PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 83

Physics

1. The distance of closest approach of an alpha-particle fired towards a nucleus with momentum p is r. What will be the distance of

closest approach when the momentum of alpha-particle is $2p$?

A. 4r

B. 2r

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

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

Answer: D

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2. Energy E of a hydrogen atom with principle quantum number n is given by $E = \frac{-13.6}{n^2} eV$. The energy of a photon ejected when the electron jumps from $n = 3$ state to $n = 2$ state of hydrogen is approximately

A. $1.5eV$

B. $0.85eV$

C. $3.4eV$

D. $1.9eV$

Answer: D

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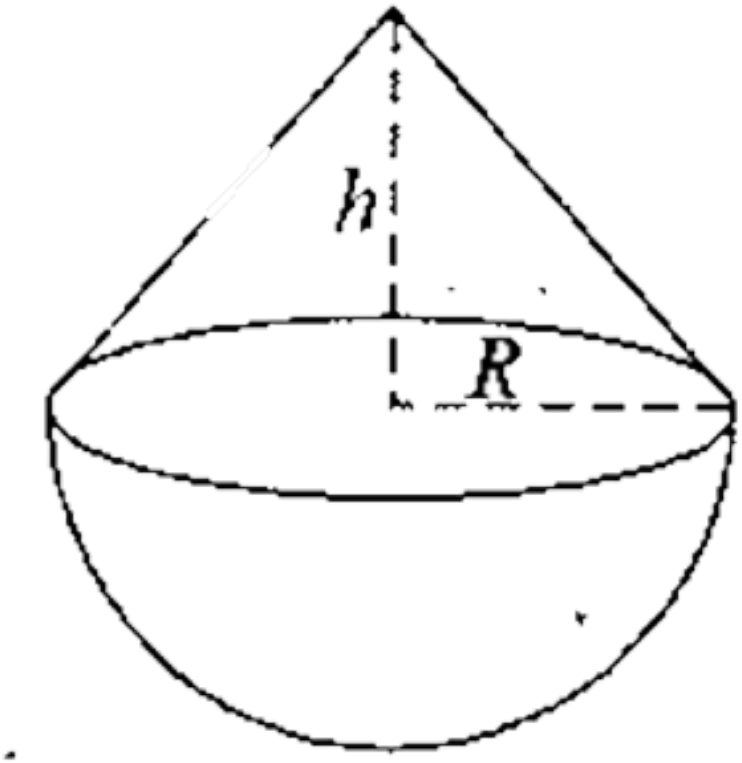
3. A uniform solid right circular cone of base radius R is joined to a uniform solid hemisphere of radius R and of the same density, so as to have a common face. The centre of mass of the composite solid lies on

the common face. The height of the cone is:



A. 2r

B. $\sqrt{3}r$

C. 3 r

D. $\sqrt{6}r$

Answer: B

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4. A wheel which is initially at rest is subjected to a constant angular acceleration about its axis. It rotates through an angle of 15° in time t sec. Then how much it rotates in the next $2t$ sec

A. 90°

B. 120°

C. 30°

D. 45°

Answer: B

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5. A tube of length L is filled completely with an incompressible liquid of mass M and closed at both ends . The tube is then rotated in a horizontal plane about one of its end with a

uniform angular velocity ω . Find the force exerted by the liquid at the other end .

A. $\frac{M\omega^2 L}{2}$

B. $Ml\omega^2$

C. $\frac{ML\omega^2}{4}$

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

Answer: A

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6. When a resistor of 11Ω is connected in series with an electric cell, the current following in it is $0.5A$. Instead, when a resistor of 5Ω is connected to the same electric cell in series, the current increases by $0.4A$ The internal resistance of the cell is

A. 1.5Ω

B. 2Ω

C. 2.5Ω

D. 3.5Ω

Answer: C

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7. The total current supplied to the given circuit by the battery is

A. $9A$

B. $6A$

C. $2A$

D. $4A$

Answer: B

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8. In a series L.C.R. circuit, the potential drop across L, C and R respectively are $40V$, $120V$ and $60V$. Them the source voltage is

