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## PHYSICS

## NTA MOCK TESTS ENGLISH

## NTA NEET TEST 85

## Physics

1. Starting with a sample of pure ${ }^{66} \mathrm{Cu}, \frac{7}{8}$ of it decays into Zn in 15 min . The corresponding half-life is
A. $7 \frac{1}{2}$ minutes
B. 10 minutes
C. 14 minutes
D. 5 minutes

## Answer: D

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2. A stationary hydrogen atom emits photon corresponding to the first line of Lyman series. If $R$ is the Rydberg constant and $M$ is the mass of the atom, then the velocity acquired by the atom is
A. $\left[\sqrt{\frac{3 E}{2 m}+C^{2}}\right]-c$
B. $\left[\sqrt{\frac{3 E}{4 m}+C^{2}}\right]-c$
C. $\frac{3 E}{4 m c}$
D. $\frac{E}{m c}$

## Answer: A

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3. A bullet of mass 0.02 kg travelling horizontally with velocity $250 \mathrm{~ms}^{-1}$ strikes a block of wood of mass
0.23 kg which rests on a rough horizontal surface.

After the impact, the block and bullet move together and come to rest after travelling a distance of 40m.

The coefficient of sliding friction of the rough surface is $\left(g=9.8 m s^{-2}\right)$
A. 0.75
B. 0.61
C. 0.51
D. 0.30

Answer: C

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4. Two bodies collide as shown in the diagram.

During the collision , they exert impulse of
magnitude J on each other


For what values of J(in N s ) the 2 kg block will change
its direction of velocity?
A. $J<12$
B. $J>12$
C. $J<10$
D. $J>10$

Answer: B
5. Particles are released from rest $A$ and slide down the smooth surface of hight $h$ to a conveyor $B$. The correct angular veleocity $\omega$ of the coneyor pulley of radius $r$ to prevent any sliding on the belt as the particles transfer to the conveyor is

A. $\sqrt{\frac{g h}{r}}$
B. $\sqrt{\frac{2 g h}{3 r}}$
C. $\sqrt{\frac{2 g h}{r}}$
D. $\sqrt{\frac{g h}{2 r}}$

## Answer: C

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6. Two short bar magnets of dipole moments $M$ and
$M \sqrt{3}$ are joined at right angles to form a cross as depicted in the figures. The value of $\theta$ for which the
system remains in equilibrium in uniform external magnetic field $B$, is
A. $\theta=30^{\circ}$
B. $\theta=45^{\circ}$
C. $\theta=60^{\circ}$
D. $\theta=15^{\circ}$

Answer: C

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## 7. If in the circuit, power dissipation is 150 W , the R is


A. $2 \Omega$
B. $6 \Omega$
C. $5 \Omega$
D. $4 \Omega$

Answer: B
8. The coefficient of mutual inductance of two coils depends on
A. Relative position and orientation of the two coils
B. The materials of the wires of the coils
C. The currents in the two coils
D. The rates at which currents are changing in the two coils

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9. The capacitors each of capacity $4 \mu F$ are to be connected in such a way that the effective capacitance is $6 \mu F$. This can be done by
A. Connecting two in parallel and one in series
B. Connecting all of them in series
C. Connecting them in parallel
D. Connecting two in series and one in parallel

Answer: D
10. In the shown figure, the charge appearing on the conducting shell (grounded) of Radius $R$, when a point charge $q$ is kept at a distance of $d$ from the centre of the sphere is:

A. $q$
B. $\frac{q d}{r}$
C. $-\frac{q r}{d}$

## Answer: C

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11. In a series resonant LCR circuit , the voltage across

R is 100 V and $R=1 k \Omega$ with $C=2 \mu F$. The resonant frequency $\omega$ is $200 \mathrm{rads}^{-1}$. At resonant the voltage across is
A. $4 \times 10^{-3} V$
B. $2.5 \times 10^{-2} V$
C. 40 V
D. 250 V

## Answer: D

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12. The transformation ratio in the step-up transformer is
A. 1
B. Greater than one
C. Less than one
D. The ratio greater or less than one depends on the other factors

## Answer: B

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13. A solid sphere of uniform density and radius $R$ applies a gravitational force of attraction equal to $F_{1}$ on a particle placed at $P$, distant $2 R$ from the centre

