PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 94

Physics

1. Ionization potential of hydrogen atom is $13.6V$. Hydrogen atoms in the ground state are excited by monochromatic radiation of

photon energy $12.1eV$. The spectral lines emitted by hydrogen atoms according to Bohr's theory will be

A. One

B. Two

C. Three

D. Four

Answer: C

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2. The angular momentum of an electron in hydrogen atom is $\frac{h}{\pi}$ The kinetic energy of the electron is

A. 13.6 eV

B. 3.4 eV

C. 1.51 eV

D. 0.85 eV

Answer: B

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3. The centre of mass of a non uniform rod of length L, whose mass per unit length varies as $\rho = \frac{k.\,x^2}{L}$ where k is a constant and x is the distance of any point from one end is (from the same end)

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

B. $\frac{L}{8}$

C. $\frac{K}{L}$

D. $\frac{3K}{L}$

Answer: A

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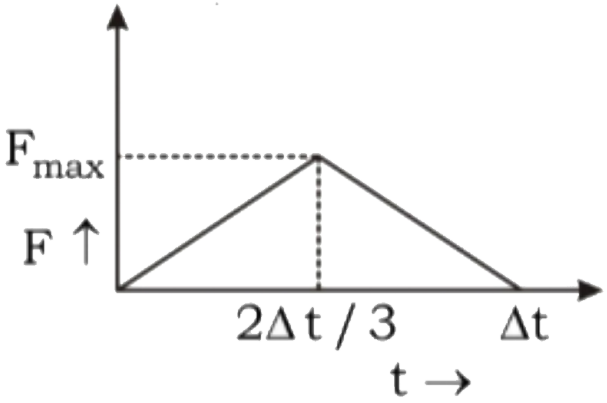
4. A body of mass m is moving with speed v makes a one-dimensional collision with a stationary body of same mass on a horizontal table . They are in connect for the a very small time interval Δt. The contact force between them varies varies as shown in the graph. (Neglect friction)



The coefficient of restitution for the collision will be

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

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

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

D. $\frac{1}{4}$

Answer: B

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5. A pendulum consisting of a small sphere of mass m, suspended by a inextensible and massless string of length 1 , is made to swing in a verticle plane. If the breaking strength of the string is 2 mg, then the maximum angular amplitude of the displacement from the verticle can be

A. 0°

B. 30°

C. 60°

D. 90°

Answer: C

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6. Two identcal magnetic dipole of magnetic moment $1.0A - m^2$ each, placed at a separation of 2 m with their axis perpendicular to each other. The resultant magnetic field at a point midway between the dipole is

A. $5 \times 10^{-7} T$

B. $\sqrt{5} \times 10^{-7} T$

C. $10^{-7} T$

D. $2 \times 10^{-7} T$

Answer: B

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7. v22

A. 550Ω

B. 440Ω

C. 330Ω

D. 880Ω

Answer: D

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8. A galvanometer of resistance 50Ω is connected to a b attery of 3V alongwith a resistance of 2950Ω in series. A full scale deflection of 30 division is obtained in the

galvanometer in order to reduce this deflection to 20 division. The resistance in sereis. should be:-

A. 2950Ω

B. 1500Ω

C. 4440Ω

D. 7400Ω

Answer: B

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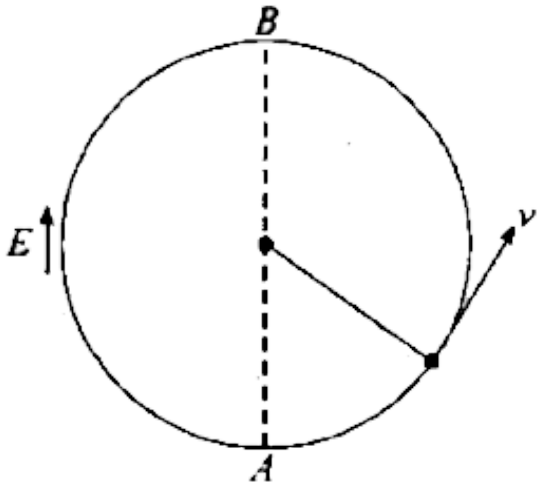
9. A particle of mass m and charge Q is attached to a string of length l. It is whirled in a vertical circle in the region of an electric field E as shown in the figure-5.105.What is the speed given to the particle at the point B,so that tension in the string when the particle is at A is ten times the weight of the particle?



