PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 38

Physics

1. Let A_n be the area enclosed by the n^{th} orbit in a hydrogen atom. The graph of $ln(A_n / A_t)$ against In (n)

A. will pass through the origin

B. will be a straight line of slope 3

C. will be a straight line of slope 3

D. will be a circle

Answer: A

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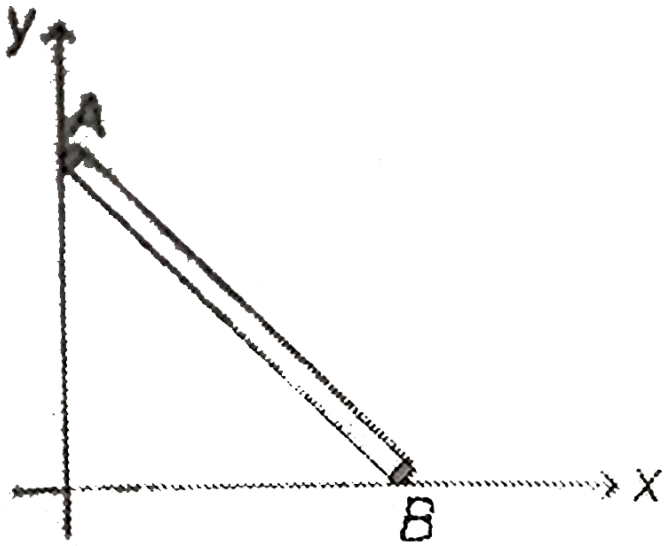
2. A rigid rod leans against a vertical wall (y-axis) as shwon in figure. The other end of the rod is ion the horizontal floor. Point A is

pushed downwards with constant velocity. Path of the centre of the rod is



A. a straight line passing through origin

B. a straight line not passing through origin

C. a circle of radius $l/2$ and centre at origin

D. a circle of radius $l/2$ and centre not at origin

Answer: C

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3. A 2000 kg rocket in free space expels 0.5 kg of gas per second at exhaust velocity

$400\ \mathrm{m\ s^{-1}}$ for 5 s. The increase in the speed of the rocket in this time is

A. $2000 ms^{-1}$

B. $200 ms^{-1}$

C. $0.5 ms^{-1}$

D. zero

Answer: C

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4. Which of the following statements is correct ?

A. If the centre of mass is at rest , then the net work done dy all the forces acting on the system is zero

B. If the velocity of the centre of mass remains zero, then the net external force acting on the system must zero

C. If the speed of centre of mass is changing , then there must be some work done by the internal forces on the system

D. If centre of mass of three - particle system is at rest and it is known that two of the particles are moving in different non - collinear lines , then third particle may be moving

Answer: B

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5. If a diamagnetic solution is poured into a U-tube and one aem of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then the level of the solution will

A. rise

B. fall

C. oscillate slowly

D. remain as such

Answer: B

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6. In the given circuit , the current following in the 1Ω resistance will be

A. $3A$

B. $4A$

C. $5A$

D. $6A$

Answer: D

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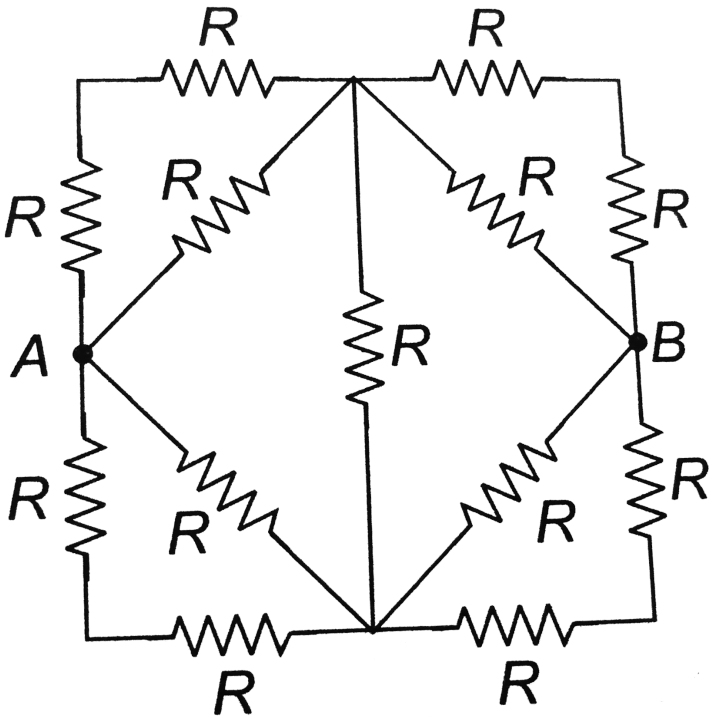
7. Thirteen resistances each of resistance R ohm are connected in the circuit as shown in the figure below. The effective resistance