O of the sphere. A spherical cavity of radius $R / 2$ is now made in the sphere as shown in the figure. The sphere with cavity now applies a gravitational force
$F_{2}$ on same particle placed at P. The ratio $F_{2} / F_{1}$ will
be


Answer: B
14. A cavity of the radius $R / 2$ is made inside a solid sphere of radius R. The centre of the cavity is located at a distance $R / 2$ from the centre of the sphere. The gravitational force on a particle of mass $m$ at a distance $R / 2$ from the centre of the sphere on the
line joining both the centres of sphere and cavity is
(opposite to the centre of the cavity).
$\left[\right.$ Here $g=\frac{G M}{R^{2}}, \quad$ where M is the mass of the sphere $]$
A. $\frac{m g}{2}$
B. $\frac{3 m g}{8}$
C. $\frac{m g}{16}$

## D. None of these

## Answer: B

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15.

Three cylindrical rods A, B and C of equal lengths and equal diameters are joined in series as shown if Fig.

Their thermal conductivities are $2 \mathrm{~K}, \mathrm{~K}$ and 0.5 K , respectively. Assume negligible loss by radiation
through the curved surface. What will be the equivalent thermal conductivity?

$$
\begin{aligned}
& \text { А. } K_{e q}=\left(\frac{6}{7}\right) K \\
& \text { в. } K_{e q}=\left(\frac{4}{5}\right) K \\
& \text { С. } K_{e q}=\left(\frac{8}{7}\right) K \\
& \text { D. } K_{e q}=\left(\frac{7}{6}\right) K
\end{aligned}
$$

Answer: A

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16. One mole of an ideal gas at an initial temperature of $T K$ does $6 R$ joules of work adiabatically. If the
ratio of specific heats of this gas at constant pressure and at constant volume is $\frac{5}{3}$, the final temperature of gas will be :-
A. $(T+2.4) K$
B. $(T-2.4) K$
C. $(T+4) K$
D. $(T-4) K$

## Answer: D

## 17. The ratio of velocity of sound in hydrogen and

 oxygen at STP isA. (a) $16: 1$
B. (b) $8: 1$
C. (c) $4: 1$
D. (d) $2: 1$

Answer: C
18. A particle of mass $2 \times 10^{-5} \mathrm{~kg}$ moves horizontally
between the plates of a parallel plate capacitor
which produce an electric field of $200 N C^{-1}$ in the
vertically upwards direction. A magnetic induction of
2.0 T is applied at right angles to the electric field in a direction normal to both $\vec{E}$ and $\vec{v}$. If g is $9.8 \mathrm{~ms}^{-2}$ and the charge on the particle is $10^{-6} \mathrm{C}$, then the velocity of the charged particle so that it continues to move horizontally is

$$
\text { A. } 2 m s^{-1}
$$

B. $20 \mathrm{~ms}^{-1}$
C. $0.2 m s^{-1}$

## D. $100 \mathrm{~ms}^{-1}$

## Answer: A

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19. With a standard rectangular bar magnet the time period of a vibration magnetometer is 4 s . The bar magnet is cut parallel to its length into four equal pieces. The time period of vibration magnetometer when one piece is used (in second) (bar magnet breadth is small) is
A. 16
B. 8
C. 4
D. 2

## Answer: C

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20. Two stations A and. B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph . Another train starts from B at 8 a.m. and travels towards $A$ at a speed of 25 kmph . At what time will they meet?
A. (a) 9 a.m.
B. (b) 10 a. m.
C. (c)10.30 a.m.
D. (d) 11 a.m.

Answer: B

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21. It was calculated that a shell when fired from a gun with a certain velocity and at an angle of elevation $5 \pi / 36$ radius should strike a given target.

In actual practice it was found that a hill just
intervened in the trajectory. At what angle of elevation should the gun be fired to hit the target ?
A. $\frac{5 \pi}{36} r a d$
B. $\frac{11 \pi}{36} \mathrm{rad}$
C. $\frac{7 \pi}{36} \mathrm{rad}$
D. $\frac{13 \pi}{36} \mathrm{rad}$

## Answer: D

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22. A piece of wire is bent in the shape of a parabola $y=k x^{2}$ ( y -axis vertical) with a bead of mass m on it.

