PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 74

Physics

1. Tritium has a half-life of 12.5 y undergoing beta decay. What fraction of sample of pure tritium will remain undecayed after 25 y.

A. One half

B. One fourth

C. One third

D. Three fourth

Answer: B

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2. As an electron makes a transition from an excited state to the ground state of a hydrogen - like atom /ion

A. Kinetic energy decrease , potential energy increase but total energy remains same

B. Kinetic energy and total energy decrease but potential energy increases

C. Its kinetic energy increase but potential energy and total decrease

D. Kinetic energy , potential energy and total energy decrease

Answer: C

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3. A curved road of diameter 1.8 km is banked so that no friction is required at a speed of $30ms^{-1}$. What is the banking angle ?

A. $\tan^{-1}(0.1)$

B. $\tan^{-1}(0.3)$

C. $\tan^{-1}(0.9)$

D. $\tan^{-1}(1.5)$

Answer: A

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4. The linear momentum of a particle varies with time t as $p = a + bt + ct^2$. Then, whichh of the following is correct?

A. Force varies with time in a quadratic manner

B. Force is time - dependent

C. The velocity of the particle is proportional to time

D. The displacement of the particle is proportional to time .

Answer: B

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5. Two buses A and B are moving around concentric circular pathe of radii r_A and r_B If the two buses complete the circular paths in the sme time. The ratio on their linear speeds is

A. 1

B. $\frac{r_A}{r_B}$

C. $\frac{r_B}{r_A}$

D. None of these

Answer: B

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6. A flywheel rotates about a fixed axis and slows down from 300 rpm to 100 rpm in 2 minutes (i) What is the angular acceleration in

$\mathrm{rad\,min}^{-2}$? (ii) How many revolutions does the wheel complete during this time ?

A. $\frac{100}{\pi}$

B. 100

C. 100π

D. 200π

Answer: D

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7. A silver wire has a temperature coefficient of resistivity $4 \times 10^{-3}.^{\circ} C^{-1}$ and its resistance at $20^{\circ} C$ is 10° Neglecting any change in dimensions due to the change in temperature , its resistance at $40^{\circ} C$ is

A. 0.8Ω

B. 1.8Ω

C. 10.8Ω

D. 11.6Ω

Answer: C

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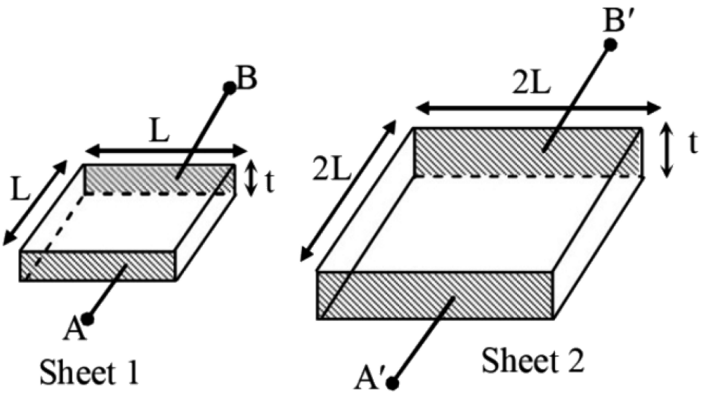
8. The resistance of metal sheet 1 between the shaded portion is R_1 and Resistance between shaded portion for sheet 2 R_2 the R_1 / R_2 is



A. 1

B. $1/2$

C. 2

D. 4

Answer: A

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9. A circular disc of radius 0.2 m is placed in a uniform magnetic field of induction $\frac{1}{\pi} Wb/m^2$ in such a way that its axis makes an angle 60° with the field. The magnetic flux linked with the disc is

A. 0.08 Wb

B. 0.01 Wb

C. 0.02 Wb

D. 0.06 Wb

Answer: C

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10. In an AC circuit the instantaneous values of emf and current are

$e = 200 \sin 300t$ volt and

$i = 2\sin\left(300t + \frac{\pi}{3}\right)$ amp The average power consumed (in watts) is