between A and B is



A. $2R\Omega$

B. $\frac{4R}{3}\Omega$

C. $\frac{2R}{3}\Omega$

D. $R\Omega$

Answer: C

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8. If the coils of a transfomer are made up of thick wire, then

A. eddy current losses will be more

B. magnetic flux leakage is reduced

C. Joule heating loss is increased

D. Joule heating loss is reduced

Answer: D

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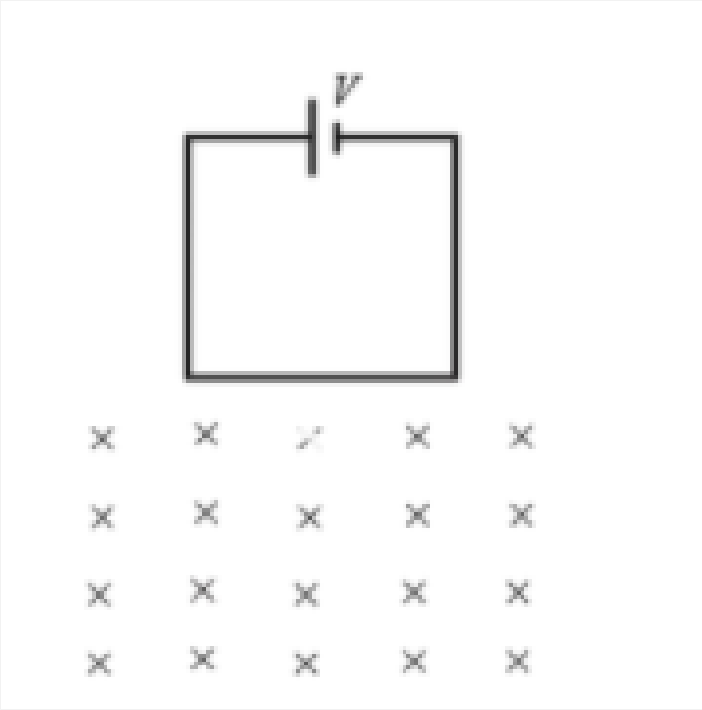
9. A current - carrying loop is dropped from the posy shown. The loop starts entering into a region of uniform magnetic field, directed into the plane . (Neglect effects of self - induction and G is the acceleration due to gravity .) Which of the following statements is

correct



A. The loop will fall with an acceleration more than g

B. The loop will fall with an acceleration less than g

C. The magnitude of acceleration of loop will increase as it moves down

D. The magnitude of acceleration of loop will remain as it moves down

Answer: B

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10. Four metal plates numbered 1,2,3 and 4 are arranged , as shown in figure . The area of each plate is A and the separation between them is d . The capacitance of the arrangement is

A. $\frac{\varepsilon_0 A}{d}$

B. $\frac{2\varepsilon_0 A}{d}$

C. $\frac{3\varepsilon_0 A}{d}$

D. $\frac{4\varepsilon_0 A}{d}$

Answer: C

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11. The electric field of an electric dipole at a point on its axis , at a distance d from the center of the dipole, varies as