The bead can slide on the wire without friction. It stays at the lowest point of the parabola when the wire is at rest. The wire is now accelerated parallel to the $x$-axis with a constant acceleration $a$. The distance of the new equilibrium position of the bead, where the bead can stay at rest with respect to the wire, from the $y$-axis is
A. $\frac{a}{g k}$
B. $\frac{a}{2 g k}$
C. $\frac{2 a}{g k}$
D. $\frac{a}{4 g k}$

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23. By what acceleration the boy must go up so that 100 kg block remains stationary on the wedge. The wedge is fixed and is smooth $\left(g=10 \mathrm{~m} / \mathrm{s}^{2}\right)$

A. $2 m s^{-2}$
B. $4 m s^{-2}$
C. $8 m s^{-2}$
D. $6 m s^{-2}$

## Answer: D

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24. The binding energy per nucleon of $\cdot{ }^{16} O$ is
7.97 MeV and that of ${ }^{17} \mathrm{O}$ is 7.75 MeV . What is the
energy in MeV required to remove a neutron from
.${ }^{17} O$ ?
A. 3.52
B. 3.64
C. 4.23
D. 7.86

## Answer: C

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25. For a radioactive sample, the intial activity of the material was 8 counts and after 3 h it becomes 1 count. The half - life of the sample is
A. 2 h
B. 1 h
C. 3 h
D. 4 h

## Answer: B

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26. A system shown in the figure consists of a massless pulley, a spring of force constant $k$ displaced vertically downwards from its equilibrium position and released, then the Period of vertical

## oscillations is


A. $T=\pi \sqrt{\left(\frac{m}{4 k}\right)}$
В. $T=2 \pi \sqrt{\left(\frac{m}{4 k}\right)}$

$$
\begin{aligned}
& \text { C. } T=2 \pi \sqrt{\left(\frac{m}{2 k}\right)} \\
& \text { D. } T=2 \pi \sqrt{\left(\frac{m}{3 k}\right)}
\end{aligned}
$$

Answer: B

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27. If a simple harmonic motion is represented by $\frac{d^{2} x}{d t^{2}}+\alpha x=0$, its time period is
A. $2 \pi \alpha$
B. $2 \pi \sqrt{\alpha}$
C. $2 \pi / \alpha$
D. $2 \pi / \sqrt{\alpha}$

## Answer: D

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28. The energy that should be added to an electron to reduce its de Broglie wavelength from one nm to 0.5 nm is
A. four times the initial energy
B. equal to the initial energy
C. twice the initial energy

## D. thrice the initial energy

## Answer: D

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29. Light of wavelength $5000 \AA$ falls on a sensitive plate with photoelectric work function of 1.9 eV . The kinetic energy of the photoelectron emitted will be
A. 1.16 eV
B. 2.38 eV
C. 0.58 eV

D. 2.98 eV

## Answer: C

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30. The weight of an empty balloon on a spring balance is $W_{1}$. The weight becomes $W_{2}$ when the balloon is filled with air.Let the weight of the air itself be w.l Neglect the thickness of the balloon when it is
filled with air. Also neglect the difference in the density of air insider and outside the balloonn

$$
\text { A. } w_{2}=w_{1}+w
$$

B. $w_{2}=\sqrt{w_{1} w}$
C. $w_{2}=w_{1}$
D. $w_{2}=w_{1}-w$

## Answer: C

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31. A horizontal pipeline carries water in a streamlime flow, At a point along the pipe, where the crosssectional area is $10 \mathrm{~cm}^{2}$, the water velocity is $1 \mathrm{~ms}^{-1}$ and the pressure is 2000 Pa . The pressure of water at
another point where the cross-sectional area is $5 \mathrm{~cm}^{2}$
, is .....Pa. (Density of water $=10^{3} \mathrm{~kg}-\mathrm{m}^{3}$ ).
A. 500
B. 400
C. 300
D. 600

## Answer: A

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32. A convex, rearview mirror of focal length 20 cm , is
fitted in a car. A second car 2 m broad and 1.6 m high
is 6 m away from the first car and overtakes the first car at a relative speed of $15 \mathrm{~ms}^{-1}$, then the speed of the first car is
A. $0.016 m s^{-1}$
B. $0.257 m s^{-1}$
C. $0.162 m s^{-1}$
D. $0.0073 m s^{-1}$

Answer: A
33. A plano-convex lens of refractive index 1.5 and radius of curvature 30 cm is silvered at the curved
surface. Now, the lens has been used to form the image of an object. What should be the distance of the object from the lense in order to have a real image of the size of the object?
A. 20 cm
B. 30 cm
C. 60 cm
D. 80 cm