A. 200

B. 100

C. 50

D. 400

Answer: B

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11. A charge Q is uniformly distributed over the surface of two conducting concentric spheres of radii R and r (Rgtr). Then, potential at common centre of these spheres is

A. $\frac{kQ(R+r)}{Rr}$

B. $\frac{kQ(R+r)}{R^2+r^2}$

C. $\frac{kQ}{\sqrt{R^2+r^2}}$

D. $kQ\left(\frac{1}{R}-\frac{1}{r}\right)$

Answer: B

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12. Two identical capacitors, have the same capacitance C. One of them is charged to potential V_1 and the other V_2. The negative ends of the capacitors are connected together. When the poistive ends are also connected, the decrease in energy of the combined system is

A. $\frac{C}{4}(V_1^2 - V_2^2)$

B. $\frac{C}{4}(V_1^2 + V_2^2)$

C. $\frac{C}{4}(V_1 - V_2)^2$

D. $\frac{C}{4}(V_1 + V_2)^2$

Answer: C

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13. A body of mass m is placed on the earth's surface . It is taken from the earth's surface to a height h = 3 R when R is the radius of the earth. The change in gravitational potential energy of the body is

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

B. $\frac{3}{4}mgR$

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

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

Answer: B

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14. Two plants A and B have the same average density . Their radii RA and RB are such that $R_A : R_B = 3:1$. If gA and g_B are the

acceleration due to gravity at the surface of the planets , the $g_A : g_B$ equals

A. $3:1$

B. $1:3$

C. $1:9$

D. $\sqrt{3}:1$

Answer: A

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15. Three rods of the same dimension have thermal conductivity 3K , 2K and K. They are arranged as shown in the figure below

Then , the temperature of the junction in steady - state is

A. $\frac{200}{3^\circ}C$

B. $\frac{100}{3^\circ}C$

C. $75^\circ C$

D. $\frac{50}{3^\circ}C$

Answer: A

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16. A gas expands with temperature according to the relation $V = KT^{\frac{2}{3}}$.Work done when the temperature changes by 60K is.

A. 10R

B. 30R

C. 40R

D. 20R

Answer: C

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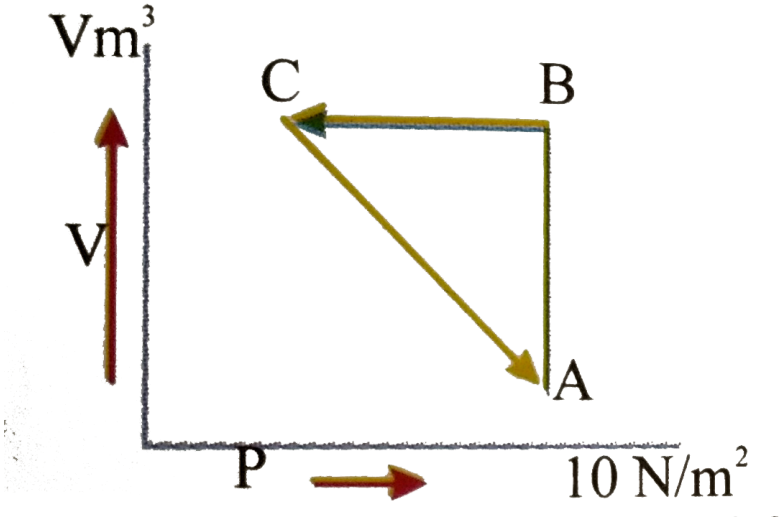
17. An ideal gas is taken through the cycle $A \to B \to C \to A$ As shown in figure. If net heat supplied to the gas in the cycle is 5j. Find the work done by the gas in the process

$C \rightarrow A$ in Joule (taken mole value)



A. $-5J$

B. $-10J$

C. $-15J$

D. $-20J$

Answer: A

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18. One mole of an ideal monoatomic gas at temperature T_0 expands slowly according to the law $\frac{p}{V}$ = constant. If the final temperature is $2T_0$, heat supplied to the gas is