A. $\frac{1}{d}$

B. $\frac{1}{d^2}$

C. $\frac{1}{d^3}$

D. $\frac{1}{d^{\frac{3}{2}}}$

Answer: C

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12. A projectile is fired from the surface of earth of radius R with a velocity ηv_e where v_e is the escape velocity and $\eta < 1$. Neglecting air resistance, the orbital velocity of projectile is -

A. $ve\sqrt{1-\eta 2}$

B. $v_e\sqrt{\frac{\eta^2}{5}}$

C. $\frac{2}{5}v_e\sqrt{\eta}$

D. $\frac{2\eta}{5}v_e$

Answer: A

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13. A geostationary satellite is orbiting the earth at a height of 6R above the surface of the earth, where R is the radius of the earth. The time period of another satellite at a

height of 2.5 R from the surface of the earth is ..... hours.

A. $6\sqrt{2}$ hour

B. 6 hour

C. $5\sqrt{2}$ hour

D. 10 hour

Answer: A

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14. The rays of the sun are focused on a piece of ice through a lens of diameter 5 cm , as a result of which 10g ice melts in 10 minutes. The amount of heat received from the sun per unit area per minute is

A. $4\text{cal cm}^{-2}\text{ min .}^{-1}$

B. $40\text{cal cm}^{-2}\text{ min .}^{-1}$

C. $4Jcm^{-2}\text{ min .}^{-1}$

D. $400\text{cal cm}^{-2}\text{ min .}^{-1}$

Answer: A

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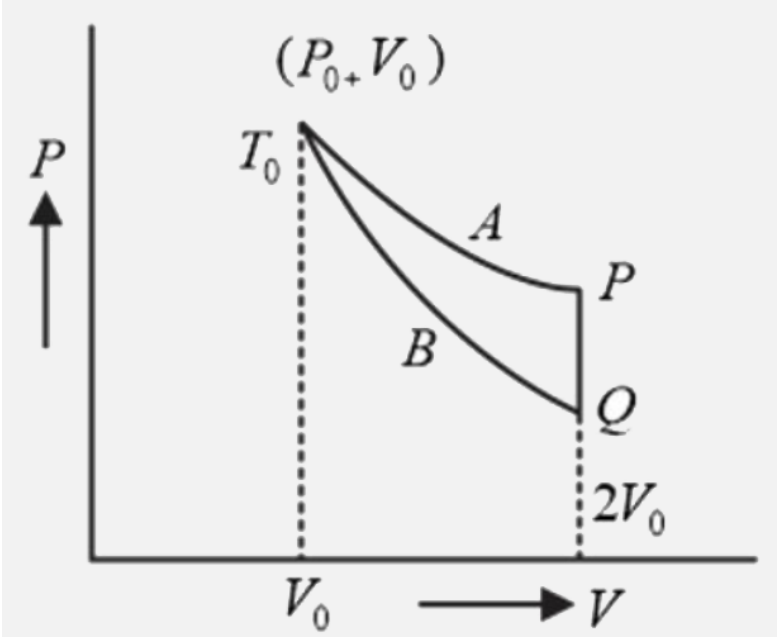
15. An ideal gas (1 mol ,monatomic) is in the initial state P (see diagram) on an isothermal curve A at a temperature T_0 . It is brought under a constant volume $(2V_0)$ process to Q which lies on an adiabatic curve B intersecting the isothermal curve A at (P_0, V_0, T_0) . The change in the internal energy of the gas (in terms of T_0) during the process is

$\left(2^{2/3} = 1.587\right)$



A. $2.3T_0$

B. $-4.6T_0$

C. $-2.3T_0$

D. $4.6T_0$

Answer: B

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16. n moles of diatomic gas in a cylinder is at a temperature T . Heat is supplied to the cylinder such that the temperature remains constant but n moles of the diatomic gas get converted into monatomic gas . The change in the total kinetic energy of the gas is