A. 220 V

B. 160 V

C. 180 V

D. 100 V

Answer: D

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9. The maximum voltage in DC circuit is 282 V. the effective voltage in AC circuit will be

A. 200 V

B. 300 V

C. 400 V

D. 564 V

Answer: A

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10. For the circuit shown in figure the charge on $4\mu F$ capacitor is

A. $40\mu C$

B. $30\mu C$

C. $24\mu C$

D. $54\mu C$

Answer: C

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11. A chance Q placed at thee center of a metallic spherical shell with inner and outer radii R_1 and R_2 respectively . The normal component of the electric field at any point on the Gaussian surface with radius between R_1 and R_2 will be

A. Zero

B. $\frac{Q}{4\pi R_1^2}$

C. $\frac{Q}{4\pi R_2^2}$

D. $\frac{Q}{4\pi(R_1 - R_2)^2}$

Answer: A

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12. A planet of mass m is the elliptical orbit about the sun $(m << M_{\text{sun}})$ with an orbital period T. If A be the area of orbit, then its angular momentum would be:

A. $\frac{2mA}{T}$

B. mAT

C. $\frac{mA}{2T}$

D. $2mAT$

Answer: A

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13. A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius

(1.02)R. The period of the second satellite is larger than the first one by approximately

A. 0.7%

B. 1.0%

C. 1.5%

D. 3.0%

Answer: D

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14. If the temperature of the sun were to increase form T to 2T and its radius from R to 2R, then the ratio of the radiant energy received on earth to what it was previously will be

A. 4

B. 16

C. 32

D. 64

Answer: D

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15. A gas for which $\gamma = 1.5$ is suddenly compressed to $1/4$ th of the initial volume. Then the ratio of the final to initial pressure is

A. $1:6$

B. $1:8$

C. $1:4$

D. $8:1$

Answer: D

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16. Two moles of a certain ideal gas at $300K$ were cooled at constant volume so that the pressure was reduced to half t he initial value. Then, as a result of heating at constant pressure, the gas expanded till its temperature got back ot the initial value. Find the total amount of heat absorbed by the gas in the process.

A. 150 R

B. 300 R

C. 75 R

D. 100 R

Answer: B

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17. A wire bent in the form a right angled triangle PQR, carries a current $1A$. It is placed in a region of a uniform magnetic field $B = 0.2T$. If $PR = 1m$, the net force on the

wire is

A. 1.73 N

B. 3.46 N

C. 2.732 N

D. Zero

Answer: D

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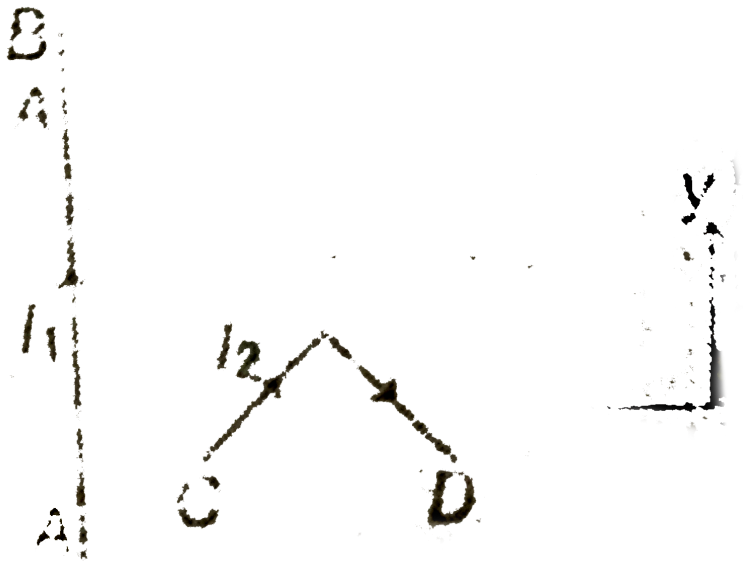
18. In the figure shown a current I_1 is established in the long straight wire AB. Another wire CD carrying currrent I_2 is placed in the plane of the paper. The line joining the ends of this wire is perpendicular to the wire AB. The resultant force on the wire CD is :