A. $2RT_0$

B. RT_0

C. $\frac{3}{2}RT_0$

D. $\frac{1}{2}RT_0$

Answer: A

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19. H^+, He^+ and O^{++} all having the same kinetic energy pass through a region in which there is a uniform magnetic field perpendicular to their velocity . The masses of H^+, He^+ and O^{2+} are $1a\mu, 4a\mu$ and $16a\mu$ respectively . Then

A. H^+ will be least deflected .

B. H^+ and O^{+2} will be deflected equally.

C. O^{+2} will be deflected most.

D. All will be deflected equally.

Answer: B

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20. A bar mangnet has length 3 cm cross sectional area 2 cm^2 and magnetic moment 3 Am^2 the intensity of magnetisation of the bar magnet is

A. $2 \times 10^5 Am^{-1}$

B. $3 \times 10^5 Am^{-1}$

C. $4 \times 10^5 Am^{-1}$

D. $5 \times 10^5 Am^{-1}$

Answer: D

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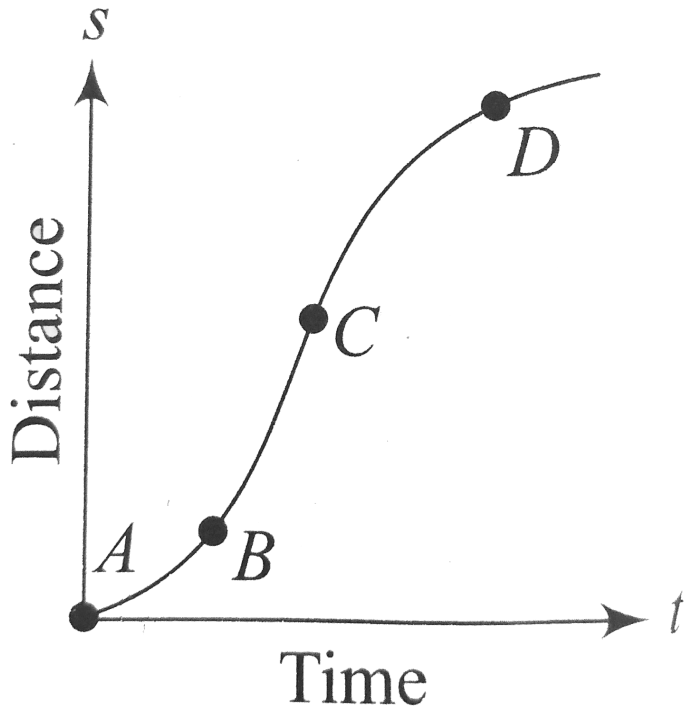
21. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is

around the point.



A. D

B. A

C. B

D. C

Answer: D

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22. A bomb is dropped from an aeroplane flying horizontally with a velocity $469ms^{-1}$ at an altitude of 980 m . The bomb will hit the ground after a time (use $g = 9.8ms^{-2}$)

A. 2 s

B. $\sqrt{2}s$

C. $5\sqrt{2}s$

D. $10\sqrt{2}s$

Answer: D

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23. A block of mass 1 kg lies on a horizontal surface in a truck. The coefficient of static friction between the block and the surface is 0.6. If the acceleration of the truck is $5m/s^2$, the frictional force acting on the block is..... newtons.

