



## PHYSICS

### BOOKS - NTA MOCK TESTS

#### NTA NEET SET 39

#### Physics

1. A Bohr's hydrogen atom undergoes a transition  $n = 5 \rightarrow n = 4$  and emits a photon of frequency  $f$ . Frequency of circular motion of electron in

$n = 4$  orbit is  $f_4$ . The ratio  $f/f_4$  is found to be  $18/5m$ . State the value of  $m$ .

A.  $\frac{18}{25}$

B.  $\frac{16}{25}$

C.  $\frac{9}{25}$

D.  $\frac{8}{25}$

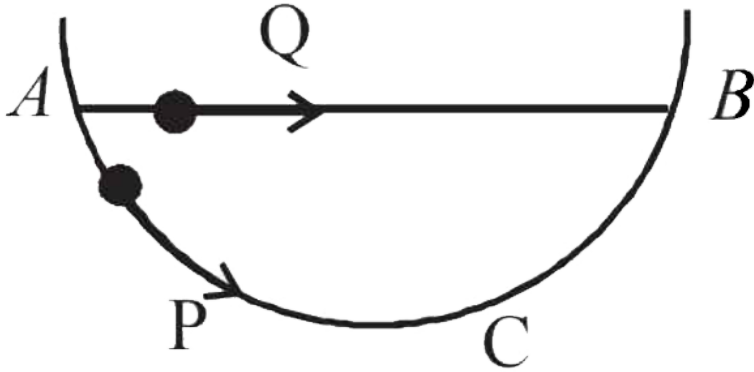
**Answer: A**



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2. A particle P is sliding down a frictionless hemispherical bowl. It passes the point A at  $t = 0$ . At this instant of time, the horizontal component of its velocity is  $v$ . A bead Q of the same mass as P is ejected from A at  $t = 0$  along the horizontal string AB, with the speed  $v$ . Friction between the bead and the string may be neglected. Let  $t_P$  and  $t_Q$  be the respective times taken by P and Q to

reach the point B. Then:



A.  $t_P < t_Q$

B.  $t_P = t_Q$

C.  $t_P > t_Q$

D. none of these

**Answer: A**



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3. Infinite blocks each of mass  $M$  are placed along a straight line with a distance  $d$  between each of them. At  $t = 0$  the leftmost block is given a velocity  $V$  towards right. The coefficient of friction between any block and the surface is  $\mu$  and all collisions are elastic. Let the total number of collisions be  $N$  then  $N$  is



A. the largest integer smaller than  $\frac{V}{\sqrt{\mu gd}}$

B. the smallest integer than  $V^2(2\mu gd)$

C. the largest integer smaller than  $\frac{V^2}{2\mu gd}$

D. The smallest integer larger than  $\frac{V}{\mu gd}$

**Answer: C**



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4. A semicircular wedge of mass  $M$  is placed on a horizontal floor. A man of mass  $m$  starts moving on wedge from position A with constant speed  $v$

relative to the wedge. Initially, both man & wedge were at rest. Neglect the friction between wedge & horizontal surface and man doesn't slip on the wedge while man moves from A to C relative to wedge. The correct statement is



- A. speed of wedge will first increase then decrease
- B. speed of the wedge will remain constant
- C. speed of the wedge first increase up to a maximum value and then remains constant
- D. the wedge doesn't move

**Answer: A**



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5. A ferromagnetic material is placed in an external magnetic field. The magnetic domains

- A. decrease only
- B. increases only
- C. some increase while other decrease
- D. remains unchanged

**Answer: C**





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6. In the circuit diagram shown below , the magnitude and direction of the flow of current , respectively , would be



- A.  $\frac{7}{3}$  A from a to b via e
- B.  $\frac{7}{3}$  A from b to b via e
- C. 1 A from b to b via e
- D. 1 A from a to b via e

**Answer: D**



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7. If each resistance  $r$  is along the 12 edges of a cubical skeleton of uniform wires then find the equivalent resistance between  $X$  and  $Y$  where  $X$  and  $Y$  are the midpoints of two opposite edges of a face of the cube.

