PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 89

Physics

1. An electron accelerated under a potential difference of V volt has a certain wavelength λ It is known that the mass of a proton is about

1800 times the mass of an electron . If a proton has to have the same wavelength λ, then it will have to be accelerated under the potential difference of

A. V volt

B. 1800 volt

C. $\frac{V}{1800}$ volt

D. $\sqrt{1800}$ volt

Answer: C

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2. if a is the radius of first Bohr orbit in hydrogen atom, the radius of $3^r d$ orbit is

A. 3a

B. 9a

C. 27a

D. 81a

Answer: B

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3. A radioactive nucleus of mass number A, initially at rest, emits an $\alpha -$ particle with a speed v. What will be the recoil speed of the daughter nucleus ?

A. $\frac{2v}{(A-4)}$

B. $\frac{2v}{(A+4)}$

C. $\frac{4v}{(A-4)}$

D. $\frac{4v}{(A+4)}$

Answer: C

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4. A shell of mass 200g is fired by a gun of mass 100kg. If the muzzle speed of the shell is $80ms^{-1}$, then the rcoil speed of the gun is

A. $1.6cms^{-1}$

B. $0.5cms^{-1}$

C. $2cms^{-1}$

D. $3cms^{-1}$

Answer: A

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5. The maximum velocity (in ms^{-1}) with which a car driver must traverse a flat curve of radius 150 m and coefficient of friction 0.6 to avoid skidding is

A. 60

B. 30

C. 15

D. 25

Answer: B

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6. A copper rod is suspended in a non homogeneous magnetic field region. The rod when in equilibrium will align itself.

A. In the region where magnetic field is strongest

B. In the region where magnetic field is weakest and parallel to direction of

magnetic field there

C. In the direction in which it was originally suspended

D. In the region where magnetic field is weakest and perpendicular to the direction of magnetic field there

Answer: D

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7. In metre bridge experiment, with a standard resistance in the right gap and a resistance coil dipped in water (in a beaker) in the left gap, the balancing length obtained is '1'. If the temperature of water is increased, the new balancing

A. $< l$

B. $> l$

C. $= 0$

D. $= l$

Answer: B

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8. In the circuit diagram given in Fig. 4.31, the cells E_1 and E_2 have emf's 4 V and 8 V and internal resistances 0.5Ω and 10Ω respectively. Calculate the current in each resistance .

A. 3.75 V, 7.5 V

B. 4.25 V , 7.5 V

C. 3.75 V, 3.75 V

D. 4.25V , 4.25 V

Answer: B

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9. An electric field is given by $\vec{E} = \left(y\hat{i} + x\hat{j}\right)\frac{N}{C}$. Find the work done (in J) in moving a $1C$ charge from $\vec{r}_A = \left(2\hat{i} + 2\hat{j}\right)$ m to $\vec{r}_B = \left(4\hat{i} + \hat{j}\right)m$.

A. $+4J$

B. $-4J$

C. $+8J$

D. Zero

Answer: D

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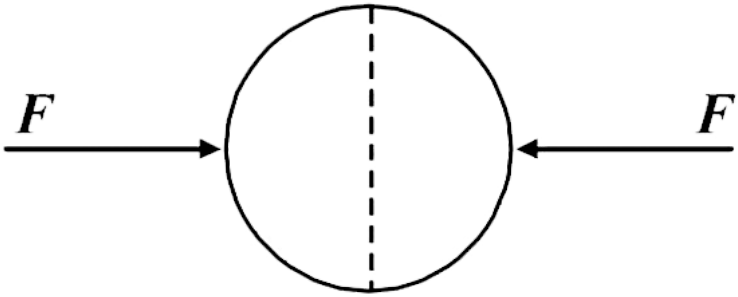
10. A uniformly charged thin spherical shell of radius R carries uniform surface charge denisty of $isgma$ per unit area. It is made of

two hemispherical shells, held together by presisng them with force F(see figure). F is proportional to



