PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

NEET

PHYSICS

1. The displacement of a particle executing simple harmonic motion is given by $y = A_0 + A\sin\omega t + B\cos\omega t$. Then the amplitude of its oscillation is given by

A. $A + B$

B. $A_0 + \sqrt{A^2 + B^2}$

C. $\sqrt{A^2 + B^2}$

D. $\sqrt{A_0^2 + (A + B)^2}$

Answer: C

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2. In which of the following devices, the eddy current effect is not used ?

A. electric heater

B. induction furnace

C. magnetic braking in train

D. electromagnet

Answer: A

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3. Average velocity of a particle executing SHM in one complete vibration is :

A. zero

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

C. $A\omega$

D. $\frac{A\omega^2}{2}$

Answer: A

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4. The speed of a swimmer in still water is 20 m//s. The speed of river water of river water is 10 m//s and due east. If he is standing on the south bank and wishes to cross the river along the shortest path the angle at which he should make his stroke w.r.t. noth is given by :-

A. 45° west

B. 30° west

C. 0°

D. 60° west

Answer: B

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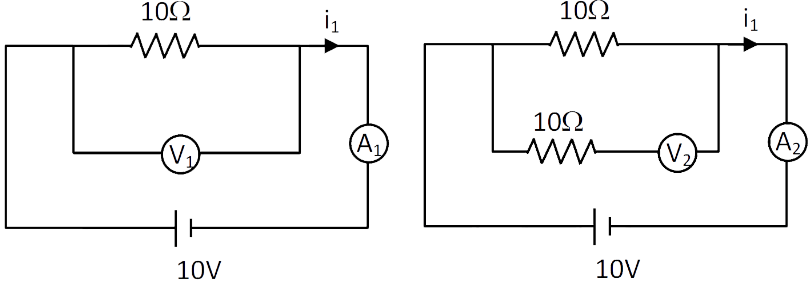
5. In the circuits shown below, the readings of the voltmeters and the ammeters will be:



A. $V_2 > V_1$ and $i_1 > i_2$

B. $V_2 > V_1$ and $i_1 = i_2$

C. $V_1 = V_2$ and $i_1 > i_2$

D. $V_1 = V_2$ and $i_1 = i_2$

Answer: D

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6. A copper rod of 88 cm and an aluminium rod of unknown length have their increase in length independent of increase in temperature. The length of aluminium rod is $\left(\alpha cu = 1.7 \times 10^{-5}K^{-1} \text{ and } \alpha Al = 2.2 \times 10^{-5}K^{-1}\right)$

A. 68 cm

B. 6.8cm

C. 113.9cm

D. 88 cm

Answer: A

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7. The unit of thermal conductivity is :

A. $Wm^{-1}K^{-1}$

B. $Jm^{-1}K^{-1}$

C. $Jm^{-1}K^{-1}$

D. WmK^{-1}

Answer: A

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8. For a p-type semiconductor, which of the following statements is true?

A. Electrons are the majority carriers and pentavalent atoms are the dopants.

B. Electrons are the majority carriers and trivalent atoms are the dopants.

C. Holes are the majority carriers and trivalent atoms are the dopants.

D. Holes are the majority carriers and pentavalent atoms are the dopants.

Answer: C

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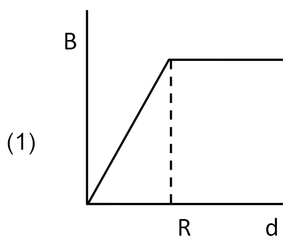
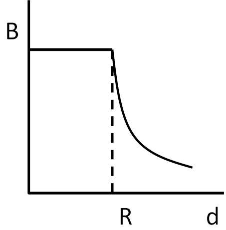
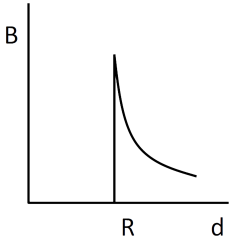
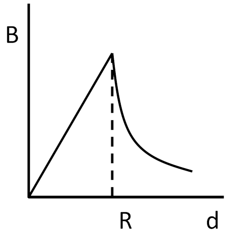
9. A cylinderical conductor of radius R is carrying constant current. The plot of the magnitude of the magnetic field, B with the distance, d from the centre of the conductor , is correctly represented by the figure:

A. 

B. (2)


C. (3)


D. (4)


Answer: D

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10. Body A of mass 4m moving with speed u collides with another body B of mass 2m at rest the collision is head on and elastic in nature. After the collision the fraction of energy lost by colliding body A is :

A. $\frac{5}{9}$

B. $\frac{1}{9}$

C. $\frac{8}{9}$

D. $\frac{4}{9}$

Answer: C

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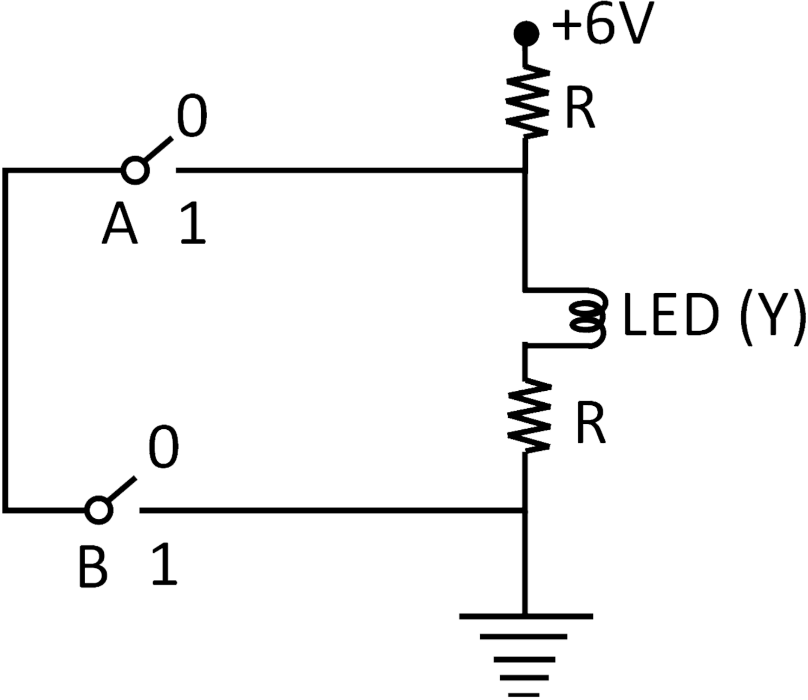
11. The correct Boolean operation represented by the circuit diagram drawn is