A.  $\frac{7r}{8}$

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

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

D.  $\frac{7r}{5}$

**Answer: A**



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8. A transformer having efficiency of 90% is working on 200 V and 3kW power supply. If the current in the secondary coil is 6A, the voltage across the secondary coil and the current in the primary coil respectively are

A. 300 V , 15 A

B. 450 V , 15 A

C. 300 V , 13.5 A

D. 600 V , 15 A

**Answer:**



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9. A magnet N-S is suspended from a spring and when it oscillates, the magnet moves in and out of the coil C. the coil is connected to a galvanometer G. then, as the magnetic oscillates

A. G shows no deflection

B. G shows deflection on one side

C. deflection of G to the left and right has  
constant amplitude

D. deflection of G to the left and right has  
decreasing amplitude

**Answer: D**



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10. The equivalent capacitance between the points A and B is



A.  $2C_0$

B.  $C_0$

C.  $4C_0$

D.  $6C_0$

**Answer: A**



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11. An electric dipole of length  $2\text{cm}$  is placed with its axis making an angle  $30^\circ$  to a uniform electric field  $10^5 \frac{\text{N}}{\text{C}}$ . If it experiences a torque of  $10\sqrt{3}\text{Nm}$ , then potential energy of the dipole ..

A.  $-10J$

B.  $-20J$

C.  $-30J$

D.  $-40J$

**Answer: C**



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12. The escape Velocity from the earth is  $11.2\text{Km}/s$ . The escape Velocity from a planet having twice the radius and the same mean density as the earth, is :

A. 11.2

B. 5.6

C. 15

D. 22.4

**Answer: D**



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13. Two satellites are in the parking orbits around the earth. Mass of one is 5 times that of the other.

The ratio of their periods of revolution is

A. 1

B.  $\sqrt{10}$

C. 10

D. 100

**Answer: A**



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14. A very small hole in an electric furnace is used for heating metals. The hole nearly acts as black body. The area of the hole is  $200\text{mm}^2$ . To keep a metal at  $727^\circ\text{C}$  heat energy flowing through this hole per sec in joules is  $(\sigma = 5.67 \times 10^{-8}\text{Wm}^{-2}\text{K}^{-4})$ .

A. 22.68

B. 2.268

C. 1.134

D. 11.34

**Answer: D**



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15. A gas is at 1 atm pressure with a volume  $800\text{cm}^3$ . When  $100\text{J}$  of heat is supplied to the gas, it expands to  $1\text{L}$  at constant pressure. The change in its internal energy is

- A.  $80\text{ J}$
- B.  $-80\text{ J}$
- C.  $20\text{ J}$
- D.  $-20\text{ J}$

**Answer: A**



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16. Which one of the following statement is true, in respect of the usual quantities represented by  $\Delta Q$ ,  $\Delta U$  and  $\Delta W$ .

- A.  $\Delta U$  and  $\Delta W$  are path dependent
- B.  $\Delta Q$  and  $\Delta U$  are path dependent
- C.  $\Delta U$  does not depends upon path.
- D.  $\Delta Q$  does not depends upon path

**Answer: C**



17. Two particles , each of mass  $m$  and charge  $q$ , are attached to the two ends of a light rigid rod of length  $2R$  . The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is

A.  $\frac{q}{2m}$

B.  $\frac{q}{m}$

C.  $\frac{2q}{m}$

D.  $\frac{q}{\pi m}$

**Answer: A**



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**18.** A loop ABCD has current  $I = 10 \text{ A}$  , as shown in the figure . AD and BC are circular arcs with centre at O, for both . The magnetic field at point O is



A.  $10^{-4} T$

B.  $10^{-5} T$

C.  $1.5 \times 10^{-5} T$

D.  $2 \times 10^{-5} T$

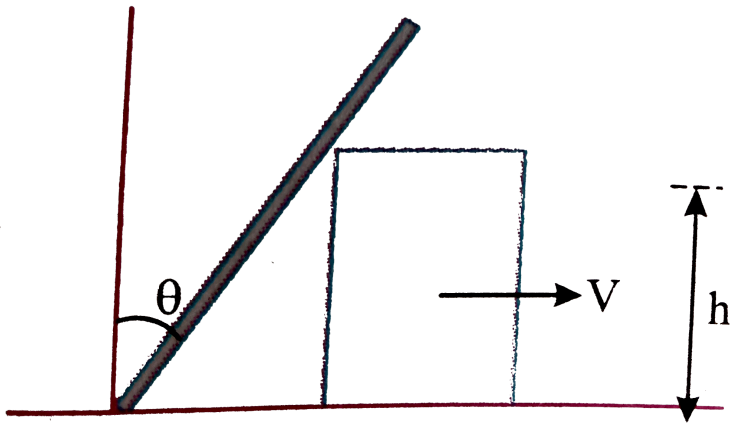
**Answer: B**



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**19.** A rod of length  $l$  is pivoted smoothly at  $O$  is resting on a block of height  $h$ . If the block moves with a constant velocity  $V$ , pick the current

alternatives



A.  $\frac{v \cos^2 \theta}{h}$

B.  $\frac{v \tan \theta}{h}$

C.  $\frac{v \sec^2 \theta}{h}$

D.  $\frac{v \cos \theta}{h}$

**Answer: A**



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20. A ray of light travelling in the direction  $\frac{1}{2}(\hat{i} + \sqrt{3}\hat{j})$  is incident on a plane mirror. After reflection, it travels along the direction  $\frac{1}{2}(\hat{i} - \sqrt{3}\hat{j})$ . The angle of incidence is

