{400}\text{sec} = 2.5\times10^{-3}\text{ sec}$$

$$\Rightarrow t = 2.5\text{ms}$$

2. The P-V diagram of a diatomic ideal gas system going under cyclic process as shown in figure. The work done during an adiabatic process CD is (use $\gamma = 1.4$)



(1) –500 J

(2) 200 J

(3) –400 J

(4) 400 J

Ans. Official Answer by NTA (1)

Sol. In adiabatic process, Work = $\dfrac{P_f V_f - P_i V_i}{1-\gamma}$

$$W = \frac{200(3)-100(4)}{1-1.4}$$

$$W = -500J$$

3. Your friend is having eye sight problem. She is not able to see clearly a distant uniform window mesh and it appears to her as non-uniform and distorted. The doctor diagnosed the problem as :

(1) Myopia and hypermetropia

(2) Presbyopia with Astigmatism

(3) Astigmatism

(4) Myopia with Astigmatism

Ans. Official Answer by NTA (4)

Sol. Part of theory

4. Match List-I with List -II.

List-I	List-II
(a) 10 km height over earth's surface	(i) Thermosphere
(b) 70 km height over earth's surface	(ii) Mesosphere
(c) 180 km height over earth's surface	(iii) Stratosphere
(d) 270 km height over earth's surface	(iv) Troposphere

(1) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

(2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

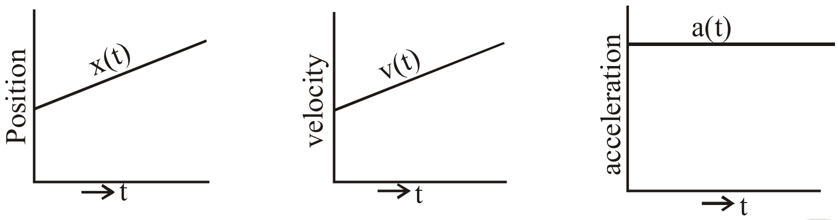
(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

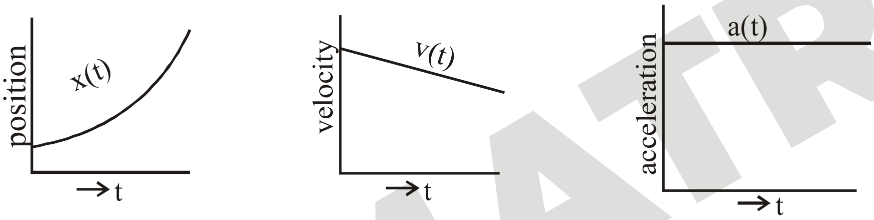
(4) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

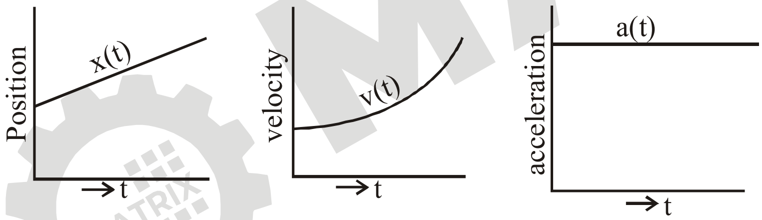
Ans. Official Answer by NTA (3)

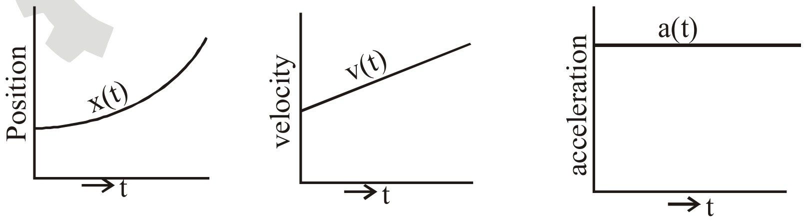
Sol. Part of theory

5. The position, velocity and acceleration of a particle moving with a constant acceleration can be represented by :

(1) 

