PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 50

Physics

1. photoelectron are emitted when $4000A^0$ radiation is incident on a surface of work function $1.9eV$. these photoelectrons pass

through a region has α particles to form He^+ ion, emitting a single photon in this process He^+ ions thus formed are in their fourth excited state.

Energy released during during the combination of He^+ ions is

A. 5.38 eV

B. 3.38 eV

C. 2.38 eV

D. 1.38 eV

Answer: B

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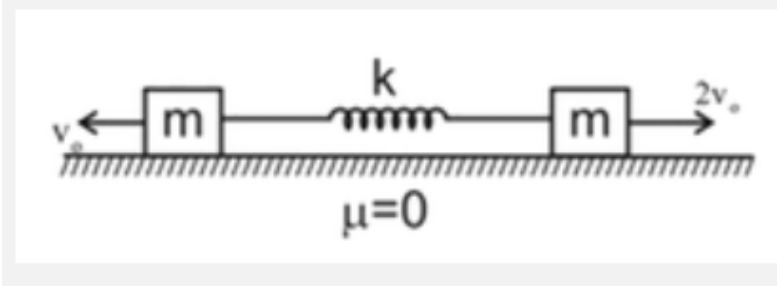
2. The figure shows two blocks of mass m each, connected by an ideal unstretched spring and then placed on a frictionless floor. If the blocks are given velocities v_0 and $2v_0$ as shown, then the maximum extension in the spring is



A. $\sqrt{\frac{mv_0^2}{k}}$

B. $\sqrt{\frac{mv_0^2}{2k}}$

C. $\sqrt{\frac{9mv_0^2}{2k}}$

D. None of these

Answer: C

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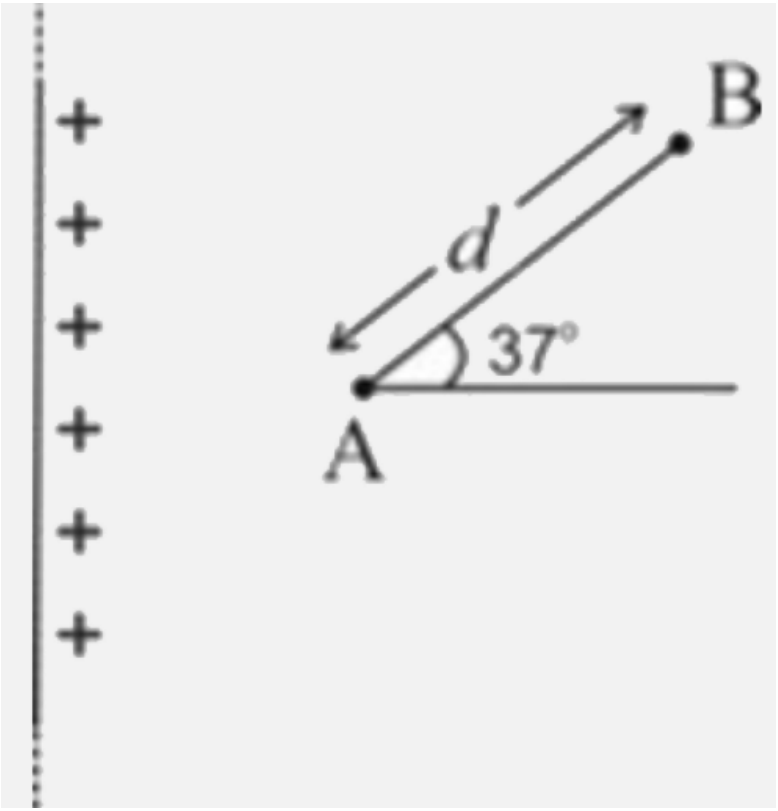
3. An infinite thin non - conducting sheet has uniform surface charge density σ. Find the potential difference $V_A - V_B$ between points

A and B as shown in the figure. The line AB makes an angle of 37° with the normal to the sheet. $\left(\sin 37^\circ = \frac{3}{5}\right)$