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $75^\circ$

**Answer: A**

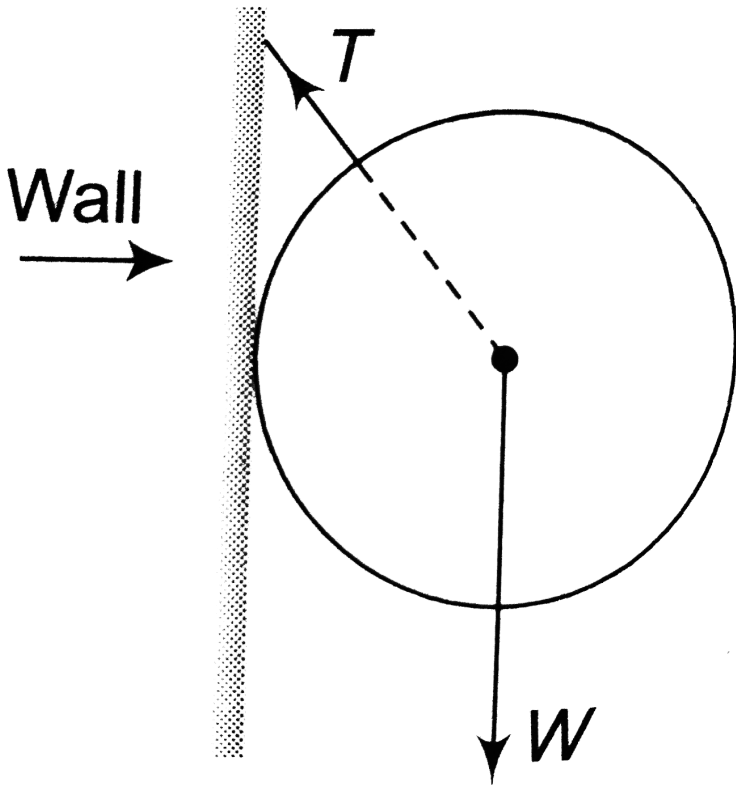




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**21.** A uniform sphere of weight  $W$  and radius  $3\text{ m}$  is being held by a frictionless wall as shown in the

figure. The tension in the string will be:



- A.  $\frac{5w}{4}$
- B.  $\frac{15w}{4}$
- C.  $\frac{5w}{6}$

D. none of these

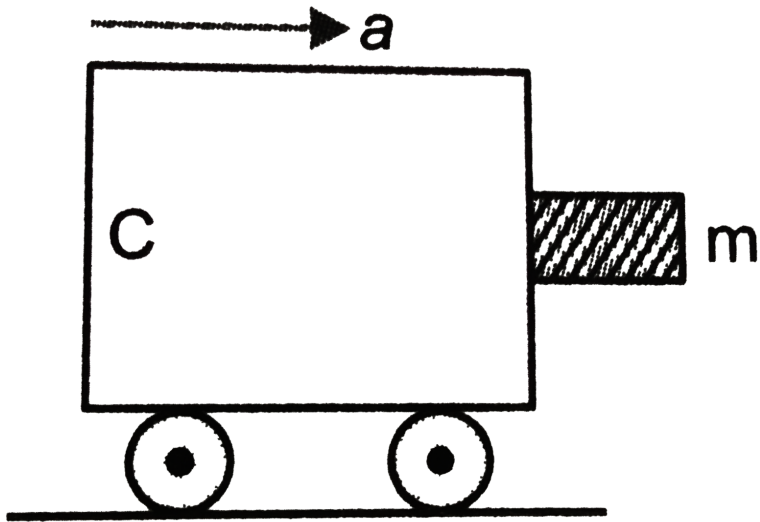
**Answer: A**



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**22.** A block of mass  $m$  is in contact with the cart  $C$  as shown in The coefficient of static friction between the block and the cart is  $\mu$  The acceleration  $a$  of the cart that will prevent the