A. $\frac{1}{\varepsilon_0}\sigma^2 R^2$

B. $\frac{1}{\varepsilon_0}\sigma^2 R$

C. $\frac{1}{\varepsilon_0}\sigma^2 R$

D. $\frac{1}{\varepsilon_0}\frac{\sigma^2}{R^2}$

Answer: A

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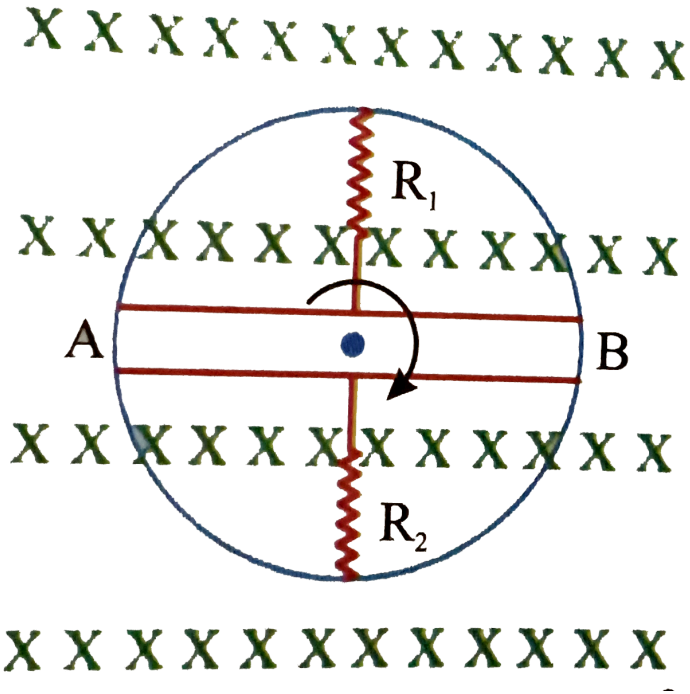
11. AB is a resistanceless conducting rod which forms a diameter of a conducting ring of radius r rotating in a uniform magnetic field B as shown in figure. The resistance R_1 and R_2 do not rotate. Then the current

through the resistor R_1 is



A. $\dfrac{B\omega r^2}{2R_1}$

B. $\dfrac{B\omega r^2}{2R_2}$

C. $\dfrac{B\omega r^2}{2R_1R_2}(R_1+R_2)$

D. $\dfrac{B\omega r^2}{2(R_1+R_2)}$

Answer: A

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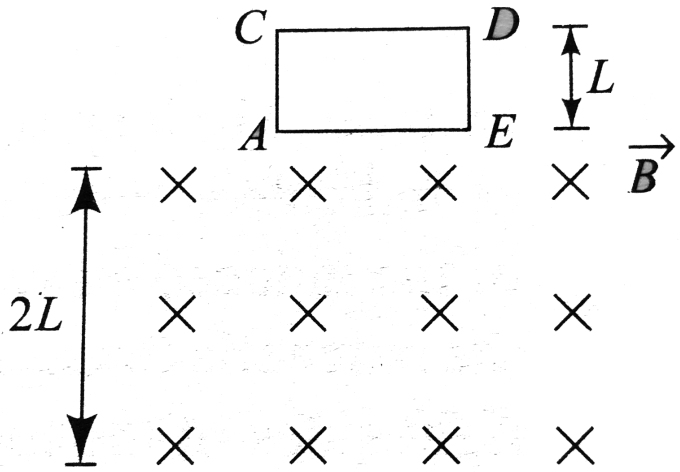
12. A square coil $ACDE$ with its plane vertically is released from rest in a horizontal uniform magnetic field $\overrightarrow{B}$ of length $2L$. The

accelaration of the coilis



A. less than g for all the time till loop crosses the magnetic field completely.

B. less than g when it enters the field and greater than g when it comes out of the

field.

