PHYSICS

NTA MOCK TESTS ENGLISH

NTA JEE MOCK TEST 79

Physics

1. If the series limit wavelength of the Lyman seires for hydrogen atom is $912Å$, them find the

series limit wavelength for the Bolmer series for the hydrogen atom,

A. 912Å

B. 1824Å

C. 3648Å

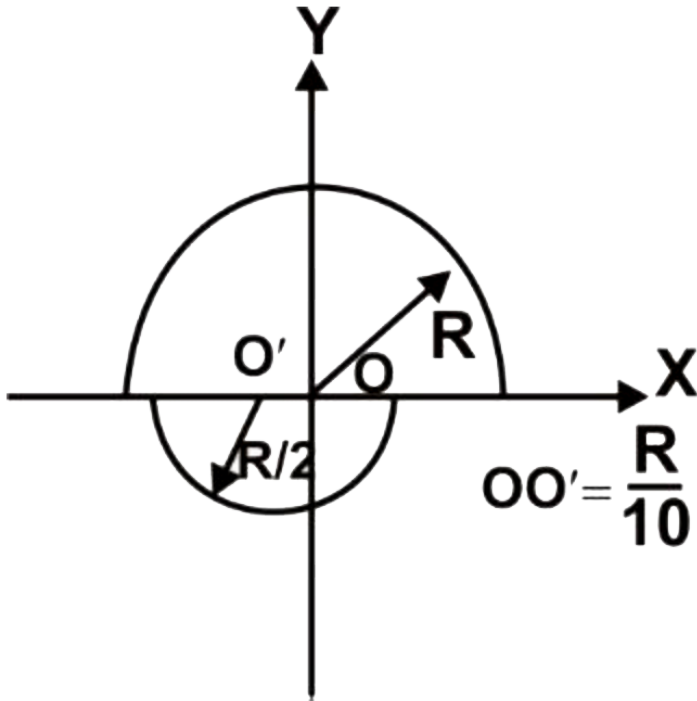D. 456Å

Answer: C

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2. Two solid hemispheres of radii R and $\dfrac{R}{2}$ with centers O and O' respectively as shown in figure. The density of bigger hemisphere is ρ and that of smaller hemisphere is 2ρ. Taking center of bigger hemisphere is at origin and the distance between centres of two hemisphere OO' is $\dfrac{R}{10}$ find co -

ordinates of center of mass of the system.

A. $\left(-\dfrac{R}{50}, \dfrac{21R}{80} \right)$

B. $\left(-\dfrac{R}{30}, \dfrac{21R}{80} \right)$

C. $\left(-\dfrac{R}{50}, \dfrac{7R}{16} \right)$

D. $\left(-\dfrac{R}{30}, \dfrac{7R}{16} \right)$

Answer: A

3. Two spherical conductors of radii $4cm$ and $5cm$ are charged to the same potential. If σ_1 and σ_2 be respective value of surface density of charge on both the conductors, then the ratio of σ_1/σ_2 will be

A. $\dfrac{25}{16}$

B. $\dfrac{16}{25}$
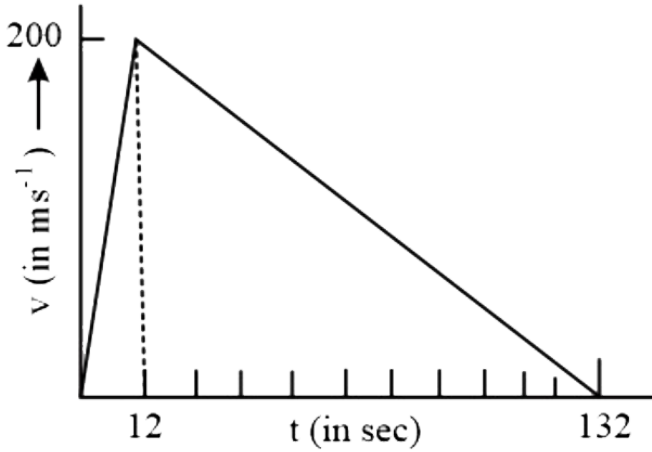
C. $\dfrac{5}{4}$

D. $\dfrac{4}{5}$

Answer: C

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4. A rocket is fired upwards, its engine explodes fully in 12 s. The height reached by the rocket as

calculated from its velocity - time graph is

A. 13200 m

B. 158400 m

C. 18400 m

D. 15400 m

Answer: A

5. A solid sphere of uniform density and radius R applies a gravitational force of attraction equal to F_1 on a particle placed at P, distant 2R from the centre O of the sphere. A spherical cavity of radius R/2 is now made in the sphere as shown in the figure. The sphere with cavity now applies a gravitational force F_2 on same particle placed at