A. NOR

B. AND

C. OR

D. NAND

Answer: D

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12. When an object is shot from the bottom of a long smooth inclined plane kept at an angle 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object is shot with the same velocity, it can travel x_2 distance. Then $x_1 : x_2$ will be :

A. $1 : 2\sqrt{3}$

B. $1 : \sqrt{2}$

C. $\sqrt{2} : 1$

D. $1 : \sqrt{3}$

Answer: D

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13. The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is :

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

B. mgR

C. $2mgR$

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

Answer: D

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14. The total energy of an electron in an atom in an orbit is $-3.4eV$. Its kinetic and potential energies are, respectively:

A. 3.4eV,3.4eV

B. $-3.4eV, \ -3.4ev$

C. $-3.4eV, \ -6.8eV$

D. $3.4eV, \ -6.8eV$

Answer: D

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15. In which of the following processes, heat is neither absorbed nor released by a system?

A. isochoric

B. isothermal

C. adiabatic

D. isobaric

Answer: C

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16. A hallow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre:

A. decreases as r increases for $r < R$ and $r > R$

B. increases as r increases for $r < R$ and $r > R$

C. zero as r increases for $r < R$, decreases as r increases for $r > R$

D. zero as r increases for $r < R$, increases for $r > R$

Answer: C

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17. Pick the wrong answer in the context with rainbow.

A. Rainbow is combined effect of dispersion, refraction and reflection of sunlight

B. When the light rays undergo two internal reflections in a water drop, a secondary rainbow is formed

C. The order of colours is reversed in the secondary rainbow.

D. An observer can see a rainbow when his front is towards the sun.

Answer: D

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18. A small hole of area of cross-section 2 mm^2 present near the bottom of a fully filled open tank of height 2. Taking g=$10m/s^2$, the rate of flow of water through the open hole would be nearly

A. $6.4 \times 10^{-6} m^3/s$

B. $12.6 \times 10^{-6} m^3/s$

C. $8.9 \times 10^{-6} m^3/s$

D. $2.23 \times 10^{-6} m^3/s$

Answer: B

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19. which of the following acts as a circuit protection device?

A. fuse

B. conductor

C. inductor

D. switch

Answer: A

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20. Two point charges A and B, having charges +Q and -Q respectively, are placed at certain distance apart and force acting between them is F, if 25% charge of A is transferred to B, then force between the charges becomes:

A. $\frac{4F}{3}$

B. F

C. $\frac{9F}{16}$

D. $\frac{16F}{9}$

Answer: C

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21. Which colour of the light has the longest wavelength?

A. violet

B. red

C. blue

D. green

Answer: B

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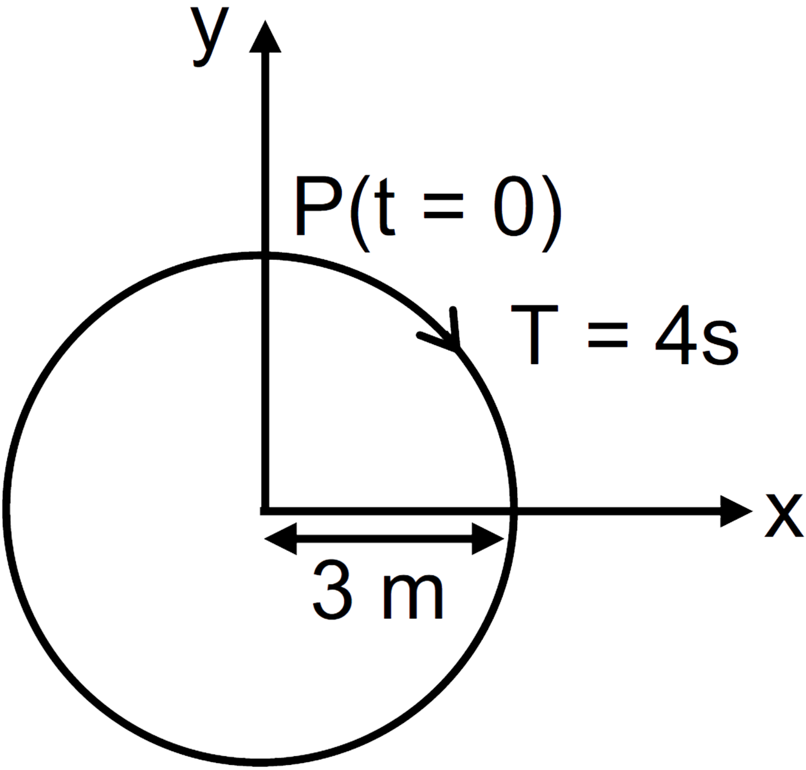
22. The radius of cirlcue, the period of revolution, initial position and sense of revolution are indicated in the figure.



y-projection of the radius vector of rotating particle P is :

A. $y(t) = 3\cos\left(\frac{\pi t}{2}\right)$, where y in m

B. $y(t) = -3\cos 2\pi t$, where y in m

C. $y(t) = 4\sin\left(\frac{\pi t}{2}\right)$, where y in m

D. $y(t) = 3\cos\left(\frac{3\pi t}{2}\right)$, where y in m

Answer: A

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23. α-particle consists of

A. 2 protons only

B. 2 protons and 2 neutrons only

C. 2 electrons, 2 protons and 2 neutrons

D. 2 electrons and 4 protons only

Answer: B

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24. A solid cylinder of mass 2 kg and radius 4 cm rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is :

A. $2 \times 10^{6} Nm$

B. $2 \times 10^{-6} Nm$

C. $2 \times 10^{-3} Nm$

D. $12 \times 10^{-4} Nm$

Answer: B

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25. In a double slit experiment, when light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1 m away, was found to be 0.2°, what will be the angular width of the first minima, if the entire experimental apparatus is immersed in water ? $\left(\mu_{\text{water}} = 4/3\right)$

A. 0.1°

B. 0.266°

C. 0.15°

D. 0.05°

Answer: C

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26. At a point A on the earth's surface of angle of dip, $\delta = +25^{\circ}$. At a point B on the earth's surface the angle of dip, $\delta = -25^{\circ}$. We can interpret that.

