PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 75

Physics

1. Maximum energy is evolved during which of the following transitions ?

A. $n = 1$ to $n = 2$

B. $n = 2$ to $n = 6$

C. $n = 2$ to $n = 1$

D. $n = 6$ to $n = 2$

Answer: C

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2. A gun (mass=M) fires a bullet (mass=m) with speed v_r relative to barrel of the gun which is inclined at an angle of 60° with horizontal.

The gun is placed over a smooth horizontal surface. Find the recoil speed of gun.

A. $V = \frac{1}{2}\frac{mV_r}{(m+M)}$

B. $V = \frac{1}{2}\frac{mV_r}{(m-M)}$

C. $V = \frac{1}{2}\frac{MV_r}{(m+M)}$

D. None of the above

Answer: A

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3. A 500 kg car takes a round turn of radius 50 m with a velocity of 36 km/hr . The centripetal force is

A. 250 N

B. 750 N

C. 1000 N

D. 1200 N

Answer: C

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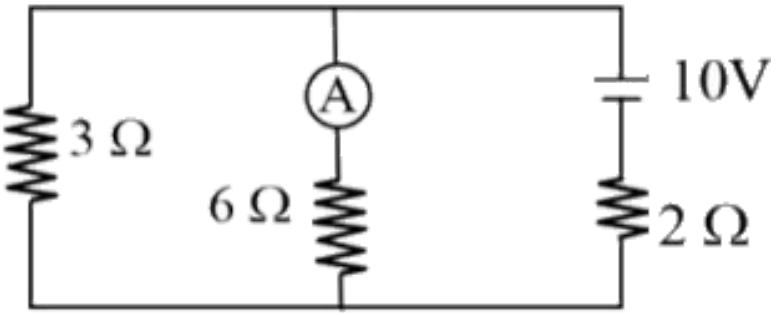
4. The reading of the ideal ammeter will be

(Resistance of ideal ammeters is zero)



A. $\frac{5}{6}A$

B. $\frac{6}{5}A$

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

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

Answer: A

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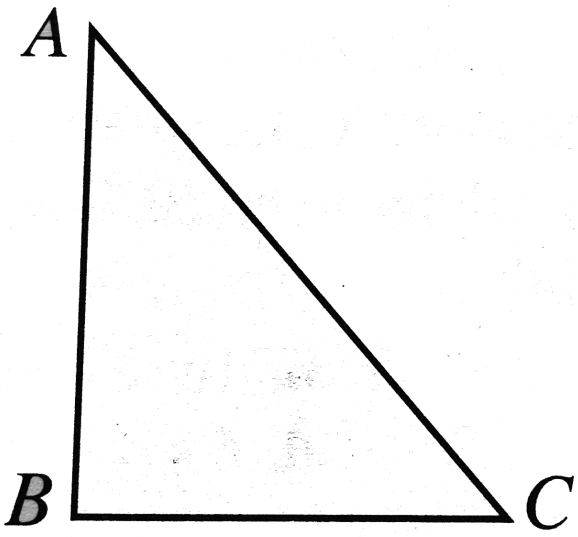

5.

Three rods of identical cross-sectional area and made from the same metal form the sides

of an isosceles Delta ABC right angled at B. The points A and B are maintained at temperetures T and $\sqrt{2}T$, respectively in the steady state. Assuming that onlyheat conduction takes place, temperature of point C is

