PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 94

Physics

1. A particle is released from a height S. At certain height its kinetic energy is three times

its potential energy. The height and speed of the particle at that instant are respectively

A. $\dfrac{h}{3}, \sqrt{\dfrac{2gh}{3}}$

B. $\dfrac{h}{3}, 2\sqrt{\dfrac{gh}{3}}$

C. $\dfrac{2h}{3}, \sqrt{\dfrac{2gh}{3}}$

D. $\dfrac{h}{3}, \sqrt{2gh}$

Answer: B

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2. Ultraviolet light of wavelength 300nn and intensity $1.0Wm^{-2}$ falls on the surface of a photosensitive material. If one per cent of the incident photons produce photoelectrons, then the number of photoelectrons emitted per second from an area of 1.0 cm^2 of the surface is nearly

A. $9.61 \times 10^{14} s^{-1}$

B. $4.12 \times 10^{13} s^{-1}$

C. $1.51 \times 10^{12} s^{-1}$

D. $2.13 \times 10^{11} s^{-1}$

Answer: C

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3. Three samples of the same gas A,B and C $(\gamma = 3/2)$ have initially equal volume. Now the volume of each sample is doubled. The process is adiabatic for A. Isobaric for B and isothermal for C. If the final pressures are

equal for all three samples, find the ratio of their initial pressures

A. $2:1:\sqrt{2}$

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

C. $\sqrt{2}:1:2$

D. $\sqrt{2}:2:1$

Answer: B

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4. In an organ pipe whose one end is at x =0, the pressure is expressed by $P = P_0\cos\dfrac{3\pi x}{2}\sin 300\pi t$ where x is in meter and t in sec. The organ pipe can be :-

A. Closed at one end, open at another with length 0.5 m =

B. Open at both ends, length = 1 m

C. Closed at both ends, length 2 m

D. Closed at end, open at another with length $\dfrac{2}{3}m$

Answer: C

5. The magnetic susceptibility of a rod is 499. The absolute permeability of vacuum is $4\pi \times 10^{-7} H/m$. The absolute permeability of the material of the rod is

A. $\pi \times 10^{-4} Hm^{-1}$

B. $2\pi \times 10^{-4} Hm^{-1}$

C. $3\pi \times 10^{-4} Hm^{-1}$

D. $4\pi \times 10^{-4}Hm^{-1}$

Answer: B

6. The velocity of water in a river is $18kmh^{-1}$ near the surface. If the river is 5 m deep, find the shearing stress between the horizontal layers of water. The coefficient of viscosity of water $= 10^{-2}poise.$

A. $10^{-1}Nm^{-2}$

B. $10^{-2}Nm^{-2}$

C. $10^{-3}Nm^{-2}$

D. $10^{-4}Nm^{-2}$

Answer: C

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7. The power obtained in a reactor using U^{235} disintergration is $1000kW$. The mass decay of U^{235} per hour is

A. $10\mu g$

B. $20\mu g$

C. $40\mu g$

D. $1\mu g$

Answer: C

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8. Let ω be the angular velocity of the earth's rotation about its axis. Assume that the acceleration due to gravity on the earth's

surface has the same value at the equator and the poles. An object weighed by a spring balance gives the same reading at the equator as at a height h above the poles ($h < < R$). The value of h is

A. $\dfrac{gR}{\omega}$

B. $\dfrac{\omega^2 R^2}{g}$

C. $\dfrac{\omega^2 R^2}{2g}$

D. $\dfrac{2\omega^2 R^2}{g}$

Answer: C

9. A particle performing SHM starts equilibrium position and its time period is 16 seconds. After 2 seconds its velocity is $\pi m/s$. Amplitude of oscillation is

$$\left(\cos 45^\circ = \frac{1}{\sqrt{2}} \right)$$

A. $2\sqrt{2}$

B. $4\sqrt{2}$

C. $6\sqrt{2}$

D. $8\sqrt{2}$

Answer: D

10. A thin disc of mass 9M and radius R from which a disc of radius R/3 is cut shown in figure. Then moment of inertia of the remaining disc about O, perpendicular to the

plane of disc is -
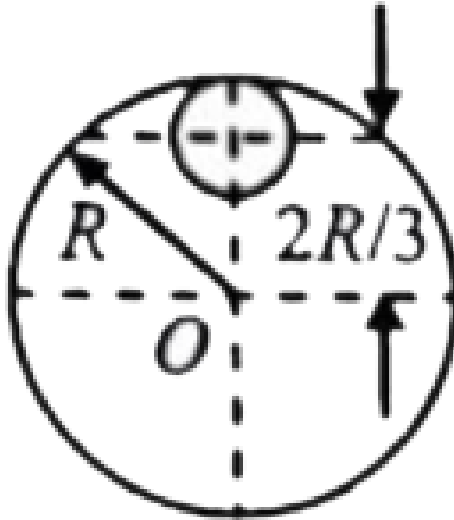
A. $4MR^2$

B. $\dfrac{40}{9}MR^2$

C. $10MR^2$

D. $\dfrac{37}{9}MR^2$

Answer: A

11. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic light of wavelength 500 nm is used, what will be the width of each slit for obtaining ten maxima of double slit within the central maxima of single slit pattern ?

