PHYSICS

NTA MOCK TESTS ENGLISH

NTA JEE MOCK TEST 98

Physics

1. Antenna current of an AM broadcast transmitter modulated by 50% is $11A$. The carrier current is

A. 9.25 A

B. 22 A

C. 10.3 A

D. 5.5 A

Answer: C

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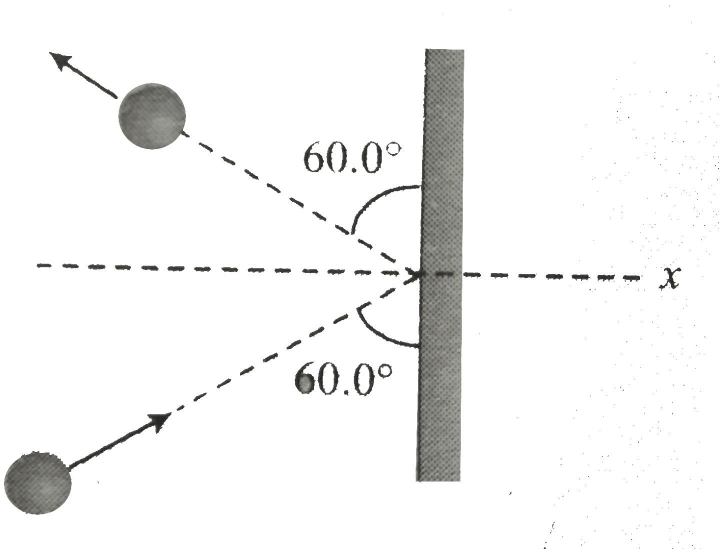
2. A 3-kg steel ball strikes a wall with a speed of $10.0ms^{-1}$ at an angle of 60.0° with the surfaces of the wall. The ball bounces off with the same speed and same angle. If the ball was in contact with the wall for 0.2s, find the average force exerted by the wall on the ball.



A. 96 N

B. 48 N

C. 24 N

D. 12 N

Answer: C

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3. If first excitation potential of a hydrogen-like atom is V electron volt, then the ionization energy of this atom will be:

A. V electron volt

B. $\frac{3V}{4}$ electron volt

C. $\frac{4V}{3}$ electron volt

D. Cannot be calculated by given information

Answer: C

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4. A liquid is kept in a cylindrical vessel which is rotated along its axis. The liquid rises at the sides, if the radius of vessel is $0.05m$ and the speed of rotation is $2rev/s$, find difference in the height of the liquid at the centre of the vessel and its sides.

A. 0.001 m

B. 0.002 m

C. 0.01 m

D. 0.02 m

Answer: D

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5. A car is taking turn on a circular path of radius R. If the coefficient of friction between the tyres and road is μ, the maximum velocity for no slipping is

A. $\alpha\sqrt{\frac{kg}{a}}$

B. $-\alpha\sqrt{\frac{kg}{a}}$

C. $kg\sqrt{\frac{\alpha}{a}}$

D. $-kg\sqrt{\frac{\alpha}{a}}$

Answer: A

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6. In two separate set-ups of the Young's double slit experiment, fringes of equal width are observed when lights of wavelength in the ratio of $1:2$ are used. If the ratio of the slit separation in the two cases is $2:1$, the ratio of the distance between the plane of the slits and the screen in the two set-ups are

A. $1:1$

B. $1:4$

C. $2:1$

D. $4:1$

Answer: D

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7. The bob of a pendulum is released from a horizontal position. If the lenght of the pendulum is 1.5 m what is the speed with which the bob arrives at the lowermost point, given that it dissipated 5% of its initial energy against air resistance?

A. $5ms^{-1}$

B. $5.5ms^{-1}$

C. $5.3ms^{-1}$

D. $4.4ms^{-1}$

Answer: C

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8. What should be the velocity of an electron so that its momentum becomes equal to that of a photon of wavelength 5200 Å ?