A. $\sqrt{5gL}$

B. $\sqrt{L\left(9g+\frac{QE}{m}\right)}$

C. $\sqrt{11gL}$

D. $v=\sqrt{L\left(11g+\frac{QE}{m}\right)}$

Answer: B

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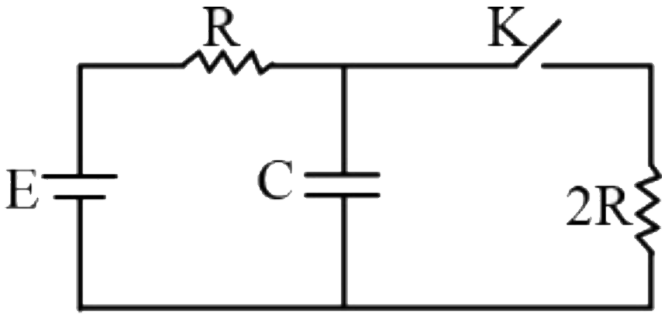
10. In the given circuit switch K is open. The charge on the capacitor is C is steady-state is

q_1 Now the key is closed and steady-state charge on C is q_2 The ratio of charges q_1 / q_2 is -



A. $3/2$

B. $3/1$

C. 1

D. $1/2$

Answer: A

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11. An ideal coil of 10H is connected in series with a resistance of $5(\Omega)$ and a battery of 5V. 2second after the connections is made, the current flowing in ampere in the circuit is

A. $\left(1-e^{-1}\right)$

B. $(1-e)$

C. e

D. e^{-1}

Answer: A

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12. A metal rod of resistance 20Ω is fixed along a diameter of a conducting ring of radius $0.1m$ and lies on $x-y$ plane. There is a magnetic field $\overrightarrow{B}=(50T)\overrightarrow{k}$. The ring rotates with an angular velocity $\omega=20rads^{-1}$ about its axis. An external resistance of 10Ω is

connected across the center of the ring and rim. The current external resistance is

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

B. $\frac{1}{3}A$

C. $\frac{1}{4}S$

D. zero

Answer: B

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13. The escape velocity from the earth is $11 km/s$. The escape velocity from a planet having twice the radius and same density as that of the earth is (in km/s)

A. $5.5 kms^{-1}$

B. $11 kms^{-1}$

C. $22 kms^{-1}$

D. None of these

Answer: C

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14. Two metallic balls of mass m are suspended by two strings of length L. The distance between upper ends is L. The angle at which the string will be inclined with vertical due to attraction is $(m << M$ where M is the mass of Earth)

A. $\tan^{-1}\left[\frac{GM}{gL}\right]$

B. $\tan^{-1}\left[\frac{GM}{2gL}\right]$

C. $\tan^{-1}\left[\frac{GM}{gL^2}\right]$

D. $\tan^{-1}\left[\frac{2GM}{gL^2}\right]$

Answer: C

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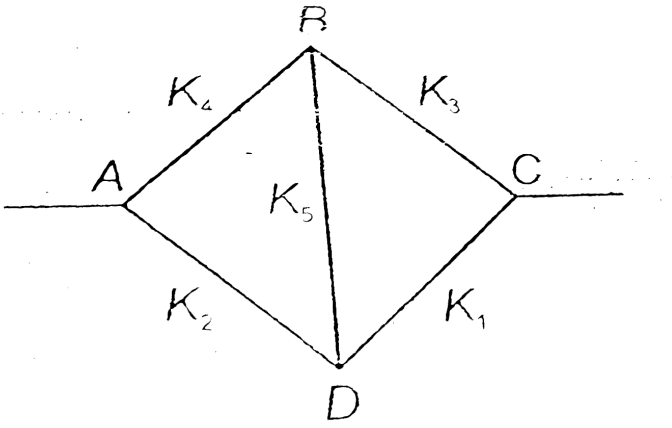
15. Five rods of same dimensions are arranged as shown in the figure. They have thermal conductivities k_1, k_2, k_3 and k_5. When points A and C are maintained at different temperature, no heat flows through the