block from falling satisfies



- A.  $5ms^{-2}$
- B.  $10ms^{-2}$
- C.  $20ms^{-2}$
- D.  $15ms^{-2}$

**Answer: C**



23. What is the difference between  ${}_{92}\text{U}^{235}$  and  ${}_{92}\text{U}^{238}$  atoms ?

A.  $\text{U}^{238}$  contains 3 more protons

B.  $\text{U}^{238}$  contains 3 protons and 3 more electrons

C.  $\text{U}^{238}$  contains 3 more neutrons and 3 more electrons

D.  $\text{U}^{238}$  contains 3 more neutrons

Answer: D



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24. In the options given below, let  $E$  denote the rest mass energy of a nucleus and  $n$  a neutron.

The correct option is:

A.

$$E({}_{92}^{236}U) > E({}_{53}^{137}I) + E({}_{39}^{97}Y) + 2E(n)$$

B.

$$E({}_{92}^{236}U) < E({}_{53}^{137}I) + E({}_{39}^{97}Y) + 2E(n)$$

C.

$$E({}_{92}^{236}U) < E({}_{56}^{140}Ba) + E({}_{36}^{94}Kr) + 2E(n)$$

D.

$$E({}_{92}^{235}U) > E({}_{56}^{140}Ba) + E({}_{36}^{94}Kr) + 2E(n)$$

**Answer: A**



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25. The bob of a simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly



unplugged. During observation, till water is coming out, the time period of oscillation would

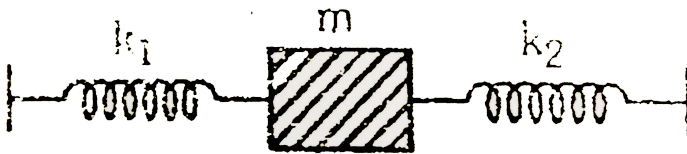
- A. First increases and then decreases to the original value
- B. First decreases and then increases to the original value
- C. Remains unchanged
- D. Increase towards a saturation value

**Answer: A**



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26. Two springs of force constants  $k_1$  and  $k_2$ , are connected to a mass  $m$  as shown. The frequency of oscillation of the mass is  $f$ . If both  $k_1$  and  $k_2$  are made four times their original values, the frequency of oscillation becomes



- A.  $f/2$
- B.  $f/4$
- C.  $4f$
- D.  $2f$

**Answer: D**



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27. Surface of certain metal is first illuminated with light of wavelength  $\lambda_1 = 350$  nm and then, by light of wavelength  $\lambda_2 = 540$  nm. It is found that the maximum speed of the photo electrons in the two cases differ by a factor of 2. The work function of the metal (in eV) is close to :

$$\text{(Energy of photon)} = \frac{1240}{\lambda(\text{in nm})} \text{ eV}$$

A. 2.5

B. 1.8

C. 5.6

D. 1.4

**Answer: B**



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**28.** A particle of mass  $M$  at rest decays into two particles of masses  $m_1$  and  $m_2$ , having non-zero velocities. The ratio of the de Broglie wavelength of the particles  $\frac{\lambda_1}{\lambda_2}$  is

A. 3

B. 4

C. 2

D. 5

**Answer: C**



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**29.** Two drops of the same radius are falling through air with a steady velocity of  $5\text{cm.s}^{-1}$ . If

the two drops coalesce, the terminal velocity would be

A.  $10\text{cm s}^{-1}$

B.  $2.5\text{cm s}^{-1}$

C.  $5 \times (4)^{1/3}\text{cm s}^{-1}$

D.  $5 \times \sqrt{3}\text{cm s}^{-1}$

**Answer: C**



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30. A cylindrical vessel of 100 cm height is kept filled upto the brim. It has four holes 1,2,3,4 which are respectively at heights of 27 cm, 30 cm , 50 cm and 80 cm from the horizontal floor. The water falling at the maximum horizontal distance from the vessel comes from

- A. hole number 4
- B. hole number 3
- C. hole number 2
- D. hole number 1

**Answer: B**



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**31.** On a plane mirror, a ray of light is incident at an angle of  $30^\circ$  with horizontal . To make the reflected ray vertical , at what angle with horizontal must a plane mirror be placed ?