(2) 

(3) 

(4) 

Ans. Official Answer by NTA (4)

Sol. In all the options,acceleration is positive & constant

$a = C$ ....(C, is positive constant)

$\Rightarrow a = \dfrac{dv}{dt}$

$\Rightarrow \int dv = \int a dt = \int C dt = Ct + C_0$

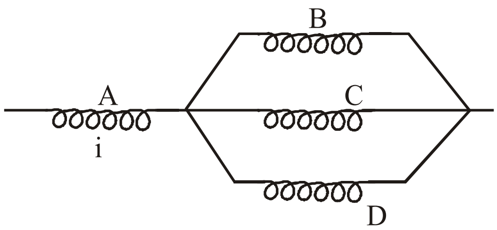
$\Rightarrow v = Ct + C_0$, straight line with positive slope

Now, $V = \frac{dx}{dt}$

$\Rightarrow \int dx = \int vdt = \int Ct + C_0 dt$

$\Rightarrow x = \frac{Ct^2}{2} + C_0 t$, Parabola Concave Upward.

6. Four identical long solenoids A, B, C and D are connected to each other as shown in the figure. If the magnetic field at the center of A is 3T, the field at the center of C would be : (Assume that the magnetic field is confined with in the volume of respective solenoid).



(1) 6 T

(2) 1 T

(3) 9 T

(4) 12 T

Ans. Official Answer by NTA (2)

Sol. magnetic field at center of solenoid = B = $\mu_0 nI$

as, all solenoids are identical , so $B \propto I$ (current)

$I_C = I_B = I_D$ ....(1) (from circuit)

and $I_C + I_B + I_D = I_A$ ......(2)...(From circuit)

by (1) & (2) $\Rightarrow I_C = \frac{I_A}{3}$

$$\frac{B_A}{B_C} = \frac{I_A}{I_C} \Rightarrow \frac{3T}{B_C} = \frac{I_A}{\frac{I_A}{3}}$$

$B_C = 1\,T$

7. The time period of a satellite in a circular orbit of radius R is T. The period of another satellite in a circular orbit of radius 9R is :

(1) 12 T

(2) 3 T

(3) 27 T

(4) 9 T

Ans. Official Answer by NTA (3)

Sol. $T \propto R^{3/2}$

$$\frac{T_2}{T_1} = \left(\frac{R_2}{R_1}\right)^{3/2}$$

$$\frac{T_2}{T} = \left(\frac{9R}{R}\right)^{3/2}$$

$T_2 = 27T$

8. In Young's double slit arrangement, slits are separated by a gap of 0.5 mm, and the screen is placed at a distance of 0.5 m from them. The distance between the first and the third bright fringe formed when the slits are illuminated by a monochromatic light of 5890Å is :

(1) 5890×10^{-7} m

(2) 1178×10^{-12} m

(3) 1178×10^{-9} m

(4) 1178×10^{-6} m

Ans. Official Answer by NTA (4)

Sol. $d = 0.5\text{mm} = 5 \times 10^{-4}$ m

$D = 0.5$ m

$\lambda = 5890\text{Å} = 5890 \times 10^{-10}$m

distance b/w 1st & 3rd bright fringe = 2β

$$= 2\left(\frac{\lambda D}{d}\right)$$

$$= 2\left(\frac{5890\times10^{-10}\times0.5}{5\times10^{-4}}\right)$$

$$= 1178\times10^{-6}\,\text{m}$$

9. A particle is travelling 4 times as fast as an electron. Assuming the ratio of de-Broglie wavelength of a particle to that of electron is 2 : 1, the mass of the particle is :

(1) $\frac{1}{16}$ times the mass of e^-

(2) $\frac{1}{8}$ times the mass of e^-

(3) 16 times the mass of e^-

(4) 8 times the mass of e^-

Ans. Official Answer by NTA (2)