P. The ratio F_2 / F_1 will be
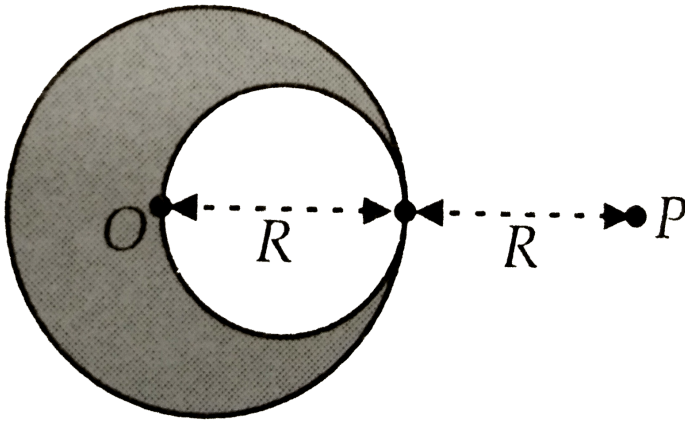
A. $\dfrac{1}{2}$

B. $\dfrac{7}{9}$

C. 3

D. 7

Answer: B

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6. If a body at $27°C$ emits 0.3 watt of heat then at $627°C$, it will emit heat equal to -

A. (a)24.3 W

B. (b)0.42 W

C. (c)2.42 W

D. (d)0.9 W

Answer: A

7. One mole of a certain ideal gas obtains an amount of heat $Q = 1.60kJ$ when its temperature is increased by $\Delta T = 72K$, keeping its pressure constant. The vlaue of $\dfrac{C_P}{C_V}$ for the gas is

A. (a)1.60

B. (b)1.40

C. (c)1.50

D. 1.30

Answer: A

8. A rectangular loop of metallic wire is of length a and breadth b and carries a current i. The magnetic field at the centre of the loop is

A. $\dfrac{\mu_0 i}{4\pi}$

B. $\dfrac{\mu_0 i}{4\pi} \dfrac{4\sqrt{a^2 + b^2}}{ab}$

C. $\dfrac{\mu_0 i}{4\pi} \dfrac{2\sqrt{a^2 + b^\circ}}{ab}$

D. $\dfrac{\mu_0 i}{4\pi} \dfrac{\sqrt{a^2 + b^2}}{ab}$

Answer: A

9. Consider a collection of large number of particles each with speed v. The direction of velocity is randomly distributed in the collection. The magnitude of relative velocity between a pair of particles averaged over all the pairs is

A. v

B. 4v

C. $\dfrac{4v}{\pi}$

D. $4\pi v$

Answer: C

10. A ball of mass 0.2 kg is thrown vertically upwards by applying a force by hand. If the hand moves 0.2 m while applying the force and the ball goes upto 2 m height further, find the magnitude of the force. (Consider $g = 10m/s^2$).

A. (a)4 N

B. (b)16 N

C. (c)20 N

D. (d)22 N

Answer: D

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11. A F^{32} radio nuclide with half-life $T = 14.3$ days is produced in a reactor at a constant rate $q = 2 \times 10^9$ nuclei per second. How soon after the beginning of production of that radio nuclide will its activity be equal to $R = 10^9$ disintegration per second?

A. 9.5 days

B. 8 days

C. 7.5 days

D. 6 days

Answer: A

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12. A simple pendulum is taken to 64 km above the earth's surface. Its new time period will

A. Increase by 1%

B. Decrease by 1%

C. Increase by 2%

D. Decrease by 2%

Answer: A

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13. When a piece of metal is illuminated by monochromatic light of wavelength λ, then stopping potential is $3V_s$. When the same surface is illuminated by the light of wavelength 2λ, then stopping potential becomes V_s. The value of

threshold wavelength for photoelectric emission

will be

A. 4λ

B. 8λ

C. $\dfrac{4}{3}\lambda$

D. 6λ

Answer: A

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14. A water tank is filled upto hight h and is being emkptied through a smll hole at the bottom. Ratio of time taken for the level of water to fall from h to $\frac{h}{2}$ and from $\frac{h}{2}$ to zero is

