PHYSICS

NTA MOCK TESTS ENGLISH

NTA NEET SET 107

Physics

1. An alpha nucleus of energy $\frac{1}{2}mv^2$ bomobards a heavy nuclear target of charge

Ze. Then the distance of closest approach for the alpha nucleus will be proportional to

A. v^2

B. $1/m$

C. $1/Ze$

D. $1/v^2$

Answer: B

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2. If an electron has an energy such that its de Broglie wavelength is 5500Å, then the energy value of that electron is $\left(h = 6.6 \times 10^{-34}\right)$ Js, $m_c = 9.1 \times 10^{-31}$ kg

A. $8 \times 10^{-20} J$

B. $8 \times 10^{-10} J$

C. 8J

D. $8 \times 10^{-25} J$

Answer: D

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3. The blocks shown in figure have equal masses. The surface of A is smooth but that of B has a friction coefficietn of 0.10 with the floor. Block A is moving at a speed of 10 m/s towards B which is kept at rest. Fnd the distance travelled by B if (a). the collision is perfectly elastic and (b). the collisioni is perfectly inelastic. Take $g = 10\frac{m}{s^2}$.

A. 3

B. 4

C. 5

D. 2

Answer: B

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4. A ball of mass m approaches a wall of mass M $(> > m)$ with speed 4 m/s along the normal to the wall . The speed of wall is 1 m/s towards the ball . The speed of the ball after an elastic collision with the wall is

A. $5 \mathrm{m\,s}^{-1}$ away from the wall

B. $9 \mathrm{m\,s}^{-1}$ away from the wall

C. $3 \mathrm{m\,s}^{-1}$ away from the wall

D. $6 \mathrm{m\,s}^{-1}$ away from the wall

Answer: D

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5. A particle of mass 100 g tied to a string is rotated along the circle of radius 0.5 m. The breaking tension of the string is 10 N. The maximum speed with which particle can be rotated without breaking the string is

A. $10 \ \ \mathrm{ms}^{-1}$

B. $9.8 \mathrm{m\,s}^{-1}$

C. $7.7 \ \ \mathrm{m\,s}^{-1}$

D. $7.07 \ \ \mathrm{m\,s}^{-1}$

Answer: D

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6. At a certain place, the angle of dip is 60° and the horizontal component of the earth's magnetic field (B_H) is 0.8×10^{-4} T. The earth's overall magnetic field is

A. $1.5 \times 10^{-4} T$

B. $1.6 \times 10^{-3} T$

C. $1.5 \times 10^{-3} T$

D. $1.6 \times 10^{-4} T$

Answer: D

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7. A galvanometer of resistance 25Ω measures $10^{-3}A$. shunt required to increase range up tow 2 A is

A. $12.5m\Omega$

B. $0.125m\Omega$

C. 0.125Ω

D. $1.25m\Omega$

Answer: A

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8. The emf of a cell is 6 V and internal resistance is $0.5 k\Omega$ The reading of a Voltmeter having an internal resistance of $2.5 k\Omega$ is

A. 6 V

B. 10 V

C. 5 V

D. 0.5 V

Answer: C

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9. If the current in the toroidal solenoid increases uniformly from zero to 6.0 A in $3.0 \mu s$ Self-inductance of the toroidal solenoid is 40μ H The magnitude of self-induced emf is

A. 80 V

B. 160 V

C. 24 V

D. 48 V

Answer: A

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10. Two coils P and Q are kept near each other. When no current flows through coil P and current increases in coil Q at the rate $10A/s$, the emf in coil P is 15 mV. When coil Q carries no current and current of $1.8A$ flows through coil P, the magnetic flux linked with the coil Q is

A. $1.4 mWb$

B. $2.2 mWb$

C. 2.7 mWb

D. 2.9 mWb

Answer: C

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11. Two large parallel metal carry charges +Q and –Q respectively . A test charge q_0 placed between them experiences a force F. If the separation between the plants is doubled, then the force on the test charge will be

A. F

B. 2F

C. $F/2$

D. $F/4$

Answer: A

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12. The amount of work done in increasing the voltage across the plates of capacitor from 5 V to 10 V is W. The work done in increasing it from 10 V to 15 V will be

A. W

B. 0.6W

C. 1.25 W

D. 1.67 W

Answer: D

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13. If the radius of the earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on the earth's surface would