A. 0

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

C. $\frac{3}{2}nRT$

D. $\frac{1}{2}nRT$

Answer: D

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17. An α - particle with a specific charge of $2.5 \times 10^7 Ckg^{-1}$ moves with a speed of $2 \times 10^5 ms^{-1}$ in a perpendicular magnetic

field of $0.05T$. Then , the radius of the circular path described by it is

A. 8 cm

B. 4 cm

C. 16 cm

D. 2 cm

Answer: C

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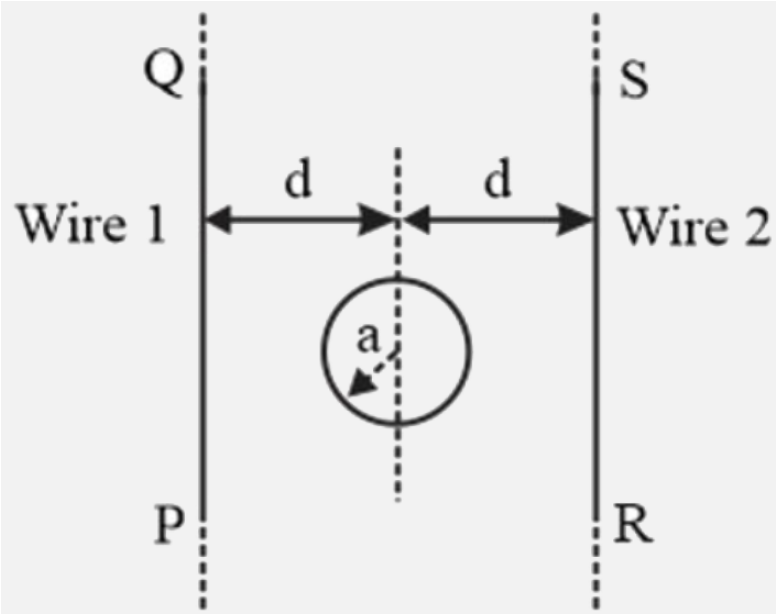
18. The figure shows a circular loop of radius a with two log parallel wires (numbered 1 and 2) all in the plane of the paper of The loop . and the wires are carrying the same current I. The current in the loop is in the counterclockwise direction if seen from above



Consider $d > > a$, and the loop is rotated about its diameter parallel to the wires by 90° from the position shown in the figure. If the currents in the wires are in the opposite directions , the torque on the loop at its new position will be (assume that the net field due to the wires is constant over the loop).

A. $\frac{\mu_0 I^2 a^2}{2d}$

B. $\frac{\mu_0 I^2 a^2}{d}$

C. $\frac{\sqrt{3}\mu_0 I^2 a^2}{d}$

D. $\frac{\sqrt{3}\mu_0 I^2 d^2}{2d}$

Answer: B

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19. At time t , the position of a body moving along the x - axis is $x = \left(t^3 - 6t^2 + 9t\right)m$ Then, it momentarily comes to rest at

A. 1 s

B. 3 s

C. 5 s

D. both 1 s and 3 s

Answer: D

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20. Wein's constant is 2892×10^{-6} MKS unit and the value of λ_m from moon is 14.46 microns. What is the surface temperature of moon

A. 100 K

B. 300 K

C. 400 K

D. 200 K

Answer: D

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21. Five persons A, B, C, D and E are pulling a cart of mass 100 kg on a smooth surface and the cart is moving with an acceleration of $3ms^{-2}$ in the east direction. If another person F comes and ans starts pulling the cart with a

force of 100 N due west , then the acceleration of the cart will be

A. $2.5ms^{-2}$

B. $1ms^{-2}$

C. $2ms^{-2}$

D. $4ms^{-2}$

Answer: C

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22. An elevator weighing 6000 kg is pulled upward by a cable with an acceleration of $5ms^{-2}$. Taking g to be $10ms^{-2}$, then the tension in the cable is

A. 6000 N

B. 9000 N

C. 60000 N

D. 90000 N

Answer: D

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23. A radioactive material decays by simulataneous emission of two particle from the with respective half - lives 1620 and 810 year . The time , in year , after which one - fourth of the material remains is

A. 4860 yr

B. 3240 yr

C. 2340 yr

D. 1080 yr

Answer: D

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24. A neutron is absorbed by a $._3^6 Li$ nucleus with the subsequent emission of an alpha particle.