A. $\frac{2\sigma d}{5\varepsilon_0}$

B. $\frac{-2\sigma d}{5\varepsilon_0}$

C. $\frac{3}{10}\frac{\sigma d}{\varepsilon_0}$

D. $\frac{-3\sigma d}{10\varepsilon_0}$

Answer: A

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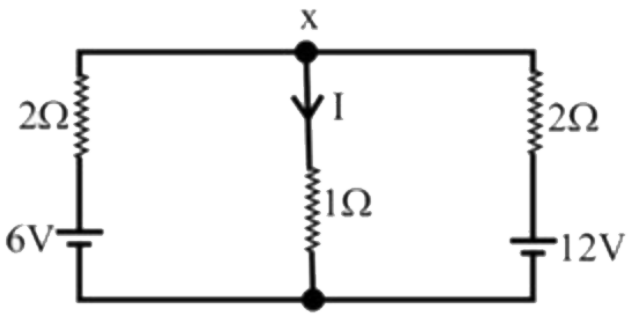
4. Find the current I in the given circuit



A. $2A$

B. 4. 5 A

C. $6A$

D. 1.5 A

Answer: B

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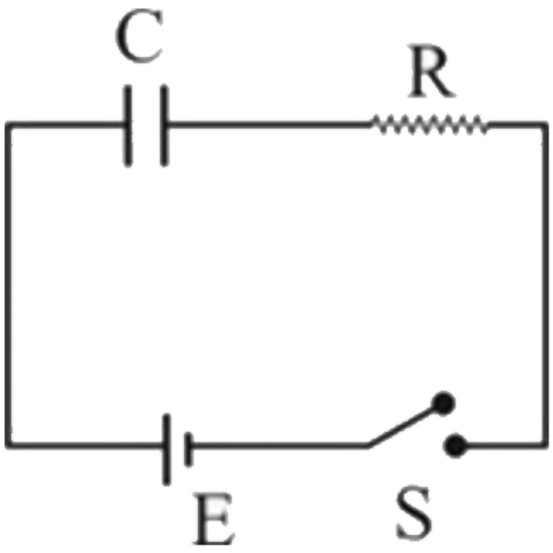
5. The capacitor shown in the figure is initially unchanged, the battery is ideal. The switch S is closed at time t= 0, then the time after which

the energy stored in the capacitor becomes one - fourth of the energy stored in it in steady - state is :



A. RC

B. RC ln 2

C. RC ln 4

D. 2RC

Answer: B

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6. A train moves towards a stationary observer with speed $34m/s$. The train sounds a whistle and its frequency registered by the observer is f_1. If the train's speed is reduced to $17m/s$, the frequency registered is f_2. If the speed of sound of $340m/s$, then the ratio $f_1/f_2$is

A. $18/19$

B. $1/2$

C. 2

D. $19/18$

Answer: D

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7. Physical quantity x and y are related as $y = 4\tan x$ .If at $x = \frac{\pi}{4}$ radian error in

measurement of x is 2% then find $\%$ error in measurement of y at $x = \frac{\pi}{4}$

A. 2%

B. $\frac{\pi}{2}\%$

C. $\frac{\pi}{6}\%$

D. $\pi\%$

Answer: B

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8. When gas is given heat ΔQ, a part of heat energy is utilized into work done W by gas and the remaining part is utilized to change in internal energy. An ideal diatomic gas is heated at constant pressure, the ratio of the internal energy change to heat energy supplied, is

A. $\frac{3}{7}$

B. $\frac{2}{5}$

C. $\frac{5}{7}$

D. $\frac{3}{5}$

Answer: C

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9. A circular loop of radius R carrying current I is kept in XZ plane. A uniform and constant magnetic field $\overrightarrow{B} = \left(B_0\hat{i} + 2B_0\hat{j} + 3B_0\hat{k}\right)$ exists in the region ($B_0 -$ a positive constant). Then the magnitude of the torque acting on the loop will be

