PHYSICS

BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2001

Physics

1. A balloon starts rising from thee ground with an acceleration of $1.25 m / s^2$. After 8 s, a

stone is released from the balloon. The stone will (taking $g = 10ms^{-2}$)

A. have a displacement of 50 m

B. cover a distance of 40 m in reaching the ground

C. reach the ground in 4 s

D. begin to move down after released.

Answer: B::C

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2. When a ceiling fan is switched off, its angular velocity reduces by 50% while it makes 36 rotations. How many more rotations will it make before coming to rest ? (Assume uniform angular retardation)

A. 36

B. 48

C. 18

D. 12

Answer: D

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3. The resultant of two forces 3P and 2P is R. If the first force is doubled then the resultant is also doubled. The angle between the two forces is

A. 90°

B. 180°

C. 60°

D. 120°

Answer: D

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4. If both the mass and radius of the earth decreases by 1% then the

A. escape velocity would decrease

B. escape velocity would increase

C. acceleration due to gravity would increase

D. acceleration due to gravity would decrease.

Answer: C

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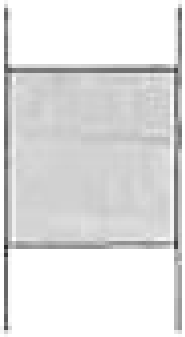
5. A vertical glass capillary tube, open at both ends, contains some water. Which of the following shapes may be taken by the water in the tube?

A. 

B. 

C. 

D.

Answer: C

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6. A ball is thrown vertically upwards. Assuming the air resistance to be constant and considerable,

A. the time of ascent $>$ the time of descent

B. the time of ascent $<$ the time of descent

C. the time of ascent $>$ the time of descent

D. the time of ascent = the time of descent

Answer: B

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7. During an adiabatic process, the pressure of a gas is found to be proportional to be the cubic of its absolute temperature. The ratio C_P / C_V gas is

A. 2

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

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

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

Answer: C

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8. Newton postulated his corpuscular theory on the basis of

A. Newton's rings

B. colours of thin films

C. rectilinear propagation of light

D. dispersion white light.

Answer: C

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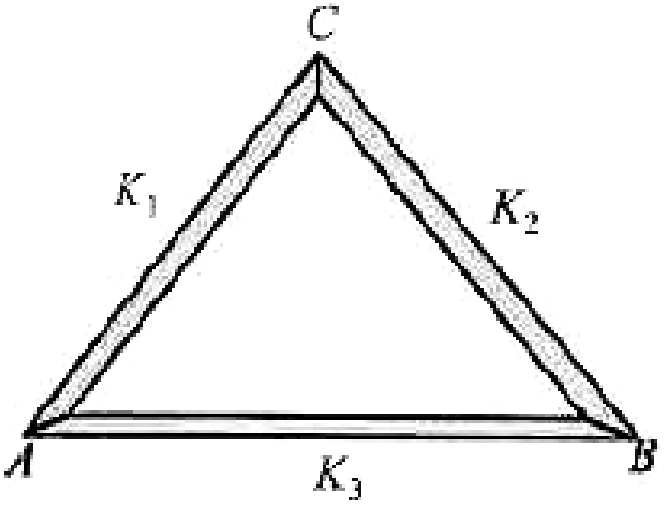
9. Three rods of same dimensions are arranged as shown in the figure. They have thermal conductivities K_1, K_2 and K_3. The points A and B are maintained at different temperatures. For the heat to flow at the same rate along ACB and AB,



A. $K_3 = \frac{K_1 K_2}{K_1 + K_2}$

B. $K_3 = 2(K_1 + K_2)$

C. $K_3 = \frac{1}{2}(K_1 + K_2)$

D. $K_3 = K_1 + K_2$

Answer: A

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10. Two spherical black bodies of radii r_1 and r_2 and with surface temperatures T_1 and T_2

respectively, radiate the same power. Then r_1/r_2 must be equal to

A. $\left(\frac{T_2}{T_1}\right)^4$

B. $\left(\frac{T_2}{T_1}\right)^2$

C. $\left(\frac{T_1}{T_2}\right)^4$

D. $\left(\frac{T_1}{T_2}\right)^2$

Answer: B

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11. A small object is placed 10 cm in front of a plane mirror. If you stand behind the object 30 cm from the mirror, and look at its image, for what distance must you focus your eyes?

