PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 27

Physics

1. A "bar" magnet is at right angles to a uniform magnetic field. The couple acting on

the magnet is to be one fourth by rotating it from the position. The angle of rotation is

A. 60°

B. 45°

C. 30°

D. 75°

Answer: A

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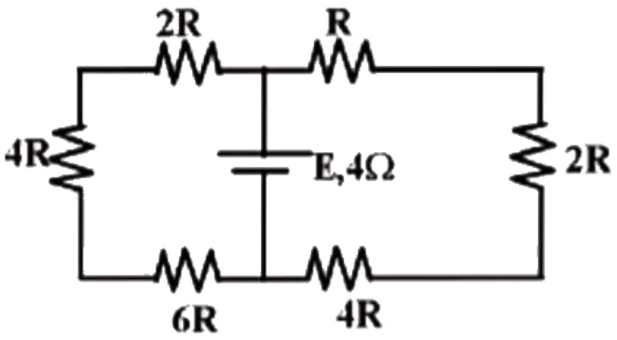
2. A battery of internal resistance 4Ω is connected to the network of the resistance as shown in figure. To deliver maximum power to the network, the magnitude of resistance R in Ω should be $\frac{x}{21}$. Find x .



A. 16

B. 17

C. 19

D. 23

Answer: C

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3. The transition from the state $n = 4$ to $n = 3$ in a hydrogen-like atom results in ultraviolet radiation. Infared radiation will be obtained in the transition

A. $2 \rightarrow 1$

B. $3 \rightarrow 2$

C. $4 \rightarrow 2$

D. $5 \rightarrow 4$

Answer: D

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4. Find the resonant frequency of a series circuit consist of an inductance 200 μH, a

capacitance of $0.0005\mu F$ and a resistance of 10 Ω.

A. 480 kHz

B. 503 kHz

C. 406 kHz

D. 607 kHz

Answer: B

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5. A coil of inductance 0.2 H and 1.0 ohm resistance is connected to a 90 V source. At what rate will the current in the coil grow at the instant the coil is connected to the source?

A. $450As^{-1}$

B. $4.5As^{-1}$

C. $45As^{-1}$

D. $0.45As^{-1}$

Answer: A

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6. 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 positive ends are also connected, the decrease in energy of the combined system is

A. $\frac{1}{4}C\left(V_1^2 - V_2^2\right)$

B. $\frac{1}{4}C\left(\frac{V_1^2 + V}{(2)^2}\right)$

C. $\frac{1}{4}C\left(V_1^2+V_2^2\right)$

D. $\frac{1}{4}C(V_1+V_2)^2$

Answer: D

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7. On moving a charge of 20 coulomb by $2cm$, $2J$ of work is done , the potential difference between the points is .

A. 0.1 V

B. 8 V

C. 2 V

D. 0.5 V

Answer: A

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8. A horizontal overheadpowerline is at height of $4m$ from the ground and carries a current of $100A$ from east to west. The magnetic field

directly below it on the ground is

$(\nu_0 = 4\pi \times 10^{-7} TmA^{-1}$

A. 2.5×10^{-7} T northwards

B. 2.5×10^{-7} T northwards

C. 5×10^{-6} T northwards

D. 5×10^{-6} T northwards

Answer: D

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9. A magnetic needle is kept in a non uniform magnetic field . It experiences

A. a force and a torque

B. a force but not a torque

C. a torque but not a force

D. neither a force nor a torque

Answer: A

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10. Two identical conducting rods are first connected independently to two vessels, one containing water at $100^\circ C$ and the other containing ice at $0^\circ C$. In the second case, the rods are joined end to end and connected to the same vessels. Let q_1 and q_2 gram per second be the rate of melting of ice in the two cases respectively. The ratio $\frac{q_1}{q_2}$ is

(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{4}{1}$ (d) $\frac{1}{4}$

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

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

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

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

Answer: C

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11. Which statement is incorrect

A. All reversible cycles have same efficiency

B. Reversible cycle has more efficiency than an irreversible one

C. Carnot cycle is a reversible one

D. Carnot cycle has the maximum efficiency in all cycles

Answer: A

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12. An ideal gas heat engine operates in a Carnot's cycle between $227^\circ C$ and $127^\circ C$. It absorbs $6 \times 10^4 J$ at high temperature. The amount of heat converted into work is

