PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET TEST 111

Physics

1. Consider a hydrogen-like atom whose energy in nth excited state is given by

$$E_n = \frac{13.6Z^2}{n^2}$$

When this excited makes a transition from excited state to ground state , most energetic photons have energy

$E_{\max} = 52.224eV.$ and least energetic photons have energy

$E_{\max} = 1.224eV$

Find the atomic number of atom and the initial state or excitation.

A. 4,5

B. 2,3

C. 2,5

D. 2,4

Answer: D

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2. The period of revolution of an electron in the ground state of hydrogen atom is T. The period of revolution of the electron in the first excited state is

A. 2T

B. 4T

C. 6T

D. 8T

Answer: D

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3. A 5000 kg rocket is set of vertical firing. The exhaust speed is $800 \quad ms^{-1}$. To give an initial upward acceleration of $20ms^{-2}$, the

amount of gas ejected per second to supply the needed thrust will be (take, $g = 10ms^{-2}$)

A. $127.5kgs^{-1}$

B.

C. $155.5kgs^{-1}$

D. $185.5kgs^{-1}$

Answer: D

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4. A bullet of mass 50g is fired from a gun of mass 2kg. If the total kinetic energy produced is 2050J, the kinetic energy of the bullet and the gun respectively are

A. 200 J, 5J

B. 2000J,50J

C. 5J,200J

D. 50J,2000J

Answer: B

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5. Two particles P and Q are moving on circle. At a certain instant of time both the particles and diametrically opposite and P has tangential acceleration $8m/s^2$ and centripetal acceleration $5m/s^2$ whereas Q has only e centripetal acceleration of$1m/s^2$. At that instant acceleration $(\text{in}m/s^2)$ of P with respect to Q is

A. 14

B. $\sqrt{80}$

C. 10

D. 12

Answer: C

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6. A magnet of magnetic $'M'$ is in the form of a quadrant of a circle. If it is straightened, its new magnetic moment will be

A. $\frac{M\pi}{\sqrt{2}}$

B. $\frac{m}{\sqrt{2}}$

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

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

Answer: D

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7. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be

A. One fourth

B. Halved

C. Doubled

D. Four times

Answer: C

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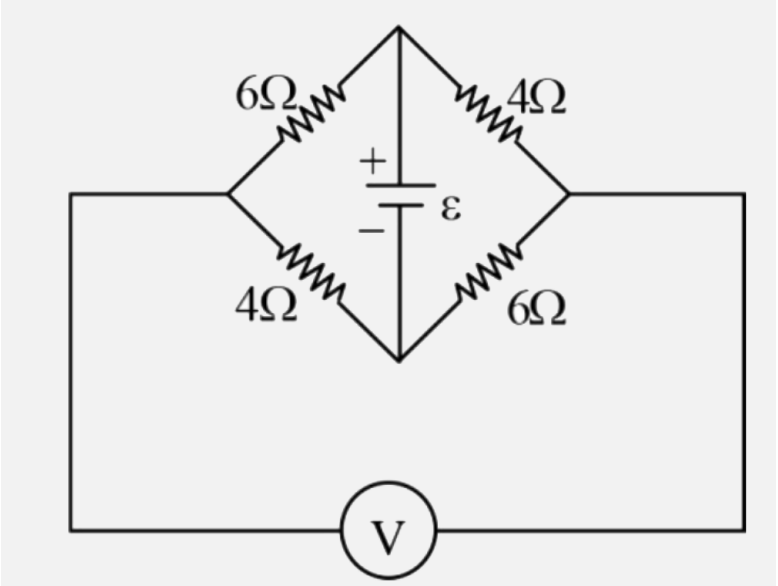
8. In the circuit shown below the voltmeter is of large resistance. The E.M.F. of the cell is ε.

