PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 78

Physics

1. The potential of an atom is given by $V = V_0 \log_e(r/r_0)$ where r_0 is a constant and r is the radius of the orbit Assumming Bohr's model to be applicable, which variation of r_n with n is possible (n being proncipal quantum number)?

A. $r_n \propto n$

B. $r_n \propto \frac{1}{n}$

C. $r_n \propto n^2$

D. $r_n \propto n\frac{1}{n^2}$

Answer: A

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2. The work function of the metal A is equal to the ionization energy of the hydrogen atom in the first excited state. The work function of the metal B is equal to the ionization energy of He^+ ion in the second orbit. Photons of the same energy E are incident on both A and B the maximum kinetic energy of photoelectrons emitted from A is twice that of photoelectrons emitted from B. Value of E (in eV) is

A. 23.8 eV

B. 20.8 eV

C. 32.2 eV

D. 24.6 eV

Answer: A

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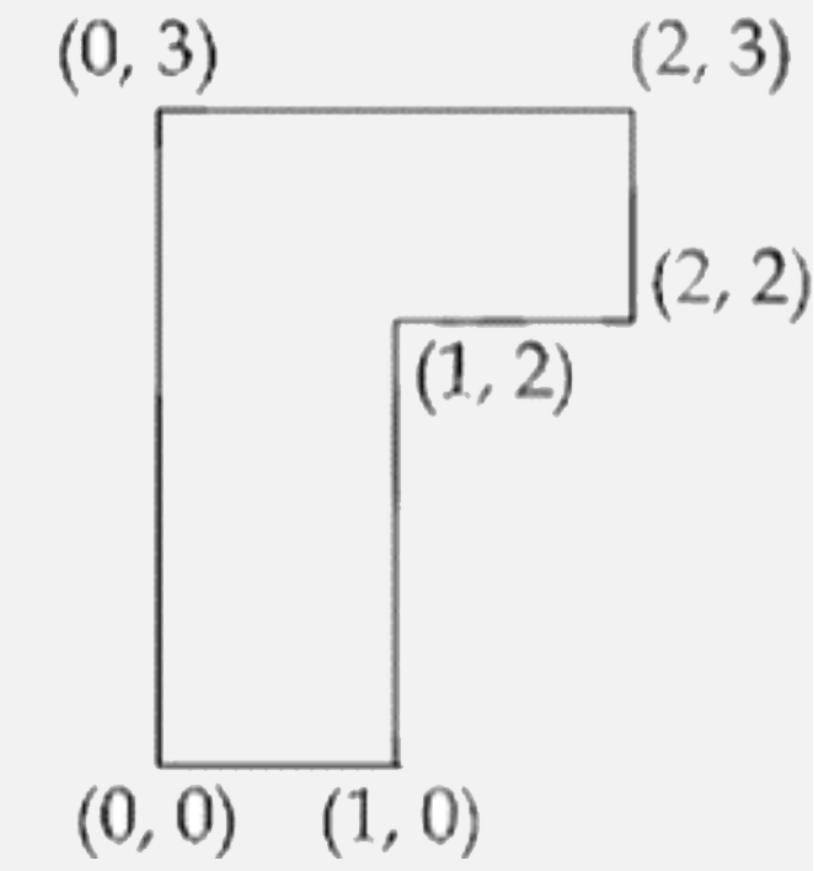
3. The coordinates of the centre of mass of a uniform flag -shaped lamina (thin flat plate) of mass 4kg .(The coordinates of the same are shown in the figure) are :



A. (1.25m, 1.50m)

B. (0.75m, 1.75m)

C. (0.75m, 0.75m)

D. (1m, 1.75m)

Answer: B

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4. The masses of five balls at rest and lying at equal distance in a straight line are in geometrical progression with ratio 2 and their coefficients of restitution are each 2/3 . If the first ball is started towards the second with velocity u, then the velocity communicated to 5^{th} ball is

A. $\frac{5}{9}$u

B. $\left(\frac{5}{9}\right)^2$ u

C. $\left(\frac{5}{9}\right)^3$ u

D. $\left(\frac{5}{9}\right)^4$ u

Answer: D

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5. A simple pendulum is oscillating with angular displacement 90° For what angle with vertical the acceleration of bob direction horizontal?