A. 5N

B. 2.5 N

C. 5.88 N

D. 9.8 N

Answer: A

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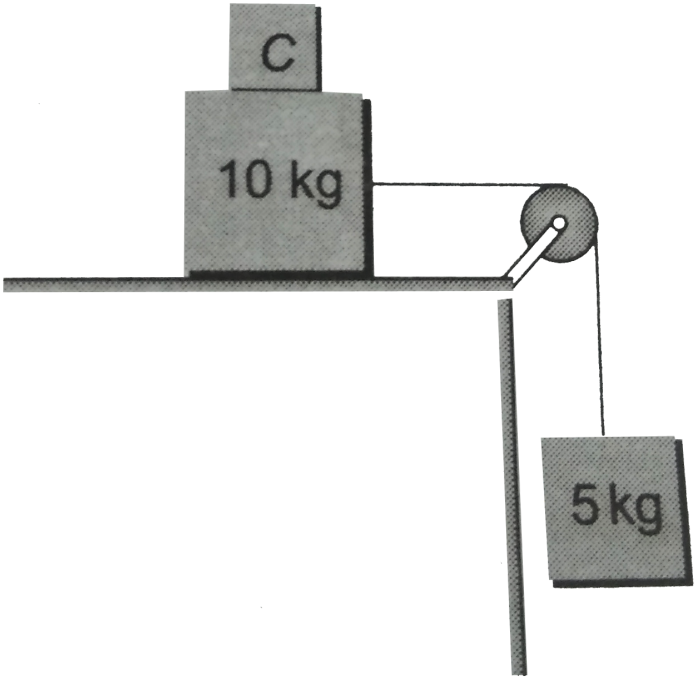
24. Two masses A and B of $10kg$ and $5kg$, respectively , are connected with a string passing over a frictionless pulley fixed at the

corner of a table as shown. The coefficient of static friction between A and the table is 0.2. The minimum mass C that should be placed on A to prevent it from moving is equal to



A. 15 kg

B. 5 kg

C. 10 kg

D. 0 kg

Answer: A

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25. A sample contains large number of nuclei. The probability that a nucleus in sample will decay after four half lives is

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

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

C. $\frac{15}{16}$

D. $\frac{7}{16}$

Answer: C

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26. A $0.2mL$ sample of a solution containing 1.0×10^{-7} curie of ${}_{1}^{3}H$ is injected to the blood stream of an animal. After sufficient time for circulatory equilibrium to be

established, $0.10mL$ of blood is found to have an activity of $20dpm$. Calculate the volume of blood in animal, assuming no change in activity of sample during circulatory equilibrium.

A. 11110 mL

B. 1110 mL

C. 11010 mL

D. 10110 mL

Answer: B

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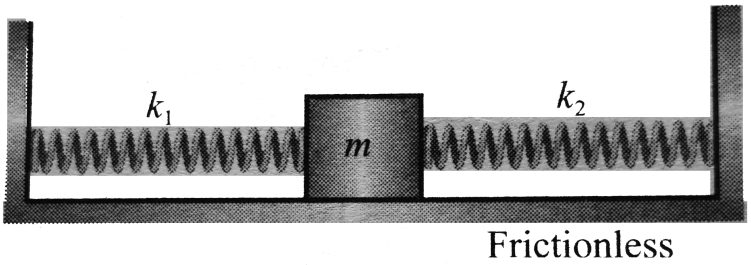

27.

Two springs with negligible masses and force constants $k_1 = 200\frac{N}{m}$ and $K_2 = 160\frac{N}{m}$ are attached to the block of mass $m = 10kg$ as shown in the fig. Initially the block is at rest, at the equilibrium position which both springs are neither stretched nor compressed. At time

$t = 0$, sharp impulse of $50Ns$ is given to the block with a hammer along the spring.

A. Period of oscillations for the mass m is $\frac{\pi}{6}$ s

B. Maximum velocity of the mass m during its oscillation is $10ms^{-1}$

C. Data are insufficient to determine maximum velocity

D. Amplitude of oscillation is 0.83 m

Answer: D

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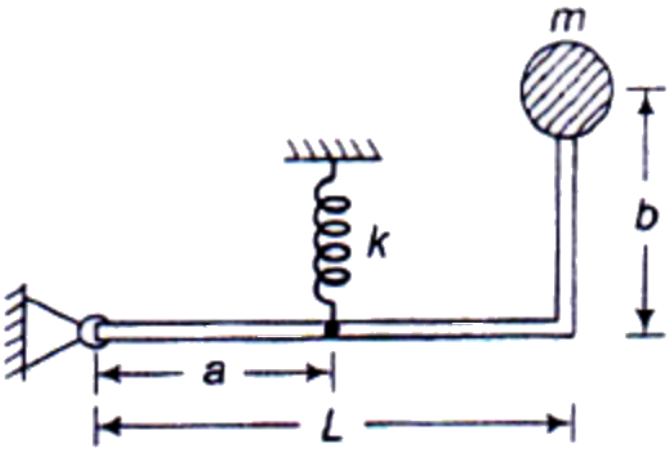
28. Consider the given system of mass m and spring constant k. Find the maximum value of b so that system performs SHM. Neglect the mass of connecting rod.