central rod if



A. $K_1K_4 = K_2K_3$

B. $K_1 = K_4$ and $K_2 = K_3$

C. $\frac{K_1}{K_4} = \frac{K_2}{K_3}$

D. $K_1K_2 = K_3K_4$

Answer: A

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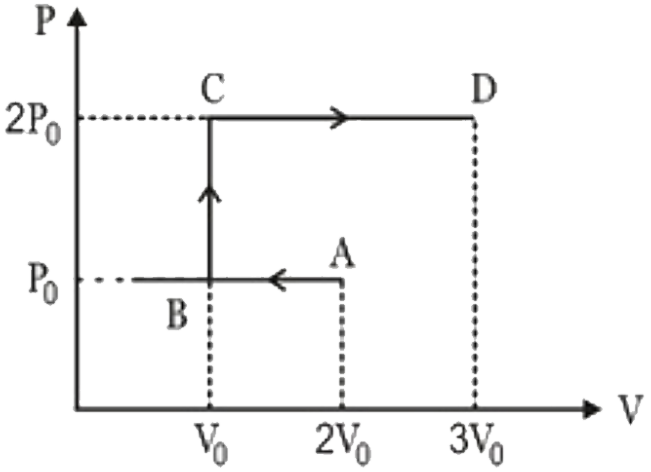
16. P – V graph of an ideal gas is as shown in the diagram . Work done by the gas in the process ABCD is



A. $4P_0V_0$

B. $2P_0V_0$

C. $3P_0V_0$

D. P_0V_0

Answer: C

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17. An ideal gas $(\gamma = 1.5)$ is expanded adiabatically. How many times has the gas to be expanded to reduce the roo-mean-square velocity of molecules becomes half ?

A. 4 times

B. 16 times

C. 8 times

D. 2 times

Answer: B

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18. The quantity of a charge that will be transferred by a current flow of 20 A over 1 h 30 min period is

A. $10.8 \times 10^3 C$

B. $10.8 \times 10^4 C$

C. $5.4 \times 10^3 C$

D. $1.8 \times 10^4 C$

Answer: B

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19. A thin circular disk of radius R is uniformly charged with density $\sigma > 0$ per unit area.The disk rotates about its axis with a uniform

angular speed ω.The magnetic moment of the disk is :

A. $2\pi R^4 \omega \rho$

B. $\pi R^4 \omega \rho$

C. $\frac{\pi R^4}{2} \omega \rho$

D. $\frac{\pi R^4}{4} \omega \rho$

Answer: D

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20. A juggler throws balls into air. He throws one when ever the previous one is at its height point. If he throws n balls each second, the height to which each ball will rise is

A. $\frac{g}{2n^2}$

B. $\frac{2g}{n^2}$

C. $\frac{2g}{n}$

D. $\frac{g}{4n^2}$

Answer: A

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21. A projectile is given an initial velocity of $\left(\hat{i}+2\hat{j}\right)m/s$, where $\hat{i}$ is along the ground and $\hat{j}$ is along the vertical . If $g=10m/s^2$, the equation of its trajectory is :

A. $y=x-5x^2$

B. $y=2x-5x^2$

C. $4y=2x-5x^2$

D. $4y=2x-25x^2$

Answer: B

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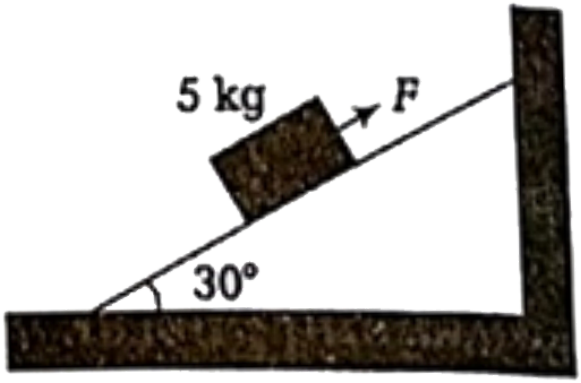
22. A force F=75 N is applied on a block of mass 5 kg along the fixed smooth incline as as shown in the figure. Here gravitational acceleration g = 10 m s^{-2} . The acceleration of