A. $700ms^{-1}$

B. $1000ms^{-1}$

C. $1400ms^{-1}$

D. $2800ms^{-1}$

Answer: C

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9. A bulb is rated at $100V$, $100W$. It can be treated as a resistor. Find out the inductance of an inductor (called choke coil) that should be connected in series with the bulb at its rated power with the help of an ac source of $200V$ and $50Hz$.

A. $\frac{\pi}{\sqrt{3}} H$

B. 100 H

C. $\frac{\sqrt{2}}{\pi} H$

D. $\frac{\sqrt{3}}{\pi} H$

Answer: D

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10. A closed pipe of length 22 cm, when excited by a 1875 Hz source forms standing waves. The number of pressure nodes formed in the pipe are [velocity of sound in air = $330ms^{-1}$]

A. 1

B. 2

C. 4

D. 3

Answer: D

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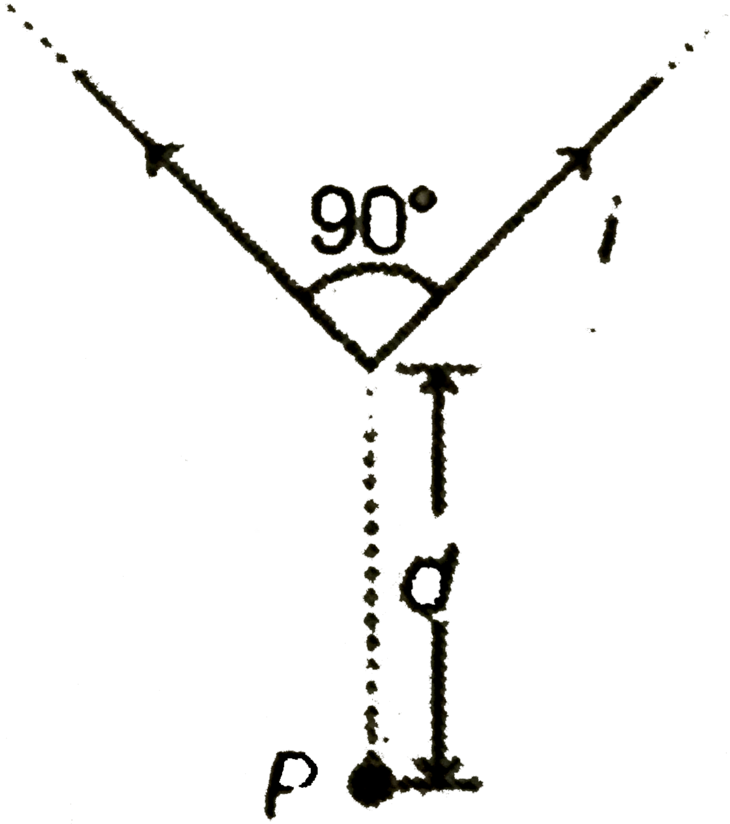
11. Find the magnetic field at P due to the arrangement show in figure