(i) Write the corresponding nuclear reaction.

(ii) Calculate the energy released, in MeV, in this reaction.

[Given: mass $._3^6 Li = 6.015126u$, mass (neutron) $= 1.0086654u$ mass (alpha particle)

$= 0.0026044u$ and mass (triton) $= 3.010000u$. Take $iu = 931MeV/c^2$]

A. $10.92MeV$

B. $10.415MeV$

C. $9.791MeV$

D. $8.73MeV$

Answer: B

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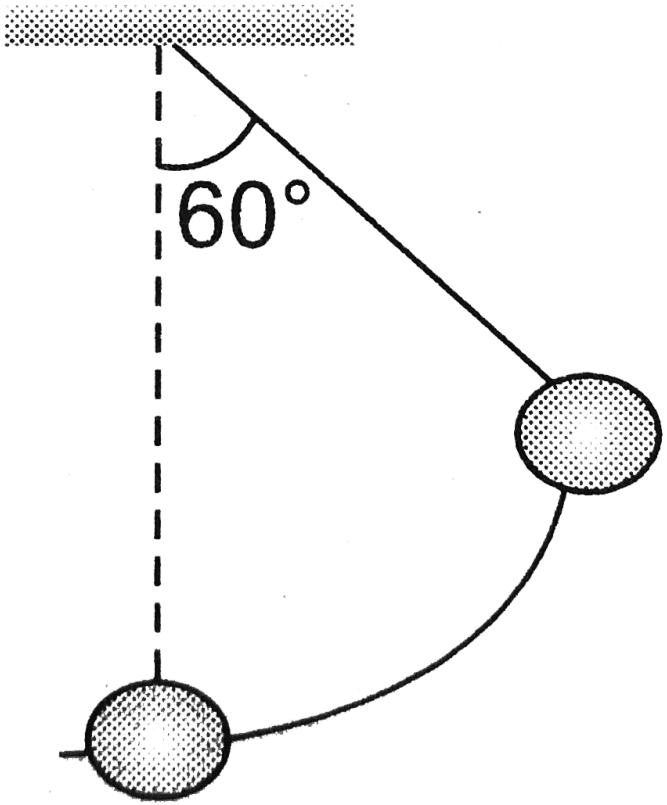
25. A pendulum of length $l = 1m$ is released from $\theta_0 = 60^\circ$. The rate of change of speed of the bob at $\theta = 30^\circ$ is.



A. $10ms^{-2}$

B. $7.5ms^{-2}$

C. $5ms^{-2}$

D. $5\sqrt{3}ms^{-2}$

Answer: C

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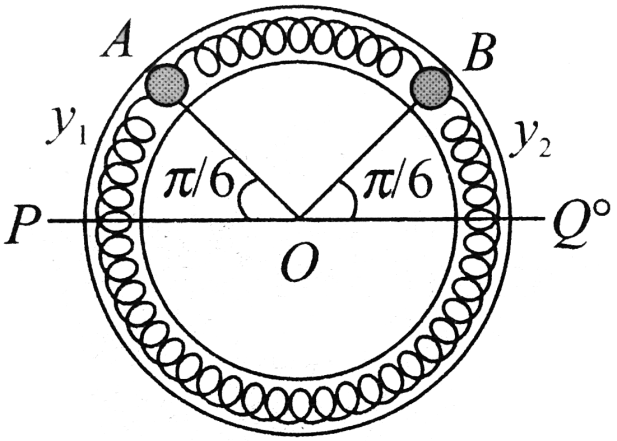
26. Two identical balls A and B each of mass $0.1kg$ are attached to two identical mass less is springs. The spring-mass system is

constrained to move inside a right smooth pipe bent in the form of a circle as shown in figure . The pipe is fixed in a horizontal plane. The center of the balls can move in a circle of radius $0.06m$. Each spring has a natural length of $0.06\pi m$ and force constant $0.1N/m$. Initially, both the balls are displaced by an angle $\theta = \pi/6$ radians with respect to diameter PQ of the circle and released from rest.