A. $\sin^{-1}\left(\frac{1}{3}\right)$

B. $\cos^{-1}\left(\frac{1}{3}\right)$

C. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

D. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

Answer: D

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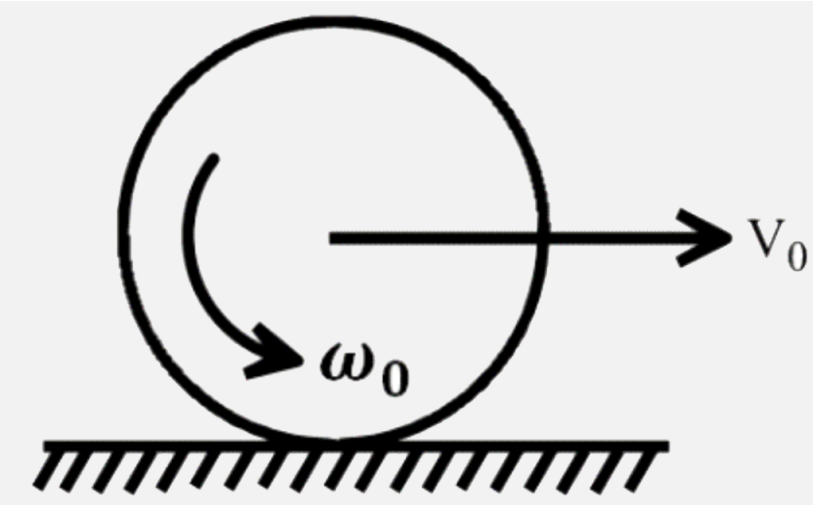
6. A disc of the radius R is spun to an angular speed ω_0 about its axis and then imparted a horizontal velocity of magnitude (at t = 0) with its plane

remaining vertical. The coefficient of friction between the disc and the plane is μ . The sense of rotation and direction of its linear speed are shown in the figure . Choose the correct statement.



A. disc will start rolling without slipping in the direction of V_0

B. slipping will never be ceased

C. disc will return to initial point

D. none of these

Answer: C

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7. With two resistance R_1 and $R_2(>R_1)$ in the two gaps of a metre bridge the balance was found to be 1/3 m from the zero end. When a 6Ω resistance is connected in series with the smaller of the two resistance, the point is shifted to 2/3 m from the same end, then R_1 and R_2 are

A. 4,2

B. 2,4

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: B

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8. Which of the following statements is false ?

A. Kirchhoff's second law represents energy conservation

B. Wheatstone bridge is the most sensitive when all the four resistances are of the same order of magnitude

C. In a balanced Wheatstone bridge if the cell and the galvanometer are exchanged , the null points is disturbed

D. A rheostat can be used as a potential divider

Answer: C

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9. A current of 10A in the primary coil of a circuit is reduced to zero. If the coefficient of mutual inductance is 3 H and emf induced in the secondary coil is 30 kV, time taken for the change of current is

A. $10^3 s$

B. $10^2 s$

C. $10^{-3} s$

D. $10^{-2} s$

Answer: C

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10. A transformer is having 2100 turns in primary and 4200 turns is secondary. An ac source of 120 V, 10 A is connected to its primary. The secondary voltage and current are

A. 240 V, 5 A

B. 120 V, 10 A

C. 240 V, 10 A

D. 120 V, 20 V

Answer: A

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11. Two large conducting plates of a parallel plate capacitor are given charges Q and 3Q respectively. If the electric field in the region between the plates is E_0 , then the force of interaction between the plates is

A. $3QE_0$

B. $\frac{2QE_0}{3}$

C. $\frac{3}{2}QE_0$

D. $\frac{QE_0}{2}$

Answer: C

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12. A solid ball of radius R has a charge density ρ given by $\rho = \rho_0\left(1 - \frac{r}{R}\right)f \text{ or } 0 \leq r \leq R$ The electric field outside the ball is :