A. A and B are both located in the southern hemisphere.

B. A and B are both located in the northern hemisphere.

C. A is located in the southern hemisphere and B is located in the northern hemisphere.

D. A is located in the northern hemisphere and B is located in the southern hemisphere.

Answer: C

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27. A force $F = 20 + 10y$ acts on a particle in y-direction where F is in Newton and y in meter. Wrok done by this force to move the particle from $y = 0$ to $y = 1m$ is:

A. 20 J

B. 30J

C. 5J

D. 25J

Answer: D

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28. When a block of mass M is suspended by a long wire of length L, the length of the wire becomes (L+l). The elastic potential energy stored in the extended wire is

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

B. Mgl

C. MgL

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

Answer: D

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29. A parallel plate capacitor 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively:

A. zero,zero

B. zero, $60\mu A$

C. $60\mu A$, $60\mu A$

D. $60\mu A$, zero

Answer: C

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30. A mass m is attached to a thin wire and whirled in a vertical circle. The wire is most likely to break when:

A. inclined at a angle of 60° from vertical

B. the mass is at the highest point

C. the wire is horizontal

D. the mass is at the lowest point

Answer: D

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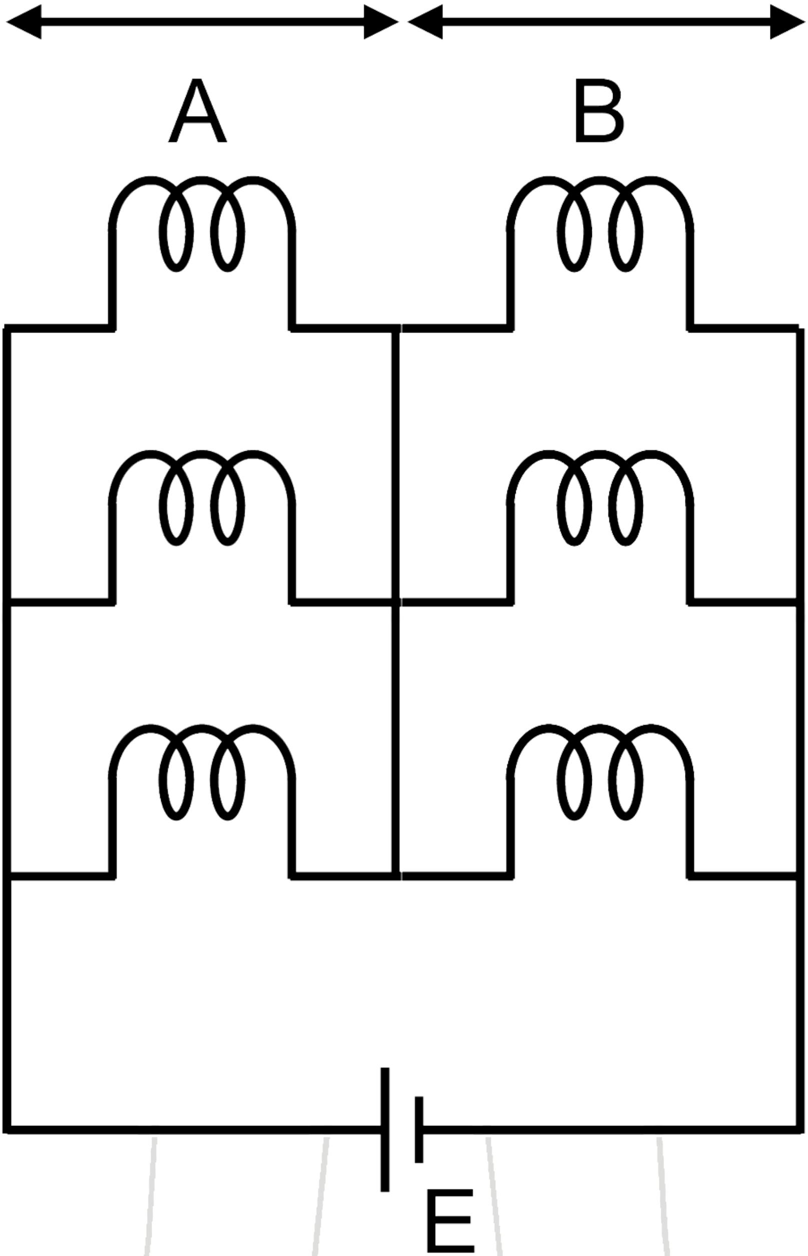
31. Six similar bulbs are connected as shown in the figure with a DC source of emf E, and zero intermal resistance.

The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be:



A. 2 : 1

B. $4:9$

C. $9:4$

D. $1:2$

Answer: C

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32. In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, what will be angle of refraction? In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, what will be angle of refraction? In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, what will be angle of refraction?

