



PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 22

Physics

1. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom

acquired as a result of photon emission will be
(m is the mass of the electron, R , Rydberg
constant and h , Planck's constant)

A. $\frac{24hR}{25m}$

B. $\frac{25hR}{25m}$

C. $\frac{24m}{25hR}$

D. $\frac{25m}{24hR}$

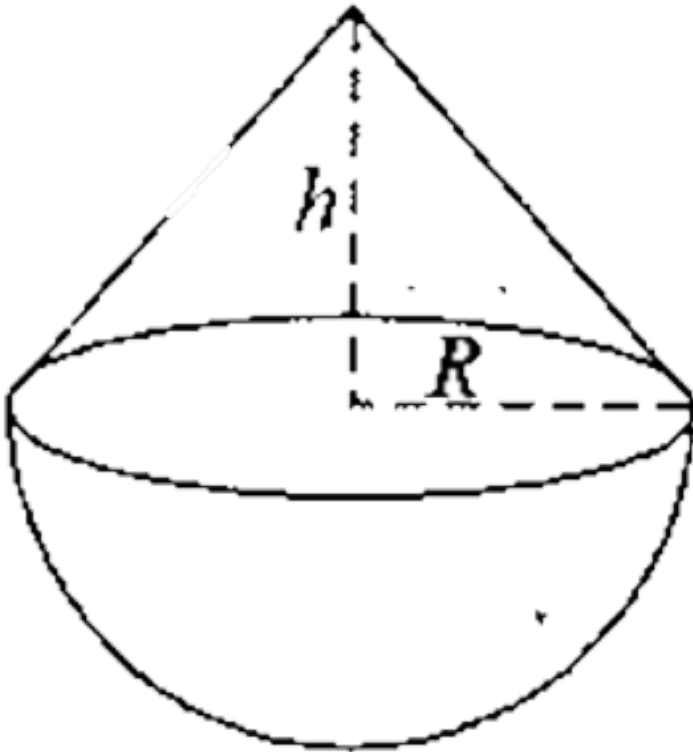
Answer: A



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2. A uniform solid right circular cone of base radius R is joined to a uniform solid hemisphere of radius R and of the same density, so as to have a common face. The centre of mass of the composite solid lies on

the common face. The height of the cone is:



A. $2r$

B. $\sqrt{3}r$

C. $3r$

D. $\sqrt{6}r$

Answer: B



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3. The distance of two points on the axis of a magnet from its centre is 10cm and 20cm respectively. The ratio of magnetic intensity at these points is $12.5:1$. The length of the magnet will be

A. 5cm

B. 25cm

C. 20cm

D. 10cm

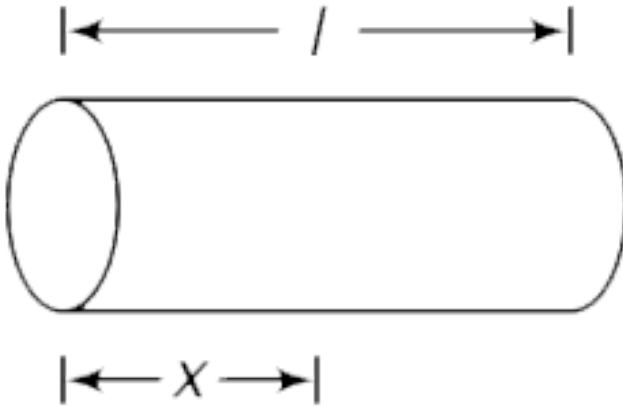
Answer: D



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4. A cylindrical conductor has length l and area of cross section A . Its conductivity changes with distance (x) from one of its ends as $\sigma = \sigma_0 \frac{l}{x}$. [σ_0 is a constant]. Calculate

electric field inside the conductor as a function of x , when a cell of emf V is connected across the ends.