A. $\frac{\rho_0 R^3}{\varepsilon_0 r^2}$

B. $\frac{4\rho_0 R^3}{3\varepsilon_0 r^2}$

C. $\frac{3\rho_0 R^3}{4\varepsilon_0 r^2}$

D. $\frac{\rho_0 R^3}{12\varepsilon_0 r^2}$

Answer: D

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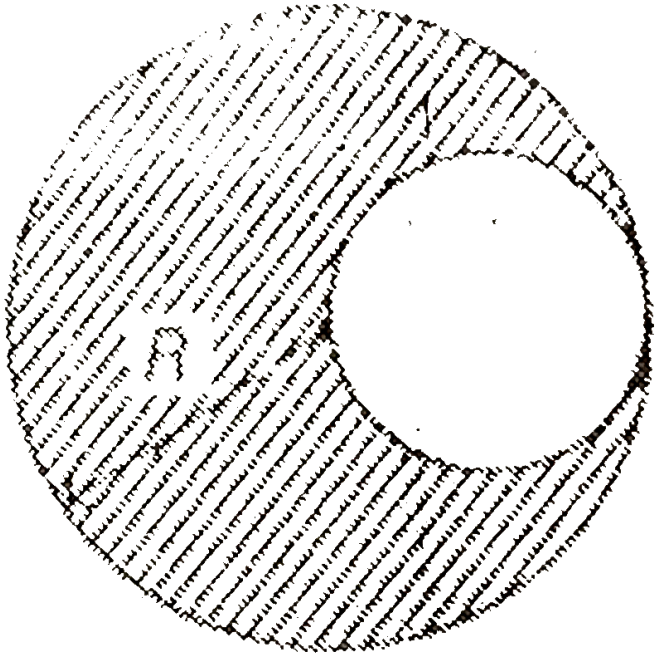
13. A spherical hole is made in a solid sphere of radius R. The mass of the sphere before hollowing was M. The gravitational field at the centre of

the hole due to the remaining mass is



A. zero

B. $\frac{GM}{8R^2}$

C. $\frac{GM}{2R^2}$

D. $\frac{GM}{R^2}$

Answer: C

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14. At what height over the earth's pole, the free fall acceleration decreases by one percent (assume the radius of earth to be 6400 km)

A. 32

B. 64

C. 80

D. 1.253

Answer: A

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15. The maximum wavelength of radiation emitted at 2000 K is $4\mu m$. What will be the maximum wavelength of radiation emitted at 2400K

A. $3.3\mu m$

B. $0.66\mu m$

C. 1 m

D. $1\mu m$

Answer: A

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16. Air is filled in a bottle and it is corked at $35^\circ C$. If the cork can come out at 3 atmospheric pressure, then upto what temperature should the bottle be heated to remove the cork ?

A. $325.5^\circ C$

B. $851^\circ C$

C. $651^\circ C$

D. None of these

Answer: C

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17. One mole of an ideal gas at temperature T expands slowly according to the law $\frac{p}{V} = \text{constant}$.

Its final temperature is T_2. The work done by the gas is

A. $R(T_2 - T_1)$

B. $(R/2)(T_2 - T_1)$

C. $(R/4)(T_2 - T_1)$

D. $PV(T_2 - T_1)$

Answer: B

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18. Two particles of masses m_a and m_b and same charge are projected in a perpendicular magnetic field . They travel along circular paths of radius r_a and r_b such that $r_a > r_b$. Then which is true ?

A. $m_a v_a > m_b v_b$

B. $m_a > m_b$ and $v_a > v_b$

C. $m_a = m_b$ and $v_a = v_b$

D. $m_b v_b > m_a v_a$

Answer: A

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19. Two north poles each of pole strength m and a south pole of pole strength m are placed at the three corners of an equilateral triangle of side a. The intensity of magnetic induction field strength at the centre of the triangle is

A. $\frac{\mu_0}{4\pi}\frac{m}{da^2}$

B. $\frac{\mu_0}{2\pi}\frac{3m}{a^2}$

C. $\frac{\mu_0}{4\pi}\frac{9m}{a^2}$

D. $\frac{\mu_0}{4\pi}\frac{m}{2a^2}$

Answer: B

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20. A bar magnet of magnetic moment M_1 is axially cut into two equal parts. If these two pieces are arranged perpendiucular to each other, the resultant magnetic moment is M_2.