A. Zero

B. Towards negative x - axis

C. Towards positive y - axis

D. None of these

Answer: D

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19. A steel wire of length l has a magnetic moment M. It is bent in L - shape (Figure). The

new magnetic moment is

A. M

B. $\frac{M}{\sqrt{2}}$

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

D. 2M

Answer: B

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20. A body is thrown up in a lift with a velocity $5ms^{-1}$ relative to the lift and the time of flight is found to be 0.8 s. The acceleration with which the lift is moving up is $(g = 10ms^{-2})$

A. $1.5ms^{-2}$

B. $2ms^{-2}$

C. $2.5ms^{-2}$

D. $3ms^{-2}$

Answer: C

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21. An acroplane is flying horizontally with a velocity of 600 km/h and a height of 1960m. When it is vectrically above a point A on the ground a bomb is released from it. The bomb strikes the ground at point B. the distance AB is:

A. 1200 m

B. 0.33 m

C. 3.33 m

D. 33 km

Answer: A

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22. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is $g/8$, then the ratio of the masses is

A. $8:1$

B. $9:7$

C. $4:3$

D. $5:3$

Answer: B

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23. An 80 kg person is parachuting and is experiencing a downward acceleration of $2.8\ \mathrm{m\ s^{-2}}$. The mass of the parachute is 5 kg. If the upward force on the open parachute is

$k \times 10^2 N$, then what what is the value of k?

$\left(\text{Take } \ g = 9.8 ms^{-2}\right)$

A. 595 N

B. 675 N

C. 456 N

D. 925 N

Answer: A

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24. A radioactive substance X decys into another radioactive substance Y. Initially, only X was present . λ_x and λ_y are the disintegration constant of X and Y. N_y will be maximum when.

A. $\frac{N_y}{N_x - N_y} = \frac{\lambda_y}{\lambda_x - \lambda_y}$

B. $\frac{N_x}{N_x - N_y} = \frac{\lambda_x}{\lambda_x - \lambda_y}$

C. $\lambda_y N_y = \lambda_x N_x$

D. $\lambda_y N_x = \lambda_x N_y$

Answer: C

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25. F_{pp}, F_{nn} and F_{np} are the nuclear forces between proton - proton , neutron - neutron and neutron - proton respectively . Then relation between them is

A. $F_{pp} = F_{\mathrm{nn}} \neq F_{np}$

B. $F_{pp} \neq F_{\mathrm{nn}} \neq F_{np}$

C. $F_{pp} = F_{\mathrm{nn}} = F_{np}$

D. $F_{pp} \neq F_{\mathrm{nn}} \neq F_{np}$

Answer: C

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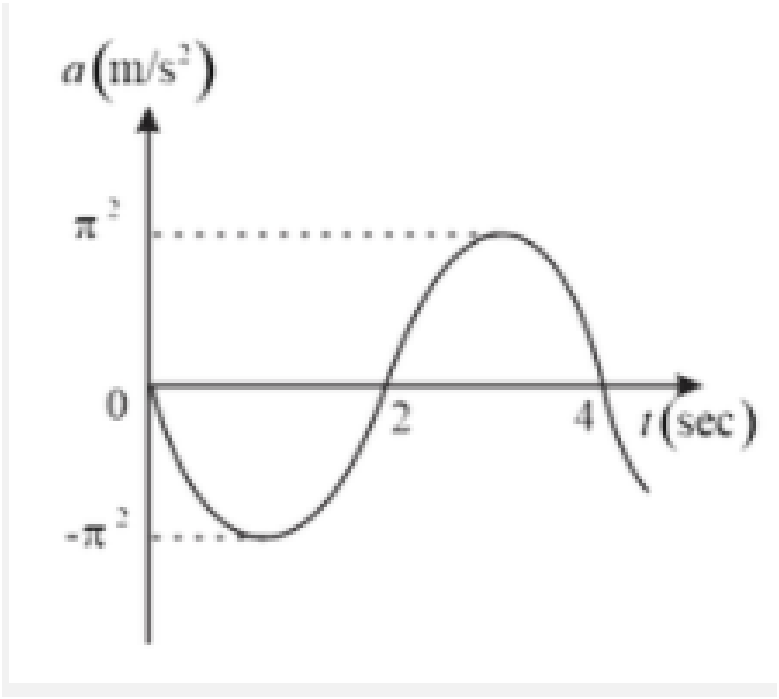
26. A block performs simple harmonic motion with equilibrium point $x = 0$. Graph of acceleration of the block as a function of time is shown. Which of the following statement is