A. 40 cm

B. 8- cm

C. 60 cm

D. 20 cm

Answer: A

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12. A luminous object is separated from a screen by a distance D. What is the greatest focal length a lens could have to focus the object on the screen?

A. 4D

B. D

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

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

Answer: C

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13. A ray of light is incident normally on one of the faces of a prism of angle 30° and refractive index $\sqrt{2}$. The angle of deviation of the ray is

A. 22.5°

B. 15°

C. 12.5°

D. 0°

Answer: D

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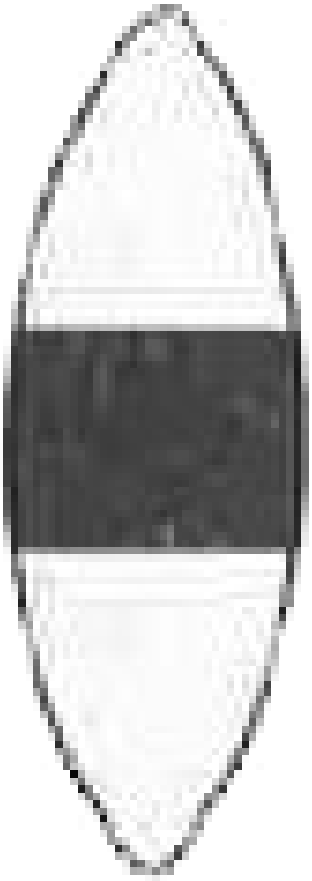
14. How wil the image formed by a convex lens be affected, if the central portion of the lens is

wrapped in black paper, as shown in the figure.



A. two images will be formed, one due to each exposed half

B. full image will be formed but without the central portion

C. full image will be formed but it is less bright

D. no image will be formed.

Answer: C

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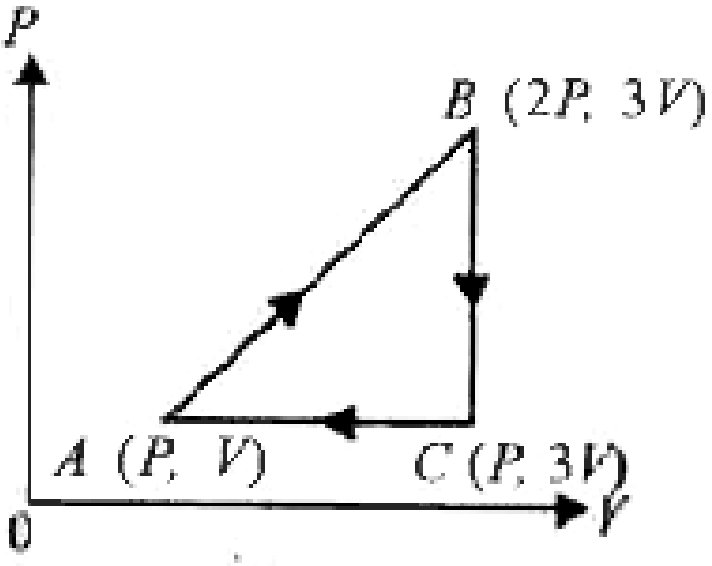
15. An ideal gas is taken ABCD as shown in the PV diagram. The work done during a cycle is



A. zero

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

C. 2PV

D. PV

Answer: D

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16. The wavelength of the light used in Young's double slit experiment is λ. The intensity at a point on the screen where the path difference is $\frac{\lambda}{6}$ is I. I_0 mdenotes the maximum intensity then the ration of I and I_0 is

A. very few coloured fringes can be seen with first order red fringes being closer to the central white fringe

B. very few coloured fringes can be seen, with first order violet fringes can be seen, with first order violet fringes being closer to the central white fringe

C. a very larger number of coloured fringes with a central white fringe can be seen

D. a very large number of coloured fringes can be seen.

Answer: B

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17. A beam of light of two wavelengths 6500Å and 5200Å, is used to obtain interference fringes in Young's double slit experiment. Suppose the m^{th} brght fringe due to 6500Å coincides with n^{th} bright fringe due to 5200Å

at a minimum distance from the cental maximum. Then

A. $m = 10, n = 8$

B. $m = 8, n = 10$

C. $m = 5, n = 4$

D. $m = 4, n = 5$

Answer: B

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18. In the experiment of diffraction at a single slit, if the slit width is decreased, the wdith of the central maximum

