PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 80

Physics

1. A small block of mass M moves on a frictionless surface of an inclined plane, as shown in the figure. The angle of the incline

suddenly changes from 60° to 30° at point B.

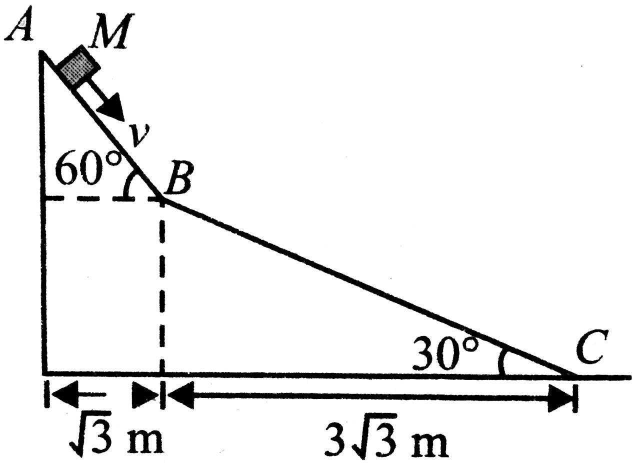
The block is many at rest at A. Assume that

collisions between the block id the incline are

totally inelastic.

The speed of the block at point C, immediately

before it leaves the second incline



A. $\sqrt{120}ms^{-1}$

B. $\sqrt{105}ms^{-1}$

C. $\sqrt{90}ms^{-1}$

D. $\sqrt{75}ms^{-1}$

Answer: B

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2. A metal wire of resistance 3Ω is elongated to make a uniform wire of double its previous length. This new wire is now bent and the ends joined to make a circle. If two points on this circle make an angle 60° at the center, the equivalent resistance between these two points will be :

A. $\frac{5}{3}\Omega$

B. $\frac{12}{5}\Omega$

C. $\frac{7}{2}\Omega$

D. $\frac{5}{2}\Omega$

Answer: A

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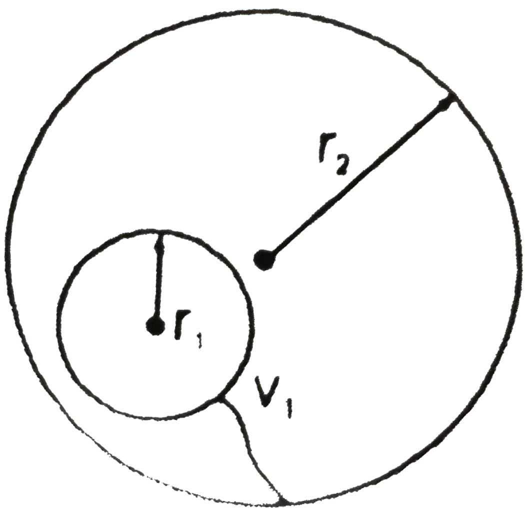
3. A metal sphere of radius r_1 charges to a potential V_1 is then placed in a thin-walled uncharged conducting spherical shell of radius r_2. Determine the potential acquired by the spherical shell after it has been connected for a short time to the sphere by a conductor.



A. $V_1 \frac{a}{b}$

B. $V_1 \frac{b}{a}$

C. $\frac{V_1(a+b)}{b}$

D. $\frac{V_1 a}{a+b}$

Answer: A

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4. A body starts from rest and moves with constant acceleration. The ratio of distance covered by the body in nth second to that covered in n second is.

A. $\frac{2}{n} - \frac{1}{n^2}$

B. $\frac{1}{n^2} - \frac{1}{n}$

C. $\frac{2}{n^2} - \frac{1}{n}$

D. $\frac{2}{n} + \frac{1}{n^2}$

Answer: A

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5. The masses and radii of the earth an moon are M_1 and R_1 and M_2, R_2 respectively. Their centres are at a distacne r apart. Find the minimum speed with which the particle of mass m should be projected from a point mid-way between the two centres so as to escape to infinity.

A. $\frac{G(M_1 + M_2)}{d}$

B. $2\sqrt{\frac{G(M_1 + M_2)}{d}}$

C. $\sqrt{\frac{Gd}{M_1 + M_2}}$

D. $\sqrt{\frac{M_1 + M_2}{Gd}}$

Answer: B

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6. Calculate the daily loss of energy by the earth, if the temperature gradient in the earth's crust is $32^{\circ} C$ per km and mean conductivity of the rock is 0.008 of CGS unit. (Given radius of earth $= 6400 km$)

A. 10^{30} cal

B. 10^{40} cal

C. 10^{20} cal

D. 10^{18} cal

Answer: D

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7. Find the minimum attainable pressure of an ideal gas in the process $T = T_0 + \alpha V^2$, Where T_0 and α are positive constant and V is the volume of one mole of gas. Draw the approximate $T - V$ plot of this process.