correct about the block ?



A. Displacement from equilibrium is maximum at t = 4 s

B. Speed is maximum at t = 4 s

C. Speed is minimum at t = 4 s

D. Speed is maximum at t = 3s

Answer: B

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27. A simple pendulum of length l has maximum angular displacement θ . Then maximum kinetic energy of a bob of mass m is

A. $mgl(1+\cos\theta)$

B. $mgl\left(1+\cos^2\theta\right)$

C. $mgl(1-\cos\theta)$

D. $mgl(\cos\theta-1)$

Answer: C

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28. Lights of two different frequencies whose photons have energies 1 and 2.5 eV, respectively, successively illuminate a metal whose work function is 0.5 eV. The ratio of the maximum speeds of the emitted electrons

A. $1:3$

B. $1:2$

C. $3:1$

D. $2:1$

Answer: B

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29. Maximum kinetic energy (E_k) of a photoelectron varies with the frequency (v) of the incident radiation as

A. 

B. 

C. 

D. 

Answer: B

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30. Water flows steadily through a horizontal pipe of a variable cross-section. If the pressure of the water is p at a point , where the speed

of the flow is v. What is the pressure at another point , where the speed of the flow is 2 v ? Let the density of water be $1gcm^{-3}$.

A. $p + \left(\frac{3}{2}\right)\rho v^2$

B. $p - 2\rho v^2$

C. $p - 3\rho v^2$

D. $p - \left(\frac{3}{2}\right)\rho v^2$

Answer: D

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31. A hole is made at the bottom of the tank filled with water (density $= 1000 kgm^{-3}$). If the total pressure at the bottom of the tank is three atmospheres (1 atmosphere $= 10^5 Nm^{-2}$), then the velocity of efflux is nearest to

A. $\sqrt{400} m/s$

B. $\sqrt{200} m/s$

C. $\sqrt{600} m/s$

D. $\sqrt{500} m/s$

Answer: C

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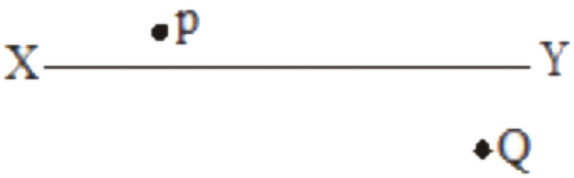
32. Two points p and Q lie on either side of an axis XY as shown. It is desired to produce an image of p at Q using a spherical mirror, with XY as the optic axis. The mirror must be



A. Converging and positioned to the left of pP

B. Diverging and positioned to the left of P

C. Converging and positioned to the right of Q

D. Diverging and positioned to the right of Q

Answer: A

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33. The sun subtends an angle half a degree at the pole of a concave mirror which has a radius of curvature of 15 m. Then the size (diameter) of the image of sun formed by the concave mirror is