Sol. $\lambda = \frac{h}{p} = \frac{h}{mv}$

$\Rightarrow \lambda \propto \frac{1}{mv}$

Given, $\frac{v_p}{v_e} = 4$ and $\frac{\lambda_p}{\lambda_e} = \frac{2}{1}$

$\Rightarrow \frac{\lambda_p}{\lambda_e} = \frac{m_e v_e}{m_p v_p}$

$\Rightarrow \frac{2}{1} = \frac{m_e}{m_p}\left(\frac{1}{4}\right)$

$\Rightarrow m_p = \frac{1}{8}(m_e)$

10. A thin circular ring of mass M and radius r is rotating about its axis with an angular speed ω. Two particles having mass 'm' each are now attached at diametrically opposite points. The angular speed of the ring will become :

(1) $\omega\frac{M-2m}{M+2m}$

(2) $\omega\frac{M+2m}{M}$

(3) $\omega\frac{M}{M+m}$

(4) $\omega\frac{M}{M+2m}$

Ans. Official Answer by NTA (4)

Sol. Apply angular momentum conservation :

$L_f = L_i$

$I_f(\omega_f) = I_i(\omega_i)$

$\left(Mr^2 + mr^2 + mr^2\right)\omega_f = \left(Mr^2\right)\omega$

$\omega_f = \left(\frac{M}{M+2m}\right)\omega$

11. What will be the average value of energy along one degree of freedom for an ideal gas in thermal equilibrium at a temperature T ? (k_B is Boltzmann constant)

(1) $\frac{1}{2}k_BT$

(2) $\frac{3}{2}k_BT$

(3) k_BT

(4) $\frac{2}{3}k_BT$

Ans. Official Answer by NTA (1)

Sol. Energy per degree of freedom = $=\frac{1}{2}K_BT$

12. A plane electromagnetic wave of frequency 100MHz is travelling in vacuum along the x-direction. At a particular point in space and time, $\vec{B} = 2.0\times10^{-8}\hat{k}T$. (where, $\hat{k}$ is unit vector along z-direction) What is $\vec{E}$ at this point ? (speed of light c = 3 × 10^8 m/s)

(1) $6.0\hat{k}V/m$

(2) $0.6\hat{k}V/m$

(3) $0.6\hat{j}V/m$

(4) $6.0\hat{j}V/m$

Ans. Official Answer by NTA (4)

Sol. As EM- wave travelling in x-direction, $\vec{V}=3\times10^{8}\hat{i}$ as we know, $\vec{E}=\vec{B}\times\vec{V}$

$\vec{E}=(2\times10^{-8}\hat{k})(3\times10^{8}\hat{i})$

$=6(\hat{k}\times\hat{i})$

$=6\hat{j}$

13. An oil drop of radius 2mm with a density 3g cm^{-3} is held stationary under a constant electric field 3.55 $\times10^{5}$ V m^{-1} in the Millikan's oil drop experiment. What is the number of excess electrons that the oil drop wil prossess ? Consider g = 9.81 m/s^2

(1) 17.3×10^{10}

(2) 48.8×10^{11}

(3) 1.73×10^{10}

(4) 1.73×10^{12}

Ans. Official Answer by NTA (3)

Sol. Net force on oil drop, $\vec{F}_{net}=0$

qE = mg

$ne(E)=\rho V_{ol}g$

$$h=\frac{\rho V_{ol}g}{eE}$$

$$h=\frac{\left(3\times10^{3}\right)\left(\frac{4}{3}\pi(2\times10^{-3})^{3}\right)(9.8)}{\left(1.602\times10^{-19}\right)\left(3.55\square\times10^{5}\right)}$$

$h=173.24\times10^{8}$

$\Rightarrow h=1.73\times10^{10}$

14. The time period of a simple pendulum is given by T = $2\pi\sqrt{\frac{l}{g}}$. The measured value of the length of pendulum is 10 cm known to a 1 mm accuracy. The time for 200 oscillations of the pendulum is found to be 100 second using a clock of 1s resolution. The percentage accuracy in the determination of 'g' using this pendulum is 'x'. The value of 'x' to the nearest integer is,