C. g all the time.

D. less than g when enters and comes out of the field but equal to g when it is within the field.

Answer: D

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13. If g is the acceleration due to gravity on earth's surface, the gain of the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth is

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

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

C. mgR

D. 2 mgR

Answer: B

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14. The value of acceleration due to gravity

A. $4.9ms^{-2}$

B. $9.8ms^{-2}$

C. $7.35ms^{-2}$

D. $19.6ms^{-2}$

Answer: C

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15. A cylinder of radius R made of a material of thermal conductivity K_1 is surrounded by a cylindrical shell of inner radius R and outer radius 2R made of a material of thermal conductivity K_2. The two ends of the combined system are maintained at two different temperatures. There is no loss of heat across the cylindrical surface and the system is in steady state. The effective thermal conductivity of the system is

(a) $K_1 + K_2$ (b) $K_1 K_2 / (K_1 + K_2)$

(c)$(K_1 + 3K_2)/4$

(d) $(3K_1 + K_2)/4.$

A. $K_1 + K_2$

B. $\frac{K_1 K_2}{(K_1 + K_2)}$

C. $\frac{(K_1 + 3K_2)}{4}$

D. $\frac{(3K_1 + K_2)}{4}$

Answer: C

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16. If one mole of a monoatomic gas $(\gamma = 5/3)$ is mixed with one mole of a diatomic gas $(\gamma = 7/5)$ the value of γ for the mixture is .

A. 1.5

B. 1.75

C. 1.33

D. 1.85

Answer: A

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17. An engine has an efficiency of $\frac{1}{6}$. When the temperature of sink is reduced by $62^\circ C$, its efficiency is doubled. Temperature of the source is

A. $90^\circ C, 37^\circ C$

B. $124^\circ C, 62^\circ C$

C. $37^\circ C, 99^\circ C$

D. $62^\circ C, 124^\circ C$

Answer: A

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18. The earth's magnetic field at a certain point is 0.70 gauss. This field is to be annulled by the magnetic field at the centre of a circular conducting loop 5.0 cm in radius. The required current is about

A. 0.66 A

B. 5.6 A

C. 0.28 A

D. 2.8 A

Answer: B

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19. A proton beam passes without deviation through a region of space where there are uniform transverse mutually perpendicular electric and magnetic field with E and B Then the beam strikes a grounded target. Find the

force imparted by the beam on the target if the beam current is equal to I .

A. $\frac{mEI}{eB}$

B. $\frac{mIE}{e}$

C. $\frac{mEI}{B}$

D. $\frac{eIm}{B}$

Answer: A

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20. A, B, C are points in a vertical line such that AB = BC. If a body falls freely from rest at A and t_1 and t_2 are times taken to travel distances AB and BC, then ratio (t_2 / t_1) is

A. $\sqrt{2}+1$

B. $\sqrt{2}-1$

C. $2\sqrt{2}$

D. $\dfrac{1}{\sqrt{2}+1}$

Answer: B

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21. A body is released from a great height and falls freely towards the earth. Exactly one sec later another body is released. What is the distance between the two bodies 2 sec after the release of the second body ?