the block is



A. $10ms^{-2}$ downwards the incline

B. $10ms^{-2}$ upwards the incline

C. $5ms^{-2}$ downwards the incline

D. $5ms^{-2}$ upwards the incline

Answer: B

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23. Maximum acceleration of the train in which a 50 kg box lying on its floor will ramain stationary is (Given: Co-efficient of static friction between the box and the train's floor is 0.3 and $g = 10ms^{-2}$)

A. $5.0ms^{-2}$

B. $3.0ms^{-2}$

C. $1.5ms^{-2}$

D. $15ms^{-2}$

Answer: B

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24. The activity of a radioactive sample is measured as 9750 counts per minute at $t = 0$ and as 975 counts per minute at $t = 5$ minutes. The decay constant is approximately

A. 0.922 per minute

B. 0.691 per minute

C. 0.461 per minute

D. 0.230 per minute

Answer: C

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25. In a radioactive material the activity at time t_1 is R_1 and at a later time t_2, it is R_1. If the decay constant of the material is λ, then

A. $R_1 = R_2 e^{-\lambda(t_1 - t_2)}$

B. $R_1 = R_2 e^{\lambda(t_1 - t_2)}$

C. $R_1 = R_2$

D. $R_1 = R_2(t_2/t_1)$

Answer: A

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26. Two identical blocks A and B , each of mass m resting on smooth floor are connected by a light spring of natural length L and spring constant k, with the spring at its natural length. A third identical block C (mass

m) moving with a speed v along the line joining A and B collides with A. The maximum compression in the spring is

A. $v\sqrt{\frac{m}{2k}}$

B. $m\sqrt{\frac{v}{2k}}$

C. $\sqrt{\frac{mv}{k}}$

D. $\frac{mv}{2k}$

Answer: A

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27. A particle is executing SHM along a straight line. Its velocities at distances x_1 and x_2 from the mean position are v_1 and v_2, respectively. Its time period is

A. $2\pi\sqrt{\dfrac{x_1^2+x_2^2}{V_1^2+V_2^2}}$

B. $2\pi\sqrt{\dfrac{x_2^2-x_1^2}{V_1^2-V_2^2}}$

C. $2\pi\sqrt{\dfrac{V_1^2+V_2^2}{x_1^2+x_2^2}}$

D. $2\pi\sqrt{\dfrac{V_1^2-V_2^2}{x_1^2-x_2^2}}$

Answer: B

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28. Find the difference of kinetic energies of photoelectrons emitted from a surface by light of wavelength 2500Å and 5000Å. $h = 6.62 \times 10^{-34} Js.$

A. 1.61 eV

B. 2.47 eV

C. 3.96 eV

D. $3.96 \times 10^{-19} eV$

Answer: B

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29. About 5% of the power of a $100W$ light bulb is converted to visible radiation. What is the average intensity of visible radiation

(a) at a distance of $1m$ from the bulb?

(b) at a distance of $10m$?

Assume that the radiation is emitted isotropically and neglect reflection.

A. $0.4Wm^{-2}$

B. $0.5Wm^{-2}$

C. $0.6Wm^{-2}$

D. $0.8Wm^{-2}$

Answer: A

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30. The pressure at the bottom of a tank of liquid is not proportional to

A. The density of the liquid

B. The area of the liquid surface

C. The height of the liquid

D. The acceleration

Answer: B

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31. What increase in pressure is required to decrease the volume of 200 litre of water by

0.004 percent? Given bulk modulus of water is 2100 Mpa.