(1) 4 %

(2) 3%

(3) 5%

(4) 2%

Ans. Official Answer by NTA (2)

Sol. $T = 2\pi\sqrt{\frac{L}{g}}$,

$\Delta T = 1\,\text{sec}, T = 100\,\text{sec}$

$\Delta L = 1\text{mm} = 10^{-3}\,\text{m}, L = 10\text{cm} = 10\times10^{-2}\ \text{m}$

$$\frac{\Delta T}{T} = \frac{1}{2}\left(\frac{\Delta L}{L}\right) - \frac{1}{2}\left(\frac{\Delta g}{g}\right)$$

$$\frac{\Delta g}{g} = 2\left[\frac{\Delta T}{T} + \frac{1}{2}\left(\frac{\Delta L}{L}\right)\right]$$

$$\frac{\Delta g}{g} = 2\left[\frac{1}{100} + \frac{1}{2}\left(\frac{10^{-3}}{10\times10^{-3}}\right)\right] = 0.03$$

$$\frac{\Delta g}{g}\times100\% = 0.03\times100\% = 3\%$$

15. A radioactive sample disintegrates via two independent decay processes having half lives $T_{1/2}^{(1)}$ and $T_{1/2}^{(2)}$ respectively. The effective half-life, $T_{1/2}$ of the nuclei is :

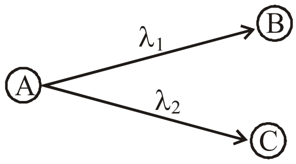
(1) $T_{1/2} = \frac{T_{1/2}^{(1)} + T_{1/2}^{(2)}}{T_{1/2}^{(1)} - T_{1/2}^{(2)}}$

(2) $T_{1/2} = \frac{T_{1/2}^{(1)} T_{1/2}^{(2)}}{T_{1/2}^{(1)} + T_{1/2}^{(2)}}$

(3) None of the above

(4) $T_{1/2} = T_{1/2}^{(1)} + T_{1/2}^{(2)}$

Ans. Official Answer by NTA (2)

Sol. 

net disintegrate constant (decay constant) = λ

$\lambda = \lambda_1 + \lambda_2$ ......(i)

as we know $T_{1/2} = \dfrac{\ln(2)}{\lambda}$

$\Rightarrow \lambda = \dfrac{\ln(2)}{T_{1/2}}$

Put in equation (i)

$\Rightarrow \dfrac{\ln(2)}{T_{1/2}} = \dfrac{\ln(2)}{T_{1/2}^{(1)}} + \dfrac{\ln(2)}{T_{1/2}^{(2)}}$

$T_{1/2} = \dfrac{T_{1/2}^{(1)} T_{1/2}^{(2)}}{T_{1/2}^{(1)} + T_{1/2}^{(2)}}$

16. A constant power delivering machine has towed a box, which was initially at rest, along a horizontal straight line. The distance moved by the box in time 't' is proportional to :

(1) $t^{1/2}$

(2) t

(3) $t^{3/2}$

(4) $t^{2/3}$

Ans. Official Answer by NTA (3)

Sol. Power = (F.V) = constant

(ma)V = constant

aV = constant (C)

$\left(V\dfrac{dv}{dx}\right)\left(\dfrac{dx}{dt}\right) = C$

$\int Vdv = \int Cdt$

$\frac{V^2}{2} = Ct$

$V = \sqrt{2Ct}$

as we know $= V = \frac{dx}{dt} = \sqrt{2Ct}$

$\int dx = \int \sqrt{2Ct}\,dt$

$x = \sqrt{2C}\left(\frac{t^{3/2}}{3/2}\right)$

$x \propto t^{3/2}$

17. Imagine that the electron in a hydrogen atom is replaced by a muon (μ). The mass of muon particle is 207 times that of an electron and charge is equal to the charge of an electron. The ionization potential of this hydrogen atom will be :