A. 24.5 m

B. 25.6 m

C. 12.3 m

D. 30.5 m

Answer: A

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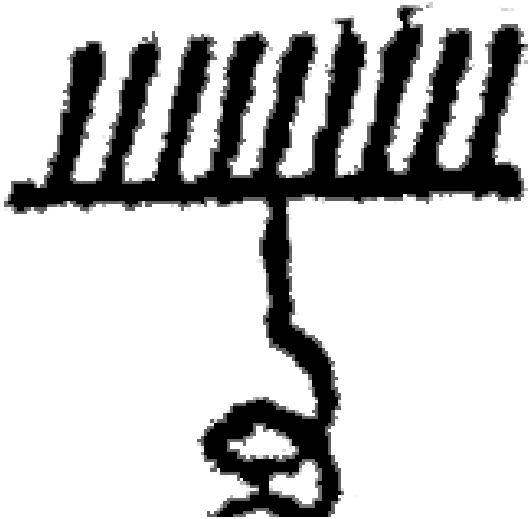
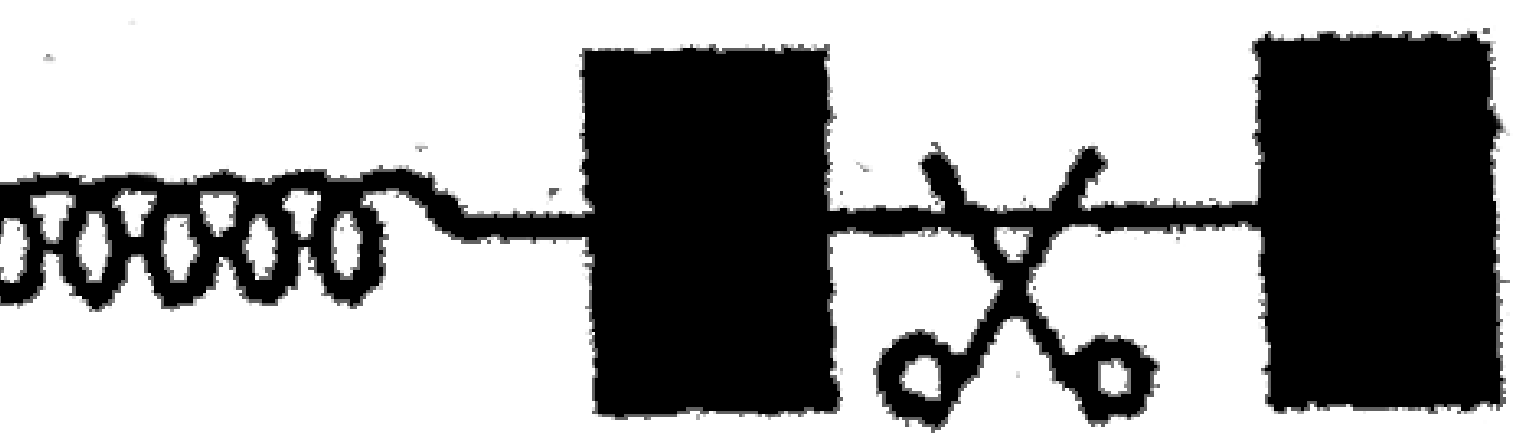
22. System shown in figure is in equilibrium and at rest. The spring and string are massless Now the string is cut. The acceleartion of mass $2m$ and m just after the string is cut will be