A. 210 kPa

B. 840 kPa

C. 8400 kPa

D. 84 kPa

Answer: D

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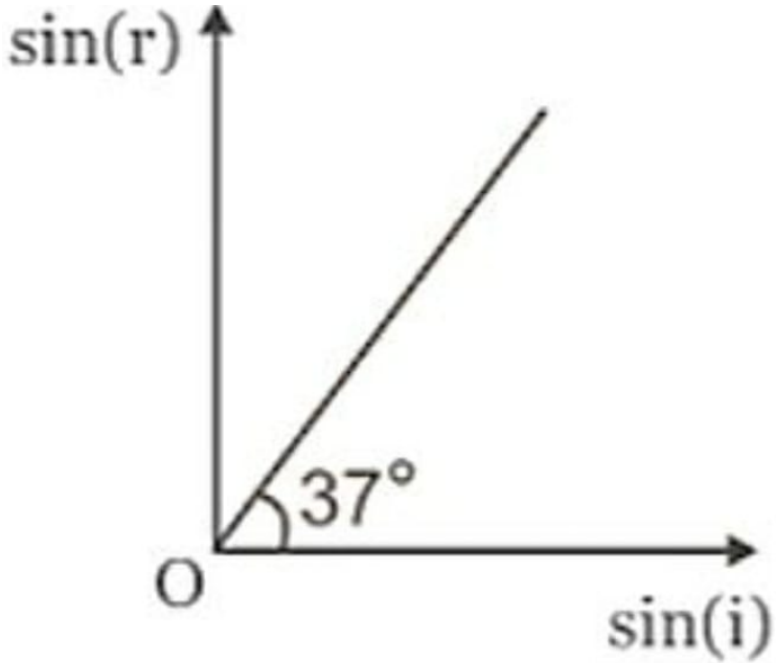
32. A ray of light travelling in medium. A is incident on the plane interface of two medium W and B and gets refracted into the medium B. The angle of incidence is I and that of refraction is r. The graph between sin(i) and sin(r) is a shown in the diagram . The correct

Statement among the following is



A. Speed of light in medium B is three fourth of that in medium A

B. Total internal reflection can take place

C. Refraction index of medium A is greater than that of medium B

D. None of these

Answer: A

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33. A point object O is placed on the principal axis of a convex lens of focal length $f = 20cm$ at a distance of 40 cm to the left of it. The diameter of the lens is 10. An eye is placed 60

cm to right of the lens and a distance h below the principal axis. The maximum value of h to see the image is

A. 0

B. 2.5 m

C. 5 cm

D. 10 cm

Answer: B

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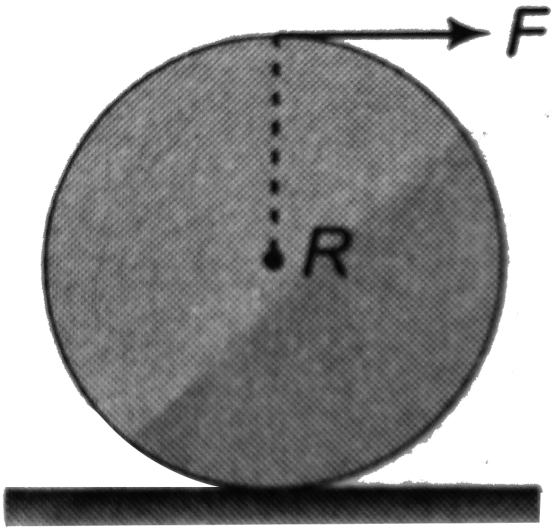

34.

A tangential force F acts at the top of a thin spherical shell of mass m and radius R. Find the acceleration of the shell if it rolls without slipping.

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

B. $\frac{6F}{5m}$

C. $\frac{7m}{2F}$

D. $\frac{2m}{7F}$

Answer: B

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35. The moment of inertia of a uniform thin rod of length L and mass M about an axis passing through a point at a distance of $L/3$ from one of its ends and perpendicular to the rod is

A. $\frac{ML^2}{12}$

B. $\frac{ML^2}{9}$

C. $\frac{7ML^2}{48}$

D. $\frac{ML^2}{48}$

Answer: B

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36. A transistor is connected in common emmitter (CE) configuration. The collector supply is $8V$ and the voltage deop across a

resistor of 800Ω in the collector circuit is $0.8V$. If the current gain factor (α) is 0.96, then the change in base current is