- A. $\frac{2Vx}{l^2}$
- B. $\frac{3\sqrt{l}}{3A\sigma_0}$
- C. $\frac{\sqrt{l}}{3A\sigma_0}$
- D. $\frac{4\sqrt{l}}{3A\sigma_0}$

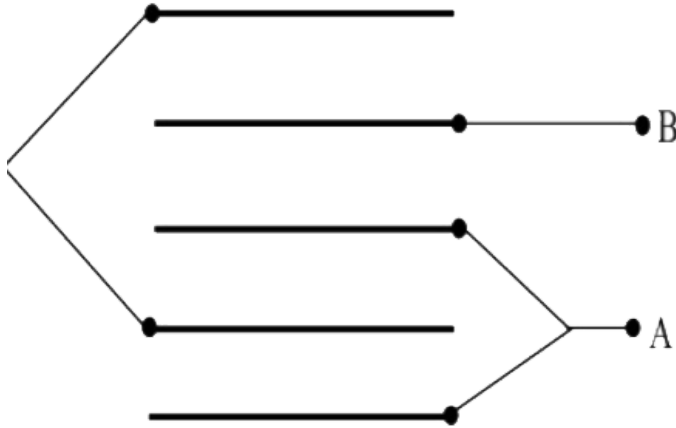
Answer: A



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5. Five identical plates of equal area A are placed parallel to each other and at equal distance d from each other as shown in the figure. The effective capacity of the system

between the terminals A and B is



A. $\frac{3}{5} \frac{\epsilon_0 A}{d}$

B. $\frac{5}{4} \frac{\epsilon_0 A}{d}$

C. $\frac{5}{3} \frac{\epsilon_0 A}{d}$

D. $\frac{4}{5} \frac{\epsilon_0 A}{d}$

Answer: C



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6. Two cells of E.M.F. E_1 and E_2 ($E_2 > E_1$) are connected in series in the secondary circuit of a potentiometer experiment for determination of E.M.F. The balancing length is found to be 825 cm. Now when the terminals to cell E_1 are reversed, then the balancing length is found to be 225 cm. The ratio of E_1 and E_2 is

A. 2:3

B. 4:7

C. 7:4

D. none of these

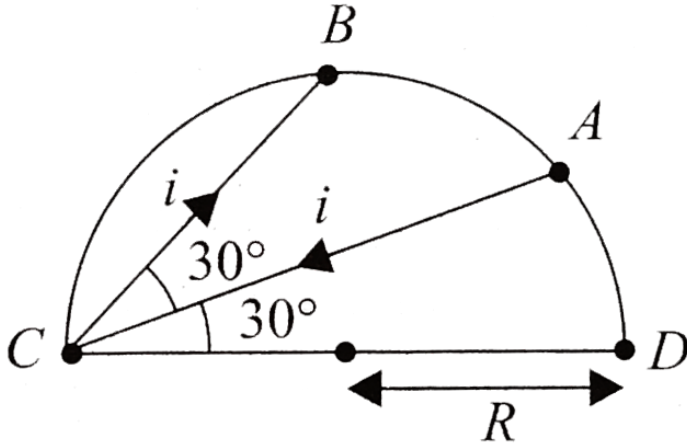
Answer: B



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7. A current carrying wire is placed in the grooves of an insulating semicircular disc of radius 'R', as shown in Fig. The current enters at point A and leaves from point B. Determine

the magnetic field at Point D.



A. $\frac{\mu_0 I}{8\pi R\sqrt{3}}$

B. $\frac{\mu_0 I}{4\pi R\sqrt{3}}$

C. $\frac{\sqrt{3}\mu_0 I}{4\pi R}$

D. none of these

Answer: B



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8. The minimum force required to move a body up an inclined plane is three times the minimum force required to prevent it from sliding down the plane. If the coefficient of friction between the body and the inclined plane is $\frac{1}{2\sqrt{3}}$, the angle of the inclined plane is

A. 60°

B. 45°

C. 30°

D. 15°

Answer: C



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9. Consider the figure here. A particle of mass m is constrained to move inside a smooth vertical groove of radius R and is connected to a light spring of spring constant K in equilibrium. O is centre of the groove. X and y