A. increases in both Fresnel and Fraunhofer diffraction

B. decreases both in Fresnel and Fraunhofer diffraction

C. increases in Fresnel diffraction but decreases in Fraunhofer diffraction

D. decreases in Fresnel diffraction but increases in Fraunhofer diffraction.

Answer: C

19. When light is incident on a doubly refracting crystal, two refracted rays-ordinary ray (O -ray) and extra ordinary ray (E -ray) are produced. Then

A. both O - ray and E - ray are polarised perpendicular to the plane of incidence

B. both O - ray and E - ray are polarised in the plane of incidence

C. E - ray is polarised perpendicular to the plane of incidence and O - ray in the plane of incidence

D. E - ray is polarised in the plane of incidence and O - ray perpendicular to the plane of incidence

Answer: B

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20. A $20cm$ length of a certain solution causes right-handed rotation of 38°. A $30cm$ length of another solution causes left-handed rotation of 24°. The optical rotation caused by $30cm$ length of a mixture of the above solutions in the volume ratio $1:2$ is

A. left handed rotation of 14°

B. right handed rotation of 14°

C. left handed rotation of 3°

D. right handed rotation of 3°

Answer: D

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21. A sine wave has an amplitude A and wavelength λ. Let V be the wave velocity and v be the maximum velocity of a particle in the medium. Then

A. $V = v \text{ if } \lambda = \frac{3A}{2\pi}$

B. $V = v \text{ if } A = 2\pi\lambda$

C. $V = v \text{ if } A = \frac{\lambda}{2\pi}$

D. V can not be equal to v

Answer: C

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22. A wave is represented by the equation $y = a\sin(kx - \omega t)$ is superposed with another wave to form a stationary wave such

that the point x= 0 is a node. Then the equation of the other wave is

A. $y = -a\sin(kx + \omega t)$

B. $y = a\sin(kx + \omega t)$

C. $y = a\cos(kx - \omega t)$

D. $y = a\cos(kx + \omega t)$

Answer: D

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23. A plane wave is described by the equation $y = 3\cos\left(\frac{x}{7} - 10t - \frac{\pi}{6}\right)$.

The maximum velocity of the particles of the medium due to this wave is

A. cross the mean position with different velocities at the same instant

B. cross the mean position with different velocities at different instants

C. cross the mean position with same speed

D. cross the mean position with same velocity

Answer: C

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24. A bus is moving with a velocity of $5ms^{-1}$ towards a huge wall. The drive sounds a horn of frequency 165Hz. If the speed of sound in air is 335 m//s, the number of beats heard per second by a passenger on the bus will be

A. 3

B. 4

C. 6

D. 5

Answer: D

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25. The speed of sound through a gaseous medium bears a constant ratio with the rms speed of its molecules. This constant ratio is

A. γ

B. $\sqrt{\frac{2\gamma}{3}}$

C. $\gamma - 1$

D. $\sqrt{\frac{\gamma}{3}}$

Answer: D

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26. A second harmonic has to be generated in a string of length l stretched between two

rigid supports. The points where the string has to be plucked and touched are

A. pluck at l/4 and touch at 3l/4

B. pluck at l/4 and touch at l/2

C. pluck at l/2 and touch at 3l/4

D. pluck at l/2 and touch at l/4

Answer: B

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27. In a sonometer wire, the tension is maintained by suspending a 50.7kg mass from the free end of the wire. The suspended mass has a volume of $0.0075m^3$. The fundamental frequency of the wire is 260Hz. If the suspended mass is completely submerged in water, the fundamental frequency will become (take $g = 10ms^{-2}$)

A. 240Hz

B. 230Hz

C. 220Hz

D. 200Hz

Answer: A

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28. If the velocity of sound in air is $336ms^{-1}$, the maximum length of a closed pipe that would produce a just audible sound is

A. 1.0 m

B. 4.2m

C. 4.2mm

D. 4.2cm

Answer: B

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29. Transverse waves of the same frequency are generated in two steel wires A and B. The diameter of A is twice of B and the tension in A is half that in B. The ratio of the velocities of waves in A and B is