A. $\frac{g}{2}$ upward , g downward

B. g upward , downward

C. g upward, 2g downward

D. 2g upward , g downward

Answer: A

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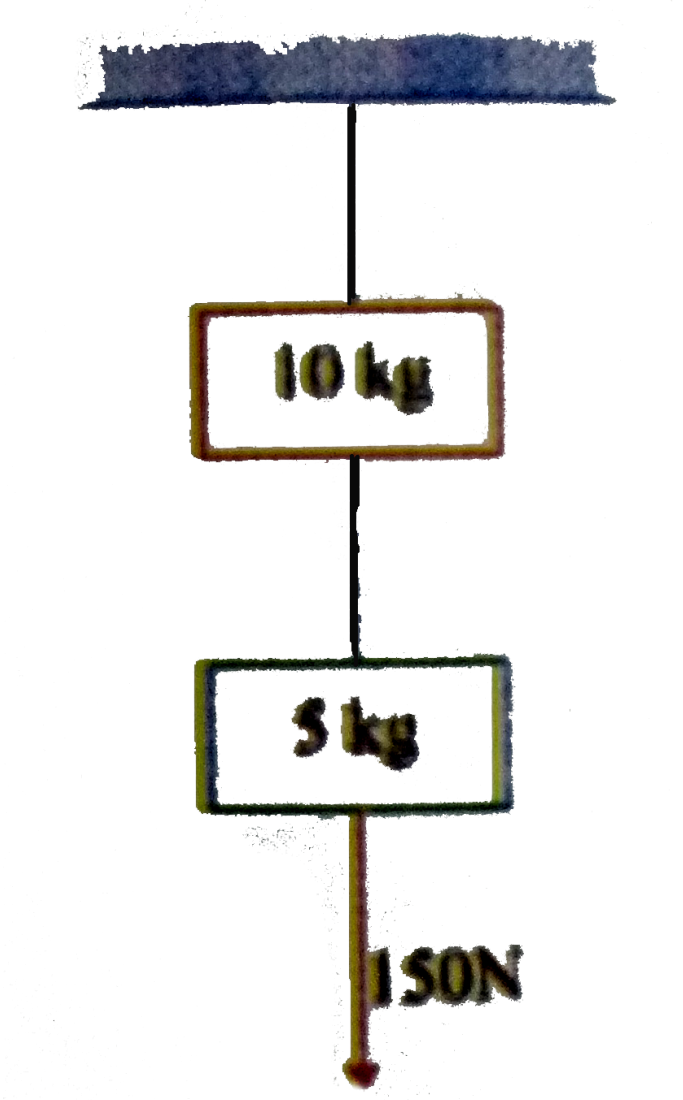
23. Two masses of $10kg$ and $5kg$ are suspended from a rigid support as shown in

figure. The system is pulled down with a force of $150N$ attached to the lower mass. The string attached to the support breaks and the system accelerates downwards



In case the force continues to act. what will be the tension acting between the two masses ? .

A. 300 N

B. 200 N

C. 100 N

D. Zero

Answer: C

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24. If a radioactive substance reduces to $\frac{1}{16}$ of its original mass in 40 days, what is its half-life ?

A. 10 days

B. 20 days

C. 40 days

D. None of these

Answer: A

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25. Two nuclei A and B are isotonic with mass numbers 15 and 16 respectively . If A contains 7

protons , then the number of protons in B would be

A. 7

B. 8

C. 9

D. 10

Answer: B

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26. A small mass executes linear SHM about O with amplitude a and period T. Its displacement from O at time $T/8$ after passing through O is:

A. $\frac{A}{8}$

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

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

D. $\frac{A}{\sqrt{2}}$

Answer: D

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27. A simple pendulum of length l is suspended from the celing of a cart which is sliding without friction on as inclined plane of inclination theta . What will be the time period of the pendulum?

A. $2\pi\sqrt{\frac{l}{g\cos\theta}}$

B. $-2\pi\sqrt{\frac{3l}{3g\cos\theta}}$

C. $-4\pi\sqrt{\frac{2l}{g\cos\theta}}$

D. $-3\pi\sqrt{\frac{4l}{2g\cos\theta}}$

Answer: A

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28. The work function of metal is $1eV$. Light of wavelength 3000Å is incident on this metal surface . The velocity of emitted photo - electrons will be

A. $10ms^{-1}$

B. 10^3ms^{-1}

C. 10^4ms^{-1}

D. $10^6 ms^{-1}$

Answer: D

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29. A 100 W sodium lamp radiates energy uniformly in all directions. The lamp is located at the centre of a large sphere that absorbs all the sodium light which is incident on it. The wavelength of the sodium light is 589 nm.

What is the energy per photon associated with the sodium light ?