A. $\frac{1}{24}mA$

B. $\frac{1}{12}mA$

C. $\frac{1}{6}mA$

D. $\frac{1}{3}mA$

Answer: A

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37. The value of β of a transistor is 19. The value of α will be

A. 0.93

B. 0.98

C. 0.99

D. 0.95

Answer: D

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38. The efficiency of carnot engine is 50% and temperature of sink is 500K. If temperature of source is kept constant and its efficiency raised to 60%, then the required temperature of the sink will be : -

A. 100 K

B. 600 K

C. 400 K

D. 500 K

Answer: C

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39. The dimensions of $e^2/4\pi\varepsilon_0 hc$, where e, ε_0, h and c are electronic charge, electric permittivity, Planck's constant and velocity of light in vacuum respectively

A. $\left[M^0L^0T^0\right]$

B. $\left[ML^0T^0\right]$

C. $\left[M^0LT^0\right]$

D. $\left[M^0L^0T^1\right]$

Answer: A

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40. When open pipe is closed from one end, then third overtone of closed pipe is higher in frequency by 150 Hz than second overtone of open pipe. The fundamental frequency of open end pipe will be

A. 75 Hz

B. 150 Hz

C. 225 Hz

D. 300 Hz

Answer: D

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41. Minimum thickness of a mica sheet having $\mu = \frac{3}{2}$ which should be placed in front of one of the slits in YDSE is required to reduce the intensity at the centre of screen to half of maximum intensity is

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

B. $\frac{\lambda}{8}$

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

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

Answer: C

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42. The extension in a string obeying Hooke's law is x. The speed of sound in the stretched

string is v. If the extension in the string is increased to $1.5x$, the speed of sound will be

A. 1.22v

B. 0.61v

C. 1.50v

D. 0.75v

Answer: A

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43. A travelling wave represented by

$y = A\sin(\omega t - kx)$

is superimposed on another wave represented by

$y = A\sin(\omega t + kx)$. The resultant is

A. A standing wave having nodes at $x = \left(n + \frac{1}{2}\right)\frac{\lambda}{2}, n = 0, 1, 2, \ldots\ldots\ldots$

B. A wave travelling along +x direction

C. A wave travelling along -x direction

D. A standing wave having nodes at

$$x = \frac{n\lambda}{2}, n = 0, 1, 2, \ldots\ldots.$$

Answer: A

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44. A force $\vec{F} = -K\left(y\hat{i} + x\hat{j}\right)$ (where K is a positive constant) acts on a particle 'moving in the $x - y$ plane. Starting from the origin, the particle is taken along the positive x-axis to the point $(a, 0)$ and then parallel to the y-

axis to the point (a, a). The total work.done by the force F on the particle is:

A. $-2Ka^2$

B. $2Ka^2$

C. $-K\alpha^2$

D. Ka^2

Answer: C

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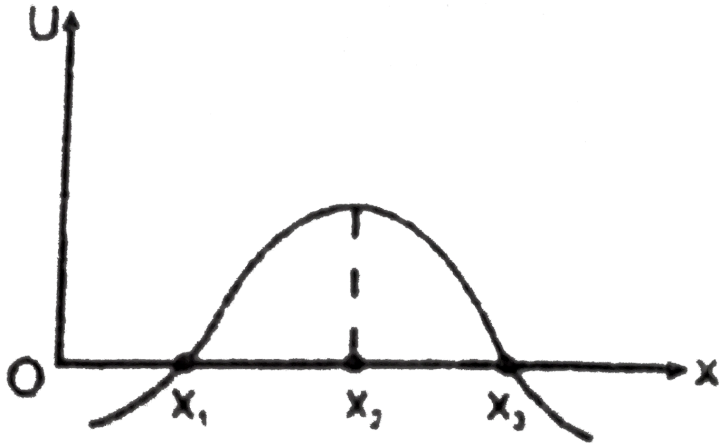
45. In the figure shown the potential energy U of a particle is plotted its position 'x' from origin. Then which of the following statement is correct A particle at :



A. x_1 is in stable equilibrium

B. x_2 is in stable equilibrium

C. x_3 is in stable equilibrium

D. None of these

Answer: D

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