A. $2I\pi R^2 B_0$

B. $\sqrt{5}I\pi R^2 B_0$

C. $\sqrt{10}I\pi R^2 B_0$

D. $6I\pi R^2 B_0$

Answer: C

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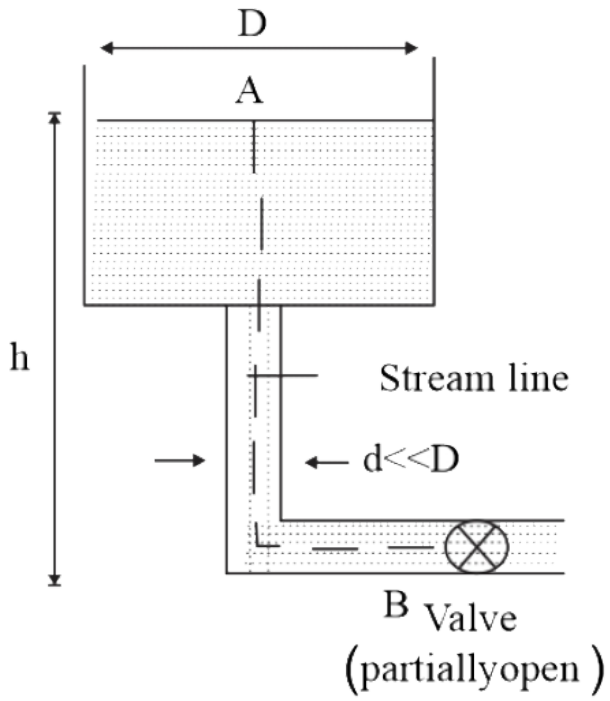
10. A storage tower supplies water, as shown in the figure. If P_0 is the atmospheric pressure h = height of water level, g = acceleration due

to gravity, $\rho =$ density and v = velocity of flow in the horizontal pipe at B, then the pressure at B is -



A. P_0

B. $P_0 + \rho gh$

C. $P_0 + \rho gh + \frac{1}{2}\rho v^2$

D. $P_0 + \rho gh - \frac{1}{2}\rho v^2$

Answer: D

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11. The electric field associated with a light wave is given by $E = E_0 \sin\left[\left(1.57 \times 10^7 m^{-1}\right)(ct - x)\right]$. Find the stopping potential when this light is used in an experiment on a photoelectric effect

with the emitter having work function 2.1eV.

$h = 6.62 \times 10^{-34} Js.$

A. 0.6 eV

B. 1.2 eV

C. 1.8 eV

D. 2. 4 eV

Answer: B

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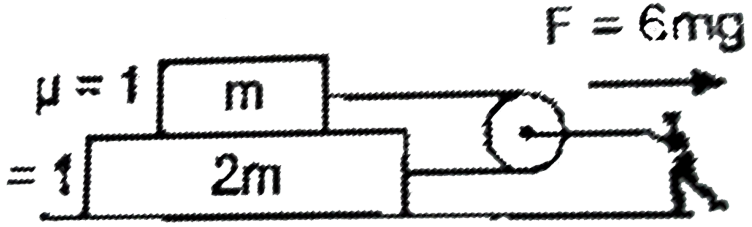
12. A block of mass m rests on top of a block of mass 2m which ls kept on a table. The coefficient of kinetic friction between all surfaces is $\mu = 1A$ massless string is connected to each mass and wraps halfway around a massless pulley, as shown. Assume that you pull on the pulley with a force of 6 mg. What ls the acceleration of your hand ?



A. $\frac{g}{2}$

B. 2 g

C. $\frac{5g}{4}$

D. $\frac{4g}{5}$

Answer: C

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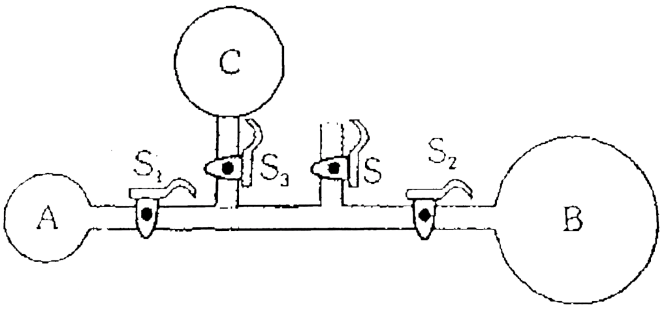
13.



The adjoining diagram shows three soap

bubbles, A , B and C prepared by blowing the capillary tube fitted with stop cocks S, S_1, S_2 and S_3 with stop cock S closed and stop cocks S_1, S_2 and S_3 opened-