A. 8.55 cm

B. 7.55 cm

C. 6.55 cm

D. 5.55 cm

Answer: C

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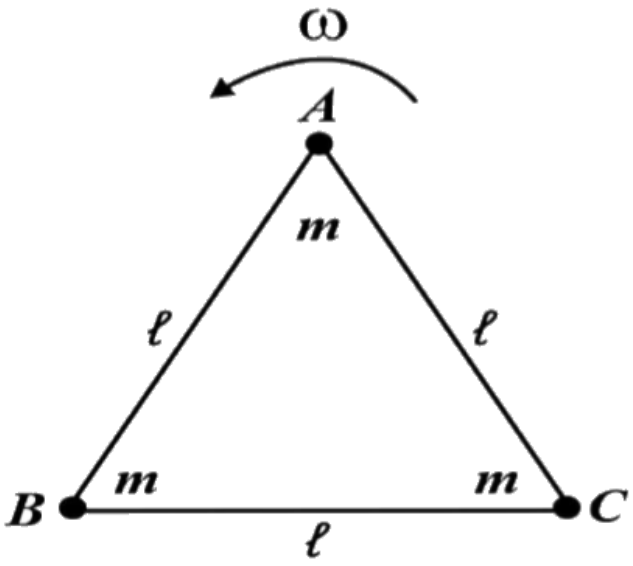
34. An equilateral triangular frame is made of three thin massless rods. Three point masses of mass m each are fixed at vertices of the frame as shown. The system is rotated with uniform angular speed ω about a fixed axis passing through A and normal to the plane of triangular frame. Neglect the effect of gravity.

The tension in rod connecting mass B and C is



A. $m\omega^2 l$

B. $\frac{m\omega^2 l}{2}$

C. $\frac{\sqrt{3m\omega^2 l}}{2}$

D. zero

Answer: D

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35. A circular disc rolls down an inclined plane . The ratio of rotational kinetic energy to total kinetic energy is

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

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

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

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

Answer: B

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36. Which logic gate is respresented by the following logic gates ?

A. NOR

B. NAND

C. AND

D. OR

Answer: C

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37. In the circuit shown the diode will conduct current for a

A. complete cycle of ac input

B. complete positive cycle of ac input

C. voltage between 4 V and 6 V of the positive half cycle of input ac

D. voltage below 4 V of the positive half cycle of input ac

Answer: C

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38. A lead bullet strikes a target with velocity of 480 m/s. if the bullet falls dead, then the rise in temperature of bullet is, (Assuming that heat produced is equally shared between the bullet and target).

$\left(J = 4.2 \times 10^3 J/kcal, C = 0.03 kcal/kgK\right)$

A. $557^\circ C$

B. $457\ {}^{C}\!\circ$

C. $857^\circ C$

D. $754^\circ C$

Answer: B

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39. The side of a rectangle are 6.01 m and 12 m Taking the significant figures into account , the area of the rectangle is

A. $7.2m^2$

B. $72.1m^2$

C. $72m^2$

D. $72.12m^2$

Answer: C

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40. The frequency of a light wave in a material is $2 \times 10^{14} Hz$ and wavelength is $5000 Å$. The refractive index of material will be

A. 1.40

B. 1.50

C. 3.00

D. 1.33

Answer: C

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41. In Fraunhofer diffraction pattern, slit width is $0.2mm$ and screen is at 2 m away from the lens. If wavelength of light used is 5000Å, then the distance between the first minimum on either side of the central maximum is (θ is small and measured in radian)

A. $10^{-1}m$

B. $10^{-2}m$

C. $2 \times 10^{-2}m$

D. $2 \times 10^{-1}m$

Answer: B

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42. n number of waves are produced on a string in 0.5 s. Now, the tension in the string is doubled (Assume length and radius constant),

the number of waves produced in 0.5s for the same harmonic will be

A. n

B. $\sqrt{2}n$

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

D. $\frac{n}{\sqrt{5}}$

Answer: B

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43. In case of closed organ pipe, which harmonin the p^{th} overtone will be

A. $2P + 1$

B. $2P - 1$

C. $P + 1$

D. $p - 1$

Answer: A

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44. A man who is running has half the kinetic energy of a boy of half his mass. The man speeds up by 1 ms^{-1} and then has the same kinetic energy as the boy. The original speed of the boy was:

A. $\sqrt{2}m/s$

B. $\left(\sqrt{2}-1\right)m/s$

C. $\dfrac{1}{\sqrt{2}-1}m/s$

D. $\dfrac{1}{\sqrt{2}}\dfrac{m}{s}$

Answer: C

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