PHYSICS

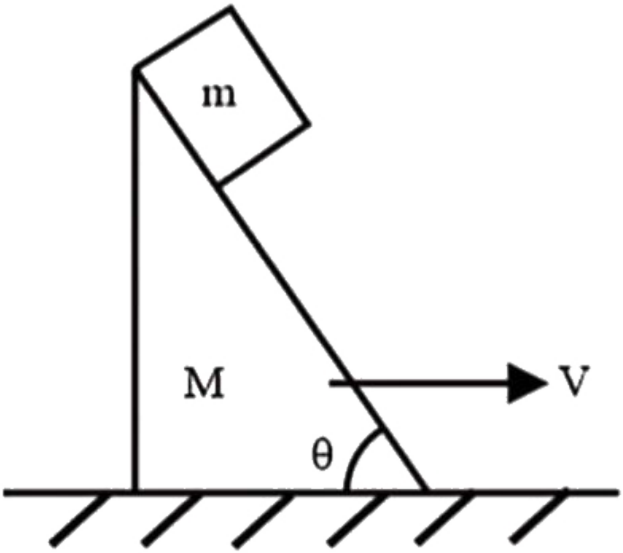
BOOKS - NTA MOCK TESTS

NTA NEET SET 29

Physics

1. A block of mass m is stationary with respect to the wedge of mass M moving with uniform speed v on horizontal surface. Work done by friction

force on the block in t seconds is



A. zero

B. $-\frac{mgvt}{2}\sin 2\theta$

C. $-\frac{mgvt}{2}$

D. $-\frac{mgvt}{4}\sin 2\theta$

Answer: B

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2. The wavelength of light coming from a distant galaxy is found to be $0.5\,\%$ more than that coming from a source on earth. Calculate the velocity of galaxy.

A. $3 \times 10^{10} ms^{-1}$

B. $1.5 \times 10^{10} ms^{-1}$

C. $1.5 \times 10^{8} ms^{-1}$

D. $1.5 \times 10^{6} ms^{-1}$

Answer: D

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3. In a single slit diffraction of light of wavelength λ by a slit of width e, the size of the central maximum on a screen at a distance b is

A. $2b\lambda + e$

B. $\frac{2b\lambda}{e}$

C. $\frac{2b\lambda}{e} + e$

D. $\frac{2b\lambda}{e} - e$

Answer: C

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4. When a polaroid sheet is rotated between two crossed polaroids, the intensity of the transmitted will be maximum, when angle θ between pass axes is

A. $\theta = 90^\circ$

B. $\theta = 0^\circ$

C. $\theta = 45^\circ$

D. it is independent of angle

Answer: C

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5. If the diameter of a cylinder is 12.6 ± 0.1 cm and its height is 34.2 ± 0.1 , then find the volume of the cylinder to the nearest significant figure .

A. $426.4 \pm 81 cm^3$

B. $4260 \pm 81 cm^3$

C. $4300 \pm 80 cm^3$

D. $4260 \pm 80 cm^3$

Answer: D

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6. Four molecules of ags have speeds 1,2,3 and 4 km / s.The volume of the root mean square speed of the gas molecules is

A. $\frac{1}{2}\sqrt{15} kms^{-1}$

B. $\frac{1}{2}\sqrt{10}kms^{-1}$

C. $2.5kms^{-1}$

D. $\sqrt{\frac{15}{2}}kms^{-1}$

Answer: D

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7. An amount of water of mass 20 g at $0^{\circ}C$ is mixed with 40 g of water at $10^{\circ}C$. Final temperature of mixture is

A. $5^{\circ}C$

B. $0^{\circ}C$

C. $20^{\circ}C$

D. $6.66^{\circ}C$

Answer: D

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8. A crystal of intrinsic silicon at room temperature has a carrier concentration of $1.6 \times 10^{16} m^{-3}$. If the donor concentration level is $4.8 \times 10^{20} m^{-3}$, then the concentration of holes in the semiconductor is