A. $1.6 \times 10^4 J$

B. $1.2 \times 10^4 J$

C. $4.8 \times 10^4 J$

D. $3.5 \times 10^4 J$

Answer: B

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13. If C_P and C_v denote the specific heats nitrogen per unite mass at constant pressure and constant volume respectively, then

(1) $C_P - C_v = \frac{R}{28}$ (2) $C_P - C_v = \frac{R}{14}$

(3) $C_P - C_v = R$ (4) $C_P - C_v = 28R$

A. $C_p - C_v = 28R$

B. $C_p - C_v = \frac{R}{28}$

C. $C_p - C_v = \frac{R}{14}$

D. $C_p - C_v = R$

Answer: B

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14. At what temperature rms speed of air molecules is doubled of that at NTP ?

A. $819^\circ C$

B. $719^\circ C$

C. $909^\circ C$

D. none of these

Answer: A

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15. During adiabatic change, specific heat is

A. zero

B. greater than zero but finite

C. less than zero

D. infinite

Answer: A

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16. A police car with a siren of frequency $8KHz$ is moving with uniform velocity $36Km/hr$ towards a ball building which reflects the sound waves. The speed of sound in air is $320m/s$. The frequency of the siren heard by the car driver is

A. 8.5 kHz

B. 8.25 kHz

C. 7.25 kHz

D. 7.5 kHz

Answer: A

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17. A body moving in a straight line with constant acceleration covers distances a and b in successive equal time interval of t. The acceleration of the body is

A. $\frac{a+b}{t^2}$

B. $\frac{b-a}{t^2}$

C. $\frac{2b-a}{2t^2}$

D. $\frac{b-2a}{t^2}$

Answer: B

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18. At a particular instant, a stationary observer on the ground sees a package falling with a speed v_1 at an angle θ to the vertical. To a pilot flying horizontally with a constant speed v relative to the ground, the package appears to be falling verically with a speed v_2

(at that same instant).

The speed of the pilot relative to the ground (v) is

A. $\left(V_1^2 + v_2^2\right)^{1/2}$

B. $(v_1 - v_2)(v_2 - v_1)$

C. $\left(v_1^2 - v_2^2\right)^{1/2}$

D. $v_1 - v_2$

Answer: C

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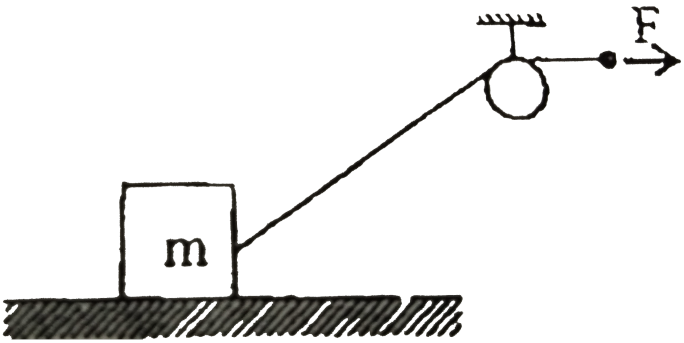
19. A block of mass m is placed on a rough horizontal floor and it is pulled by a ideal string by a constant force F as shown. As the block moves towards right the friction force on block



A. remains constant

B. increases

C. decreases

D. can not be calculated

Answer: C

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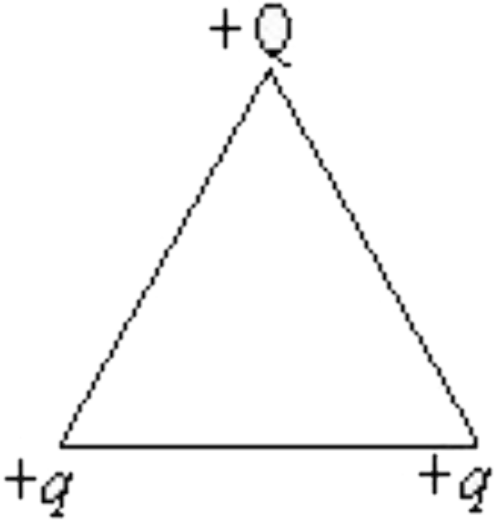
20. Three charges are placed at the vertex of an equilateral triangle as shown in figure. The value of Q, for which the electrostatic

potential energy of the system is zero, is



A. $-q$

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

C. $-2q$

D. $\frac{-q}{2}$

Answer: D

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21. A force of $7\hat{i} + 6\hat{k}$ newton makes a body move on a rough plane with a velocity of $3\hat{j} + 4\hat{k}ms^{-1}$. Calculate the power in watt.