A. Decreases by 2%

B. Remain unchanged

C. Increase by 2%

D. Become zero

Answer: C

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14. The change in potential energy when a body of mass m is raised to a height nR_E from earth's surface is (R_E=radius of the earth)

A. mgR

B. $mgR\frac{n}{(n+1)}$

C. $mgR\frac{n^2}{(n^2+1)}$

D. $\frac{mgR}{n}$

Answer: B

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15. Consider an expanding sphere of instantaneous radius ? whose total mass remains constant. The expansion is such that the instantaneous density ρ remains uniform throughout the volume. The rate of fractional change in density $\left(\frac{dp}{\rho dt}\right)$ is constant. The velocity v of any point on the surface of the expanding sphere is proportional to

A. R^3

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

C. R

D. $R^{\frac{2}{3}}$

Answer: C

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16. An ideal gas at $27^{\circ} C$ is compressed adiabatically to $\frac{8}{27}$ of its original volume. The rise in temperature is $\left(\gamma = \frac{5}{3}\right)$

A. 450K

B. 375K

C. 225K

D. 405K

Answer: B

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17. Two spheres of the same material have radii 1 m and 4 m, temperature 4000K and 2000K respectively. Then the ratio of energy radiated per second by the first sphere as compared to that by the second is

A. $1:1$

B. $16:1$

C. $4:1$

D. $1:9$

Answer: A

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18. In the given option,the magnetic dipole moment of current loop is independent of

A. Magnetic field in which it is lying

B. Number of turns

C. Area of the loop

D. Current in the loop

Answer: A

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19. A long solonoid carrying a current produces a magnetic field along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is

A. B

B. 2B

C. 4B

D. B/2

Answer: A

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20. The position x of a particle varies with time t as $x = at^2 - bt^3$. The acceleration at time t of the particle will be equal to zero, where (t) is equal to .`

A. $2at - 3bt^2$

B. $2a - 6bt$

C. $2a - 6b$

D. None of these

Answer: B

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21. Ship A is sailing towards north-east with velocity $\overrightarrow{r} = 30\hat{i} + 50\hat{J}\, km/hr$ where $\hat{i}$ points east and $\hat{j}$, north. Ship B is at a distance of $80 km$ east and $150 km$ norht of Ship A and is sailing towards west at $10 km / hr$. A will be at minimum distance from B in:

A. 4.2 h

B. 3.2 h

C. 2.6 h

D. 2.2 h

Answer: C

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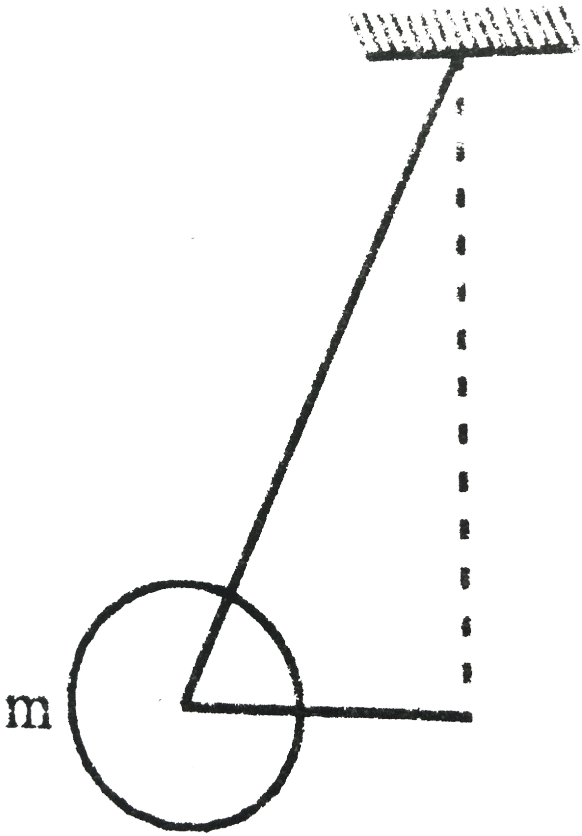
22. A ball of mass $(m) 0.5 kg$ is attached to the end of a string having length $(L) 0.5 m$. The ball is rotated on a horizontal circular path about vertical axis. The maximum tension that the string can bear is $324 N$. The maximum possible value of angular velocity of ball (in radian//s) is -



A. 9

B. 8

C. 27

D. 36

Answer: D

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23. A mass m moving horizontal (along the x-axis) with velocity v collides and sticks to mass of $3m$ moving vertically upward (along the y-axis) with velocity $2v$. The final velocity of the combination is