The reading of the voltmeter is



A. zero

B. $\frac{\varepsilon}{10}$

C. $\frac{\varepsilon}{5}$

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

Answer: C

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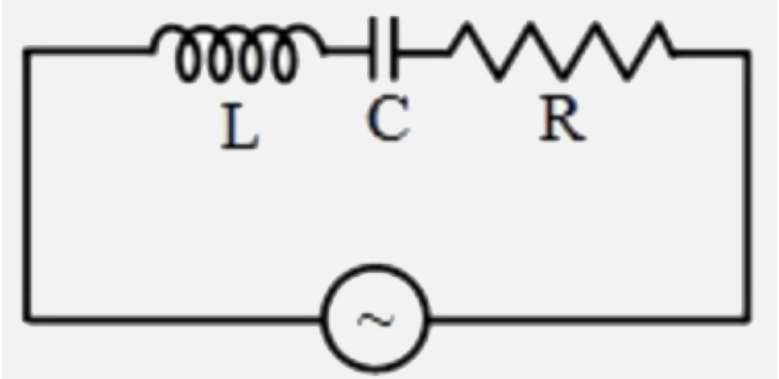
9. A 100 V, AC source of frequency 500 Hz is connected to an LCR circuit with $L = 8.1mH$, $C = 12.5\mu F$, $R = 10\Omega$ all connected in series as shown in the figure. What is the quality

factor of the circuit?



A. 2.02

B. 2.54

C. 50.54

D. 200.54

Answer: B

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10. A coil having inductance and L and resistance R is connected to a battery of emf $\in$ at $t = 0$. If t_1 and t_2 are time for $90\,\%$ and $99\,\%$ completion of current growth in the circuit, then $\frac{t_1}{t_2}$ will be-

A. $1:2$

B. $2:1$

C. $1:5$

D. $5:1$

Answer: A

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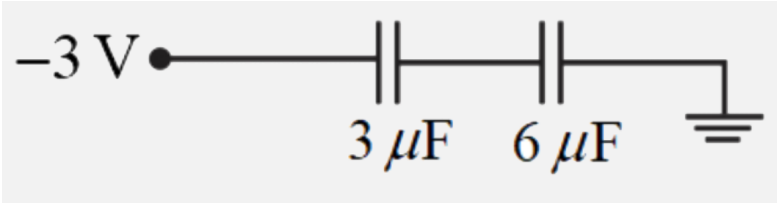
11. The total electrostatic energy stored in both the capacitor is



A. $9\mu J$

B. $40.5\mu J$

C. $13.5\mu J$

D. $18\mu J$

Answer: A

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12. A hollow charged metal sphere has radius r . If the potential difference between its surface and a point at a distance $3r$ from the centre is V, then electric field intensity at a distance $3r$ is

A. $\frac{V}{6r}$

B. $\frac{V}{4r}$

C. $\frac{V}{3r}$

D. $\frac{V}{2r}$

Answer: A

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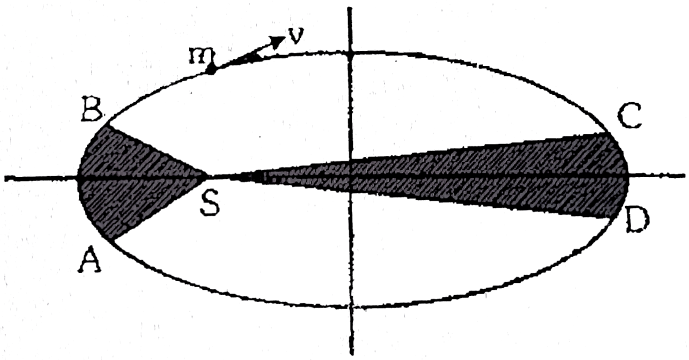

13.

The figure shows elliptical orbit of a planet m about the sun S. the shaded area SCD is twice the shaded area SAB. If t_1 be the time for the planet to move from C to D and t_2 is the time to move from A to B, then:

A. $t_1 = 4t_2$

B. $t_1 = 2t_2$

C. $t_1 = t_2$

D. $t_1 > t_2$

Answer: B

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14. The magnitude of binding energy of the satellite is E and kinetic energy is K. The ratio E/K is

A. 2

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

C. 1

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

Answer: C

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15. Calculate the temperature at which a perfect black body radiates at the rate of $1Wcm^{-2}$, value of Stefan's constant, $\sigma = 5.67 \times 10^{-5}Wm^{-2}K^{-8}$