A. $3:2\sqrt{2}$

B. $1:2\sqrt{2}$

C. $1:\sqrt{2}$

D. $1:2$

Answer: B

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30. When we hear a sound, we can identify its source from

A. overtones present in the sound

B. wavelength of sound

C. amplitude of sound

D. intensity of sound

Answer: A

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31. A charge q is placed at the centre of the line joining two equal charges Q. The system

of three charges will be in equilibrium if q is equal to

A. $+\frac{Q}{2}$

B. $+\frac{Q}{4}$

C. $-\frac{Q}{4}$

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

Answer: C

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32. Two equal negative charges -q are fixed at the points $(0, \alpha)$ and $(0, -\alpha)$ on the y-axis. A positive charge Q is released from rest at the point $(2\alpha, 0)$ on the x-axis. The charge Q will

A. execute oscillatory but not simple harmonic motion

B. execute simple harmonic motion about the origin

C. move to infinity

D. move to the origin and remain at rest.

Answer: A

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33. A ball of mass 1g and charge $10^{-8}C$ moves from a point A whose potential is 600V to the point B whose potential is zero. Velcoity of the ball at the point B is $20cms^{-1}$. The velocity of the ball at the point is

A. $2.8ms^{-1}$

B. $2.8cms^{-1}$

C. $16.7ms^{-2}$

D. $16.7cms^{-1}$

Answer: D

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34. In a parallel plate capacitor of capacitance C, a metal sheet is inserted between the plates, parallel to them. The thickness of the sheet is half of the separation between the plates. The capacitance now becomes

A. C/4

B. C/2

C. 2C

D. 4C

Answer: C

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35. While a capacitor remains connected to a battery, a dielectric slab is slipped between the plates. Then

A. the energy stored in the capacitor decreases

B. the electric field between the plates increases

C. charges flow from the battery to the capacitor

D. the potential difference between the plates is charged.

Answer: C

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36. An electric bulb is designed to draw power P_0 at voltage V_0. If the voltage is V, it draws a power P. Then

A. $P = \left(\frac{V_0}{V}\right)^2 P_0$

B. $P = \left(\frac{V}{V_0}\right)^2 P_0$

C. $P = \left(\frac{V}{V_0}\right) P_0$

D. $P = \left(\frac{V_0}{V}\right) P_0$

Answer: B

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37. Three resistances of values $2\Omega, 3\Omega \text{ and } 6\Omega$ are to be connected to produce an effective resistance of 4Ω. This can be done by connecting

A. 2Ω resistance in parallel with the parallel combination of $3\Omega \text{ and } 6\Omega$

B. 2Ω resistance in series with the parallel combination of $3\Omega \text{ and } 6\Omega$

C. 3Ω resistance in series with the parallel combination of 2Ω and 6Ω

D. 6Ω resistance in series with the parallel combination of 2Ω and 3Ω

Answer: B

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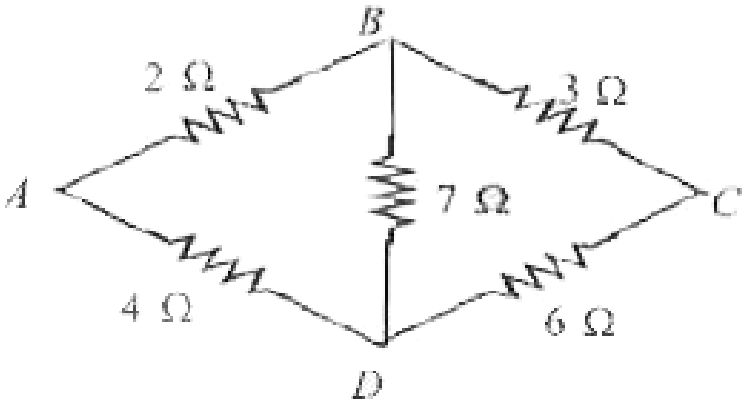
38. Five resistance are connected as shown in the figure. The equivalent resistance between

A and C is



A. 10.6Ω

B. 15Ω

C. 22Ω

D. $\frac{10}{3}\Omega$

Answer: D

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39. A battery supplies 150W and 196 W power to two resistors of 6Ω and 4Ω when they are connected separately to it. The internal resistance of battery is