(1) 2815.2 eV

(2) 27.2 eV

(3) 13.6 eV

(4) 331.2 eV

Ans. Official Answer by NTA (1)

Sol. Ionization PE $= \frac{Z^2 mq^4}{8n^2h^2 \epsilon_0^2}$

m $\rightarrow$ mass of revolving particle
q $\rightarrow$ charge of revolving particle
P.E $\propto$ mq^4

$\frac{P.E_\mu}{PE_e} = \frac{m_\mu q_\mu^4}{m_e\, q_e^{\ 4}} = 207$

18. A loop of flexible wire of irregular shape carrying current is palced in an external magnetic field. Identify the effect of the field on the wire.

(1) Loop assumes circular shape with its plane paralledl to the field

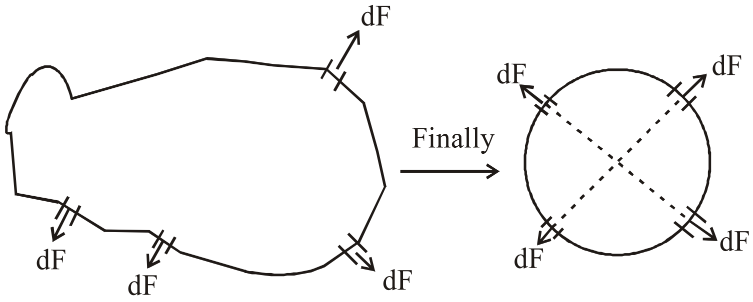
(2) Shape of the loop remains unchanged

(3) Loop assumes circular shape with its plane normal to the field

(4) Wire gets stretched to become straight

Ans. Official Answer by NTA (3)

Sol. Loop will act like magnetic dipole. In equilibrium direction of dipole will be parallel to magnetic field-directon.
$\Rightarrow$ Its plane remains normal to field.
Now on each element of wire force due to magnetic field will be perpendicular to length of element and outward in direction. So loop will become circular.



19. In a series LCR resonance circuit, if we change the resistance only, from a lower to higher value :

(1) The quality factor will increase

(2) The quality factor and the resonance frequency will remain constant

(3) The resonance frequency will increase

(4) The bandwidth of resonance circuit will increase

Ans. Official Answer by NTA (4)

Sol. Resonance frequency $\omega = \frac{1}{\sqrt{LC}}$, independent from 'R'

Quality factor = $\frac{\omega L}{R}$, depends upon R, as R increases $\rightarrow$ 'as' decreases

Band width (β) = $\frac{R}{L}$, as R increases $\rightarrow$ β increases

20. In the experiment of Ohm's law, a potential difference of 5.0 V is applied across the end of a conductor of length 10.0 cm and diameter of 5.00mm. The measured current in the conductor is 2.00 A. The maximum permissible percentage error in the resistivity of the conductor is :

(1) 3.9

(2) 8.4

(3) 7.5

(4) 3.0

Ans. Official Answer by NTA (1)

Sol. $R = \frac{V}{I}$

$\frac{\rho L}{A} = \frac{V}{I}$ .... $\left(R = \frac{\rho L}{A} \text{ and } A = \frac{\pi d^2}{4}\right)$

$\rho = \frac{V}{IL}\left(\frac{\pi d^2}{4}\right)$

$\frac{\Delta\rho}{\rho} = \left(\frac{\Delta V}{V} + \frac{\Delta I}{I} + \frac{\Delta L}{L} + \frac{2\Delta d}{d}\right)$

$\frac{\Delta\rho}{\rho} = \frac{0.1}{5} + \frac{0.01}{2} + \frac{0.1}{10} + 2\left(\frac{0.01}{5}\right) = 0.039$

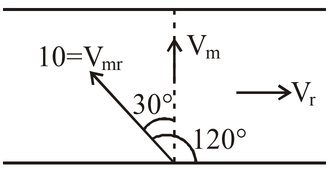
$\frac{\Delta\rho}{\rho} \times 100\% = 0.039 \times 100\% = 3.9\%$

Section B

1. A person is swimming with a speed of 10m/s at an angle of 120° with the flow and reaches to a point directly opposite on the other side of the river. The speed of the flow is 'x' m/s. The value of 'x' to the nearest integer is ....