A. $576K$

B. $648K$

C. $695K$

D. $766K$

Answer: B

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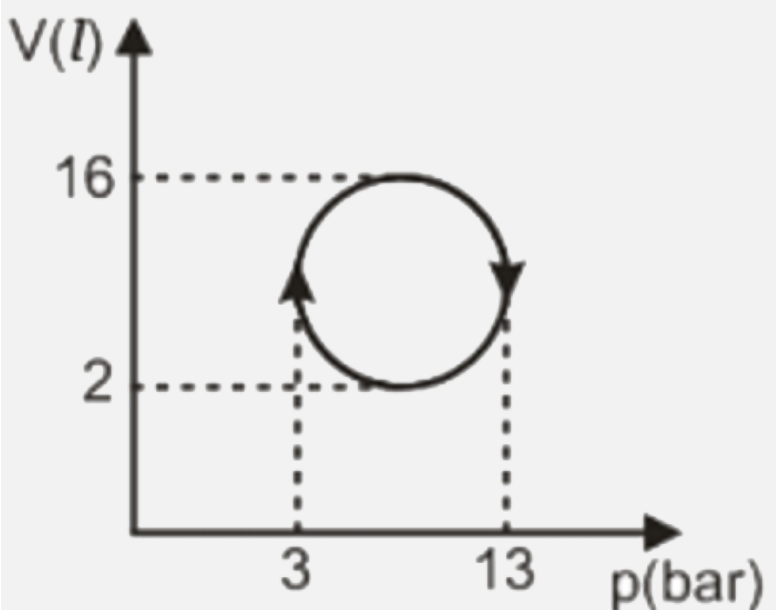
16. Work done (in kJ) by the gas in the following cyclic process is



A. -11

B. -11000

C. 11

D. 11000

Answer: C

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17. A Carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10J, the amount of energy absorbed from the reservoir at lower temperature is

A. 99 J

B. 90 J

C. 1 J

D. 100 J

Answer: B

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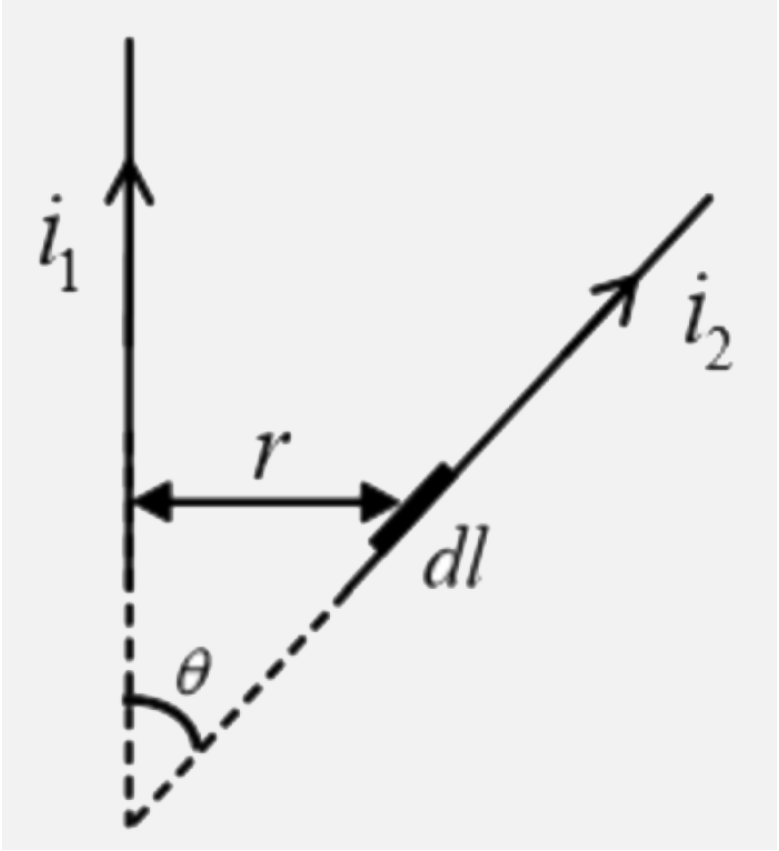
18. Wires 1 and 2 carrying currents i_1 and i_2 respectively are inclined at an angle θ to each other. What is the force on a small element dl of wire 2 at a distance of r from wire 1 (as shown in the figure) due to the magnetic field

of wire 1 ?



A. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \tan\theta$

B. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \sin\theta$

C. $\frac{\mu_0}{2\pi r} i_1 i_2 dl \cos\theta$

D. $\frac{\mu_0}{4\pi r} i_1 i_2 dl \sin\theta$

Answer: C

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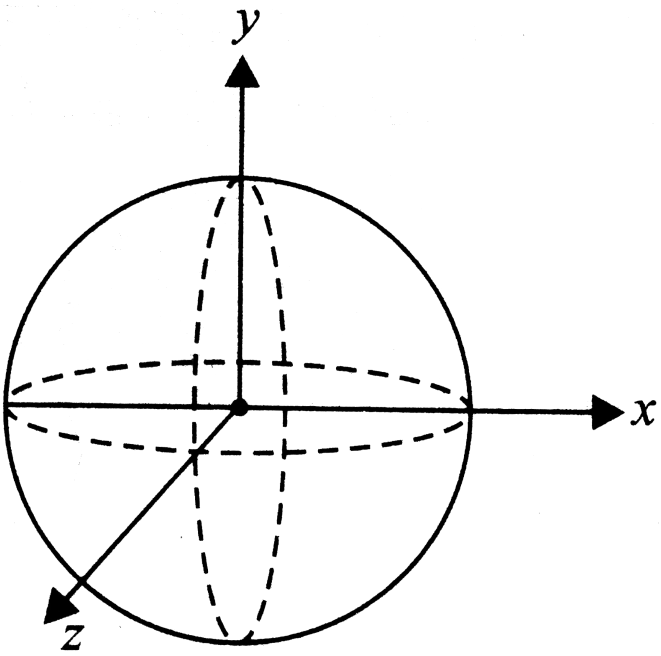
19. Three rings, each having equal radius R, are placed mutually perpendicular to each other and each having its centre at the origin of coordinate system. If current I is flowing through each ring, then the magnitude of the

magnetic field at the common centre is



A. $\sqrt{3}\frac{\mu_0 I}{2R}$

B. zero

C. $\left(\sqrt{2}-1\right)\frac{\mu_0 I}{2R}$

D. $\left(\sqrt{3}-\sqrt{2}\right)\frac{\mu_0 I}{2R}$

Answer: A

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20. The speed of a body moving with uniform acceleration is u. This speed is doubled while covering a distance S. When it covers an additional distance S, its speed would become

A. $\sqrt{3}u$

B. $\sqrt{5}u$

C. $\sqrt{11}u$

D. $\sqrt{7}u$

Answer: D

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21. A body is projected horizontally with speed $20ms^{-1}$. The speed of the body after 5s is nearly

A. $54ms^{-1}$

B. $35ms^{-1}$

C. $20ms^{-1}$

D. $70ms^{-1}$

Answer: A

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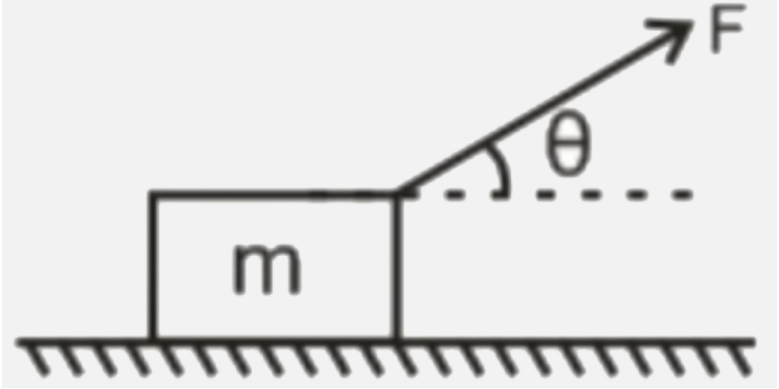
22. A wooden block of mass m resting on a rough horizontal table is pulled by a force F as shown in the figure. If μ is the coefficient of friction between block and table, its

acceleration will be



A. $\frac{\mu F \cos\theta}{m}$

B. $\frac{\mu F \sin\theta}{m}$

C. $\frac{F}{m}(\cos\theta - \mu\sin\theta) - \mu g$

D. $\frac{F}{m}(\cos\theta - \mu\sin\theta)$

Answer: C

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23. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is $g/8$, then the ratio of the masses is

A. $8:1$

B. $9:7$

C. $4:3$

D. $5:3$

Answer: B

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24. In a radioactive material the activity at time t_1 is R_1 and at a later time t_2, it is R_2. If the decay constant of the material is λ, then

A. $R_1 = R_2$

B. $R_1 = R_2 e^{-\lambda(t_1 - t_2)}$

C. $R_1 = R_2 e^{\lambda(t_1 - t_2)}$

D. $R_1 = R_2(t_2 / t_1)$

Answer: B

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25. The mass of a $._3^7 Li$ nucleus is $0.042u$ less than the sum of the masses of all its nucleons. The binding energy per nucleon of $._3^7 Li$ nucleus is nearly

A. 46 MeV

B. 5.6 MeV

C. 3.9 MeV

D. 23 MeV

Answer: B

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26. A 5kg mass bounces in simple harmonic motion at the end of a spring. At which point the acceleration of the mass is the greatest?