A. 24

B. 34

C. 21

D. 45

Answer: A

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22. Two bodies of $6kg$ and $4kg$ masses have their velocity $5\hat{i} - 2\hat{j} + 10\hat{k}$ and $10\hat{i} - 2\hat{j} + 5\hat{k}$ respectively. Then, the velocity of their centre of mass is

A. $5\hat{i} + 2\hat{j} - 8\hat{k}$

B. $7\hat{i} + 2\hat{j} - 8\hat{k}$

C. $7\hat{i} - 2\hat{j} + 8\hat{k}$

D. $5\hat{i} - 2\hat{j} + 8\hat{k}$

Answer: C

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23. Which of the following statements is FALSE for a paricle moving in a circle with a constant angular sppeed?

A. The velocity vector is tangent to the circle

B. The acceleration vector is tangent to the circle

C. The acceleration vector points to the centre of the circle

D. The velocity and acceleration vectors are perpendicular to each other

Answer: B

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24. A satellite of mass m revolves around the earth of radius R at a hight x from its surface. If g is the acceleration due to gravity on the surface of the earth, the orbital speed of the satellite is

A. gx

B. $\frac{gR}{R-x}$

C. $\frac{gR^2}{R+x}$

D. $\left(\frac{gR^2}{R+x}\right)^{1/2}$

Answer: D

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25. The time period of a satellite of earth is 5 hours. If the separation between the centre of earth and the satellite is increased to 4 times the previous value, the new time period will become-

A. 10 hrs

B. 80 hrs

C. 40 hrs

D. 20 hrs

Answer: C

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26. A particle moves such that its acceleration a is given by a = -bx , where x is the displacement from equilibrium positionand is a constant. The period of oscillation is

A. $2\pi\sqrt{b}$

B. $\frac{2\pi}{b}$

C. $\frac{2\pi}{\sqrt{b}}$

D. $2\sqrt{\frac{\pi}{b}}$

Answer: C

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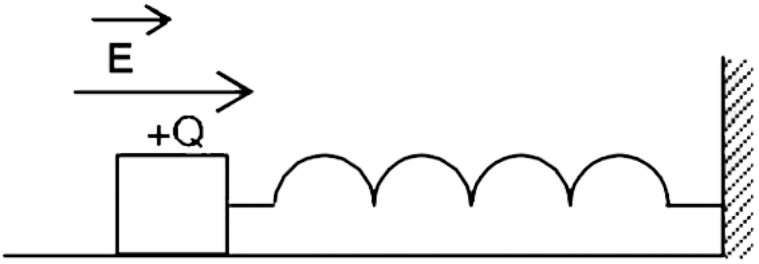
27. A wooden block performs SHM on a frictionaless surface with frequency, v_0. The block carries a charge +Q on its surface. If now a uniform electric field $\vec{E}$ is switched-on as

shown, then the SHM of the block will be



A. of the same frequency and with shifted mean position

B. of the same frequency and with the same mean position

C. of changed frequency and with shifted mean position

D. of changed frequency and with the same mean position

Answer: A

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28. The velocity of kerosene oil in a horizontal pipe is $5m/s$. If $g = 10m/s^2$ then the velocity head of oil wlill be

A. 1.25 m

B. 12.5 m

C. 0.125 m

D. 125 m

Answer: A

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29. The terminal velocity V of a spherical ball of lead of radius R falling through a viscous liquid varies with R such that

A. $\frac{v}{R}$=constant

B. vR = constant

C. v = constant

D. $\frac{v}{R^2}$ = constant

Answer: D

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30. 10 Two particles of masses m_1 and m_2 initially at rest start moving towards each other under their mutual force of attraction.