Then the vale of $\frac{M_1}{M_2}$ is

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

B. 1

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

D. $\sqrt{2}$

Answer: D

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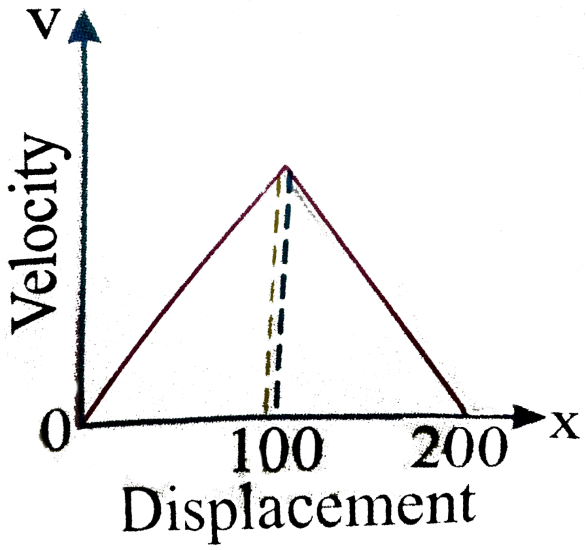
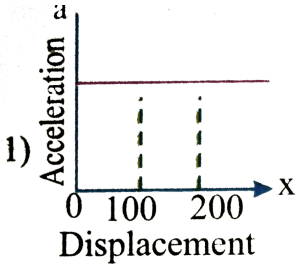
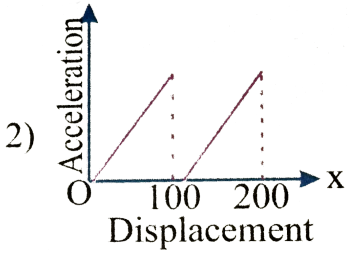
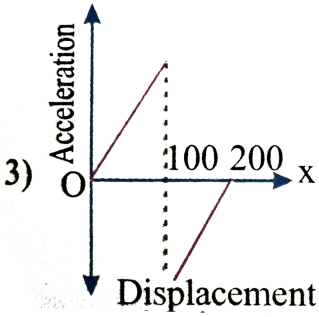
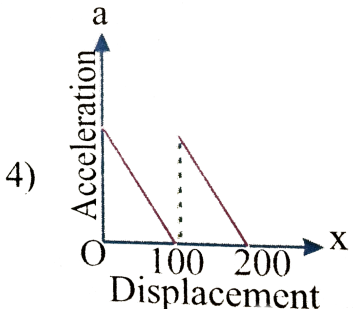


21.









Velocity(v) versus displacement(x) plot of a body moving along a straight

line is as shown in the graph. The corresponding plot of acceleration(a) as a function of displacement(x) is

A. 

B. 

C. 

D. 

Answer: C

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22. A boy is standing on an open truck. The truck is moving with acceleration $2ms^{-2}$ on a horizontal road. When the speed of the truck is $10ms^{-1}$ and reaches to an pole , boy projected a ball with velocity $10ms^{-1}$ in a vertically upward direction relative to himself (take $g = 10ms^{-2}$). Neglect the height of boy and truck. The distance of the ball from the pole where ball land is

A. 20 m

B. 10 m

C. 30 m

D. 40 m

Answer: A

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23. If the coefficient of friction between the wedge A and block B shown in the figure is μ, then the maximum possible horizontal acceleration of A for which B doesn't slip is [angle of inclination of wedge = 45°]

A. μg

B. $g\left(\frac{1+\mu}{1-\mu}\right)$

C. $\frac{g}{\mu}$

D. $g\left(\frac{1-\mu}{1+\mu}\right)$

Answer: B

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24. Two blocks each of mass m are joined together using an ideal spring of force constant K and natural length l_0 . The blocks are touching each other when the system is released from rest on a rough horizontal surface. Both the blocks come to rest simultaneously when the extension in the spring is $\frac{l_0}{4}$. The coefficient of friction between each block and the surface (assuming it to be same between any of the blocks and the surface) is :