A. $\frac{3T}{\sqrt{2}+1}$

B. $\frac{T}{\sqrt{2}+1}$

C. $\frac{T}{3\left(\sqrt{2}-1\right)}$

D. $\frac{T}{\sqrt{2}-1}$

Answer: A

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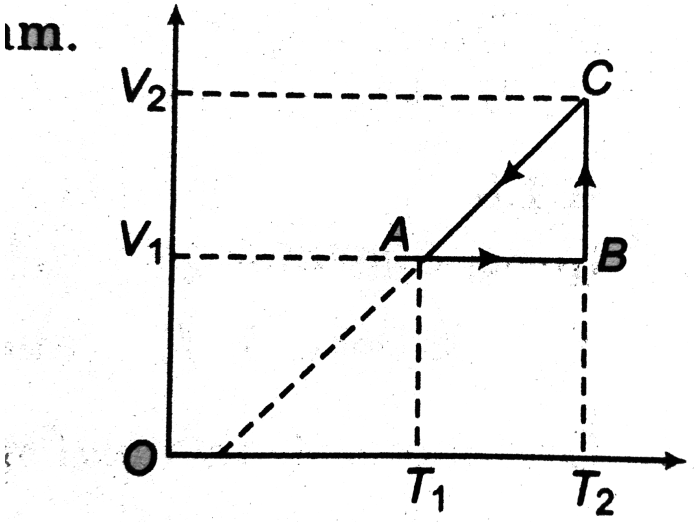
6. The cyclic process for 1 mole of an ideal gas is shown in the V-T diagram. The work done in

AB, BC and CA respectively is



A. $0, RT_1 \ln\left(\frac{V_1}{V_2}\right), R(T_1 - T_2)$

B. $R, (T_1 - T_2)R, RT_1 \ln\left(\frac{V_1}{V_2}\right)$

C. $0, RT_2 \ln\left(\frac{V_2}{V_1}\right), \frac{RT_1}{V_1}(V_1 - V_2)$

D. $0, RT_2 \ln\left(\frac{V_1}{V_2}\right), R(T_1 - T_2)$

Answer: C

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7. A particle accelerated by a potential difference V flies through a uniform transverse magnetic field with induction B. The field occupies a region of space d in thickness. Prove that the angle a through which the particle deviates from the initial direction of its motion is given by.

$$\alpha = \sin^{-1}\left(dB\sqrt{\frac{q}{2Vm}}\right)$$

where m is the mass of the particle.

A. $\theta = \sin^{-1}\left(dB\sqrt{\frac{qV}{2m}}\right)$

B. $\theta = \sin^{-1}\left(dB\sqrt{\frac{q}{2mV}}\right)$

C. $\theta = \tan^{-1}\left(dB\sqrt{\frac{qV}{2m}}\right)$

D. $\theta = \tan^{-1}\left(dB\sqrt{\frac{q}{2mV}}\right)$

Answer: B

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8. Two tall buildings are 40 m apart. With what speed must a ball be thrown horizontally from a window 145 m above the ground in one building, so that it will enter a window 22.5 m above from the ground in the other?

A. $5ms^{-1}$

B. $8ms^{-1}$

C. $10ms^{-1}$

D. $16ms^{-1}$

Answer: B

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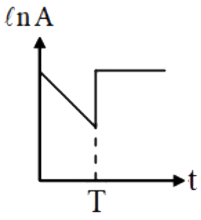
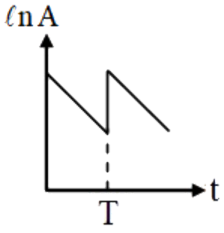
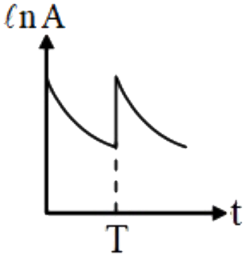
9. At time $t = 0$, some radioactive gas is injected into a sealed vessel. At time T, some more of the same gas is injected into the same vessel. Which one of the following graphs best represents the variation of the logarithm of the activity A of the gas with time t?

A.



B. 

C. 

D. None of these

Answer: B

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10. The displacement y of a particle executing periodic motion is given by

$$y = 4\cos^2\left(\frac{1}{2}t\right)\sin(1000t)$$

This expression may be considereed to be a result of the superposition of

A. 4

B. 3

C. 2

D. 5

Answer: B

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11. In an experiment tungsten cathode which has a threshold 2300Å is irradiated by ultraviolet light of wavelength 1800Å. Calculate

(i) Maximum energy of emitted photoelectron and

(ii) Work function for tungsten.

(Mention both the results in electron-volts)

Given Planck's constant $h = 6.6 \times 10^{-34} joe - \sec,$

$\leq V = 1.6 \times 10^{-19}$ joule and velocity of light $c = 3 \times 10^{8} m/\sec$

A. $0.15eV$

B. $1.5eV$

C. $15eV$

D. $150eV$

Answer: B

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12. There is same change in length when a 33000 N tensile force is applied on a steel rod of area of cross-section $10^{-3}m^2$. The change of temperature reuired to produce the same elongation, if the steel rod is heated , if (The modulus of elasticitay is $3 \times 10^{11} N/m^2$ and the coefficient of linear expansion of steel is $11 \times 10^{-5}/^{\circ} C$).