A. 90°

B. 180°

C. 0°

D. equal to angle of incidence

Answer: A

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33. Two similar thin equi-convex lenses, of focal f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1, When the space between the two lens is filled with glycerin (which has the same refractive index ($\mu = 1.5$) as that of glass) then the equivalent focal length is F_2, The ratio $F_1 : F_2$ will be

A. $3:2$

B. $2:1$

C. $1:2$

D. $2:3$

Answer: C

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34. Ionized hydrogen atoms and α - particle with moments enters perpendicular to a constant megnetic field. B. The ratio of their radii of their paths $r_H : r_\alpha$ be :

A. $1:4$

B. $2:1$

C. $1:2$

D. $4:1$

Answer: B

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35. In an experiment, the percentage of error occurred in the in the measurement of physical quantities A,B,C and D are $1\%, 2\%, 3\%$ and 4% respectively. Then the maximum percentage of error in the measurement X, where $X = \frac{A^2B^{1/2}}{C^{1/3}D^3}$, will be

A. 10%

B. $\left(\frac{3}{13}\right)\%$

C. 16%

D. -10%

Answer: C

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36. A block of mass 10 kg in contact against the inner wall of a hollow cylindrical drum of radius 1m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be $\left(g = 10m/s^2\right)$

A. $10\pi rad/s$

B. $\sqrt{10} rad/s$

C. $\frac{10}{2\pi} rad/s$

D. $10 rad/s$

Answer: D

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37. A 800 turn coil of effective area $0.05m^2$ is kept perpendicular to a magnetic field 5×10^{-5} T. When the plane of the coil is rotated by 90° around any of its coplanar axis in 0.1 s, the emf induced in the coil will be:

A. 0.02V

B. 2V

C. 0.2V

D. $2 \times 10^{-3}V$

Answer: A

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38. Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed u_A and u_B respectively. Their time period of rotation is the same. The ratio of angular speed of a to that of B will be:

A. $1:1$

B. $r_A:r_B$

C. $\upsilon_A:\upsilon_B$

D. $r_B:r_A$

Answer: A

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39. A soap bubble, having radius of 1 mm, is blown from a detergent solution having radius of 1 mm is blown from a detergent solution having a surface tension of $2.5 \times 10^{-2} N/m$. The pressure inside the bubble equals at a point Z_0 below the free surface of water in a container. Taking $g = 10 m/s^2$, density of water $= 10^3 kg/m^3$, the value of Z_0 is :

A. 0.5cm

B. 100 cm

C. 10 cm

D. 1 cm

Answer: D

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40. A body weighs 200 N on the surface of the earth. How much will it weigh half way down to the centre of the earth ?

A. 100M

B. 150N

C. 200N

D. 250N

Answer: A

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41. An electron is accelerated through a potential difference of $10,000V$. Its de Broglie wavelength is, (nearly): $\left(me = 9 \times 10^{-31} kg\right)$

A. 12.2nm

B. $12.2 \times 10^{-13} m$

C. $12.2 \times 10^{-12} m$

D. $12.2 \times 10^{-14} m$

Answer: C

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42. Two parallel infinite line charges with linear charge densities $+\lambda C/m$ and -λ C/m are placed at a distance of 2R in free space. What is the electric field mid-way between the two line charges?

A. $\frac{\lambda}{2\pi\varepsilon_0 R} N/C$

B. zero

C. $\frac{2\lambda}{\pi\varepsilon_0 R} N/C$

D. $\frac{\lambda}{\pi\varepsilon_0 R} N/C$

Answer: D

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43. Increase in temperature of a gas filled in a container would lead to :

A. decrease in intermolecular distance

B. increase in its mass

C. increase in its kinetic energy

D. decrease in its pressure

Answer: C

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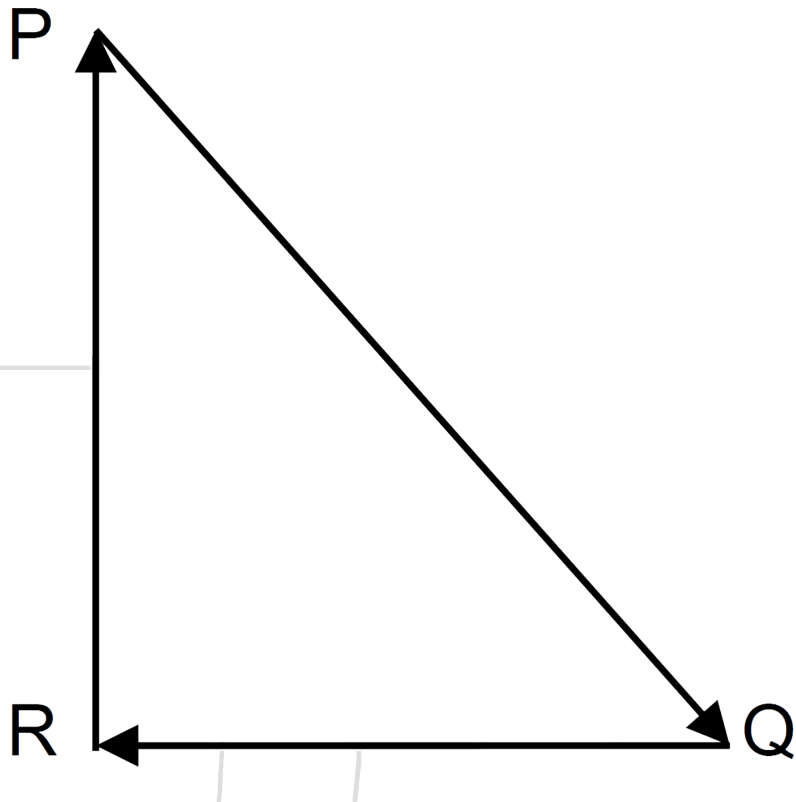
44. A particle moving with velocity $\vec{V}$ is acted by the three forces shown by the vector triangle PQR. The velocity of the particle will :



A. change according to the smallest force $\vec{QR}$

B. increase

C. decrease

D. remain constant

Answer: D

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45. A disc of radius 2 m and mass 100kg rolls on a horizontal floor, its centre of mass has speed of $20cm/s$. How much work is needed to stop it ?