a. Calculate the frequency of oscillation of the ball B.

b. What is the total energy of the system ?

c. Find the speed of the ball A when A and B are at the two ends of the diameter PQ.



A. πHz

B. $\frac{1}{\pi} Hz$

C. $2\pi Hz$

D. $\frac{1}{2\pi} Hz$

Answer: B

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27. A photo - cell is being operated in saturation mode . Electromagnetic radiations of wavelength λ m fall upon the photo - cell . The corresponding spectral sensitivity of photocell is JAW^{-1} . The number of photo - electrons produced by each incident photon, is

A. $\frac{hc}{2e\lambda J}$

B. $\frac{hc}{e\lambda}$

C. $\frac{hc}{e\lambda}$

D. $\frac{2hc}{e\lambda J}$

Answer: B

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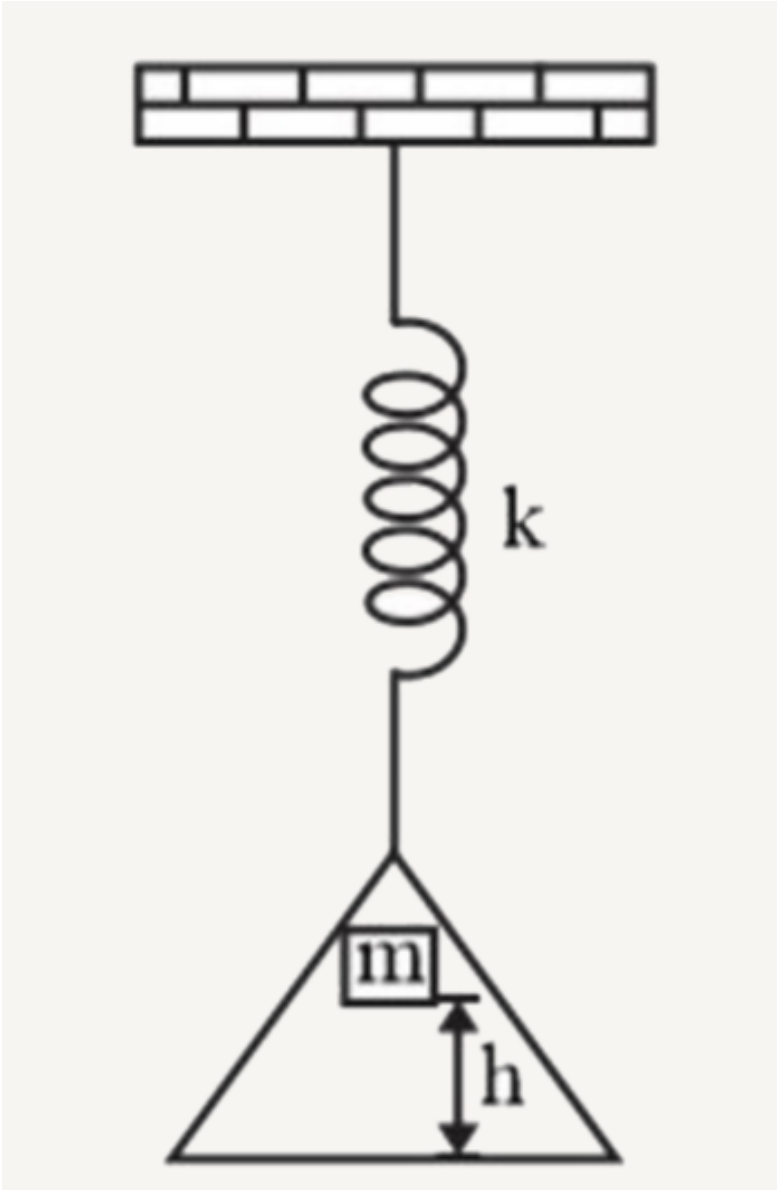
28. A load of mass m falls from a height h on to the scale pan hung from a spring , as shown in the figure . If the spring constant is k , mass