A. When the spring is fully compressed and when the spring is fully extended

B. When the spring is at its rest length

C. When the spring is halfway between its rest length and is fully extended or compressed length

D. The acceleration is constant.

Answer: A

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27. For Simple Harmonic Oscillator, the potential energy is equal is equal to kinetic energy

A. twice during each cycle

B. four times during each cycle

C. when x = 0

D. when x = a

Answer: B

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28. The work function of a substance is 4.0 eV.

The longest wavelength of light that can cause

photoelectron emission from this substance is approximately equal to

A. 540 nm

B. 400 nm

C. 310 nm

D. 220 nm

Answer: C

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29. When light of wavelength 300 nm or less falls on a photoelectric emitter A, photoelectrons are emitted. For another emitter B, light of wavelength 600 nm is sufficient for releasing photoelectorns. The ratio of the work function of emitter A to B is

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: B

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30. A solid ball of density ρ_1 and radius r falls vertically through a liquid of density ρ_2. Assume that the viscous force acting on the ball is $F = krv$, where k is a constant and v its velocity. What is the terminal velocity of the ball ?

A. $\frac{4\pi g r^2(\rho_1 - \rho_2)}{3k}$

B. $\frac{2\pi r(\rho_1 - \rho_2)}{3gk}$

C. $\frac{2\pi g(\rho_1 + \rho_2)}{3gr^2k}$

D. None of these

Answer: A

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31. When a glass capilary tube of the radius 0.015 cm is dipped in water, the water rises to a heigth of 15 cm within it. Assuming the contact angle between water and glass to be

0°, the surface tension of water is

$[\rho_{\text{water}} = 1000 kgm^{-3}, g = 9.81 ms^{-2}]$

A. $0.11 Nm^{-1}$

B. $0.7 Nm^{-1}$

C. $0.072 Nm^{-1}$

D. None of these

Answer: A

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32. To get three images of a single object, one should have two plane mirrors at an angle of

A. 60°

B. 90°

C. 120°

D. 30°

Answer: B

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33. A point object O and a mirror M move with velocities of $3cms^{-1}$ and $4cms^{-1}$, respectively as shown in the figure. OO' is the normal to the mirror. What is the velocity of the image?

A. $5cms^{-1}$

B. $7cms^{-1}$

C. $8cms^{-1}$

D. $2\sqrt{19}cms^{-1}$

Answer: B

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34. An object of radius R and mass M is rolling horizontally without slipping with speed v . It then rolls up the hill to a maximum height $h = \frac{3v^2}{4g}$. The moment of inertia of the object is (g = acceleration due to gravity)

A. solid sphere

B. hollow sphere

C. disc

D. ring

Answer: C

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35. A rupee coin, starting from rest rolls down a distance of 1 m on a plane inclined at an

angle of 30° with the horizontal. Assuming that $g = 9.81ms^{-2}$, time taken is : -

A. 0.68 s

B. 0.6 s

C. 0.5 s

D. 0.7 s

Answer: D

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36. When LED is forward biased, then

A. electrons from the n - type side cross the p-n junction and recombine with holes in the p - type side

B. electron and holes neutralise each other in depletion region

C. at junction electrons and holes remain at rest

D. None of these

Answer: A

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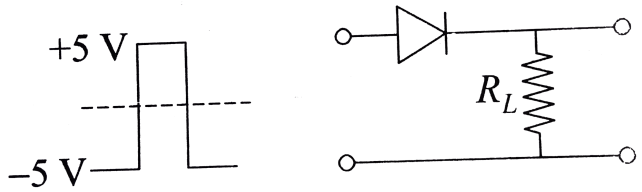
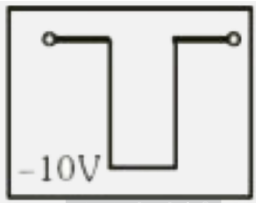
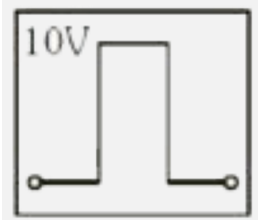
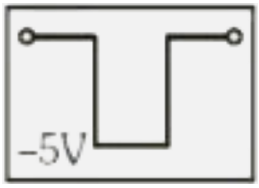
37. If an a $p-n$junction, a square input signal of $10V$ is applied, as shown