A. 2.5Ω

B. 2Ω

C. 1Ω

D. 0.5Ω

Answer: C

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40. A battery of electromotive force E is connected in series with a resistance R and a voltmeter. An ammeter is connected in parallel with the battery. Then

A. only voltmeter is likely to be damaged

B. only ammeter is likely to be damaged

C. neither the ammeter nor the voltmeter will be damaged

D. both ammeter and voltmeter are likely to be damaged.

Answer: C

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41. An electron moving in a circular orbit of radius makes n rotations per second. The

magnetic field produced at the centre has magnitude :

A. $\frac{\mu_0 n^2 e}{2r}$

B. $\frac{\mu_0 ne}{2r}$

C. $\frac{\mu_0 ne}{2\pi r}$

D. zero

Answer: B

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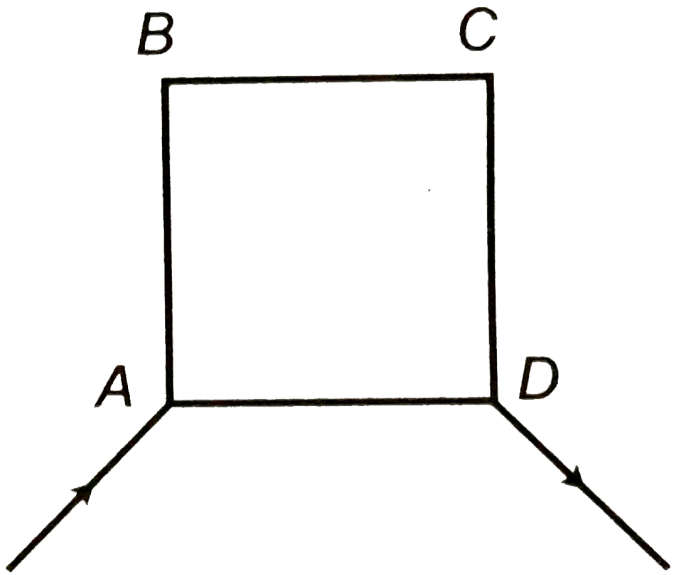
42. $ABCD$ is a square loop made of a uniform conducting wire. A current enters the loop at A and leaves at D. The magnetic field is



A. zero at all points inside the loop

B. zero at all points outside the loop

C. maximum at the centre of the loop

D. zero only at the centre of the loop

Answer: D

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43. A milliammeter of range 10 mA has a coil of resistance 1Ω. To use it as a voltmeter of range 10V, the resistance that must be connected in series with it is

A. 1000Ω

B. 999Ω

C. 99Ω

D. 9Ω

Answer: B

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44. Magnetic fields at two points on the axis of a circular coil at a distance of $0.05m$ and $0.2m$

from the centre are in the ratio $8:1$. The radius of the coil is

A. 0.15m

B. 0.2m

C. 1.0m

D. 0.1m

Answer: D

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45. Pick out the statement which is not true?

A. While taking reading with a tangent galvanometer, the readings are repeated by reversing the current to take care of the fact that the plane of the coil may not be exactly along the earth's magnetic meridian.

B. Measurements with thetangent galvanometer will be more accurate

when the deflection is around 45°

C. A short magnet is used in a tangent galvanometer since a long magnet would be heavy and may not easily move

D. A tangent galvanometer cannot be used in the polar region.

Answer: A::D

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46. The relative permeability is represented by μ_r and susceptibility is denoted by χ for a magnetic substance then for a paramagnetic substance.

A. $\mu, \ < 1, x > 0$

B. $\mu, \ < 1, x < 0$

C. $\mu, \ > 1, x > 0$

D. $\mu, \ > 1, x < 0$

Answer: C

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47. A small magnet M is allowed to fall through a fixed horizontal conducting ring R. Let g be the acceleration due to gravity. The acceleration of M will be