A.  $30^\circ$

B.  $60^\circ$

C.  $45^\circ$

D.  $54^\circ$



**Answer: A**



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**32.** A particle is moving in a circle of radius 1 cm and with a constant speed of  $8\text{cm s}^{-1}$ . Centre of the circle lies on principle axis of a converging lens of focal length 50 cm and at a distance of 75 cm from the lens . Plane of the circle is perpendicular to principle axis. The correct statement is

A. Speed of the image is  $4\text{cm s}^{-1}$

B. Speed of the image is  $8\text{cm s}^{-1}$

C. Speed of the image is  $16\text{cm s}^{-1}$

D. Speed of the image is  $3.2\text{cm s}^{-1}$

**Answer: C**



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**33.** A solid sphere rolls without slipping on a rough horizontal floor, moving with a speed  $v$ . It makes an elastic collision with a smooth vertical wall. After impact

A.  $\frac{2}{7}v_0$

B.  $\frac{3}{7}v_0$

C.  $\frac{4}{7}v_0$

D.  $\frac{3}{5}v_0$

**Answer: B**



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**34.** A uniform solid cylindrical roller of mass  $m$  and  $R$  is rolled on the ground, without slipping, by applying a constant horizontal force  $F$ . Find

angular acceleration of cylinder .



A.  $\frac{F}{mR}$

B.  $\frac{2F}{mR}$

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

D.  $\frac{F}{3mR}$

**Answer: C**



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35. What will be the input of  $A$  and  $B$  for the Boolean expression  $\overline{(A + B)} \cdot \overline{(A \cdot B)} = 1$ ?

A. (0,0)

B. (0,1)

C. (1,0)

D. (1,1)

**Answer: A**



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36. The collector current for a transistor is  $6.6\text{mA}$ , and its current gains  $\alpha$  is 0.95. Determine  $I_B$  and  $\beta$

A.  $\beta = 19, I_B = 350\mu\text{A}$

B.  $\beta = 19, I_B = 220\mu\text{A}$

C.  $\beta = 30, I_B = 330\mu\text{A}$

D.  $\beta = 30, I_B = 220\mu\text{A}$

**Answer: A**



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37. Total degrees of freedom of one molecule of a diatomic gas at normal temperature is

A. 2

B. 4

C. 6

D. 8

**Answer: C**



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38. Two moles of an ideal gas with  $\frac{C_P}{C_V} = \frac{5}{3}$  are mixed with 3 moles of another ideal gas with  $\frac{C_P}{C_V} = \frac{4}{3}$ . The value of  $\frac{C_P}{C_V}$  for the mixture is

A. 1.45

B. 1.50

C. 1.47

D. 1.42

**Answer: D**



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39. Among the following quantities , the quantity whose dimension is independent of mass and length is

A. Energy

B. Thrust

C. Momentum

D. Angular velocity

**Answer: D**



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40. The density of a material in the shape of a cube is determined by measuring three sides of the cube and its mass. If the relative errors in measuring the mass and length are respectively 1.5 % and 1 %, the maximum error in determining the density is:

- A. 6 %
- B. 2.5 %
- C. 3.5 %
- D. 4.5 %

**Answer: D**



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41. In YDSE intensity at central maxima is  $I_0$ . The ratio  $\frac{I}{I_0}$ , at path difference  $\frac{\lambda}{8}$  on the screen from central maxima, is closed to

A. 0.74

B. 0.8

C. 0.9

D. 0.85

Answer: D



42. A polarizer-analyser set is adjusted such that the intensity of light coming out of the analyser is just 12.5 % of the original intensity. Assuming that the polarizer – analyser set does not absorb any light the angle by which the analyser need to be rotated further to reduce the output intensity to be zero, is :

A.  $71.6^\circ$

B.  $18.4^\circ$

C.  $90^\circ$

D.  $45^\circ$

**Answer: B**



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**43.** A string of length 2m is fixed at two ends. It is in resonance with a tuning fork of frequency 240 Hz in its third harmonic. Then speed of wave sound in string and its fundamental frequency is:

A.  $320\text{ms}^{-1}$ ,  $120\text{Hz}$

B.  $320\text{ms}^{-1}$ ,  $80\text{Hz}$

C.  $180\text{m s}^{-1}$ ,  $80\text{Hz}$

D.  $180\text{m s}^{-1}$ ,  $120\text{Hz}$

**Answer: B**



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**44.** Two loud speakers are being compared . One is perceived to be 32 times louder than the other.

The difference in intensity levels between the two , when measured in decibels is

A. 60

B. 40

C. 50

D. 30

**Answer: C**



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**45.** A body is displaced from  $(0, 0)$  to  $(1m, 1m)$  along the path  $x = y$  by a force  $F = (x^2\hat{j} + y\hat{i})N$ . The work done by this force will be

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

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

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

D.  $\frac{7}{5}J$

**Answer: B**



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