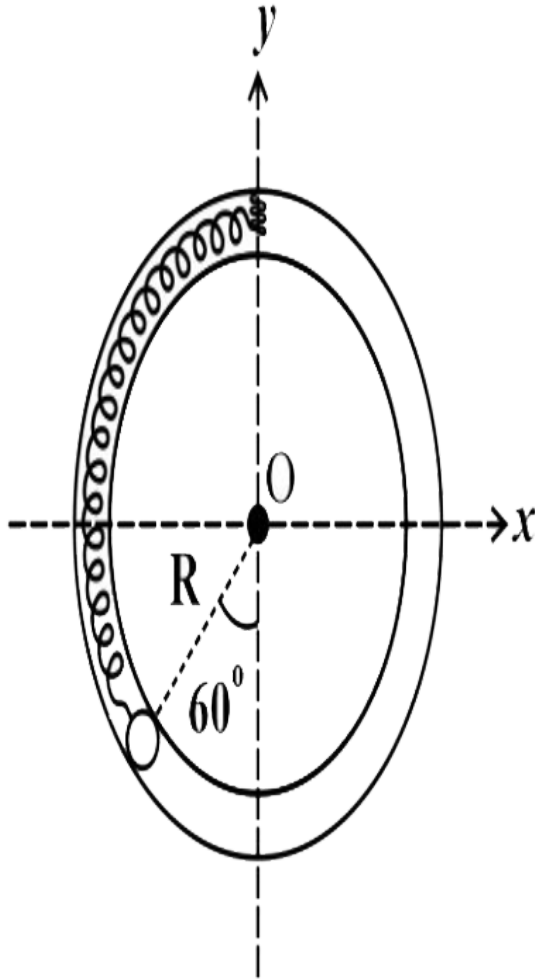
are horizontal and vertical axes respectively.

Different physical parameters are related as

$2KR = 7mg$. Angular frequency of the

oscillations, if the particle is slightly displaced

from the shown equilibrium position is



A. $\sqrt{\frac{g}{R}}$

B. $\sqrt{\frac{g}{2R}}$

C. $2\sqrt{\frac{g}{R}}$

D. $\sqrt{\frac{2g}{R}}$

Answer: C



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10. If the electron in hydrogen atom jumps from second Bohr orbit to ground state and difference between energies of the two states is radiated in the form of photons. If the work function of the material is $4.2eV$, then

stopping potential is

[Energy of electron in n th orbit

$$= -\frac{13.6}{n^2} eV]$$

A. $2V$

B. $4V$

C. $6V$

D. $8V$

Answer: C



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11. The work done in blowing a soap bubble of volume V is W . The work done in blowing a soap bubble of volume $2V$ is

A. W

B. $2W$

C. $\sqrt{2}W$

D. $4^{1/4}W$

Answer: D



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12. A sphere of radius R is gently dropped into liquid of viscosity η in a vertical uniform tube. It attains a terminal velocity v . Another sphere of radius $2R$ when dropped into the same liquid, will attain its terminal velocity.

- A. v
- B. $2v$
- C. $4v$
- D. $9v$

Answer: C



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13. A thin converging lens of focal length $f = 25$ cm forms the image of an object on a screen placed at a distance of 75 cm from the lens.

Now the screen is moved closer to the lens by a distance of 25 cm. The distance through which the object has to be shifted so that its image on the screen is sharp again is

A. 37.5 cm

B. 16.25 cm

C. 12.5 cm

D. 13.5 cm

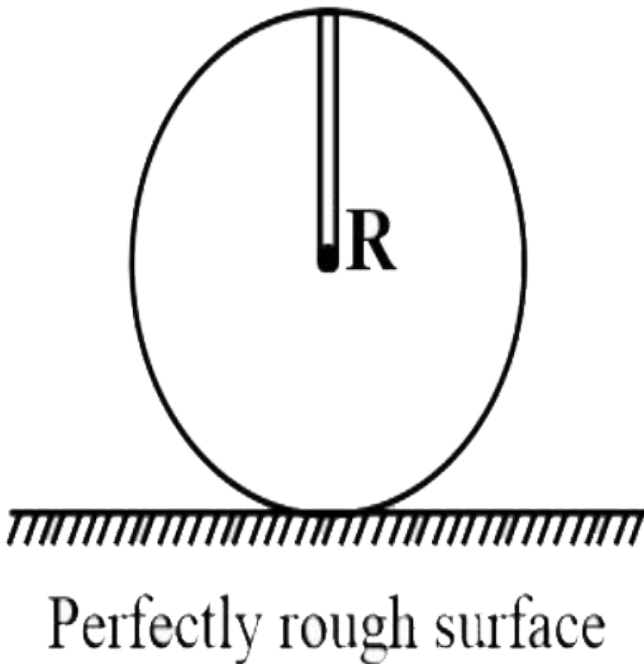
Answer: C



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14. In a diagram shown, a rod of mass M has been fixed on a ring of the same mass. The whole system has been placed on a perfectly rough surface. The system is gently displaced so that the ring starts rolling. The velocity of

the centre of the ring when the rod becomes horizontal is (the length of the rod is equal to the radius of the ring)