A. $20^{\circ} C$

B. $15^{\circ} C$

C. $10^{\circ} C$

D. $0^\circ C$

Answer: C

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13. What is the required condition, if the light incident on one face of a prism, does not emerge from the other face?

A. $n < \text{cosec}\left(\frac{A}{2}\right)$

B. $n < \sec\left(\frac{A}{2}\right)$

C. $n > \sec A$

D. $n > \operatorname{cosec}\left(\frac{A}{2}\right)$

Answer: D

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14. When a celling fan is switched off, its angular velocity falls to half while it makes 36 rotations. How many more rotations will it make before coming to rest ?

A. 24

B. 36

C. 18

D. 12

Answer: D

15. In a CE amplifier, the input ac signal to be amplified is applied across

A. Forward biased emitter - base junction

B. Reverse biased collector - base junction

C. Reverse biased emitter - base junction

D. Forward biased collector - base junction

Answer: A

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16. The temperature of a ideal gas is increased for 100 k to 400k. If at 100 K the root mea

square velocity of the gas molecules is v, at 400K it becomes

A. 2V

B. 4V

C. 0.5V

D. V

Answer: A

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17. If force (F), length (L) and time (T) be considered fundamenal units, then the units of mass will be

A. $\left[FLT^{-2}\right]$

B. $\left[FL^{-1}T^{-1}\right]$

C. $\left[FL^{-1}T^{2}\right]$

D. $\left[F^{2}LT^{-2}\right]$

Answer: C

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18. In Fraunhofer diffraction experiment, L is the distance between screen and the obstacle, b is the size of obstacle and λ is wavelength of incident light. The general condition for the applicability of Fraunhofer diffraction is :

A. $\frac{b^2}{L\lambda} > > 1$

B. $\frac{b^2}{L\lambda} = 1$

C. $\frac{b^2}{L\lambda} < < 1$

D. $\frac{b^2}{L\lambda} \neq 1$

Answer: C

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19. An organ pipe of length L is open at one end and closed at other end. The wavelengths of the three lowest resonating frequencies that can be produced by this pipe are

A. 4L, 2L, L

B. 2L, L, L/2

C. 2L, L, 2L/3

D. 4L, 4L/3, 4L/5

Answer: D

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20. A force F is related to the position of a particle by the relation $F = \left(10x^2\right)N$. Find the work done by the force when the particle moves from $x = 2m \rightarrow x = 4m.$

A. $\frac{56}{3}J$

B. 560 J

C. $\frac{560}{3}J$

D. $\frac{3}{560}J$

Answer: C

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21. A coil having inductance and L and resistance R is connected to a battery of emf $\in$ at $t = 0$. If t_1 and t_2 are time for $90\,\%$ and $99\,\%$ completion of current growth in the circuit, then $\frac{t_1}{t_2}$ will be-

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22. The capacitance of a capacitor between$4/3$ times its original value if a dielectric slab of thickness $t = d/2$ is inserted between the plates (d is the separation between the plates). What is the dielectric consant of the slab?

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23. A balloon rises from rest on the ground with constant acceleration $g//8$. A stone is

dropped from the balloon when the balloon has risen to a height of (H). Find the time taken by the stone to reach the ground.

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24. A spherical uniform planet is rotating about its axis. The velocity of a point on its equator is $7.5kms^{-1}$. Due to the rotation of the planet about its axis, the acceleration due to gravity g at equator is $1/2$ of g at poles. What is the escape velocity $\left(\text{in km s}^{-1}\right)$ of a

particle on the planet from the pole of the planet?

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25. A body of mass 5 kg stJrls from the origin with an initial velocity $\bar{u} = \left(30\hat{i} + 40\hat{j}\right) ms^{-1}$ .If a constant force $\left(-6\hat{i} - 5\hat{j}\right) N$ acts on the body, the time in velocity, which the y-component of the velocity becomes zero is.

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