of the not bounce , relative to the pan , then the amplitude of vibration is



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

B. $\frac{mg}{k}\sqrt{\left(1+\frac{2hk}{mg}\right)}$

C. $\frac{mg}{k}+\frac{mg}{k}\sqrt{\left(1+\frac{2hk}{mg}\right)}$

D. $\frac{mg}{k}\sqrt{\frac{1+2hk}{mg}-\frac{mg}{k}}$

Answer: B

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29. An object is floating in a liquid , kept in a container . The container is placed in a lift .

Choose the correct option .

A. Buoyant force increases as the lift accelerates up

B. Buoyant force decreases as the lift accelerates up

C. Buoyant force remains constant as the lift accelerates

D. The fraction of solid submerged into liquid decreases

Answer: A

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30. Surface tension of water is 0.072 Nm^{-1}. The excess pressure inside a water drop of diameter 1.2 mm is :-

A. $240Nm^{-2}$

B. $120Nm^{-2}$

C. $0.06Nm^{-2}$

D. $72Nm^{-2}$

Answer: A

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31. The graph between object distance u and image distance v from a convex lens is given .The correct option option , from the following ,is

A. $f = 5 \pm 0.1$

B. $f = 5 \pm 0.05$

C. $f = 0.5 \pm 0.1$

D. $f = 0.5 \pm 0.05$

Answer: B

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32. A convex lens is used to obtain a magnified image of an object on a screen . The object is at a distance 10 m from the lens . If the magnification is 19. the focal length of the lens is

A. 9.5 cm

B. 0.95 cm

C. 9.5 m

D. 0 . 95 m

Answer: C

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33. A small coin is placed at a distance r from the centre of a gramophone record.The rotational speed of the record is gradually increased. If the coefficient of friction between

the coin and the record is μ, the minimum angular frequency of the record for which the coin will fly off is given by :

A. $\sqrt{\frac{2\mu g}{r}}$

B. $\sqrt{\frac{\mu g}{2r}}$

C. $\sqrt{\frac{\mu g}{r}}$

D. $2\sqrt{\frac{\mu g}{r}}$

Answer: C

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34. A thin uniform rod of length l and mass m is swinging freely about a horizontal axis passing through its end. Its maximum angular speed is ω. Its centre of mass rises to a maximum height of -

A. $\frac{1}{3}\frac{l^2\omega^2}{g}$

B. $\frac{1}{6}\frac{l\omega}{g}$

C. $\frac{1}{2}\frac{l^2\omega^2}{g}$

D. $\frac{1}{6}\frac{l^2\omega^2}{g}$

Answer: D

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35. If a full wave rectifier circuit is operating from $50Hz$ mains, the fundamental frequency in the ripple will be