A. 1J

B. 3J

C. 30 KJ

D. 2J

Answer: B

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46. A particle of mass m is projected with velocity making an angle of 45° with the horizontal When the particle lands on the level ground the magnitude of the change in its momentum will be .

A. $mv\sqrt{2}$

B. zero

C. 2 mv

D. $mv/\sqrt{2}$

Answer: A

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47. A long solenoid has 500 turns. When a current of $2A$ is passed through it, the resulting magnetic flux linked with each turn of the solenoid is $4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. 1.0 henry

B. 4.0 henry

C. 2.5 henry

D. 2.0 henry

Answer: A

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48. A particle of mass m, charge q and kinetic energy T enters in a transverse uniform magnetic field of induction B. After the 3 s, the kinetic energy of the particle will be

A. T

B. 4 T

C. 3 T

D. 2 T

Answer: A

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49. The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}ms^{-2}$, in the third second is.

A. $\frac{10}{3}m$

B. $\frac{19}{3}m$

C. 6m

D. 4m

Answer: A

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50. A particle of mass $1mg$ has the same wavelength as an electron moving with a velocity of $3 \times 10^{6} ms^{-1}$. The velocity of the particle is

A. $3 \times 10^{-31} ms^{-1}$

B. $2.7 \times 10^{-21} ms^{-1}$

C. $2.7 \times 10^{-18} ms^{-1}$

D. $9 \times 10^{-2} ms^{-1}$

Answer: C

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51. Sand is being dropped on a conveyor belt at the rate of Mkg/s. The force necessary to kept the belt moving with a constant with a constant velocity of vm/s will be.

A. $\frac{Mv}{2}$ newton

B. zero

C. Mv newton

D. 2 Mv newton

Answer: C

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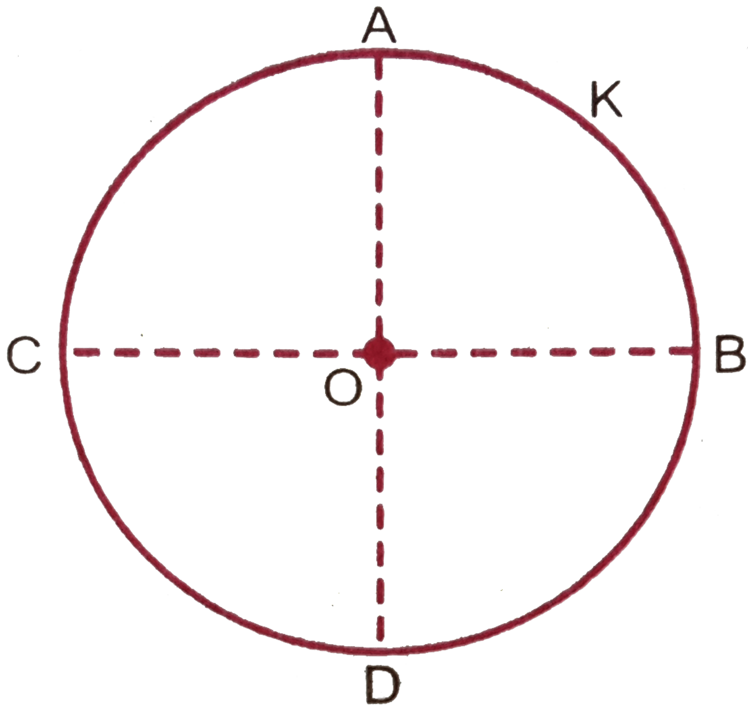
52. A thin conducting ring of radius R is given a charge $+Q$, Fig. The electric field at the center O of the ring due to the charge on the part AKB of the ring is E. The electric field at the center due to the charge on part $ACDB$ of the ring is



A. E along KO

B. 3E along OK

C. 3 E along KO

D. E along OK

Answer: D

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53. Two nuclei have their mass numbers in the ratio of $1:3$. The ratio of their nuclear densities would be

A. $(3)^{1/3}:1$

B. $1:1$

C. $1:3$

D. $3:1$

Answer: B

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54. If $M(A, Z), M_p$ and M_n denote the masses of the nucleus $._Z X^A$, proton and neutron respectively in units of U (where $1U = 931 MeV/c^2$) and B.E. represents its B.E. in MeV, then

A. $M(A, Z) = ZM_p + (A - Z)M_n - BE$

B. $M(A, Z) = ZM_p + (A - Z)M_n + BE/C^2$

C. $M(A, Z) = ZM_p + (A - Z)M_n - BE/C^2$

D. $M(A, Z) = ZM_p + (A - Z)M_n + BE$

Answer: C

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55. A particle moves in a straight line with a constant acceleration. It changes its velocity from $10 ms^{-1}$ to $20 ms^{-1}$ while passing through a distance $135 m$ in t seconds. The value of t is.

A. 12

B. 9

C. 10

D. 1.8

Answer: B

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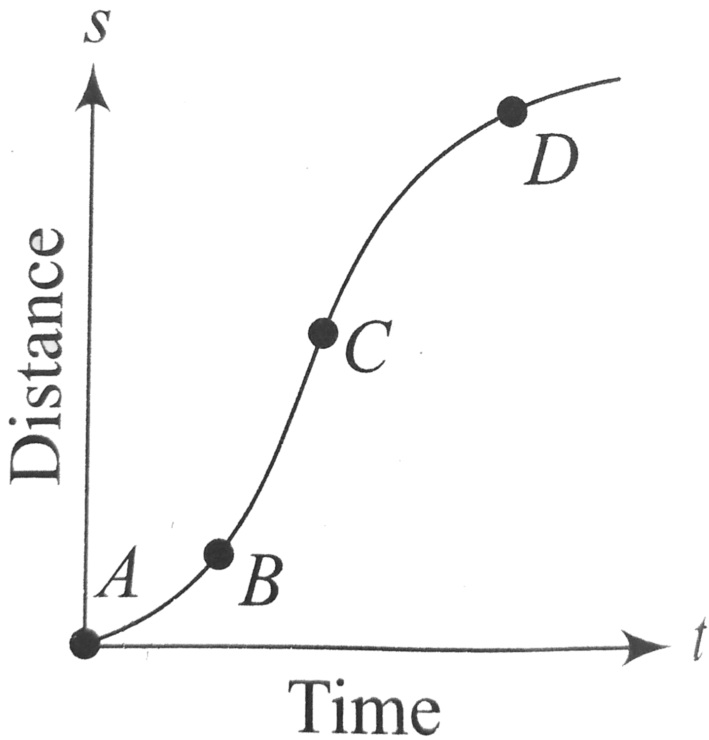
56. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point.