A. $2R\sqrt{\alpha T_0}$

B. $3R\sqrt{\alpha T_0}$

C. $3R$

D. $3R\sqrt{\frac{\alpha T_0}{2}}$

Answer: A

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8. A wire in the from of a square of side $'a'$ carries a current i. Then the magnetic induction at the centre of the square wire is (Magnetic permeability of free space=μ_0)

A. $\frac{\mu_0 i}{2\pi a}$

B. $\frac{\mu_0 i\sqrt{2}}{\pi a}$

C. $\frac{2\sqrt{2}\mu_0 i}{\pi a}$

D. $\frac{\mu_0 i}{\sqrt{2}\pi a}$

Answer: C

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9. To a stationary man, rain appears to be falling at his back at an angle 30° with the vertical. As he starts moving forward with a speed of $0.5 ms^{-1}$, he finds that the rain is falling vertically.

The speed of rain with respect to the stationary man is.

A. 0.5 m s^{-1}

B. 1 m s^{-1}

C. $\frac{\sqrt{3}}{2} \text{ m s}^{-1}$

D. $\frac{1}{\sqrt{3}} ms^{-1}$

Answer: B

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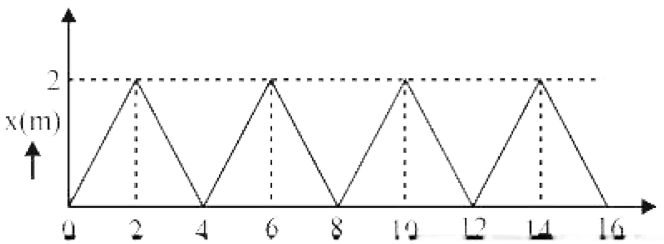
10. The figure shows the position – time (x – t) graph of one – dimensional motion of a body of mass 0.4 kg. The magnitude of each impulse is:



A. 0.4 N s

B. 0.8 N s

C. 1.6 N s

D. 0.2 N s

Answer: B

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11. There is a stream of neutrons with a kinetic energy of $0.0327 eV$. If the half-life of neutrons is $700 s$, what fraction of neutrons will decay before they travel is distance of $10 m$? Given mass of neutron $= 1.676 \times 10^{-27} kg$.

A. 3.96×10^{-6}

B. 3.90×10^{-6}

C. 3.85×10^{-6}

D. 4.86×10^{-6}

Answer: A

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12. An oil drop carrying a charge q has a mass m kg. it is falling freely in air with terminal speed v. the electric field required to make, the drop move upwards with the same speed is

A. $\frac{mg}{q}$

B. $\frac{2mg}{q}$

C. $\frac{mgv}{q^2}$

D. $\frac{2mgv}{q}$

Answer: B

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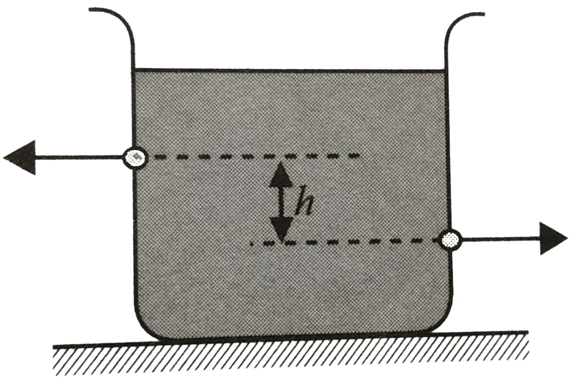
13. There are two identical small holes of area of cross section a on the opposite sides of a tank containing liquid of density ρ. The differences in height between the holes is h. The tank is resting on a smooth horizontal surface. The horizontal force which will have to be applied on the tank to keep it in equilibrium is



A. $gh\rho a$

B. $\frac{2gh}{\rho a}$

C. $2\rho agh$

D. $\frac{\rho gh}{a}$

Answer: C

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14. A convex lens of focal length 10 cm and imag formed by it, is at least distance of distinct vision then the magnifying power is

A. 3.5

B. 2.5

C. 1.5

D. 1.4

Answer: A

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15. A uniform disc of mass M and radius R is mounted on a fixed horizontal axis. A block of mass m hangs from a massless string that is wrapped around the rim of the disc. The magnitude of the acceleration of the falling block (m) is

A. $\frac{2M}{M+2m}g$

B. $\frac{2m}{M+2m}g$

C. $\frac{M+2m}{2M}g$

D. $\frac{2M+m}{2M}g$

Answer: B

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16. A charge of 8.0 mA in the emitter current brings a charge of 7.9 mA in the collector current. The values of α and β are

A. 0.99, 90

B. 0.96, 79

C. 0.97, 99

D. 0.99, 79

Answer: D

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17. The specific heats of argon at constant pressure and constant volume are $525J/kg$ and $315J/kg$, respectively. Its density at NTP will be\

A. 0.64 kg m^{-3}

B. 1.20 kg m^{-3}

C. 1.75 kg m^{-3}

D. 2.62 kg m^{-3}

Answer: C

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18. The dimensions of magnetic flux are