A. B will start collapsing with volumes of A and C increasing

B. C will start collapsing with volumes of A and B increasing

C. C and A both will start collapsing with the volume of B increasing

D. Volume of A, B and C will become equal to equilibrium

Answer: A

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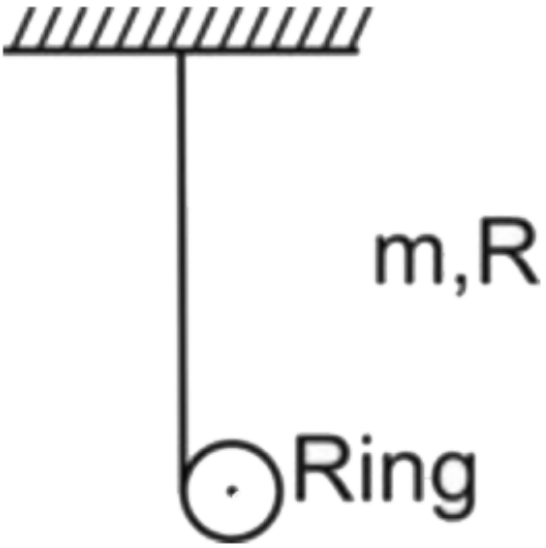
14. An ideal string is wrapped on a ring and the free end of the string is attached to the ceiling as shown in the figure. Initially, the system is held in equilibrium by an external agent and at some instant of time, the system

is released from rest. If there is no slipping between the string and the ring, then the tension in the string is



A. mg

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

C. $\frac{mg}{3}$

D. 2mg

Answer: B

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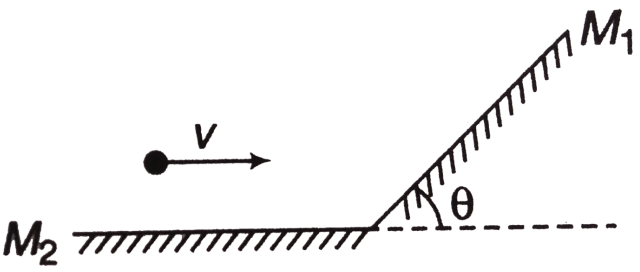
15. A point object is moving with a speed v before an arrangement of two mirrors as shown in

figure. Find the magnitude of velocity of image in

mirror M_1 with respect to image in mirror M_2



A. $v_0\sqrt{3}$

B. $v_0\sqrt{6}$

C. $\frac{v_0}{\sqrt{3}}$

D. $\left(\frac{v_0\sqrt{3}}{2}+v_0\right)$

Answer: B

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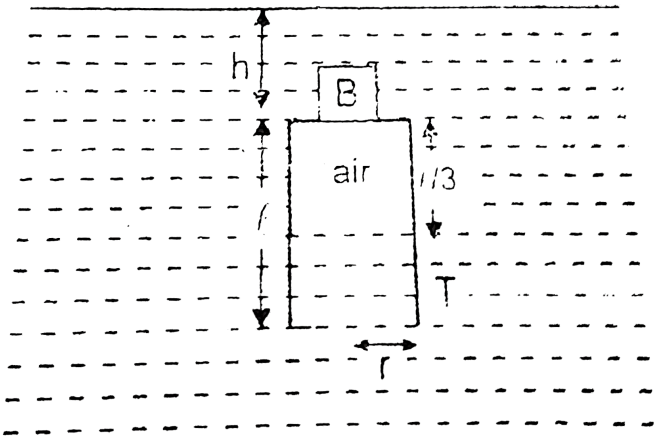
16. A light cylindrical tube 'T' of length l and radius 'r' containing air is inverted in water (density d). One end of the tube is open and the other is closed A block 'B' of density 2d is kept on the tube as shown in the figure. The tube stays in equilibrium in the position shown. (Assume the atmosphere pressure is to be P_0)

Assume that density of air is very small than density of block and water. Pick up the correct

statement (s)



A. $v = \dfrac{d_1}{d_2 - d_1}\dfrac{pr^2 l}{3}$

B. $v = \dfrac{d_2}{d_2 - d_1}\dfrac{pr^2 l}{3}$

C. $v = \dfrac{d_1}{d_1 - d_2}\dfrac{pr^2 l}{3}$

D. $\dfrac{d_1}{d_2}\dfrac{pr^2 l}{3}$

Answer: A

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17. The velocity of a particle measured from an instrument is 0.00204300 m/s. The number of significant figures is

A. 8

B. 4

C. 6

D. 3

Answer: C

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18. White light is used to illuminate the two slits in Young's double slit experiment. The separation between the slits is b and the screen is at a distance $D > > b$ from slits. At a point on the screen directly in front of one of the slits, the missing wavelengths are