Ans. Official Answer by NTA (5)

Sol. $V_{mr} \sin 30° = V_r$

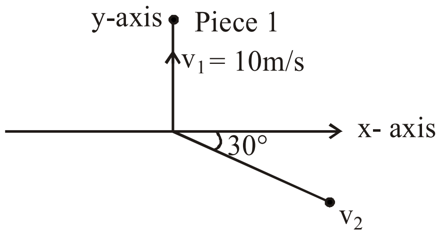


$\Rightarrow 10\left(\frac{1}{2}\right) = V_r$

$\Rightarrow V_r = 5$

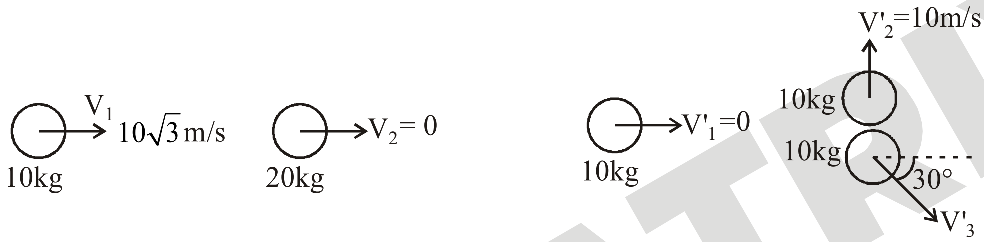
2. A ball of mass 10 kg moving with a velocity $10\sqrt{3}$ m/s along the x-axis, hits another ball of mass 20 kg which is at rest. After the collision, first ball comes to rest while the second ball disintegrates into two equal pieces. One piece starts moving along y-axis with a speed of 10m/s. The second piece starts moving at an angle of 30° with respect to the x-axis.
The configuration of pieces after colision is shown in the figure. below.

The value of x to nearest integer is ....



Ans. Official Answer by NTA (20)

Sol. Just before collision Just After collision.



on system, Fext = 0

Apply momentum conservation along y-direction or along 'x' direction $\Rightarrow$ $P_f = P_i$

$$10V_3' \cos 30° = 10\left(10\sqrt{3}\right)$$

$$10V_3'\left(\frac{\sqrt{3}}{2}\right) = 100\sqrt{3}$$

$$V_3' = 20 m/s$$

or along y-direction $\Rightarrow$ $P_f = P_i$

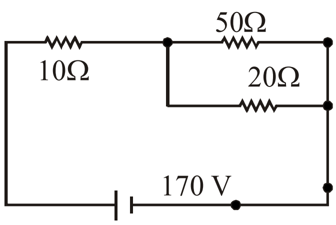
$$10V_2' - 10V_3' \sin 30° = 0$$

$$10(10) - 10V_3'\left(\frac{1}{2}\right) = 0$$

$$V_3' = 20 m/s$$

So, you can apply momentum conservation in both direction both will given same answer.

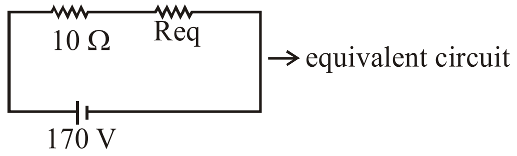
3. The voltage across the 10Ω resistor in the given circuit is x volt.



The value of 'x' to the nearest integer is___ .

Ans. Official Answer by NTA (70)

Sol.