A. $ML^2T^2I^{-1}$

B. $ML^{-2}T^{-2}I^{-2}$

C. $ML^2T^2I^{-2}$

D. $ML^2T^{-2}I^{-2}$

Answer: C

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19. Sound waves in the air are always longitudinal because

A. Of the inherent characteristics of sound waves in air

B. Air does not have a modulus of rigidity

C. Air is a mixture of several gases

D. Density of air is very small

Answer: B

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20. A block of mass $m = 0.1 kg$ is connceted to a spring of unknown spring constant k. It is compressed to a distance x from its equilibrium position and released from rest. After approaching half the distance $\left(\frac{x}{2}\right)$ from the euilibrium position, it hits another block and comes to rest momentarily, while the other block moves with velocity $3 ms^{-1}$. The total initial energy of the spring is :

A. 0.6 J

B. 0.8 J

C. 1.5 J

D. 0.3 J

Answer: A

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21. A hydrogen like atom (described by the Borh model) is observed to emit six wavelength, originating from all possible transitions between a group of levels. These levels have energies between - 0.85 eV and -

0.544 eV (including both these values). (a)Find the atomic number of the atom.

(b) Calculate the smallest wavelength emitted in these transitions.

(Take, hc = 1240 eV - nm, ground state energy of hydrogen atom =-13.6 eV)

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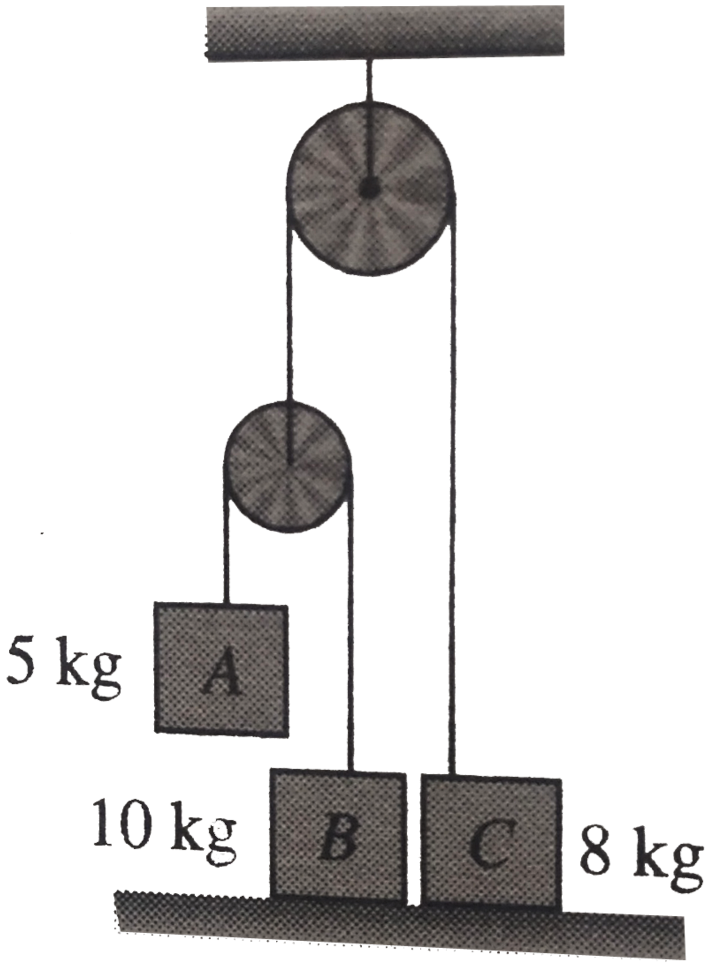
22. In the following arrangement, the system is initially at rest. The 5-kg block is now released. Assuming the pulley and string to be massless and smooth, the acceleration of block C will be



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23. A non - conducting ring of mass m = 4 kg and radius R = 10 cm has charge Q = 2 C uniformly distributed over its circumference. The ring is placed on a rough horizontal surface such that the plane of the ring is parallel to the surface. A vertical magnetic field $B = 4t^3T$ is switched on at t = 0. At t = 5 s ring starts to rotate about the vertical axis through the centre. The coefficient of friction between the ring and the surface is found to be $\frac{k}{24}$. Then the value of k is

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24. Two blocks of masses m_1=1kg and m_2 = 2kg are connected by a spring of spring constant k = 24 N/m and placed on a frictionless horizontal surface. The block m_1 is imparted an initial velocity v_0 = 12cm/s to the right. The amplitude of osciallation is

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25. Four monochromatic and coherent sources of light emitting waves in phase at placed on y axis at y = 0, a, 2a and 3a. If the intensity of wave reaching at point P far away on y axis from each of the source is almost the same and equal to I_0, then the resultant intensity at P for $a = \frac{\lambda}{8}$ is nI_0. The value of $[n]$ is.

Here [] is greatest integer funciton.

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