A. $53 \times 10^{12} m^{-3}$

B. $4 \times 10^{11} m^{-3}$

C. $4 \times 10^{12} m^{-3}$

D. $5.3 \times 10^{11} m^{-3}$

Answer: D

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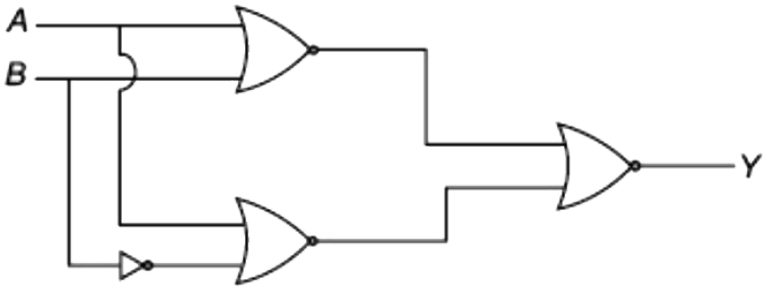
9. The output of the given logic circuit is



A. A + B

B. $A + \overline{B}$

C. A

D. B

Answer: C

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10. When a silicon PN junction is in forwards biased condition with series resistance, it has knee voltage of $0.6V$. Current flow in it is $5mA$,

when PN junction is connected with $2.6V$ battery, the value of series resistance is

A. 100Ω

B. 200Ω

C. 400Ω

D. 500Ω

Answer: C

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11. The distance between the centres of carbon and oxygen atoms in the carbon monoxide molecule is 1.130Å . Locate the centre of mass of the molecule relative to the carbon atom .

A. 5.428Å

B. 1.130Å

C. 0.6457Å

D. $0.3260Å$

Answer: C

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12. What is the magnitude of torque acting on a particle moving in the xy - plane about the origin if its angular momentum is $4.0\sqrt{t}kgm^2s^{-1}$?

A. $8t^{3/2}$

B. $\frac{4}{\sqrt{t}}$

C. $\frac{2}{\sqrt{t}}$

D. $\frac{3}{2\sqrt{t}}$

Answer: C

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13. If two mirrors are inclined at some angle and an object is placed between the mirrors and there are 7 images formed for an object, then the angle between the mirrors is

A. 54°

B. 45°

C. 60°

D. 64°

Answer: B

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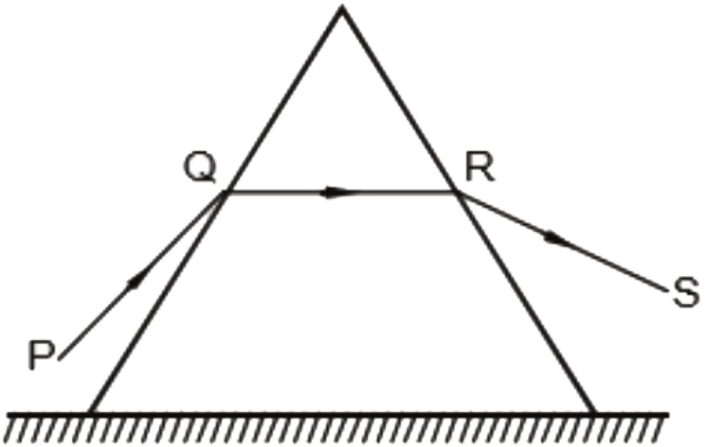
14. A ray of light is incident on an equilateral glass prism placed on a horizontal table. Which of the following is true for the condition of

minimum deviation ?



A. PQ is horizontal

B. QR is horizontal

C. RS is horizontal

D. either PQ or RS is horizontal

Answer: B

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15. The excess pressure inside an air bubble of radius r just below the surface of water is P_1. The excess pressure inside a drop of the same radius just outside the surface is P_2. If T is surface tension then

A. $P_1 = 2P_2$

B. $P_1 = P_2$

C. $P_2 = 2P_1$

D. $P_2 = 0, P_1 \neq 0$

Answer: B

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16. A small tiny lead shot is gently dropped on the surface of a viscous liquid

A. the lead shot will fall will an acceleration equal to g at that place

B. the velocity of the lead shot will decrease with time

C. the velocity of the lead shot will increase continuously

D. the velocity of the lead shot will reach a steady value after sometime

Answer: D

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17. The kinetic energy of the most energetic photoelectrons emitted from a metal surface is doubled when the wavelength of the incident radiation is reduced from $\lambda_1 \text{ to } \lambda_2$ The work function of the metal is