A. $\frac{Kl_0}{40mg}$

B. $\frac{Kl_0}{8mg}$

C. $\frac{3Kl_0}{8mg}$

D. $\frac{17Kl_0}{20mg}$

Answer: C

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25. In the options given below, let E denote the rest mass energy of a nucleus and n a neutron. The correct option is:

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

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

C. $E\left(_{92}^{236}U\right) < E\left(_{56}^{140}I\right) + E\left(_{36}^{97}Kr\right) + 2E(n)$

D. $E\left(_{92}^{236}U\right) > E\left(_{56}^{140}I\right) + E\left(_{36}^{97}Kr\right) + 2E(n)$

Answer: A

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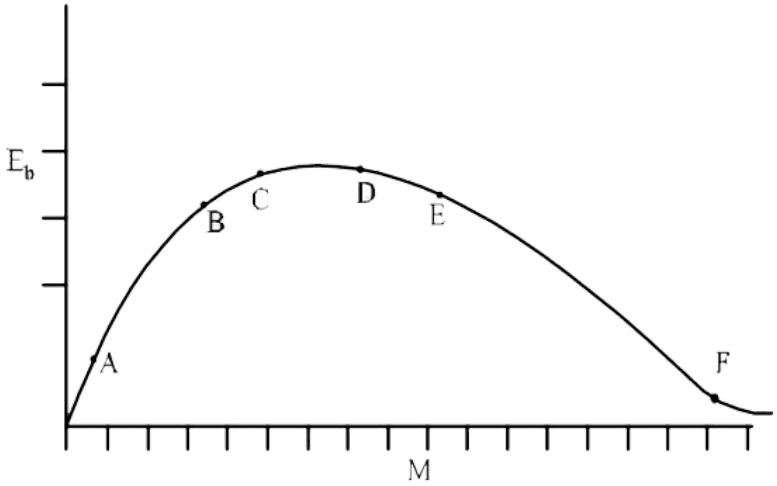

26.

The above is a plate of binding energy per nucleon E_0 against the nuclear mass M, A, B, C, D, E, F correspond to different nuclei Consider four reactions:

A. $A + B \rightarrow C + \varepsilon$

B. $C \rightarrow A + B + \varepsilon$

C. $D + E \rightarrow F + \varepsilon$

D. $F \rightarrow D + E + \varepsilon$

Answer: D

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27. In the previous question, the angular frequency of the simple harmonic motion is ω. The coefficient of friction between the coin and the platform is μ. The amplitude of oscillation is gradually increased. The coin will begin to slip on the platform for the first time

(i) at the extreme positions of oscillations

(ii) at the mean position

(iii) for an amplitude of $\frac{\mu g}{\omega^2}$

(iv) for an amplitude of $\frac{g}{\mu\omega^2}$

A. at the mean position

B. at the extreme position of oscillations

C. for an amplitude of $\mu g / \omega^2$

D. for an amplitude of $g / \mu\omega^2$

Answer: C

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28. An object of mass 1kg executes simple harmonic oscillations along the x-axis, with a frequency of $\frac{2}{\pi}Hz$. At the position x = 1 m, the object has a kinetic energy of 24 J. The amplitude of the oscillation is

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

B. 2 m

C. 4 m

D. 8 m

Answer: B

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29. Lights of wavelenths $\lambda_1 = 340nm$ and $\lambda_2 = 540nm$ are incident on a metallic surface. If the ratio of the maximum speeds of electrons ejected is 2, the work function of the metal is

A. 2 eV

B. 1.85 eV

C. 1 e V

D. 1.5 eV

Answer: B

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30. The potential difference that must be applied to stop the fastest photoelectrons emitted by a nickel surface , having work function $5.01eV$, when ultraviolet light of $200nm$ falls on it , must be

A. 2.4 V

B. $-1.2V$

C. $-2.4V$

D. $1.2V$

Answer: D

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31. Two liquid drop have diameters of 1 cm and 1.5 cm. The ratio of excess pressures inside them is