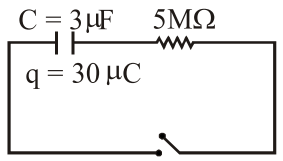
$$\text{Req} = \frac{50\times20}{50+20} = \frac{100}{7}\Omega$$

Voltage across '10Ω' resistor = x = $170\left(\frac{10}{10+\text{Req}}\right)$

$$x = 170\left(\frac{10}{10+\frac{100}{7}}\right)$$

$\Rightarrow x = 70$

4.



The circuit shown in the figure consists of a charged capacitor of capacity $3\,\mu F$ and a charge of $30\,\mu C$. At time t = 0, when the key is closed, the value of current flowing through the 5Ω resistor is 'x' μA. The value of 'x' to the nearest integer is_____.

Ans. Official Answer by NTA (2)

Sol. Just after key is closed(at t = 0), current through resistor will be maximum.

$$I_{t=0} = I_{max} = \left(\frac{Q}{C}\right)\frac{1}{R}$$

$$= \frac{30\times10^{-6}}{3\times10^{-6}\times5\times10^{6}}$$

$= 2 \times 10^{-6}$ A

$= 2\mu A$

5. Two separate wires A and B are stretched by 2 mm and 4 mm respectively, when they are subjected to a force of 2N. Assume that both the wires are made up of same material and the radius of wire B is 4 times that of the radius of wire A. the length of the wires A and B are in the ratio of a : b. Then $\frac{a}{b}$ can be expressed as $\frac{1}{x}$ where x is ____

Ans. Official Answer by NTA (32)

Sol. $\Delta L_A = 2mm = 2\times10^{-3}\,m$

$\Delta L_B = 4mm = 4\times10^{-3}\,m$

$\frac{r_B}{r_A} = 4$

$F_A = F_B = 2N$

Wires made of same material , $\gamma_A = \gamma_B$.

Stress = γ (Strain)

$$\frac{F}{A} = \gamma\left(\frac{\Delta L}{L}\right) \Rightarrow L = \frac{A\gamma\Delta L}{F}$$

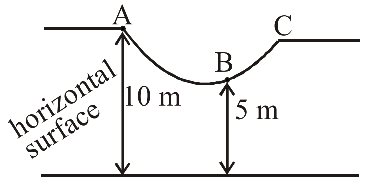
$$\frac{L_A}{L_B} = \left(\frac{A_A}{A_B}\right)\left(\frac{\gamma_A}{\gamma_B}\right)\left(\frac{\Delta L_A}{\Delta L_B}\right)\left(\frac{F_B}{F_A}\right)$$

$$\frac{a}{b} = \left(\frac{\pi r_A^2}{\pi r_B^2}\right)(1)\left(\frac{2\times10^{-3}}{4\times10^{-3}}\right)\left(\frac{2}{2}\right)$$

$$\frac{a}{b} = \left(\frac{1}{4}\right)^2\left(\frac{1}{2}\right)$$

$\frac{a}{b} = \frac{1}{32}$ compare with $'\frac{1}{x}'$

x = 32

6. 

As shown in the figure, a particle of mass 10 kg is placed at a point A. When the particle is slightly displaced to its right, it starts moving and reaches the point B. The speed of the particle at B is x m/s. (Take $g = 10 m/s^2$)

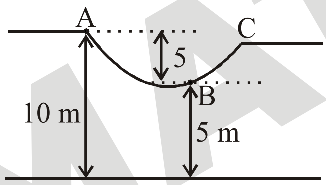
The value of 'x' to the nearest integer is___.