A. $\frac{hc}{\lambda_1\lambda_2}(2\lambda_2 - \lambda_1)$

B. $\frac{hc}{\lambda_1\lambda_2}(2\lambda_1 - \lambda_2)$

C. $\frac{hc}{\lambda_1\lambda_2}(\lambda_1 + \lambda_2)$

D. $\frac{hc}{\lambda_1\lambda_2}(\lambda_1 - \lambda_2)$

Answer: A

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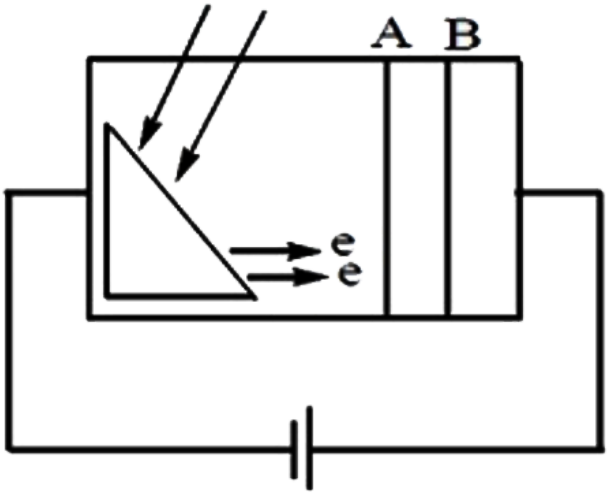
18. In a photoelectric experiment under conditions of saturation current , we consider two different cross - section A and B as shown. Here , v_A and v_B represent the average speed of electrons at the two cross - sections .



A. $i_A > i_B$

B. $v_A = v_B$

C. $i_A = i_B$

D. $v_A > v_B$

Answer: C

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19. The velocity of a particle varies with its displacement as $v = \left(\sqrt{9 - x^2}\right) ms^{-1}$.

Find the magnitude of the maximum acceleration of the particle.

A. $3ms^{-2}$

B. $4ms^{-2}$

C. $3.5ms^{-2}$

D. $5ms^{-2}$

Answer: A

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20. A mass (M) is suspended from a spring of negligible mass. The spring is pulled a little and then released so that the mass executes SHM of time period T. If the mass is increased by m, the time period becomes $\frac{5T}{3}$. Then the ratio of $\frac{m}{M}$ is .

A. $3/5$

B. $25/9$

C. $16/9$

D. $5/3$

Answer: C

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21. The end product of the β^- decay of ${}_{15}^{32}P$ is

A. ${}_{16}^{32}S$

B. ${}_{16}^{35}S$

C. ${}_{14}^{32}N$

D. ${}_{17}^{32}Cl$

Answer: A

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22. A radio isotope X with a half-life 1.4×10^9 years decays of Y which is stable. A sample of the rock from a cave was found to contain X and Y in the ratio $1:7$. The age of the rock is.

A. 2×10^9 years

B. 3×10^9 years

C. 6×10^9 years

D. 7×10^9 years

Answer: B

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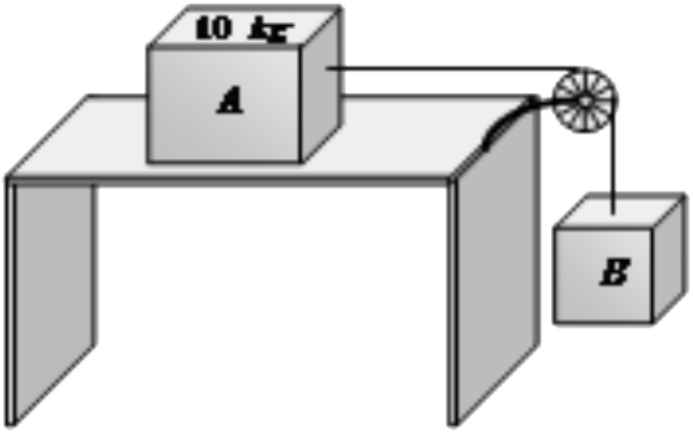
23. If the mass of the block A = 10 kg and the coefficient of static and kinetic friction is 0.2, then the mass of block B to start the motion is



A. 2 kg

B. 2.2 kg

C. 4.8 kg

D. 200 g

Answer: A

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24. A projectile is projected from the ground by making an angle of 60° with the horizontal. After 1 s projectile makes an angle of 30° with the horizontal . The maximum height attained by the projectile is (Take $g = 10ms^{-2}$)