A. $1:1$

B. $5:3$

C. $2:3$

D. $3:2$

Answer: D

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32. A rod of length l and radius r is joined to a rod of length $l/2$ and radius $r/2$ of same material. The free end of small rod is fixed to a rigid base and the free end of larger rod is given a twist of θ°, the twist angle at the joint will be

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

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

C. $\frac{5\theta}{6}$

D. $\frac{8\theta}{9}$

Answer: D

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33. A convex lens if in contact with concave lens. The magnitude of the ratio of their focal length is $\frac{2}{3}$. Their equivalent focal length is 30 cm. What are their individual focal lengths?

A. $-75, 50$

B. $-10, 15$

C. $75, 50$

D. $-15, 10$

Answer: D

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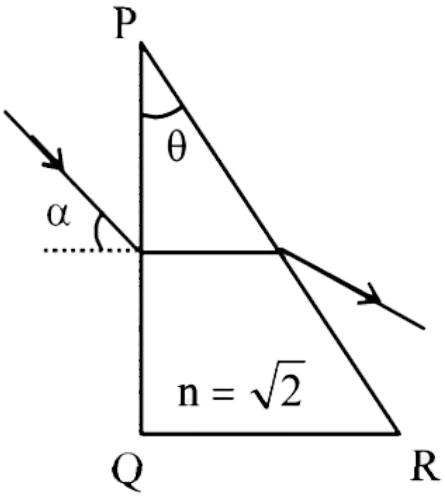
34. A parallel beam of light is incident from air at an angle α on the side PQ of a right angled triangular prism of refractive index $n = \sqrt{2}. Lightundergoes \rightarrow tal \int ernalref \leq ction \in theprismattheface$ alpha$hasa$ min $i\mu mvalueof$45degree. $The\angle$theta$oftheprismis$



A. 15°

B. 22.5°

C. 30°

D. 45°

Answer: A

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35. A solid sphere of mass M and radius R having tmoment of inertia I about its diameter is recast into a solid dise of radius r and thickness t. The moment of inertia of the disc about an axis passing the edge and perpendicular to the plane remains I. Then R and r are related as

A. $\frac{2}{\sqrt{15}}R$

B. $\frac{2}{\sqrt{5}}R$

C. $\frac{3}{\sqrt{15}}R$

D. $\frac{\sqrt{3}}{\sqrt{15}}R$

Answer: A

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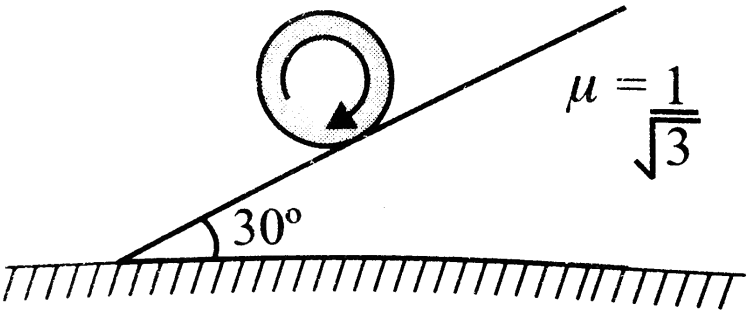
36. A disc is rotated about its axis with a certain angular velocity and lowered gently on a rough inclined plane as shown in Fig., then



A. It will rotate at the position where it was placed and then will move downwards

B. It will go downwards just after it is lowered

C. It will go downwards first and then climb up

D. It will climb upwards and then move downwards

Answer: A

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37. In the figure potential difference between A and B is :

A. 10 V

B. 5 V

C. 15 V

D. 0 V

Answer: A

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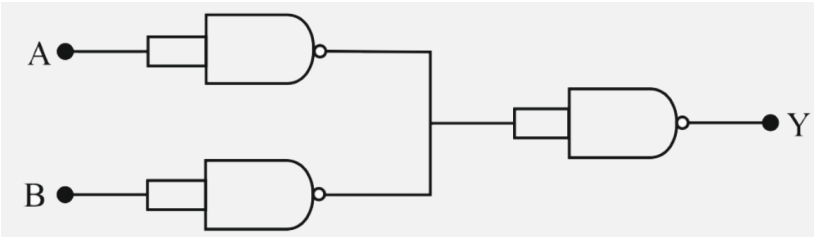
38. The combination of gates shown in the figure below produces .