A. $\frac{2x^2}{z}$

B. $\frac{3x^2}{z}$

C. $\frac{x^2}{5z}$

D. $\frac{x^2}{2z}$

Answer: C

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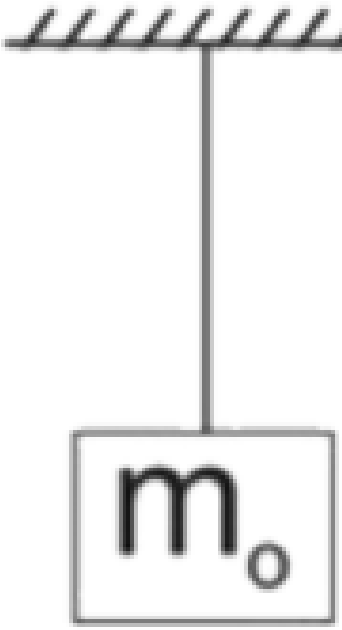
19. The block of mass $m_0 = \mu L$ is attached to a uniform string of mass $M = \mu L$ and length L as shown in the figure. If a wave pulse is produced near the block, then the time it

taken to reach the ceiling is



A. $(\sqrt{2}-1)\sqrt{\frac{L}{g}}$

B. $2(\sqrt{2}+1)\sqrt{\frac{L}{g}}$

C. $2(\sqrt{2}-1)\sqrt{\frac{L}{g}}$

D. $(\sqrt{2}+1)\sqrt{\frac{L}{g}}$.

Answer: C

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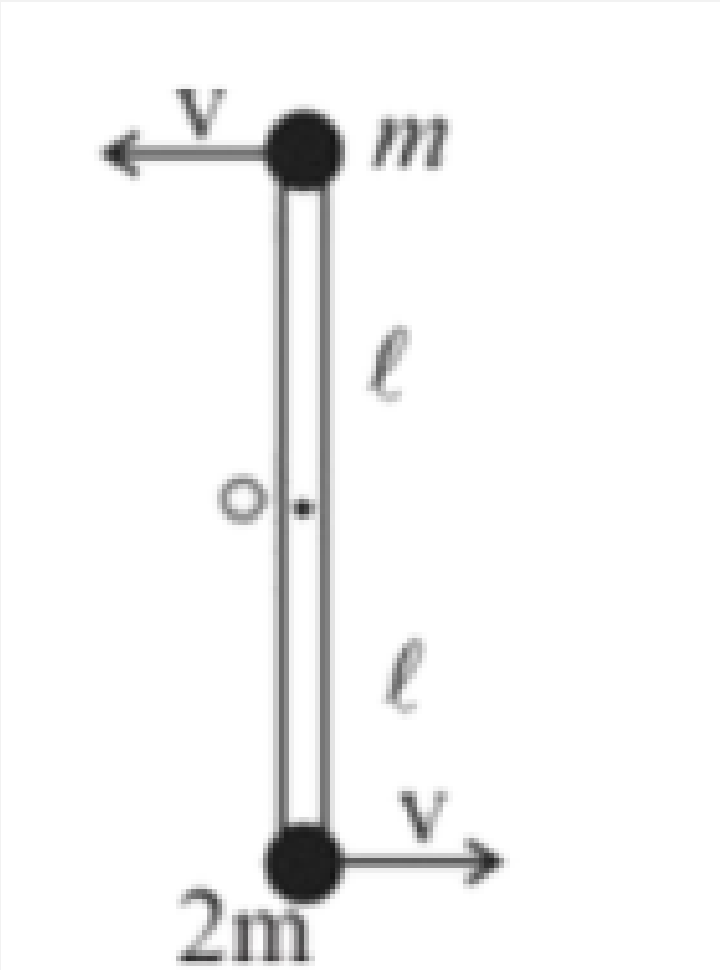
20. Two particles of masses m and 2m are attached to the massless rod of length 2l as shown in figure. The rod is hinged at its midpoint O and is free to rotate in vertical plane about hinge. The minimum speed v at the given instant so that it can complete the

circle.



A. $\sqrt{gl}$

B. $\sqrt{4gl}$

C. $\sqrt{5gl}$

D. $\sqrt{\frac{4gl}{3}}$

Answer: D

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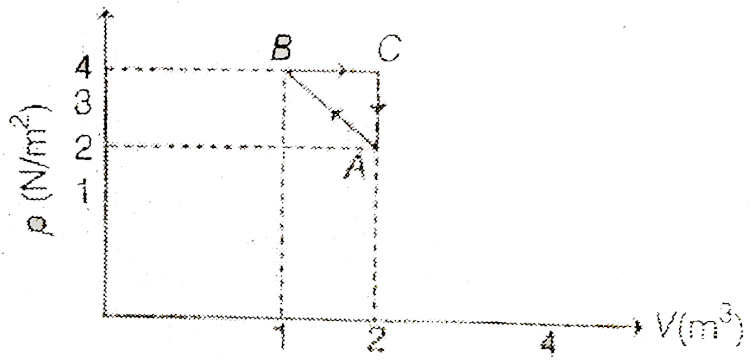
21. Corresponding to the process shown in figure, the heat given to the gas in the process

ABCA is $(0.2x)J$. Find value of x.