A. $\frac{45}{2}m$

B. $\frac{45}{4}m$

C. $\frac{43}{2}m$

D. $\frac{43}{4}m$

Answer: B

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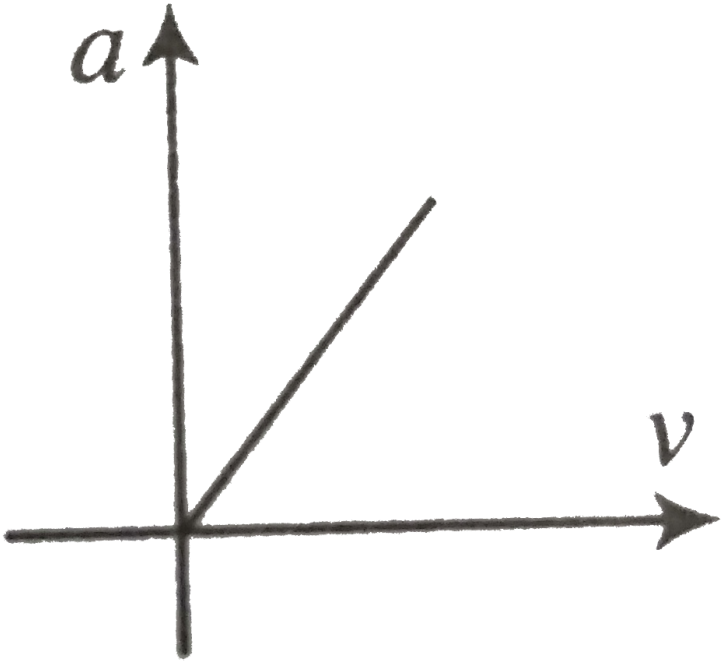
25. The acceleration - velocity graph of a particle moving in a straight line is shown in figure. Then the slope of the velocity- displacement graph



A. increases linearly decrease linearly

B. decreases linearly

C. is constant

D. increases parabolically

Answer: C

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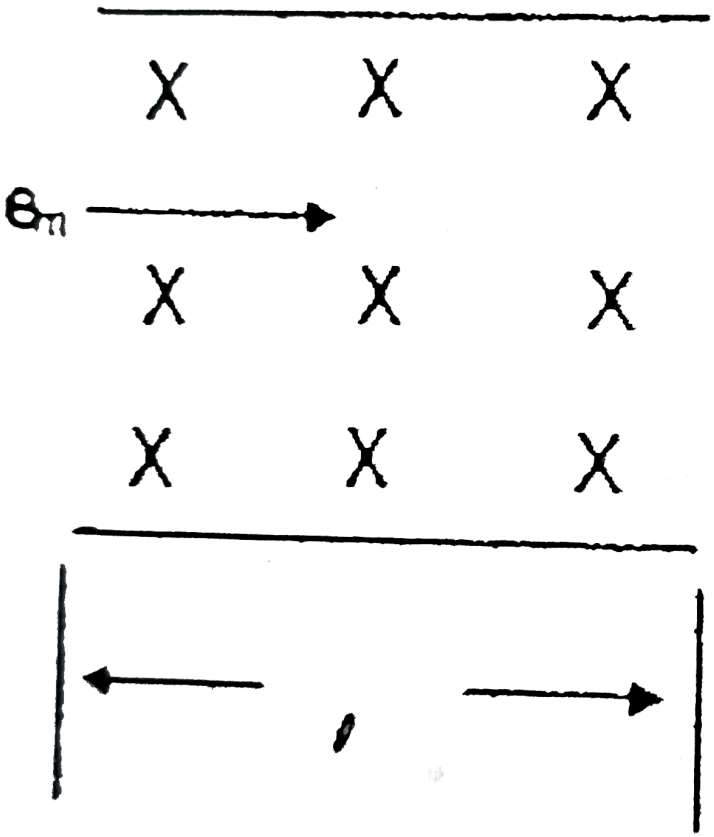
26. An electron moves straight inside a charged parallel plate capacitor of uniform surface charge density σ. The space between the plates is filled with constant magnetic field of induction $\vec{B}$. The time of straight line motion of the electron in the capacitor is



A. $\frac{e\sigma}{\varepsilon_{01}B}$

B. $\frac{\varepsilon_{01} B}{\sigma}$

C. $\frac{e 1 \sigma}{\varepsilon_0 B}$

D. $\frac{\varepsilon_0 1 B}{3\sigma}$

Answer: B

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27. An (α)-particle and a proton are both simultaneously projected in opposite direction into a region of constant magnetic field perpendicular to the direction of the field. After some time it is found that the velocity of the (α)-particle has changed in a direction by 45°. Then at this time, the angle between velocity vectors of (α)-particle and proton is