Answer: A
34. Two rings of same radius and mass are placed such that their centres are at a common point and their planes are perpendicular to each other. The moment of inertia of the system about an axis passing through the centre and perpendicular to the plane of one of the rings is (mass the ring $=m$, radius $=r$ )
A. $\frac{1}{2} m r^{2}$
B. $m r^{2}$
C. $\frac{3}{2} m r^{2}$

## Answer: C

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35. Two rings of radius $R$ and $n R$ made of same material have the ratio of moment of inertia about an axis passing through center is $1: 8$. The value of $n$ is
A. (a) 2
B. (b) $2 \sqrt{2}$
C. (c) 4
D. (d) $\frac{1}{2}$

Answer: A

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36. The output $Y$ of the combination of logic gates
shown is equal to

A. A
B. $\bar{A}$
C. $A+B$
D. $A B$

Answer: A

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37. When $p-n$ junction diode is forward biased, then
A. the depletion region in reduced and barrier height is increased
B. the depletion region is widened and barrier height is reduced
C. both the depletion region and barrier height are reduced
D. both the depletion region and barrier height are increased

## Answer: C

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38. A pendulum clock is 5 sec . Slow at a temperature $30^{\circ} \mathrm{C}$ and 10 sec. fast at a temperature of $15^{\circ} \mathrm{C}$, At
what temperature does it give the correct time-
A. (a) $18^{\circ} C$
B. (b) $22^{\circ} C$
C. (c) $20^{\circ} \mathrm{C}$
D. (d) $25^{\circ} \mathrm{C}$

## Answer: C

## D Watch Video Solution

39. The dimensional formula for entropy is
A. $\left[M L T^{-2} K^{-1}\right]$
B. $\left[M L^{2} T^{-2}\right]$
C. $\left[M L^{2} T^{-2} K^{-1}\right]$
D. $\left[M L^{-2} T^{-2} K^{-1}\right]$

## Answer: C

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40. Young's double-slit experiment is carried ot by using green, redj and blue light, one color at a time.

The fringe widths recorded are $\beta_{G}, \beta_{R}$ and $\beta_{B}$, respectively. Then,
A. $\beta_{G}>\beta_{B}>\beta_{R}$

$$
\text { B. } \beta_{B}>\beta_{G}>\beta_{R}
$$

C. $\beta_{R}>\beta_{B}>\beta_{G}$
D. $\beta_{R}>\beta_{G}>\beta_{B}$

## Answer: D

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41. Young's double slit experiment uses a monochromatic source of light. The shape of interference fringes formed on the screen is
A. Straight line
B. Parabola
C. Hyperbola
D. Circle

## Answer: A

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42. If a sound wave of frequency 500 Hz and velocity
$350 \mathrm{~m} / \mathrm{s}$. Then the distance between the two particles of a phase difference of $60^{\circ}$ will be nearly
A. (a) 70 cm
B. (b) 0.7 cm
C. (c) 12.0 cm

D. (d) 120.0 cm

## Answer: C

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43. Two loudspeaker $L_{1}$ and $L_{2}$, driven by a common oscillator and amplifier, are arranged as shown. The frequency of the oscillator is gradually increased from zero and the detector at $D$ records a series of maxima and minima. If the speed of sound is
$330 \mathrm{~ms}^{-1}$, then at what frequency (in Hz ) does the first maximum is observed?

A. 165 Hz
B. 330 Hz
C. 495 Hz
D. 660 Hz

Answer: B

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44. A body constrained to move along the $z$-axis of a coordinate system is subject to a constant force $F$ is
given by
$F=-\hat{i}+2 \hat{j}+3 \hat{k} \mathrm{~N}$
Where, $\hat{i}, \hat{j}, \hat{k}$ are unit vectors along the $x-, y-$ and $z$ axis of the system respectively. What is the
work done by this force in moving the body a distance of 4 m along the z -axis?
A. 12 J
B. 13 J
C. 10 J
D. 9 J

## Answer: A

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45. A wind - powered generator converts wind energy into electrical energy. Assume that the generator convents a fixed fraction of the wind energy intercepted by to blades into electrical energy for
wind speed $V$, the electrical power output will be propertional to
A. v
B. $v^{2}$
C. $v^{3}$
D. $v^{4}$

Answer: C

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