A. 70 .7 Hz

B. 100 Hz

C. 25 Hz

D. 59 Hz

Answer: B

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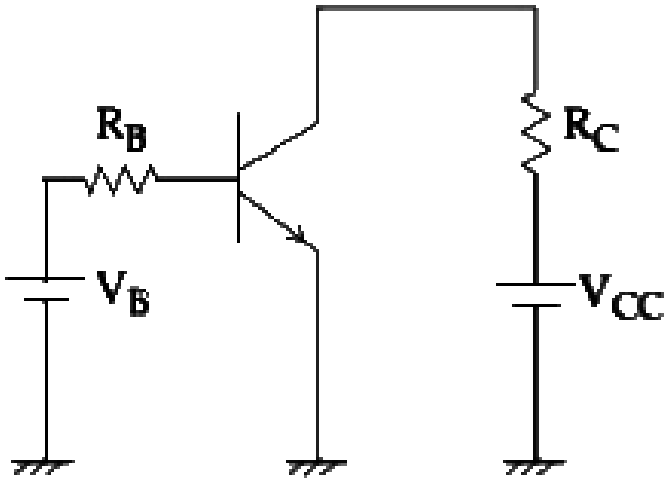
36. A common emitted amplifier circuit, built using an npn transistor, is shown in the figure. Its dc current gain is 250, $R_C = 1K\omega$ and $V_{CC} = 10V$. What is the minimum base current for V_{CE} to reach saturation?



A. $10\mu A$

B. $40\mu A$

C. $7\mu A$

D. $100\mu A$

Answer: B

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37. At constant pressure, the ratio of increases in volume of an ideal gas per degree rise in kelvin temperature to its volume is

A. T^2

B. $\frac{1}{T}$

C. T^3

D. T

Answer: B

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38. An experiment is performed to measure the specific heat of copper . A lump of copper is heated in an oven, then dropped into a

beaker of water . To calculate the specific heat of copper, the experiment must know or measure the value of all quantities below except the

A. heat capacity of water and breaker

B. original temperature of the copper and the water

C. final (equilibrium) temperature of the copper and the water

D. time taken to achieve equilibrium after the copper is dropped into the water

Answer: D

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39. The dimensional formula of $\frac{1}{\mu_0 \in_0}$ is .....

A. $\left[M^0 L^2 T^{-2}\right]$

B. $\left[M^0 L^1 T^{-1}\right]$

C. $\left[M^0 L^{-2} T^{-2}\right]$

D. $\left[M^0 L^1 T^{-2}\right]$

Answer: A

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40. The relative error in the determination of the surface area of a sphere is α. Then the relative error in the determination of its volume is :

A. $\frac{3}{2}\alpha$

B. $\frac{2}{3}\alpha$

C. α

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

Answer: A

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41. The central fringe shifts to the position of fifth bright fringe, if a thin film of refractive index 1.5 is introduced in the path of light of wavelength 5000Å. The thickness of the glass plate is

A. $1\mu m$

B. $5\mu m$

C. $3\mu m$

D. $4\mu m$

Answer: B

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42. A rigid circular loop of radius r & mass m lies in the xy plane on a flat table and has a current I flowing in it At this particular place the earth's magnetic filed is $B = B_x\hat{i} + B_y\hat{j}$ How large must I be before one edge of the

loop will lift from table

Repeat if ,$\overrightarrow{B} = \overrightarrow{B_x}\hat{i} + \overrightarrow{B_z}\hat{k}$.

A. $\frac{mg}{\pi\sqrt{B_x^2 + B_2^2}}$

B. $\frac{mg}{\pi r B_x}$

C. $\frac{mg}{\pi r B_z}$

D. $\frac{mg}{\pi\sqrt{B_x B_z}}$

Answer: B

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43. The charge, which will flow through a 200 Ω galvanometer connected to a 400 Ω circular coil of 1000 turns wound on a wooden stick 20 mm in diameter, if a magnetic field $B = 0.012T$ parallel to the axis of the stick decreased suddenly to zero is

A. $6.3\mu C$

B. $63\mu C$

C. $0.63\mu C$

D. $630\mu C$

Answer: A

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44. The ratio of the intensities two waves is 1 : 9 The ratio of their amplitudes is

A. $3:1$

B. $1:3$

C. $1:9$

D. $9:1$

Answer: B

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45. A body of mass 1 kg is rotated in a horizontal circle of radius 1 m and moves with velocity $2ms^{-1}$ The work done in 10 revolutions is

A. 40 J

B. 20 J

C. $4 \times 2\pi(10)J$

D. zero

Answer: D