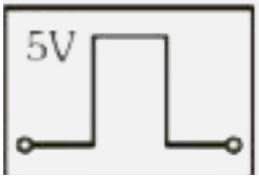


then the output across R_L will be

A. 

B. 

C. 

D. 

Answer: D

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38. A gaseous mixture contains an equal number of hydrogen and nitrogen molecules. Specific heat measurements on this mixture at a temperature below 150 K would indicate the value of the ratio of specific heats for the mixture as

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

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

C. $\frac{5}{3}$

D. $\frac{7}{5}$

Answer: A

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39. Out of following four dimensional quantities, which one quantity is to be called a dimensional constant

A. Acceleration due to gravity

B. Surface tension of water

C. Weight of a standard kilogram mass

D. The velocity of light in vacuum

Answer: D

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40. In Young's double-slit experiment, the path difference between two interfering waves at a point on the screen is 13.5 times the wavelength. The point is

A. Bright but not central bright

B. Neither bright not dark

C. Central bright

D. Dark

Answer: D

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41. A wavefront is represented by the plane $y = 3 - x$. The propagation of wave takes place at

A. 45° with x - direction

B. $135^\circ C$ with x-direction

C. 60° with x-direction

D. No sufficient data

Answer: A

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42. A police car moving at $30\,\mathrm{m\,s^{-1}}$, chases a motorcyclist. The policeman sounds his horn at 180 Hz, while both of them move towards a stationary siren of frequency 160 HZ. He does not observe any beats then, calculate the

speed $\left(\text{in m s}^{-1}\right)$ of the motorcyclist round off two decimal places? [speed of sound $= 330ms^{-1}$]

A. $2ms^{-1}$

B. $30ms^{-1}$

C. $35.02ms^{-1}$

D. $40ms^{-1}$

Answer: C

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43. Of the following, the equation of progressive wave is

A. $y = A\cos ax \sin bt$

B. $y = A\sin bt$

C. $y = A\cos(ax + bt)$

D. $y = A\tan(ax + bt)$

Answer: C

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44. A pump motor is used to deliver water at a certain rate from a given pipe. To obtain 'n' times water from the same pipe in the same time, by what amount the power of the motor should be increased?

A. $n^{1/2}$

B. n^2

C. n^3

D. n

Answer: C

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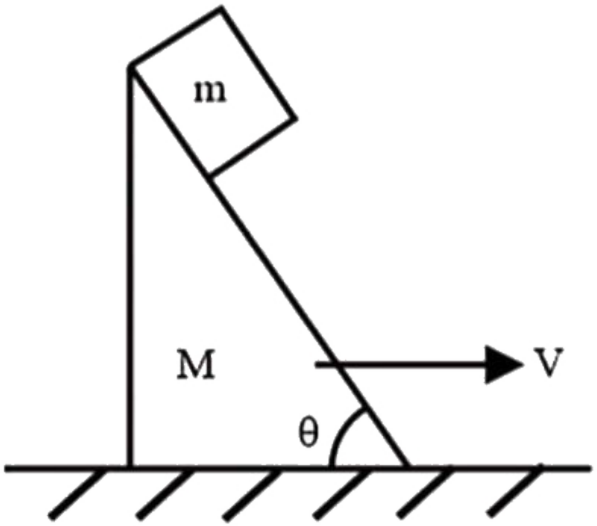
45. A block of mass m is stationary with respect to the wedge of mass M moving with uniform speed v on horizontal surface. Work done by friction force on the block in t

seconds is



A. zero

B. $-\frac{mgvt}{2}\sin 2\theta$

C. $-\frac{mgvt}{2}$

D. $-\frac{mgvt}{2}\sin\theta$

Answer: B

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