A. D

B. A

C. B

D. C

Answer: D

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57. An electric kettle takes $4A$ current at $220V$. How much time will it take to boil $1kg$ of wate from temperature $20^{\circ}C$? The temperature of boiling water is $100^{\circ}C$

A. 12.6 min

B. 4.2 min

C. 6.3 min

D. 8.4 min

Answer: C

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58. In the phenomenon of electric discharge through gases at low pressure , the coloured glow in the tube appears as a result of

A. collisions between the charged particles emitted from the cathode and the atoms of the gas

B. collision between different electrons of the atoms of the gas

C. excitation of electrons in the atoms

D. collision between the atoms of the gas

Answer: C

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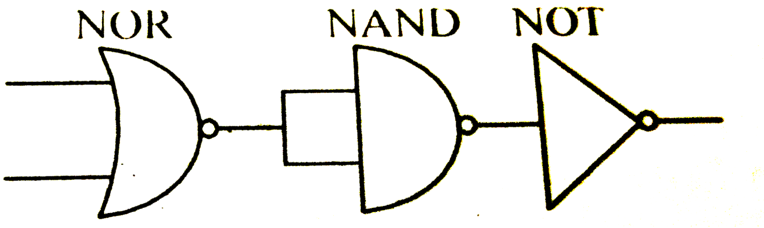
59. The circuit is equivalent to -



A. NOR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: A

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60. If the error in the measurement of radius of a sphere in 2% then the error in the determination of volume of the spahere will be

A. 8%

B. 2%

C. 4%

D. 6%

Answer: D

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61. A thin rod of length L and mass M is bent at its midpoint into two halves so that the angle between them is 90°. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is.

A. $\frac{ML^2}{6}$

B. $\frac{\sqrt{2}ML^2}{24}$

C. $\frac{ML^2}{24}$

D. $\frac{ML^2}{12}$

Answer: D

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62. A p - n photodiode is made of a material with a band gap of $2.0eV$. The minimum frequency of the radiation that can be absorbed by the material is nearly

A. $1 \times 10^{14} Hz$

B. $20 \times 10^{14} Hz$

C. $10 \times 10^{14} Hz$

D. $5 \times 10^{14} Hz$

Answer: D

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63. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is:

A. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

B. $2\left(I_1 + I_2\right)$

C. $I_1 + I_2$

D. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

Answer: B

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64. If Q, E and W denote respectively the heat added, change in internal energy and the work done in a closed cycle process, then

A. $E = 0$

B. $Q = 0$

C. $W = 0$

D. $Q = W = 0$

Answer: A

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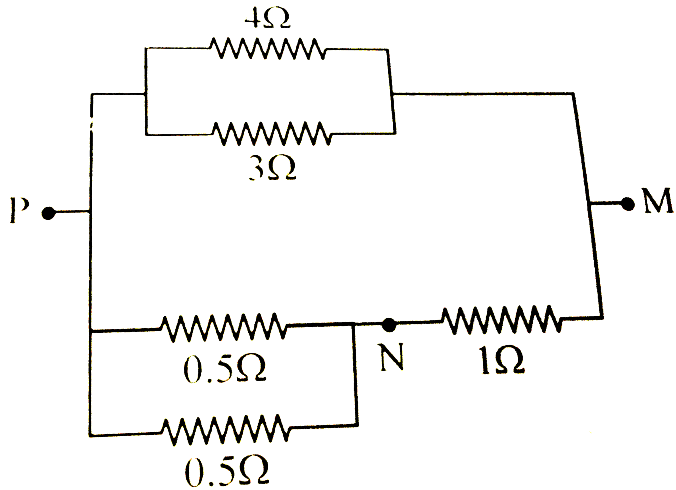
65. In the circuit shown, the current through the 4Ω resistor is 1 amp when the points P and M are connected to a D.C. voltage source. The potential difference between the points M and N is -



A. 0.5 volt

B. 3.2 volt

C. 1.5 volt

D. 1.0 volt

Answer: B

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66. On a new scale of temperature (which is linear) and called the W scale. The freezing and boiling points of water are $39^{\circ} W$ and $239^{\circ} W$ respectively. What will be the temperature on the new scale, corresponding to a temperature of $39^{\circ} C$ on the Celsius scale?

A. $200^{\circ} W$

B. $139^{\circ} W$

C. $78^{\circ} W$

D. $117^{\circ} W$

Answer: D

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67. The wave described by $y = 0.25\sin(10\pi x - 2\pi t)$, where x and y are in metres and t in seconds , is a wave travelling along the:

A. $+ve$ x direction with frequency 1 Hz and wavelength $\lambda = 0.2m$

B. $-ve$ x direction with amplitude 0.25 m and wavelength $\lambda = 0.2m$

C. $-ve$ x direction with frequency 1 Hz

D. $+ve$ x direction with frequency π Hz and wavelength $\lambda = 0.2m$

Answer: A

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68. The electric potential at a point in free space due to a charge Q coulomb is $Q \times 10^{11}$ volts. The electric field at that point is

A. $4\pi\varepsilon_0 Q \times 10^{20}$volt/m

B. $12\pi\varepsilon_0 Q \times 10^{22}$volt/m

C. $4\pi\varepsilon_0 Q \times 10^{22}$volt/m

D. $12\pi\varepsilon_0 Q \times 10^{20}$volt/m

Answer: C

Watch Video Solution

69. The velocity of electromagnetic radiatior in a medium of permittivity ε_0 and permeability μ_0 is given by

A. $\dfrac{1}{\sqrt{\mu_0 \varepsilon_0}}$

B. $\sqrt{\frac{\mu_0}{\varepsilon_0}}$

C. $\sqrt{\frac{\varepsilon_0}{\mu_0}}$

D. $\sqrt{\mu_0\varepsilon_0}$

Answer: A

Watch Video Solution

70. Two points are located at a distance of $10m$ and $15m$ from the source of oscillation. The period of oscillation is 0.05s and the velocity of the wave is $300 m/s$. What is the phase difference between the oscillation of two points?