A. NOR gate

B. OR gate

C. AND gate

D. XOR gate

Answer: B

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39. A monoatomic gas $(\gamma = 5/3)$ is suddenly compressed to $(1/8)$ of its volume adiabatically then the pressure of the gas will change to

A. $\frac{24}{5}$

B. 8

C. $\frac{40}{3}$

D. 32

Answer: D

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40. Unit of magnetic moment is

A. Ampere - metre^2

B. Ampere - metre

C. Weber - metre^2

D. Weber - metre

Answer: A

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41. In Young's double - slit experiment, d = 0.1 mm, D = 20 cm, and $\lambda = 5460\text{Å}$, the angular position for first dart fringe will be

A. 0.08°

B. 0.24°

C. 0.32°

D. 0.16°

Answer: D

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42. Two identical radiators have a separation of $d = \lambda/4$ where λ is the wavelength of the waves emitted by either source. The initial phase difference between the sources is $\lambda/4$. Then the intensity on the screen at a distant point situated at an angle $\theta = 30^\circ$ from the radiators is (here I_0 is intensity at that point due to one radiator alone)

A. I_0

B. $2I_0$

C. $3I_0$

D. $4I_0$

Answer: B

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43. A pipe of length 1.5 m closed at one end is filled with a gas and it resonates at $30^\circ C$ in its fundamental with a tuning fork. Another pipe of the same length but open at both ends and filled with air and it resonates in its fundamental with the same tuning fork. Calculate the velocity of sound at $0^\circ C$ in the gas, given that the velocity of sound in air is $360ms^{-1}$ at 30°.

A. $580m/s$

B. $683m/s$

C. $800m/s$

D. $743m/s$

Answer: B

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44. The wavelength of two notes in air are $\frac{40}{195}m$ and $\frac{40}{193}m$. Each note produces 9 beats per second separately with third note of fixed frequency. The velocity of sound in air in m/s is

A. 330

B. 340

C. 350

D. 360

Answer: D

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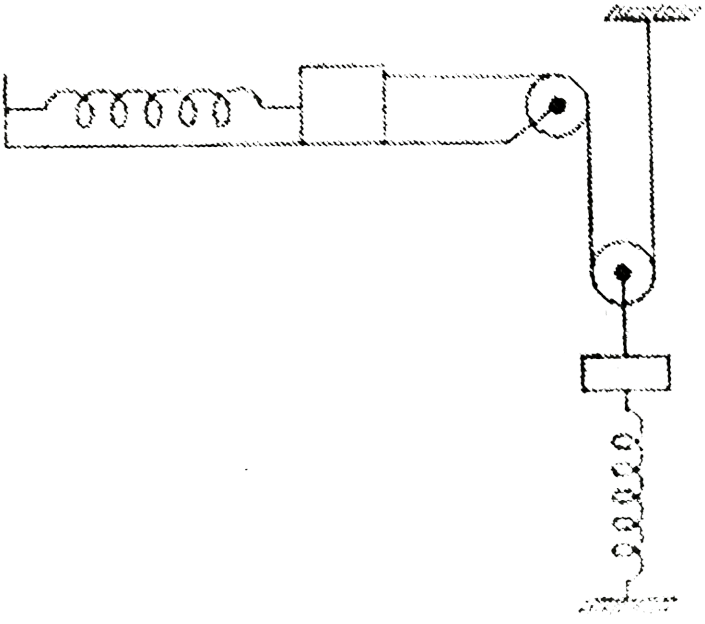
45. The system is released from rest with both the springs in unstretched positions. Mass of each block is 1 kg and force constant of each spring is $10N/m$.



Extension of horizontal spring in equilibrium is

A. 0.2 m

B. 0.4 m

C. 0.6 m

D. 0.8 m

Answer: B

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