A. $\sqrt{2}$

B. $\dfrac{1}{\sqrt{2}}$

C. $\sqrt{2} - 1$

D. $\dfrac{1}{\sqrt{2} - 1}$

Answer: C

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15. A symmetric double convex lens is cut in two equal parts by a plane perpendicular to the principal axis. If the power of the original lens was 4D, the power of a cut lens will be
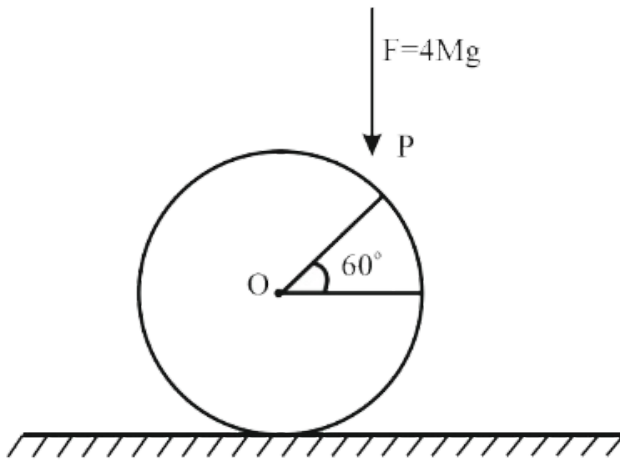
A. 2 D

B. 3 D

C. 4 D

D. 5 D

Answer: A

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16. A uniform solid sphere of mass M and radius R is lying on a rough horizonal plane. A constant force $F = 4Mg$ acts vertically downwards at point P such that the line OP makes an angle of $60°$ with the horizontal as shown in the figure. The minimum value of the coefficient of friction μ

so that sphere performs pure rolling, is

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

B. $\dfrac{4}{7}$

C. $\dfrac{2}{7}$

D. $\dfrac{2}{5}$

Answer: C

17. A silicon specimen is made into p - type semiconductor by doping, on an average, one indium atom per 5×10^7 sillicon atoms. If the number density of atoms in the silicon per cubic centimetre is 5×10^{28} Then the number of acceptor atoms in silicon will be.

A. 2.5×10^{20} atom cm^{-3}

B. 2.5×10^{25} atom cm^{-3}

C. 1×10^{13} atom cm^{-3}

D. 1×10^{15} atom cm^{-3}

Answer: D

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18. A lead bullet of 10 g travelling at $300 ms^{-1}$ strikes against a block of wood and comes to rest. Assuming 50% of heat is absorbed by the bullet, the increase in its temperature is

A. $100°C$

B. $125°C$

C. $150°C$

D. $200°C$

Answer: C

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19. If Surface tension (S), Moment of Inertia (I) and Planck's constant (h), were to be taken as the fundamental units, the dimensional formula for linear momentum would be :

A. $S^{1/2}T^{1/2}h^0$

B. $S^{1/2}T^{3/2}h^{-1}$

C. $S^{3/2}T^{1/2}h^0$

D. $S^{1/2}T^{1/2}h^{-1}$

Answer: A

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20. Two indentical piano wires, kept under the same tension T have a fundamental frequency of 600Hz. The fractional increase in the tension of one of the wires which will lead to occurrence of

6 beats/s when both the wires oscillate together would be :

A. 0.01

B. 0.02

C. 0.03

D. 0.04

Answer: B

21. A stone of mass 1 kg tied to a light inextensible string of lenth $L = \dfrac{10}{3} m$, whirling in a circular path in a vertical plane. The ratio of maximum tension to the minimum tension in the string is 4. If g is taken to be $10 ms^{-2}$, the speed of the stone at the highest point of the circle is