A. 90°

B. 45°

C. $45^\circ + 90^\circ$

D. $\frac{45^\circ + 90^\circ}{2}$

Answer: C

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28. Calculate the gas constant for 1 g of gas from the following data :

$C_p = 0.245 \text{cal g}^{-1}.^\circ C^{-1}, C_v = 0.165 \text{ cal g}^{-1}.^\circ C^{-1}$ and $J = 4.2 \times 10^7$e

A. $3.36 \times 10^6 \text{erg g}^{-1}.^\circ C^{-1}$

B. $2.13 \times 10^6 \text{erg g}^{-1}.^\circ C^{-1}$

C. $4.26 \times 10^6 \text{erg g}^{-1}.^\circ C^{-1}$

D. $4.57 \times 10^6 \text{erg g}^{-1}.^\circ C^{-1}$

Answer: A

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29. A Carnot engine efficiency is equal to $\frac{1}{7}$. If the temperature of the sink is reduced by 65 K , the efficiency becomes $\frac{1}{4}$. The temperature of the

source and the sink in the first case are respectively

A. 620 K, 520 K

B. 520 K, 606.67 K

C. 606.67K ,520K

D. 520K , 610K

Answer: C

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30. Two moles of ideal helium gas are in a rubber balloon at $30^\circ C$. The balloon is fully expandable and can be assumed to require no energy in its expansion. The temperature of the gas in the balloon is slowly changed to $35^\circ C$. The amount of heat required in raising the temperature is nearly (take R

$= 8.31 J/mol.\ K$)

A. 62 J

B. 140 J

C. 124 J

D. 208 J

Answer: D

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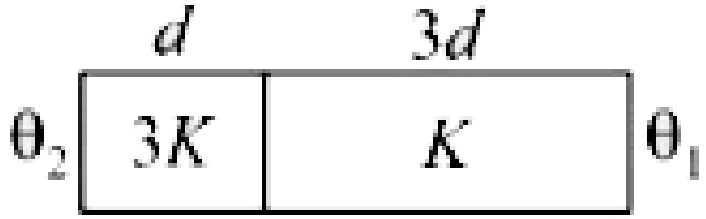
31. Two materials having coefficients of thermal conductivity '3 K' and 'K' and thickness 'd' and '3 d', respectively, are joined to form a slab as shown in the figure. The temperatures of the outer surfaces are θ_2 and θ_1 respectively, $(\theta_2 > \theta_1)$ The temperature at the interface is:



A. $\frac{\theta_2 + \theta_1}{2}$

B. $\frac{\theta_1}{6} + \frac{5\theta_2}{6}$

C. $\frac{\theta_1}{3} + \frac{2\theta_2}{3}$

D. $\frac{\theta_1}{10} + \frac{9\theta_2}{10}$

Answer: D

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32. The height of the point vertically above the earth's surface, at which acceleration due to gravtiy becomes 1% of its value at the surface is (Radius of the earth =R)

A. 8R

B. 9R

C. 10R

D. 20R

Answer: B

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33. Two planets are at distance R_1 and R_2 from the Sun. Their periods are T_1 and T_2 then $\left(\frac{T_1}{T_2}\right)^2$ is equal to

A. $\frac{R_1}{R_2}$

B. $\left(\frac{R_1}{R_2}\right)^2$

C. $\left(\frac{R_1}{R_2}\right)^3$

D. $\left(\frac{R_2}{R_1}\right)^3$

Answer: C

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34. If the potential of a capacitor having capacity of $6\mu F$ is increased from 10 V to 20 V,then increase in its energy will be

A. $12 \times 10^{-6} J$

B. $9 \times 10^{-6} J$

C. $4.5 \times 10^{-6} J$

D. $2.25 \times 10^{-6} J$

Answer: B

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35. How does the electric field (E) between the plates of a charged cylindrical capacitor vary with the distance r from the axis of the cylinder ?