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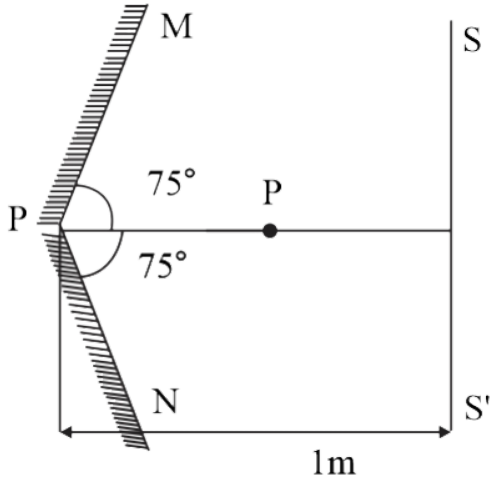
22. Two large plane mirrors PM and PN are arrange as shown. The length of the part of large screen SS' in which two image of the object placed at P can be seen is x (in m). Find

the value $\sqrt{3}x$.



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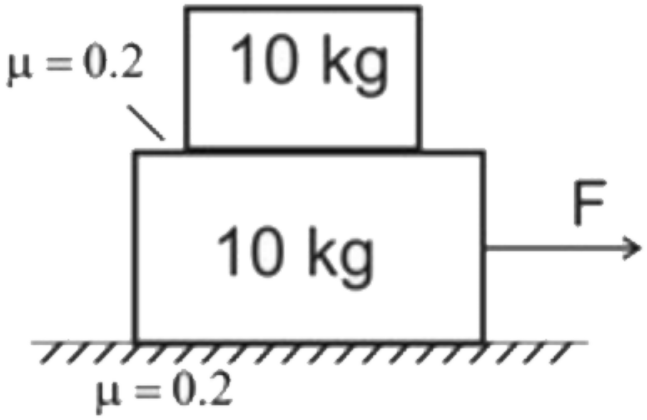
23. Initially, both the blocks are at rest on horizontal surface as shown in the figure. Find the minimum value of force F in (N) so that

sliding starts between the blocks $(g = 10ms^{-2})$



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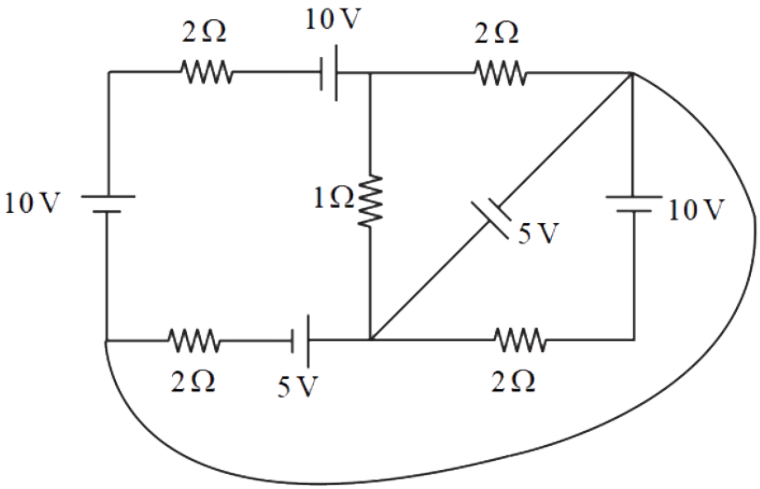
24. In the given cirucit diagram the current through the 1Ω resistor is I. Find the value of

2I (in A)?



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25. The equation of a stationary wave in a metal rod is given by $y = 0.92 \sin. \frac{\pi x}{3} \sin 1000t$, where x is in cm

and t is in second. The maximum tensile stress at a point x = 1 cm is $\frac{n\pi}{3} \times 10^8 \text{ dyne cm}^{-2}$. What is the value of n? [Young's modulus of the material of rod is $= 8 \times 10^{11} \text{ dyne cm}^{-2}$]

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