A. $\frac{ka^2}{mg}$

B. $\frac{k}{mg}$

C. $\frac{ka^2}{2mg}$

D. $\frac{2ka^2}{mg}$

Answer: A

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29. Light of two different frequencies whose photons have energies 1eV and 2.5 eV respectively illuminate a metallic surface

whose work function is 0.5 eV successively. Ratio of maximum kinetic energy of emitted electrons will be:

A. $1:4$

B. $1:2$

C. $1:1$

D. $1:5$

Answer: B

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30. The de-Broglie wavelength of neutron in thermal equilibrium at temperature T is

A. $\frac{25.2}{\sqrt{T}}\text{Å}$

B. $\frac{0.308}{T}\text{Å}$

C. $\frac{0.025}{\sqrt{T}}\text{Å}$

D. $\frac{0.25}{\sqrt{T}}\text{Å}$

Answer: A

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31. A raindrop of radius 0.3 mm has a terminal velocity in air $1ms^{-1}$. The viscosity of air is 18×10^{-3} poise. The viscous force on it is

A. 101.73×10^{-4} dyne

B. 101.73×10^{5} dyne

C. 16.95×10^{-4} dyne

D. 16.95×10^{-5} dyne

Answer: A

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32. Two metal wires P and Q of same length and material are stretched by same load. Yheir masses are in the ratio $m_1 : m_2$. The ratio of elongation of wire P to that of Q is

A. $m_1^2 : m_2^2$

B. $m_2^2 : m_1^2$

C. $m_2 : m_1$

D. $m_1 : m_2$

Answer: C

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33. The distance between an object and the screen is 100cm. A lens produces an image on the screen when the lens is placed at either of the positions 40cm apart. The power of the lens is nearly

A. 3 D

B. 5 D

C. 7 D

D. 9 D

Answer: B

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34. A biconvex lens of focal length f forms a circular image of radius r of sun in focal plane . Then which option is correct

A. $\pi r^2 \propto f$

B. $\pi r^2 \propto f^2$

C. If lower half part is covered by black sheet, then area of the image is equal to

$$\frac{\pi r^2}{2}$$

D. If f is doubled , intensity will increase

Answer: B

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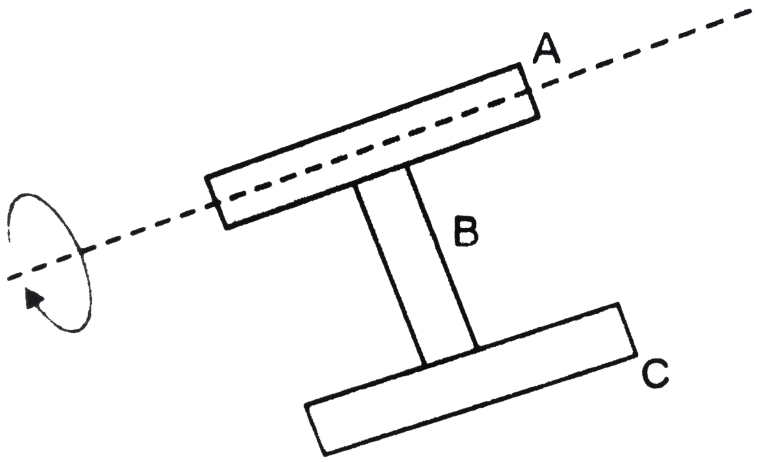
35. A rigid body is made of three identical thin rods, each of length L, fastened together in the form of letter H, Fig. The body is free to rotate about a horizontal axis that turns along the length of one of legs of H. The body is

allowed to fall from rest from a position in which plane of H is horizontal. The angular speed of body when plane of H is vertical is