A. $\dfrac{\mu_0 i}{\sqrt{2}\pi d}\left(1-\dfrac{1}{\sqrt{2}}\right)\otimes$

B. $\dfrac{2\mu_0 i}{\sqrt{2}\pi d}\otimes$

C. $\dfrac{\mu_0 i}{\sqrt{2}\pi d}\otimes$

D. $\frac{\mu_0 i}{2\sqrt{2}\pi d}\left(1+\frac{1}{\sqrt{2}}\right)\otimes$

Answer: A

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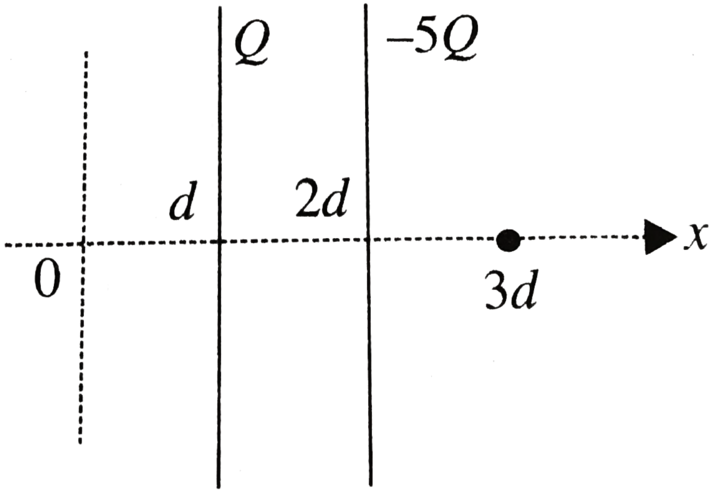
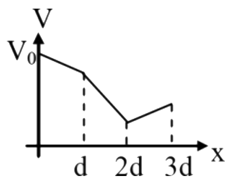
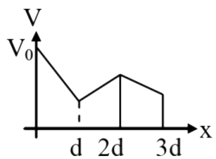
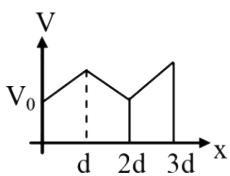
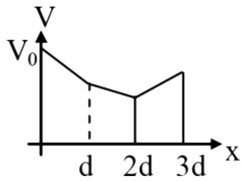
12. Two large identical plates are placed in front of each other at $x = d$ and $x = 2d$ as shown in the figure. If charges on plates are Q and $-5Q$, the potential versus distance graph for region x = 0 to x = 3d is (d is very small and potential at x = 0 is v_0)



A. 

B. 

C. 

D. 

Answer: A

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13. The dimensional formula for magnetic flux is

A. $[ML^2T^{-2}A^{-1}]$

B. $[ML^0T^{-2}A^{-2}]$

C. $\left[M^{0}L^{-2}T^{-2}A^{-3}\right]$

D. $\left[ML^{2}T^{-2}A^{3}\right]$

Answer: A

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14. A uniform disc of mass M and radius R is supported vertically by a pivot at its periphery as shown. A particle of mass M is fixed to the rim and raised to the highest point above the center. The system is released from rest and it can rotate about pivot freely. The angular speed of the system when the attached object is directly beneath the pivot, is

A. $\sqrt{\dfrac{24g}{11R}}$

B. $\sqrt{\frac{8g}{11R}}$

C. $\sqrt{\frac{8g}{3R}}$

D. $\sqrt{\frac{14g}{3R}}$

Answer: A

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15. A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absorbed by the ice and all energy of ice gets converted into heat heat during its fall. The value of h is (Latent heat of ice is 3.4×10^5 J/kg and g = 10N/kg)

A. 34 km

B. 544 km

C. 136 km

D. 68 km

Answer: C

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16. 80 kg of a radioactive material reduces to 10 kg in 1 h. The decay constant of the material is

A. $5.80 \times 10^{-4} s^{-1}$

B. $1.16 \times 10^{-3} s^{-1}$

C. $2.32 \times 10^{-3} s^{-1}$

D. $4.64 \times 10^{-3} s^{-1}$

Answer: A

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17. Image of an object approaching a convex mirror of radius of curvature 20m along its optical axis is 25 50 observed to move from $25/3m$ to $50/7$m in 30s. What is the speed of the object in km per hour?