A. equal to g when it is below or above R and moving towards or away from R

B. greater than g when it is below R and moving away from R

C. greater than g when it is a above R and moving towards R

D. less than g when it is above R and moving towards R.

Answer: D

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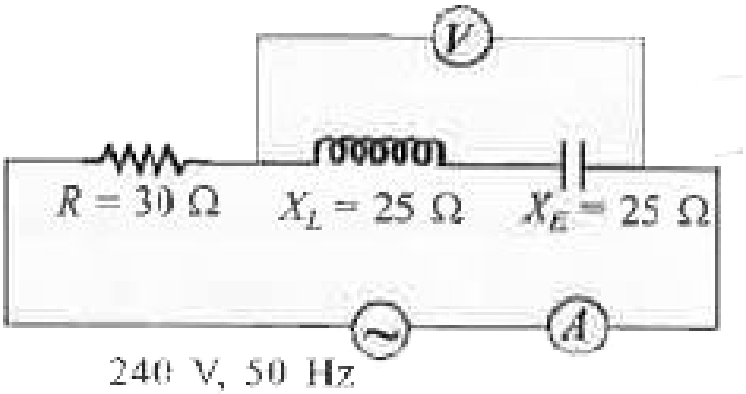
48. In the circuit shown in the figure, neglecting source resistance, the voltmeter

and ammeter readings will respectively be



A. 150V, 8A

B. 0V, 8V

C. 0V, 3A

D. 150V, 3A

Answer: B

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49. A train is moving towards north with a speed of 180 kilometer per hour. If the vertical component of the earth's magnetic field is $0.2 \times 10^{-4}T$, the e.m.f induced in the axis 1.5m long is

A. 54mV

B. 5.4mV

C. 1.5mV

D. 15mV

Answer: C

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50. The core of a transformer is laminated to reduce

A. magnetic loss

B. copper loss

C. hysteresis loss

D. eddy current loss

Answer: D

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51. Two nucleons are at a separation of $1 \times 10^{-15} m$. The net force between them is F_1, if both are neutrons, F_2 if both are protons and F_3 if one is a proton and other is a neutron. In such a case.

A. $F_1 = F_2 > F_3$

B. $F_1 = F_3 > F_2$

C. $F_2 > F_1 > F_3$

D. $F_1 = F_2 = F_3$

Answer: D

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52. The electron in a hydrogen atom makes a transition from $n = n_1$ to $n = n_2$ state. The time period of the electron in the initial state (n_1) is eigh times that in the final state (n_2). The possible values of n_1 and n_2 are

A. $n_1 = 6, n_2 = 2$

B. $n_1 = 8, n_2 = 1$

C. $n_1 = 8, n_2 = 2$

D. $n_1 = 4, n_2 = 2$

Answer: D

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53. If radiation of all wavelengths from ultraviolet to infrared ispassed through

hydrogen gas at room temperature absorption lines will be observed in the

A. Lyman, Balmer and Paschen series

B. both Lyman and Balmer series

C. Lyman series

D. Balmer series

Answer: A

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54. Let the potential energy of hydrogen atom in the ground state be zero. Then its total energy in the first excited state will be

A. 27.2 eV

B. 23.8eV

C. 13.6eV

D. 10.2eV

Answer: D

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55. Three fourthers of the active nuclei present in a redioactive sample decay in 3/4s. The half life of the sample is

A. $\frac{3}{8}s$

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

C. $\frac{1}{2}s$

D. 1s

Answer: A

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56. Pick out the statement which is not true?

A. UV radiations are used for sterilisation of water.

B. Shortest wavelength UV radiations are beneficial to living tissues while longer wavelengths UV are harmful

C. UV radiations have wavelengths extending from 200nm to 400nm

D. Sun is a natural source of UV radiations.

Answer: B

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57. The work function of aluminium is 4.125eV. The cut off wavelength for photoelectric effect for aluminium is

A. 150 nm

B. 420nm

C. 200nm

D. 300nm

Answer: D

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58. Pick out the statement which is true

A. Both fission and fusion produce same amount of energy per atom as well as per unit mass

B. The energy released per unit mass is more in fusion and that per atom is

more in fission.

C. The energy released per atom is more in fusion than in fission

D. The energy released per unit mass is more in fission than in fusion.

Answer: B

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

A. fluctuates

B. does not change

C. decreases

D. increases.

Answer: C

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60. In an n-p-n transistor circuit, the collector current is 10mA. If 90% of the electrons emitted reach the collector, the emitter current (I_E) and base current (I_B) are given by

A. $I_E = -1mA, I_B = 9mA$

B. $I_E = 9mA, I_B = 1mA$

C. $I_E = 1mA, I_B = 11mA$

D. $I_E = 11mA, I_B = 1mA$

Answer: D

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