A. $\sqrt{\frac{g}{L}}$

B. $\frac{1}{2}\sqrt{\frac{g}{L}}$

C. $\frac{3}{2}\sqrt{\frac{g}{L}}$

D. $2\sqrt{\frac{g}{L}}$

Answer: C

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36. A ring of mass M is kept on w horizontal rough surface . A force F is applied tangentially at its rim as shown . The coefficient of friction between the ring and surface is μ Then

A. Friction will act in the forward direction

B. Friction will act in the backward direction

C. Frictional force will not act

D. Frictional force will be μMg

Answer: C

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37. A p-n junction in series with a resistance of $5k\Omega$ is connected across a 50 V DC source . If

the forward bias resistance of the junction is 50Ω , the forward bias current is

A. 1 mA

B. 2 mA

C. 20 mA

D. 9.9 mA

Answer: D

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38. Given the following truth table where A , B are inputs and Y the output :

A	B	Y
0	0	1
1	0	1
0	1	1
1	1	0

The output Y is :

A. $A\overline{B}$

B. $\overline{A}B$

C. AB

D. $\overline{AB}$

Answer: D

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39. A steel wire , of uniform area $2m^2$, is heated up to $50^\circ C$ and is stretched by tying its ends rigidly . The change in tension , when the temperature falls from $50^\circ C$ to $30^\circ C$ is (Take $Y = 2 \times 10^{11} Nm^{-2}, \alpha = 1.1 \times 10^{-5^\circ C-1}$)

A. $1.5 \times 10^{10} N$

B. 5 N

C. 88 N

D. $2.5 \times 10^{-10} N$

Answer: C

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40. Select the dimensional formula of $\frac{B^2}{2\mu 0}$

A. $\left[M^1 L^1 T^2\right]$

B. $\left[M^{-1} L^1 T^2\right]$

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

D. $\left[M^{1}L^{-1}T^{-2}\right]$

Answer: D

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41. If θ is the polarising angle for two optical media whose critical angles are C_1 and C_2, then the correct relation is

A. $\sin\theta = \dfrac{\sin C_2}{\sin C_1}$

B. $\theta = \dfrac{\sin C_2}{\sin C_1}$

C. $\tan\theta = \dfrac{\sin C_1}{\sin C_2}$

D. $\sin\theta = \dfrac{\sin C_1}{\sin C_2}$

Answer: C

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42. At the first minimum adjacent to the central maximum of a single-slit diffraction pattern the phase difference between the

Huygens wavelet from the edge of the slit and the wavelet from the mid-point of the slit is

A. $\frac{\pi}{2}$ rad

B. πrad

C. $\frac{\pi}{8} rad$

D. $\frac{\pi}{4}$ rad

Answer: B

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43. An object of specific gravity ρ is hung from a thin steel wire. The fundamental frequency for transverse standing waves in wire is $300Hz$. The object is immersed in water so that one half of its volume is submerged. The new fundamental frequency in Hz is

A. $300\left(\frac{2\rho-1}{2\rho}\right)^{\frac{1}{2}}$

B. $300\left(\frac{2\rho}{2\rho-1}\right)^{\frac{1}{2}}$

C. $300\left(\frac{2\rho}{2\rho-1}\right)$

D. $300\left(\frac{2\rho-1}{2\rho}\right)$

Answer: A

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44. Two sound waves of wavelength $1m$ and $1.01m$ in a gas produce 10 beats in 3s. The velocity of sound in the gas is

A. $150ms^{-1}$

B. $115.2ms^{-1}$

C. $336.6ms^{-1}$

D. $200ms^{-1}$

Answer: C

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45. A uniform chain of length 2 m is kept on a table such that a length of 60 cm hangs freely from the edge of the table. The total mass of the chain is 4 kg. What is the work done in pulling the entire chain on the table?

A. 7.2 J

B. 3.6 J

C. 120 J

D. 1200 J

Answer: B

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