A. $3kmh^{-1}$

B. $4kmh^{-1}$

C. $5kmh^{-1}$

D. $6kmh^{-1}$

Answer: A

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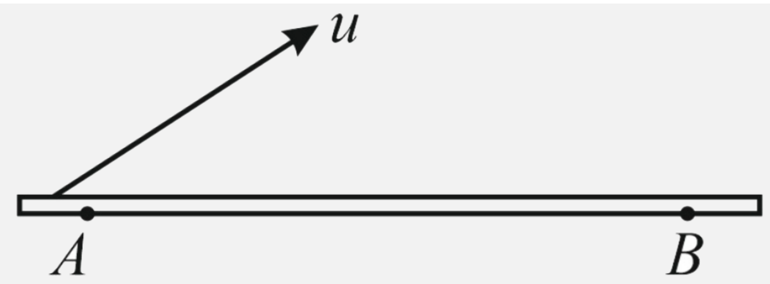
18. A large flat metal surface has a uniform charge density $(+\sigma)$. An electron of mass m and charge ρ leaves the surface at the point A with speed u and returns to it at point B. Disregarding gravity the maximum value of AB is



A. $\dfrac{4u^2 m\varepsilon_0}{\sigma\rho}$

B. $\dfrac{u^2 . \rho\varepsilon_0}{m\sigma}$

C. $\dfrac{2\varepsilon_0 m u^2}{\rho\sigma}$

D. $\dfrac{u^2\sigma\rho}{\varepsilon . m}$

Answer: C

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19. A gas is heated in such a way that its pressure and volume both become double. Now by decreasing temperature, some of air molecules were introduced into the container to maintain the increased volume and pressure. Assuming $1/4^{th}$ of the initial number of moles has been given for this purpose. By what fraction of temperature has been raised finally of initial absolute temperature.

A. 4 times

B. $\frac{16}{5}$ times

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

D. $\frac{1}{5}$times

Answer: B

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20. A body executes S.H.M. of period 20 seconds. Its velocity is $5cms^{-1}$, 2 seconds after it has passed the mean position. Find the amplitude of the bob

$(\cos 36^{\circ} = 0.809)$

A. 21.45 cm

B. 16. 56 cm

C. 19.67 cm

D. 15. 34 cm

Answer: C

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21. A ball is dropped from height 5m. The time after which ball stops rebounding if coefficient of restitution between ball and ground $e = 1/2$, is

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22. Two cells having an internal resistance of 0.2Ω and 0.4Ω are connected in parallel (same polarity) the voltage across the battery is 1.5 V. If the emf of one cell is 1.2 V, then the emf of second cell is

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23. A astronomical telescope has objective and eye-piece of focal length 40cm, 4cm, respectivley. To view an object must be separated by a distance

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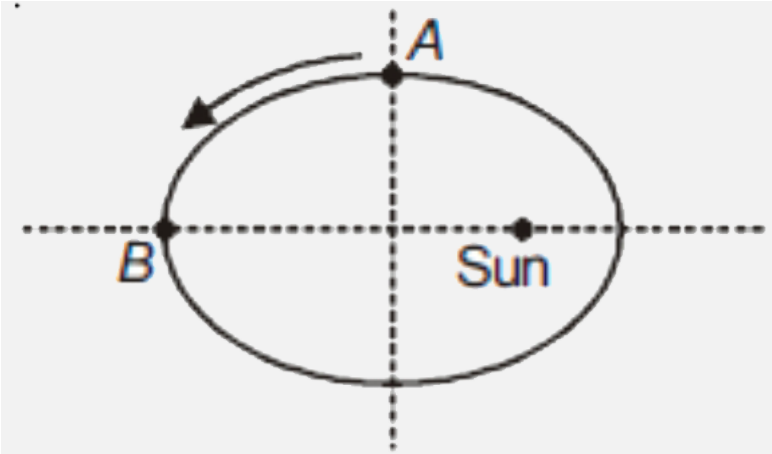
24. A planet is revolving around the sun in an elliptical orbit having eccentricity $e\left(=\frac{\pi}{4}\right)$. If the time period of revolution is 16 months then find the time taken by the planet in going from A to B in months.



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25. $1.56 \times 10^5 J$ of heat is conducted through is $2m^2$ wall of 12 cm thick in one hour. Temperature difference between the two sides of the wall is $20^\circ C$. The thermal conductivity of the material of the wall is (in $Wm^{-1}K^{-1}$)

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