The speed of the centre of mass at any time t, when they are at a distance r apart, is

A. zero

B. $\frac{G(m_1 m_2)}{r^2} . \frac{1}{m_1} t$

C. $\frac{G.(m_1 m_2)}{r^2} . \frac{1}{m_2} t$

D. $\left(G \frac{m_1 m_2}{t^2} . \frac{1}{m_1 + m_2} \right) t$

Answer: A

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31. Angular momentum is conserved

A. always

B. never

C. when external force is absent

D. when external torque is absent

Answer: D

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32. How many different wavelengths may be observed in the spectrum form a hydrogen sample, if the atoms are excited to third excited state?

A. 3

B. 4

C. 5

D. 6

Answer: D

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

A. kinetic energy and total energy decrease but potential energy increases

B. its kinetic energy increases but potential energy and total energy decrease

C. kinetic energy, potential energy and total energy decrease

D. kinetic energy decreases, potential energy increases but total energy remains same

Answer: B

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34. When the nucleus of $.^{238}U_{92}$ disintegrates to give one nuclues of $.^{206}U_{82}$, the number of $\alpha-$ particles emitted and the number of $\beta-$ particles emitted is

A. 4 and 8 respectively

B. 6 and 8 respectively

C. 8 and 6 respectively

D. 8 and 10 resepctively

Answer: C

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35. In a photoelectric effect , the $K.E.$ of electrons emitted from the metal surface depends upon

A. intensity of light

B. frequency of incident light

C. velocity of incident light

D. both intensity and velocity of light

Answer: B

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36. A simple pendulum is suspended from the ceilling of a left. When the lift is at rest, its time period is T. With what accleration should

lift be acclerated upwards in order to reduce its time period to $\frac{T}{2}$.

A. 2g

B. 3g

C. 4g

D. g

Answer: B

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37. The difference in the variation of resistance with temperature in a metal and a semiconductor arises essentially due to the difference in the

A. crystal structure

B. variation of the number of charge carriers with temperature

C. type of bonding

D. variation of cattering mechanism with temperature

Answer: B

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38. A photon of light enters a block of glass after travelling through vaccum. The energy of the photon on entering the glass block

A. Increases because its associated wavelength decreases

B. Decreases because the speed of the radiation decreases

C. Stays the same because the speed of the radiation and the associated wavelength do not change

D. Stays the same because the frequency of the radiation does not change

Answer: D

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39. In a common emitter transistor amplifier, $\beta = 60, R_0 = 5000\Omega$ and internal resistance of a transistor is 500Ω. The voltage amplification of the amplifier will be

A. 500

B. 460

C. 600

D. 560

Answer: C

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40. An object is placed asymmetrically between two plane mirrors inclined at an angle of 72°. The number of images formed is

A. 5

B. 4

C. 2

D. Infinite

Answer: A

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41. For a prism of refractive index 1.732, the angle of minimum deviation is equal to the angle of the prism. The angle of the prism is

A. 60°

B. 70°

C. 50°

D. none of these

Answer: A

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42. A narrow slit of width 1 mm is illuminated by monochromatic light of wavelength 600 nm. The distance between the first minima on either side of a screen at a distance of 2 m is

A. 1.2 cm

B. 1.2 mm

C. 2.4 cm

D. 2.4 mm

Answer: D

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43. Unpolarized light of intensity I passes through an ideal polarizer A. Another identical polarizer B is placed behind A. The intensity of light beyond B is found to be $\frac{I}{2}$ Now another identical polarizer C is placed between A and B. The intensity beyond B is now found to be $\frac{I}{8}$. The angle between polarizer A and C is :

A. 60°

B. 0°

C. 30°

D. 45°

Answer: D

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44. In a $p-n$ junction diode, change in temperature due to heating

A. does not affect resistance of $p-n$ junction

B. affects only forward resistance

C. affects only reverse resistance

D. affects the overall V - I characteristics of p-n junction

Answer: D

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45. The centre of mass of three particles of masses 1 kg, 2 kg and 3 kg is at (2,2, 2). The position of the fourth mass of 4 kg to be placed in the system as that the new centre of mass is at (0, 0, 0) is

A. $(-3, -3, -3)$

B. $(-3, 3, -3)$

C. $(2, 3, -3)$

D. $(2, -2, 3)$

Answer: A

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