   A. 0.2 mm

B. 0.1 mm

C. 0.5 mm

D. 0.02 mm

Answer: A

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12. The dc common emitter current gain of a n-p-n transistor is 50. The potential difference applied across the collector and emitter of a transistor used in CE configuration is,

$V_{CE} = 2V$. If the collector resistance, $R_C = 4k\Omega$, the base current (I_B) and the collector current (I_C) are

A. $I_B = 10\mu A$, $I_C = 0.5mA$

B. $I_B = 0.5\mu A$, $I_C = 10mA$

C. $I_B = 5\mu A$, $I_C = 1mA$

D. $I_B = 1\mu A$, $I_C = 0.5mA$

Answer: A

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13. Three equal weights of mass 2 kg each are hanging on a string passing over a fixed pulley as shown in fig What is the tension in the string connecting weights B and C?
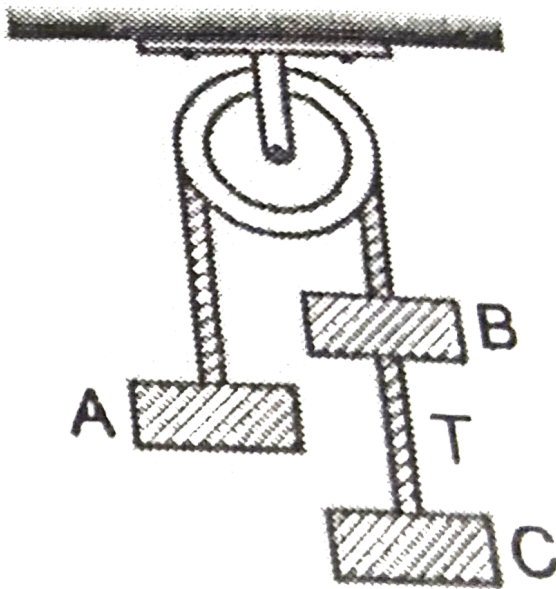
A. Zero

B. 3.3 N

C. 13.3 N

D. 19.6 N

Answer: C

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14. A transformer is used to light a $100W$ and $110V$ lamp from a $220V$ mains. If the main current is $0.5A$, the Efficiency of the transformer is approximately:
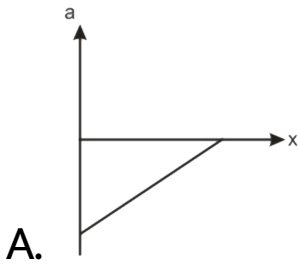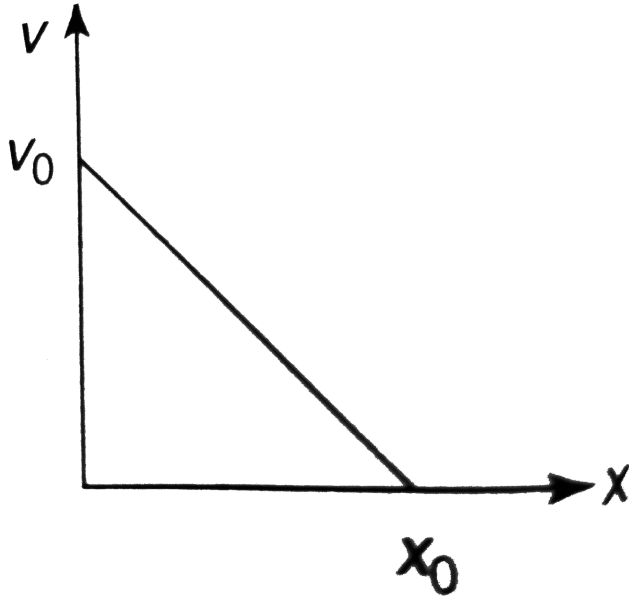
A. 86 %
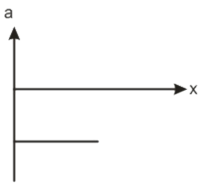
B. 91 %

C. 96 %
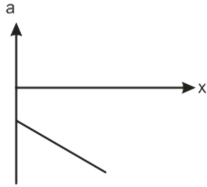
D. 98 %

Answer: B

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15. The given graph shows the variation of velocity with displacement. Which one of the graphs given below correctly represents the

variation of acceleration with displacement ?