22. For resistances are connected by an ideal battery of emf 15 V, the circuit is in steady - state

then the current (in ampere) in wire AB is :
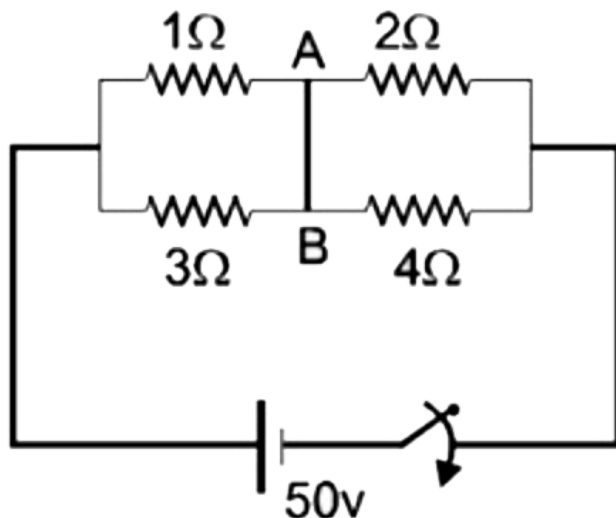
23. A non-conducting ring of radius R having uniformly distributed charge Q starts rotating about x-x' axis passing through diameter with an

angular acceleration α, as shown in the figure.

Another small conducting ring having radius

$a(a < \, < R)$ is kept fixed at the centre of bigger

ring is such a way that axis xx' is passing through

its centre and perpendicular to its plane. If the

resistance of small ring is $r = 1\Omega$, find the

induced current in it in ampere.

(Given

$$q = \frac{16 \times 10^2}{\mu_0} C, R = 1m, a = 0.1m, \alpha = 8\text{rad s}^{-2}$$
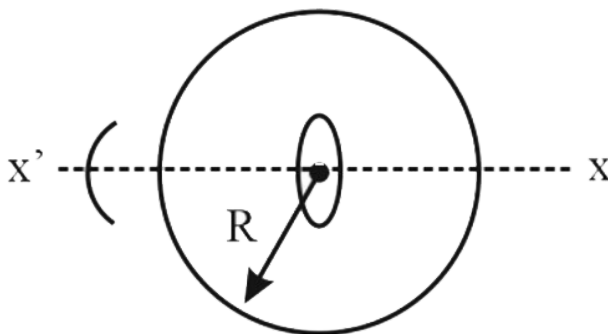
24. In YDSE arrangement as shown in figure, fringes are seen on screen using monochromatic source S having wavelength 3000 Å (in air). S_1 and S_2 are two slits seperated by d = 1 mm and D = 1m. Left of slits S_1 and S_2 medium of refractive index $n_1 = 2$ is present and to the right of S_1 and S_2 medium of $n_2 = \dfrac{3}{2}$, is present. A thin slab of thickness 't' is placed in front of S_1 . The refractive index of n_3 of the slab varies with distance from it's starting face as shown in figure.
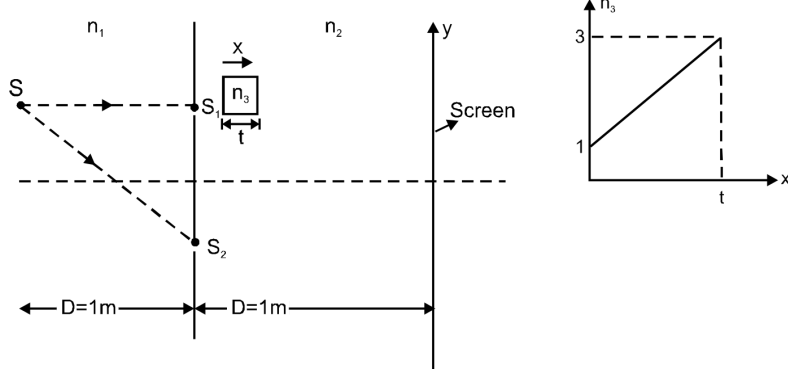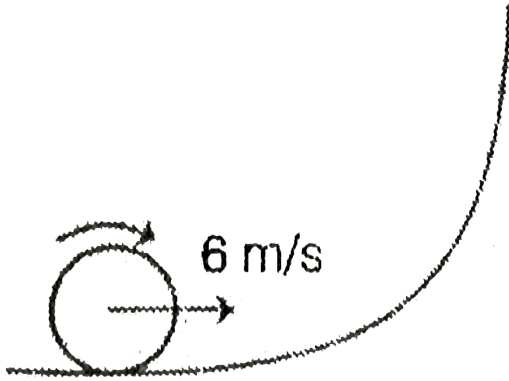
In order to get central maxima at the centre of screen, the thickness of slab required is :

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25. A disc of radius 0.1 mrolls without sliding on a horizontal suirface with a velocity of 6 m/s. It then ascends a smooth continous track as shown in figure. The height upto which it will ascend is

$(g=10m/s^2)$