A. 3×10^{20} photon s^{-1} are delivered

B. 2×10^{20} photon s^{-1} are delivered

C. 1×10^{20} photon s^{-1} are delivered

D. 4×10^{20} photon s^{-1} are delivered

Answer: A

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30. water is flowing through a tube of non-uniform cross-section. If the radii of the tube at the ebtrance and the exit are in the ratio $3:2$ then the ratio of the velocites of flow of watern at the entrance and the exit is

A. $1:1$

B. $4:9$

C. $9:4$

D. $8:27$

Answer: B

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31. The bulk modulus for an incompresssible liquid is

A. Zero

B. Unity

C. Infinity

D. Between 0 and 1

Answer: C

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32. When a monochromatic light ray is incident on a medium of refracive index μ with angle of incidence θ_1, the angle of refraction is θ_r. if θ_i is changed slightly by $\Delta\theta_i$, then the corresponding change in θ_r will be-

A. $\Delta\theta_i$

B. $\mu\Delta\theta_i$

C. $\frac{1}{\mu}.\frac{\cos\theta_i}{\cos\theta_r}.\Delta\theta_1$

D. $\mu.\frac{\cos\theta_i}{\cos\theta_r}.\Delta\theta_i$

Answer: C

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33. A ray of light strikes a transparent rectangular slab of refractive index $\sqrt{2}$ at an angle of incidence of 45°. The angle betweent the reflected and refracted rays is

A. 95°

B. 120°

C. 135°

D. $105^\circ C$

Answer: D

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34. The moment of inertia of a rod about its perpendicular bisector is I . When the temperature of the rod is increased by ΔT , the increase in the moment of inertia of the rod about the same axis is (Here , α is the coefficient of linear expansion of the rod)

A. $\alpha I \Delta T$

B. $2\alpha I \Delta T$

C. $4\alpha I \Delta T$

D. $\frac{\alpha I \Delta T}{2}$

Answer: B

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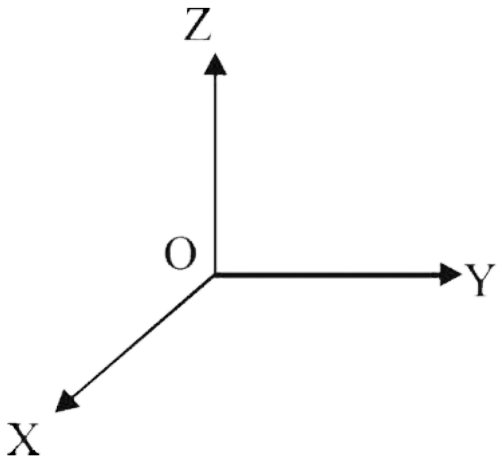
35. A force of $-F\hat{k}$ acts on O, the origin of the coodinate system. The torque about the point

(1,-1) is



A. $-F\left(\hat{i}-\hat{j}\right)$

B. $F\left(\hat{i}-\hat{j}\right)$

C. $-F\left(\hat{i}+\hat{j}\right)$

D. $F\left(\hat{i}+\hat{j}\right)$

Answer: C

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

A. 2.5×10^{30} atom cm^{-3}

B. 2.5×10^{35} atom cm^{-3}

C. 1×10^{13} atom cm^{-3}

D. 1×10^{15} atom cm^{-3}

Answer: D

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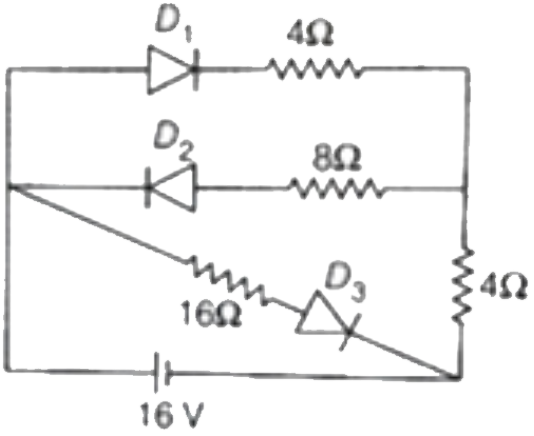
37. In the given circuit,



the current through the battery is

A. 1.5 A

B. $2A$

C. $3A$

D. $5.33A$

Answer: C

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38. Initially , a bearker has 100 g of water at temperature $90^\circ C$ Later another 600 g of water at temperatures $20^\circ C$ was poured into the beaker. The temperature ,T of the water after mixing is