A. π

B. $\pi/6$

C. $\pi/3$

D. $2\pi/3$

Answer: D

Watch Video Solution

71. Two simple harmonic motions of angular frequency $100 rad s^{-1}$ and $1000 rad s^{-1}$ have the same displacement amplitude. The ratio of their maximum accelerations is

A. $1:10^3$

B. $1:10^4$

C. $1:10$

D. $1:10^2$

Answer: D

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72. If the lattice parameter for a crystalline structure is 3.6Å, then the atomic radius of fcc crystals is

A. 2.92 Å

B. 1.27 Å

C. 1.81 Å

D. 2.10 Å

Answer: B

Watch Video Solution

73. Water falls from a height of $60m$ at the rate $15kg/s$ to operate a turbine. The losses due to frictional forces are 10% of energy . How much power is generated to by the turbine? (g=10 m//s^(2))`.

A. 12.3 kW

B. 7.0 kW

C. 8.1 kW

D. 10.2 kW

Answer: C

Watch Video Solution

74. The energy required to charge a parallel plate condenser of plate separtion d and plate area of cross-section A such that the unifom field between the plates is E is

A. $\varepsilon_0 E^2 Ad$

B. $\frac{1}{2}\varepsilon_0 E^2 Ad$

C. $\frac{1}{2}\varepsilon_0 E^2 / Ad$

D. $\varepsilon_0 E^2 / Ad$

Answer: A

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75. A boy is trying to start a fire by focusing sunlight on a piece of paper using an equiconvex lens of focal length $10cm$. The diameter of the sun is $1.39 \times 10^9 m$ and its mean distance from the earth is $1.5 \times 10^{11} m$. What is the diameter of the sun's image on the paper ?

A. $6.5 \times 10^{-5} m$

B. $12.4 \times 10^{-4} m$

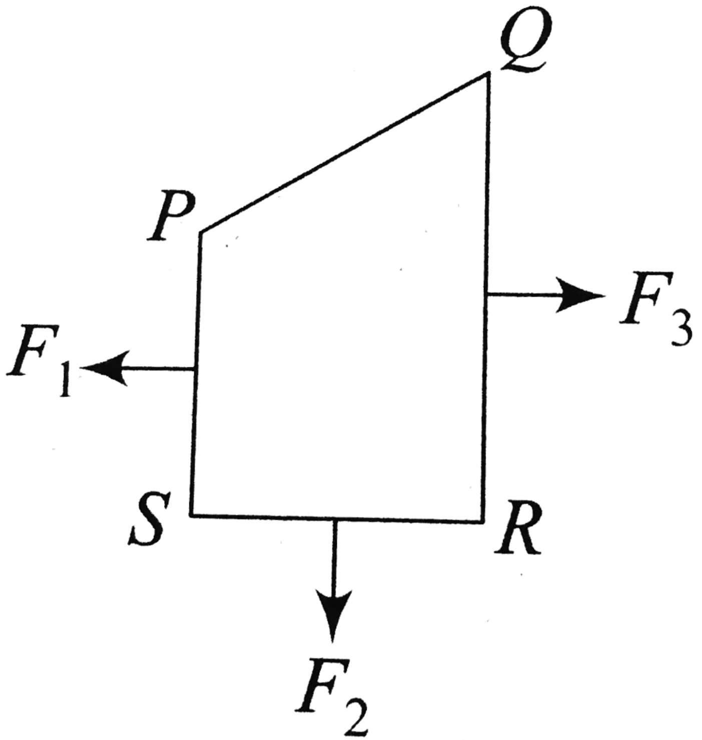
C. $9.2 \times 10^{-4} m$

D. $6.5 \times 10^{-4} m$

Answer: C

Watch Video Solution

76. A closed loop $PQRS$ carrying a current is place in a unifrom magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment QP is



A. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

B. $F_3 - F_1 - F_2$

C. $F_3 - F_1 - F_2$

D. $\sqrt{(F_3 - F_1)^2 + F_2^2}$

Answer: D

Watch Video Solution

77. A wire of a certain material is stretched slowly by ten percent. Its new resistance and specific resistance become respectively.

A. both remain the same

B. 1.1 times, 1.1 times

C. 1.2 times, 1.1 times

D. 1.21 times, same

Answer: D

Watch Video Solution

78. Curie temperature is the temperature above which

A. paramagnetic material becomes ferromagnetic material

B. ferromagnetic material becomes diamagnetic material

C. ferromagnetic material becomes paramagnetic material

D. paramagnetic material becomes diamagnetic material

Answer: C

Watch Video Solution

79. Which two of the following five physical parameters have the same dimensions?`

Energy density

Refractive index

Dielectric constant

Young's modulus

Magnetic field

A. (a) and (b)

B. (a) and (e)

C. (b) and (d)

D. (c) and (e)

Answer: A

Watch Video Solution

80. The groud state energy of hydrogen atom is $-13.6eV$. When its electron is in first excited state, its exciation energy is

A. 10.2 eV

B. zero

C. 3.4 eV

D. 6.8 eV

Answer: A

Watch Video Solution

81. The voltage gain of an amplifier with 9% negative feedback is 10. The voltage gain without feedback will be

A. 1.25

B. 100

C. 90

D. 10

Answer: B

Watch Video Solution

82. A galvanometer of resistance 50Ω is connected to a battery of $3V$ along with resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 division the above series resistance should be