A. $E \propto \frac{1}{r^2}$

B. $E \propto \frac{1}{r}$

C. $E \propto r^2$

D. $E \propto r$

Answer: B

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36. In an oscillating LC circuit the maximum charge on the capacitor is Q. The charges on the capacitor when the energy is stored equally between the electric and magnetic field is

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

B. $\frac{Q}{\sqrt{3}}$

C. $\frac{Q}{\sqrt{2}}$

D. Q

Answer: C

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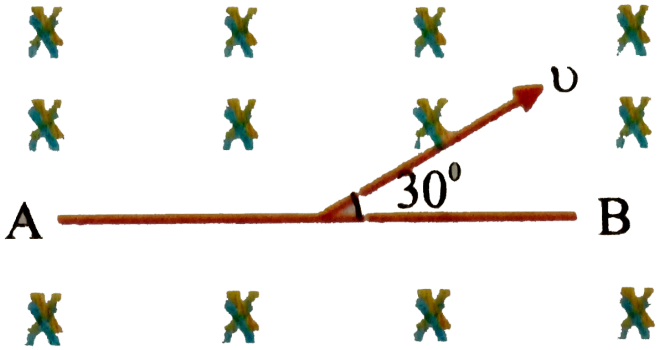
37. A conducitng rod AB of length $l = 1m$ moving at a velcity $v = 4m/s$ making an angle 30° with its length. A uniform magnetic field $B = 2T$

exists in a direction perpendicular to the plane of motion. Then :



A. $v_A - v_B = 8v$

B. $v_A - v_B = 4v$

C. $v_B - vA_= 8v$

D. $v_B - vA_= 4v$

Answer: B

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38. A 5.0 amp current is setup in an external circuit by a 6.0 volt storage battery for 6.0 minutes. The chemical energy of the battery is reduced by

A. $1.08 \times 10^4 J$

B. $1.08 \times 10^{-4} J$

C. $1.8 \times 10^4 J$

D. $1.8 \times 10^{-4} J$

Answer: A

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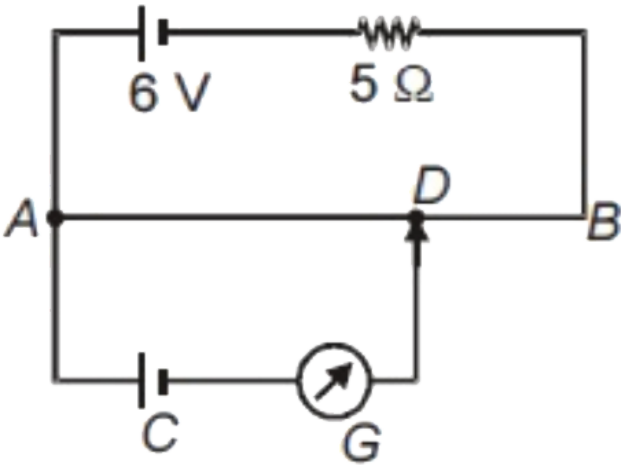
39. In the potentiometer circuit shown in the figure the internal resistance of the 6V battery is 1Ω and length of the wire AB is 100 cm . When AD = 60 cm , the galvanometer shows no deflection . The EMF of the

cell C is (the resistance of the wire AB is 2Ω)



A. 0.7V

B. 0.8V

C. 0.9V

D. 1.0V

Answer: C

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40. A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as

A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. anti - ferromagnetic

Answer: B

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41. The angular velocity of second's hand of a watch will be.

A. $\frac{\pi}{60} rads^{-1}$

B. $\frac{\pi}{30} rads^{-1}$

C. $60\pi rads^{-1}$

D. $30\pi rads^{-1}$

Answer: B

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42. Two homogeneous spheres A and B of masses m and 2m having radii 2a and a respectively are placed in touch . The distance of the centre of mass from the first sphere is

A. a

B. $2a$

C. $3a$

D. none of these

Answer: B

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43. A loaded spring gun of mass M fires a bullet of mass m with a velocity v at an angle of elevation θ. The gun is initially at rest on a horizontal smooth surface. After firing, the centre of mass of the gun and bullet system

A. moves with a velocity $v\frac{m}{M}$

B. moves with a velocity $\frac{vm}{M}\cos\theta$ in the horizontal direction

C. remains at rest

D. moves with a velocity $\frac{v(M-m)}{(M+m)}$ in the horizontal direction

Answer: C

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44. The shortest wavelength of Lyman series of the hydrogen atom is equal to the shortest wavelength of Balmer series of a hydrogen -like atom of atomic number Z. The value of Z is equal to

A. 2

B. 3

C. 4

D. 6

Answer: A

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45. A γ photon of momentum P is emitted by a radioactive nucleus of mass M . The total energy released in this process will be (Assume nuclei is free to recoil) [c is the speed of light]

A. Pc

B. $\frac{P^2}{2M}$

C. $P\left(c+\frac{P}{2M}\right)$

D. $P\left(c+\frac{P}{4M}\right)$

Answer: C

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