A. $\frac{1}{4}v\hat{i} + \frac{3}{2}v\hat{j}$

B. $\frac{1}{3}v\hat{i} + \frac{2}{3}v\hat{j}$

C. $\frac{2}{3}v\hat{i} + \frac{1}{3}v\hat{j}$

D. $\frac{3}{2}v\hat{i} + \frac{1}{4}v\hat{j}$

Answer: A

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24. A nucleus disintegrated into two nucleus which have their velocities in the ratio of $2:1$. The ratio of their nuclear sizes will be

A. $2^{\frac{1}{3}} : 1$

B. $1 : 3^{\frac{1}{2}}$

C. $3^{\frac{1}{2}} : 1$

D. $1 : 2^{\frac{1}{3}}$

Answer: D

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25. A radioactive nucleus A with a half life T, decays into nucleus B. At t=0, there is no nucleus B. At some time t, the ratio of the number of B to that of A is 0.3 . Then, t is given

by

A. $t = \dfrac{T}{\log(1.3)}$

B. $t = \dfrac{T}{2}\dfrac{\log 2}{\log 1.3}$

C. $t = T\dfrac{\log 1.3}{\log 2}$

D. $t = T\log(1.3)$

Answer: C

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26. A particle of mass (m) is executing oscillations about the origin on the (x) axis. Its potential energy is $V(x) = k|x|^3$ where (k) is a positive constant. If the amplitude of oscillation is a, then its time period (T) is.

A. Proportional to $\frac{1}{\sqrt{a}}$

B. Independent to a

C. Proportional to $\sqrt{a}$

D. Proportional to $a^{\frac{3}{2}}$

Answer: A

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27. The Shortest distance travelled by a particle executing SHM from mean position in 2 s is equal to $\sqrt{3}/2$ times its amplitude . Determine its time period.

A. 11 s

B. 12 s

C. 13 s

D. 14 s

Answer: B

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28. If the directions of electric and magnetic field vectors of a plane electromagnetic wave are along positive y- direction and positive z-direction respectively , then the direction of propagation of the wave is along

A. Positive z - direction

B. Negative z - direction

C. Negative y - direction

D. Positive x - direction

Answer: D

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29. The frequency of $\gamma - rays$, X-rays and ultraviolet rays are a,b,c and c respectivley.

A. $a < b, b < c$

B. $a < b, b > c$

C. $a > b, b > c$

D. $a > b, b < c$

Answer: B

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30. A capillary tube of the radius 0.5 mm is immersed in a beaker of mercury . The level inside the tube is 0.8 cm below the level in beaker and angle of contact is 120° . What is the surface tension of mercury , if the mass density of mercury is $\rho = 13.6 \times 10^3 kgm^3$

and acceleration due to gravity is g = 10 m s^{-2}

?

A. $0.225 \mathrm{N\ m}^{-1}$

B. $0.544 \mathrm{N\ m}^{-1}$

C. $0.285 \mathrm{N\ m}^{-1}$

D. $0.375 \mathrm{N\ m}^{-1}$

Answer: B

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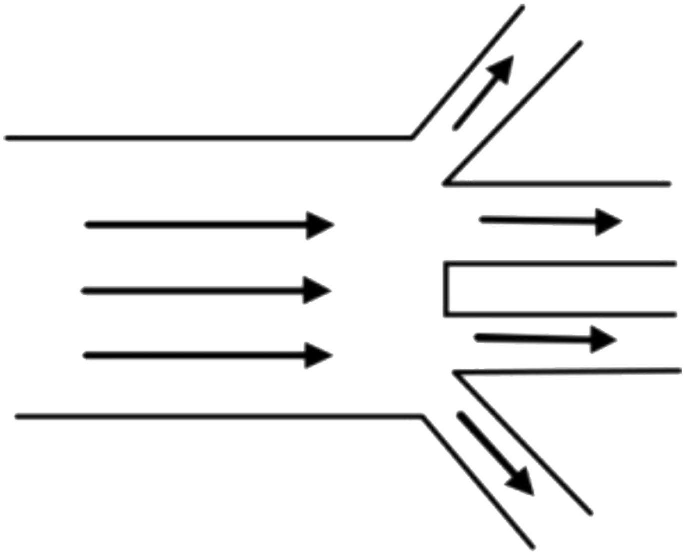
31. Water is flowing through a channel that is 12m wide with a speed of $0.75ms^{-1}$ The water then flows into four identical channels that have a width of 4.0m each. The depth of the water does not change as it flows into the four channels. The speed of the water in one of the smaller channels is