Ans. Official Answer by NTA (10)

Sol. Apply Energy conservation theorem $\Rightarrow \Delta U + \Delta KE = 0$

$$mg(-5) + \frac{1}{2}m\left(V_B^2 - V_A^2\right) = 0$$

$$-mg(5) + \frac{1}{2}m\left(V_B^2 - 0\right) = 0$$



$$V_B = \sqrt{10g}$$

$$\Rightarrow V_B = \sqrt{10 \times 10} \qquad \Rightarrow V_B = 10 m/s$$

7. A bullet of mass 0.1 kg is fired on a wooden block to pierce through it, but stops after moving a distance of 50 cm into it. If the velocity of bullet before hitting the wood is 10m/s and it slows down with uniform deceleration, then the magnitude of effective retarding force on the bullet is 'x' N.

The value of 'x' to the nearest integer is ____ .

Ans. Official Answer by NTA (10)

Sol. Deceleration is uniform, a = constant

Mag. of retarding force = F = ma = constant

fore is constant so work done (W) = $\vec{F}.\vec{S}$

Apply work energy theorem $\Rightarrow W = \Delta K.E. = \frac{1}{2}m\left(V_f^2 - V_i^2\right)$

$F(50\times10^{-2}) = \frac{1}{2}(0.1)(0^2 - 10^2)$

$F = -10$ N

–ve sign shows that direction of force opposite to direction of displacement

magnitude = 10N

8. A parallel plate capacitor has plate area 100 m^2 and plate separation of 10m. The space between the plates is filled up to a thickness 5m with a material of dielectric constant of 10.

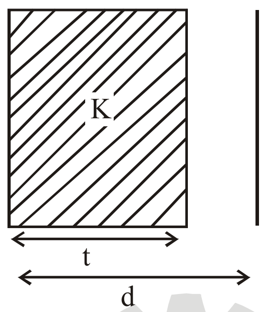
The resultant capacitance of the system is 'x' pF.

The value of $\varepsilon_0 = 8.85\times10^{-12}\,F.m^{-1}$

The value of 'x' to the nearest integer is____.

Ans. Official Answer by NTA (161)

Sol.



$$C = \frac{A\varepsilon_0}{\left(d - t + \frac{t}{k}\right)}$$

$$C = \frac{100\times8.85\times10^{-12}}{\left(10 - 5 + \frac{5}{10}\right)}$$

$$C = \frac{8.85\times10^{-12}}{5.5} = 160.9\times10^{-12}\,F$$

C = 161 PF

9. An npn transistor operates as a common emitter amplifier with a power gain of 10^6. The input circuit resistance is $10k\Omega$. The common emitter current gain 'β' will ____.(Round off to the Nearest Integer)

Ans. Official Answer by NTA (100)

Sol. $P = \frac{\beta^2 R}{r}$

$10^6 = \frac{\beta^2 \times 10 \times 10^3}{100}$

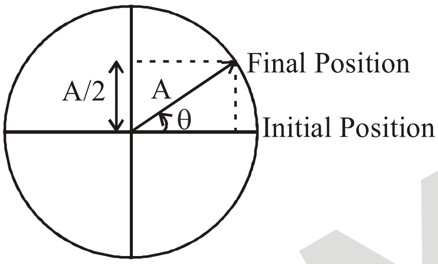
$\beta^2 = 10^4$

$\beta = 10^2 = 100$

10. A particle performs simple harmonic motion with a period of 2 second. The time taken by the particle to cover a displacement equal to half of its amplitude from the mean position is $\frac{1}{a}$s.
The value of 'a' to the nearest integer is___.

Ans. Official Answer by NTA (6)

Sol.



In Right Angled triangle $\Rightarrow A\sin\theta = \frac{A}{2}$

$\Rightarrow \sin\theta = \frac{1}{2}$

$\Rightarrow \theta = \frac{\pi}{6}$ radian

$T = \frac{2\pi}{\omega} \Rightarrow \frac{2\pi}{T} = \frac{2\pi}{2}$

$w = \pi$ rad / sec

time taken (t) = $\frac{\theta}{\omega}$

$t = \frac{\pi/6}{\pi} = \frac{1}{6}$

Compare with $t = \frac{1}{a}$

$\Rightarrow a = 6$