A. $\sqrt{\frac{3gR}{10}}$

B. $\sqrt{\frac{5gR}{3}}$

C. $\sqrt{\frac{3gR}{7}}$

D. $\sqrt{\frac{2gR}{9}}$

Answer: A



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15. The current gain for a common emitter amplifier is 69. If the emitter current is 7 mA, the base current is

A. 0.1 mA

B. 1 mA

C. 0.2 mA

D. 2 mA

Answer: A



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16. Two vessel separately contains two ideal gases A and B at the same temperature, the pressure of A being twice that of B. under such conditions, the density of A is found to be 1.5

times the density of B. the ratio of molecular weight of A and B is

A. $\frac{3}{4}$

B. 2

C. $\frac{1}{2}$

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

Answer: A



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17. The length of an object is measured using a vernier system whose main scale is 30 cm long with 600 divisions. If 19 divisions of the main scale coincide with 20 divisions of the vernier scale, then its least count is

A. 0.25 cm

B. 0.025 cm

C. 0.35 cm

D. 0.0025 cm

Answer: D



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18. Two polaroids are crossed. If now one of them is rotated through 30° and unpolarised light of intensity I_0 is incident on the first polaroid, then the intensity of transmitted light will be

A. $\frac{I_0}{4}$

B. $\frac{3I_0}{4}$

C. $\frac{3I_0}{8}$

D. $\frac{I_0}{8}$

Answer: D



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19. A closed and an open organ pipe have the same length. When they are vibrating simultaneously in their first overtone, they produce three beats. The length of the open pipe is now made one third the original length and one of its ends is closed. On the other

hand, the length of the closed pipe is made three times the original length. The number of beats produced when they vibrate with fundamental frequencies will be

- A. 8
- B. 14
- C. 17
- D. 8

Answer: A



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20. Power of the only force acting on a particle of mass $m=1$ kg moving in straight line depends on its velocity as $P = v^2$ where v is in m/s and P is in watt. If initial velocity of the particle is 1m/s, then the displacement of the particle in $\ln 2$ second will be :

A. $(\ln 2 - 1)m$

B. $(\ln 2)^2 m$

C. $1m$

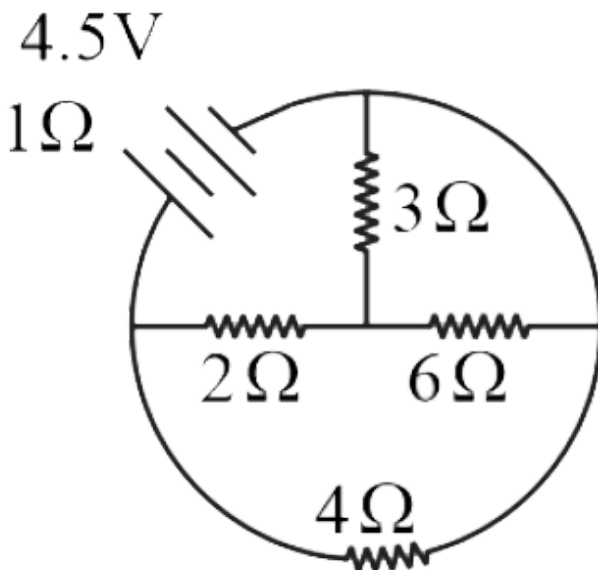
D. $2m$

Answer: C



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21. The power dissipated (in watt) in 3Ω resistance in the following circuit is



A.

B.

C.

D.

Answer: 0.75



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22. In LCR circuit current resonant frequency is 600Hz and half power points are at 650 and 550Hz . The quality factor is



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23. The plates of a parallel plate capacitor are charged to a potential difference of 117 V and then connected across a resistor. The potential difference across the capacitor decreases exponentially with to time. After 1s the potential difference between the plates is 39 V, then after 2s from the start, the potential difference (in V) between the plates is



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24. A carnot engine has efficiency $\frac{1}{5}$. Efficiency becomes $\frac{1}{3}$ when temperature of sink is decreased by 50 K What is the temperature (in Kelvin) of sink ?



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25. In optical communication system operating at 1200nm, only 2% of the source frequency is available for TV transmission having a

bandwidth of 5 MHz. The number of TV channels that can be transmitted is



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