A.

B.
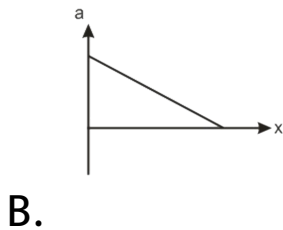
C.

D.

Answer: A

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16. A particle of specific charge $\frac{q}{m} = \pi C kg^{-1}$ is projected from the origin toward positive x-axis with a velocity of $10ms^{-1}$ in a uniform

magnetic field $\vec{B} = -2\hat{k}T$. The velocity $\vec{v}$ of particle after time $t = \dfrac{1}{12}s$ will be (in ms^{-1})

A. $5\left[\hat{i} + \sqrt{3}\hat{j}\right]$

B. $5\left[\sqrt{3}\hat{i} + \hat{j}\right]$

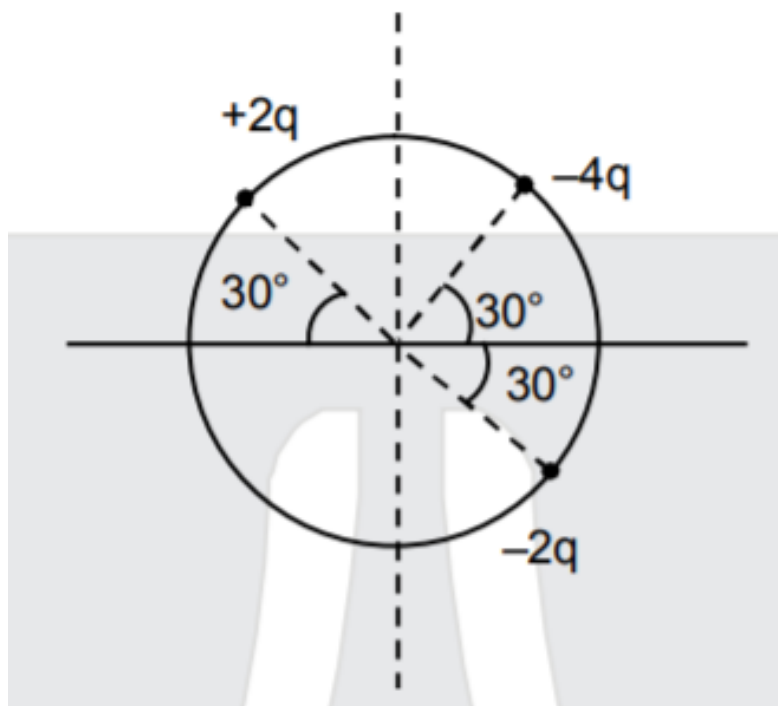C. $5\left[\sqrt{3}\hat{i} - \sqrt{3}\hat{j}\right]$

D. $5\left[\hat{i} + \hat{j}\right]$

Answer: B

17. 3 charges are placed in a circle of radius d as shown in figure. Find the electric field along x-axis at centre of circle.

A. $\dfrac{\sqrt{3}q}{\pi\varepsilon_0 d^2}$

B. $\dfrac{2\sqrt{3}q}{\pi\varepsilon_0 d^2}$

C. $\dfrac{\sqrt{3}q}{4\pi\varepsilon_0 d^2}$

D. $\dfrac{3\sqrt{3}q}{4\pi\varepsilon_0 d^2}$

Answer: A

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18. Position of a body with acceleration a is given by $x = Ka^m t^n$, here t is time Find demension of m and n.

A. m = 1, n = 1

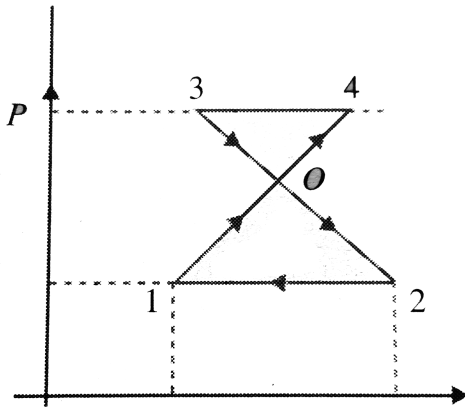B. m = 1, n = 2

C. m = 2, n = 1

D. m = 2, n = 2

Answer: B

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19. Determine the work done by an ideal gas

doing $1 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1$.