A. $0.56ms^{-1}$

B. $2.3ms^{-1}$

C. $0.25ms^{-1}$

D. $0.75ms^{-1}$

Answer: A

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32. A ray of light is incident on the plane mirror at rest. The mirror starts turning at a uniform angular acceleration of $\pi rad s^{-2}$. The reflected ray at the end of $\frac{1}{4}$ s must have turned through

A. 90°

B. 45°

C. 22.5°

D. 11.25°

Answer: D

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33. A beam of parallel rays is brought to focus by a planoconvex lens. A thin Concave lens of the same focal length is joined to the first lens. The effect of this is

A. The focus shifts to infinity

B. The focal point shifts towards the lens by a small distance

C. The focal point shifts away from the lens by a small distance

D. The focus remains undisturbed

Answer: A

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34. By keeping moment of inertia of a body constant, if we double the time period, then angular momentum of body

A. Remains constant

B. Becomes half

C. Doubles

D. quadruples

Answer: B

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35. A body of mass m slides down an incline and reaches the bottom with a velocity v. If the same mass were in the form of a ring which rolls down this incline, the velocity of the ring at the bottom would have been

A. v

B. $\sqrt{2}v$

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

D. $\sqrt{\frac{2}{5}}v$

Answer: C

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36. A silicon specimen is made into a p-type semiconductor by doping. On an average, one indium atom per 5×10^{7} silicon atoms. If the number density of atoms in the silicon specimen is $5 \times 10^{28} atm / m^{3}$, then the number of acceptor atoms in silicon per cubic centimeter will be

A. $2.5 \times 10^{30} \text{atom cm}^{-3}$

B. $2.5 \times 10^{35} \text{atom cm}^{-3}$

C. 1×10^{13} atom cm^{-3}

D. 1×10^{15} atom cm^{-3}

Answer: D

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37. If the forward voltage in a diode is increased, the width of the depletion region

A. Increase

B. Decrease

C. Not change

D. Initially increase and then decrease

Answer: A

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38. An ideal gas heat engine operates in a Carnot cycle between $227^{\circ} C$ and $127^{\circ} C$. It absorbs $6 Kcal.$ of heat at higher temperature. The amount of heat in $kcal$ ejected to sink is

A. 4.8

B. 2.4

C. 1.2

D. 6.0

Answer: A

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39. The dimensions of coefficient of self inductances are

A. $\left[ML^2T^{-2}A^{-2}\right]$

B. $\left[ML^2T^{-2}A^{-1}\right]$

C. $\left[MLT^{-2}A^{-2}\right]$

D. $\left[MLT^{-2}A^{-1}\right]$

Answer: A

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40. In Young's experiment, the ratio of maximum to minimum intensities of the fringe system is $4:1$. The amplitudes of the coherent sources are in the ratio

A. $1:1$

B. $3:1$

C. $1:4$

D. $5:1$

Answer: B

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41. In a single - slit diffraction pattern , the position of first secondary maximum is at 30° , then what will be the angular position of second minima ?

A. $\sin^{-1}(2/3)$

B. $\sin^{-1}(1)$

C. $\sin^{-1}(1/2)$

D. None

Answer: A

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42. A pulse of a wavetrain travels along a stretched string and reaches the fixed end of the string. It will be reflected back with

A. The same phase as the incident pulse but with velocity reversed

B. A phase change of 180° with no reversal of velocity

C. The same phase as the incident pulse with no reversal of velocity

D. A phase change of 180° with velocity reversed

Answer: D

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43. A motor car is approaching towards a crossing with a velocity of 72 km h^{-1}. The frequency of the sound of its horn as heard by a policeman standing on the crossing is 260 Hz. The frequency of horn is

A. 200 Hz

B. 244 Hz

C. 150 Hz

D. 80 Hz

Answer: B

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44. If linear momentum if increased by 50% then kinetic energy will be increased by

A. 50%

B. 100%

C. 125%

D. 25%

Answer: C

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45. A bucket full of water weighs 5 kg, it is pulled from a well 20 m deep. There is a small hole in the bucket through which water leaks at a constant rate. If it is observed that for every meter the bucket loses 0.2 kg mass of water, then the total work done in pulling the bucket up from the well is $[g = 10ms^{-2}]$

A. 600 J

B. 400 J

C. 100 J

D. 500 J

Answer: A

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