A. $20^\circ C$

B. $30^\circ C$

C. $45^\circ C$

D. $55^\circ C$

Answer: B

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39. The density of material in CGS system of units is $4gcm^{-3}$. In a system of units in which unit of length is 10 cm and unit of mass is 100 gm, then the value of density of material will be

A. 0.4

B. 40

C. 400

D. 0.04

Answer: B

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40. Unpolarized light passes through two polaroids, the axis of one is vertical and that of the other is 30° to the vertical . What is the

orientation and intensity of the transmitted light ?

A. Plane polarized at 60° to the vertical and having intensity of $\frac{I_0}{4}$

B. Plane polarized at 30° to the vertical and having intensity of $\frac{3I_0}{8}$

C. Plane polarized at 60° to the vertical and having intensity of $\frac{I_0}{2}$

D. No light passes

Answer: B

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41. Two light sources are coherent when

A. their amplitudes are equal

B. their frequencies are equal

C. their wavelengths are equal

D. their frequencies are equal their phase difference is constant with time

Answer: D

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42. The figure shows the location of a source and detector at time t = 0. The source and detector are moving with velocities $v_s = 5\hat{i}ms^{-1}$ and $v_D = 10\hat{j}ms^{-1}$ respectively . The frequency of signals received by the detector at the moment when the source cros the origin is (the frequency of the source is 100 Hz . Velocity bof sound $330ms^{-1}$

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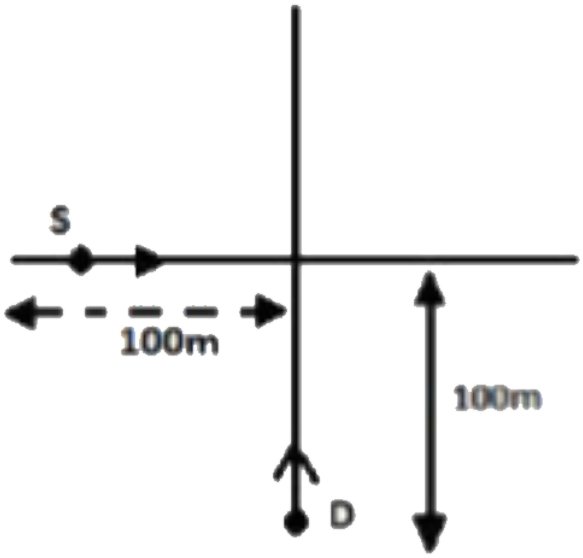

A. 97 Hz

B. 47 Hz

C. 90 Hz

D. 60 Hz

Answer: A

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43. An iron load of 2 kg is suspended in the air from the free end of a Sonometer wire of length 1 m. A tuning fork of frequency 256 Hz is in resonance with time the length of the sonometer wire. If the load is immersed in water that will be in resonance with the same tuning fork is (specified gravity of iron=8)

A. $\sqrt{8}$

B. $\sqrt{6}$

C. $\frac{1}{\sqrt{6}}$

D. $\sqrt{\frac{7}{8}}$

Answer: D

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44. If a body has kinetic energy. T, moving on a rough horizontal surface stops at distance y. The frictional force exerted on the body is

A. $\frac{T}{\sqrt{y}}$

B. $\frac{\sqrt{T}}{y}$

C. yT

D. $\frac{T}{y}$

Answer: D

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45. A body of mass $3kg$ is under a constant force which causes a displacement s metre in it, given by the relation $s = \frac{1}{3}t^2$, where t is in

seconds. Work done by the force in 2 seconds is

A. 8/3 J

B. 19/5 J

C. 5/19 J

D. 3/8 J

Answer: A

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