Given

$P_1 = 10^5 Pa, P_0 = 3 \times 10^5 Pa, P_3 = 4 \times 10^5 Pa$

and $V_2 - V_1 = 10L.$

A. 740 J

B. 750 J

C. 730 J

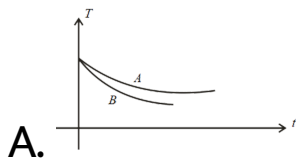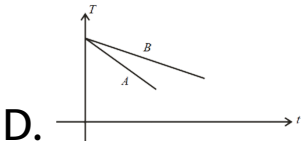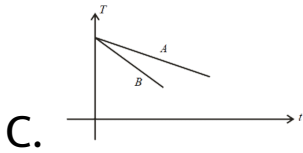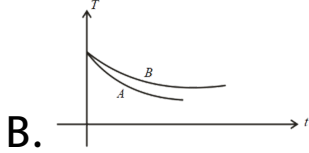D. 745 J

Answer: B

20. Two identical containers of same emissivity containing liquids A & B art same temperature of $60°$ initially and densitiy ρA and ρB respectively. Where $\rho A < \rho B$. Which plot best represents the temperature varitation of both with time? Given

$$\left(S_A = 1000\frac{J}{kg - K}, \ S_B = 2000\frac{J}{kg - K} \right)$$

A.

B.

C.

D.

Answer: B

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**21.** In the hydrogen atom spectrum, λ_{3-1} and λ_{2-1} represent wavelengths

emitted due to transition from second and first excited states to the ground state respectively . The ratio $\dfrac{\lambda_{3-1}}{\lambda_{2-1}} = \dfrac{p}{q}$, where p and q are the smallest positive integers . What is the value of (p + q) ?

22. From a uniform solid cone of base radius R and height H, a symmetric cone of the base radius $\dfrac{R}{2}$ is removed as shown. Then the centre of mass is shifted by H/n. Find the value
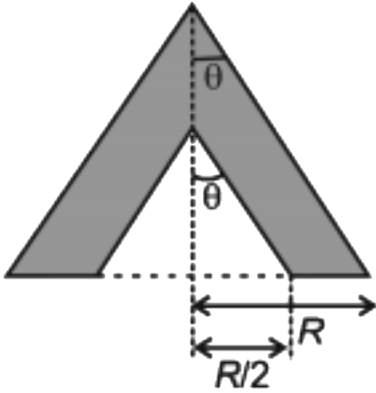
of of n.

23. The velocity and acceleration vectors of a particle undergoing circular motion are $v = 2\hat{i}m/s$ and $a = 2\hat{i} + 4\hat{j}m/s^2$

respectively at some instant of time. The radius of the circle is
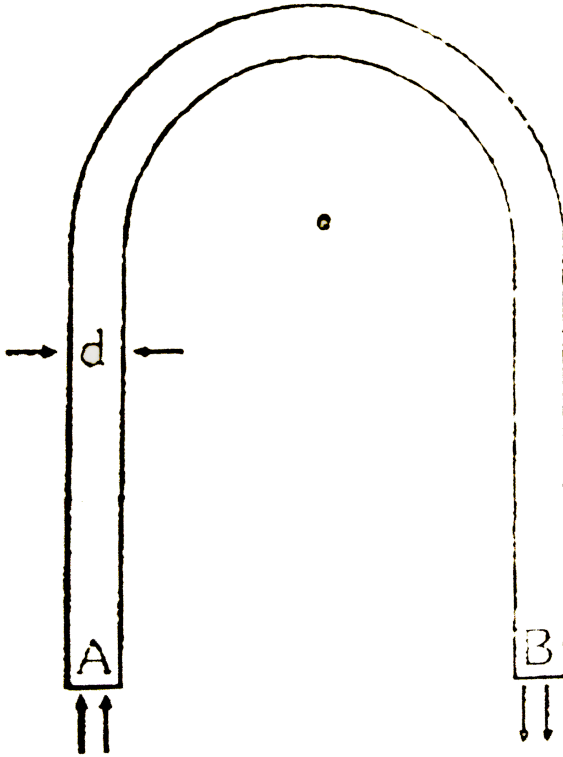
24. Two unknown resistances are connected in two gaps of a meter-bridge. The null point is obtained at 40 cm from left end. A 30Ω resistance is connected in series with the smaller of the two resistances, the null point shifts by 20 cm to the right end. The value of smaller resistance in Ω is

25. A rod made of glass $(\mu = 1.5)$ and of square cross-section is equal is bent into the shape shown in figure. A parallel beam of light falls perpendicular on the plane flat surface . Referring to the diagram, d is the width of a side & R is radius of inner semicircle. find the maximum value of ratio $\dfrac{d}{R}$ so that all light entering the glass through surface A emerge

from the glass through surface B.