A. 6050Ω

B. 4450Ω

C. 5050Ω

D. 5550Ω

Answer: B

Watch Video Solution

83. A shell of mass $200g$ is ejected from a gun of mass $4kg$ by an explosion that generate $1.05kJ$ of energy. The initial velocity of the shell is

A. $40ms^{-1}$

B. $120ms^{-1}$

C. $100ms^{-1}$

D. $80ms^{-1}$

Answer: C

Watch Video Solution

84. In any AC circuit the emf (e) and the current (i) at any instant are given respectively by $e = E_0 \sin\omega t$

$i = I_0 \sin(\omega t - \phi)$

The average power in the circuit over one cycle of AC is

A. $\frac{E_0 I_0}{2} \cos\phi$

B. $E_0 I_0$

C. $\frac{E_0 I_0}{2}$

D. $\frac{E_0 I_0}{2} \sin\phi$

Answer: A

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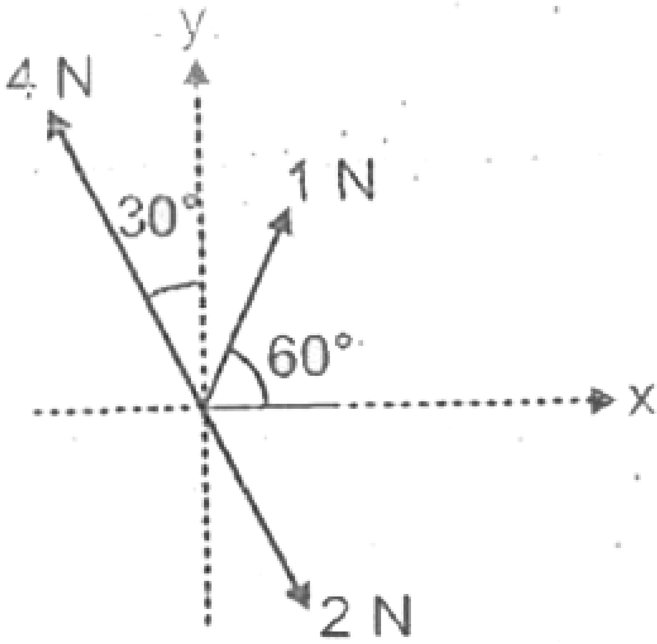
85. Three froces acting on a body are shown in the figure. To have the resultant force only along the y-direction, the magnitude of the minimum additional force needed is



A. $\frac{\sqrt{3}}{4}N$

B. $\sqrt{3}N$

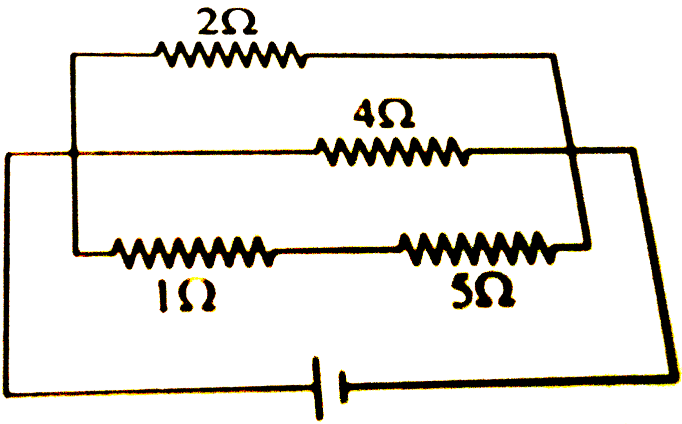
C. $0.5N$

D. $1.5N$

Answer: C

Watch Video Solution

86. A current of 3 amp. flows through the 2Ω resistor shown in the circuit. The power dissipated in the 5Ω resistor is -



A. 1 watt

B. 5 watt

C. 4 watt

D. 2 watt

Answer: B

View Text Solution

87. Two radioactive materials X_1 and X_2 have decay constants 5λ and λ respectively. If initially they have the same number of nuclei, then the ratio of the number of muclei of X_1 to that of X_2 will be $\frac{1}{e}$ after a time

A. $\frac{1}{4\lambda}$

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

C. λ

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

Answer: A

Watch Video Solution

88. The work function of a surface of a photosensitive material is $6.2eV$. The wavelength of the incident radiation for which the stopping potential is $5V$ lies in the

A. Infrared region

B. X-ray region

C. Ultraviolet regi

D. Visible region

Answer: C

Watch Video Solution

89. A point performs simple harmonic oscillation of period T and the equation of motion is given by $x = a\sin\left(\omega t + \frac{\pi}{6}\right)$. After the elapse of what fraction of the time period, the velocity of the point will be equal to half of its maximum velocity ?

A. T/3

B. T/12

C. T/8

D. T/6

Answer: B

Watch Video Solution

90. Two thin lenses of focal length f_1 and f_2 are in contact and coaxial. The power of the combination is

A. $\dfrac{f_1 + f_2}{2}$

B. $\dfrac{f_1 + f_2}{f_1 f_2}$

C. $\sqrt{\frac{f_1}{f_2}}$

D. $\sqrt{\frac{f_2}{f_1}}$

Answer: B

Watch Video Solution

91. At $10^\circ C$, the value of the density of a fixed mass of an ideal gas divided by its pressure is x. at $110^\circ C$, this ratio is

A. $\frac{10}{110}x$

B. $\frac{283}{383}x$

C. x

D. $\frac{383}{283}x$

Answer: B

Watch Video Solution

92. A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is $20m$. The speed of the car at the top of the hill is between

A. 16 m/s and 17 m/s

B. 13 m/s and 14 m/

C. 14 m/s and 15 m/s

D. 15 m/s and 16 m/s

Answer: C

Watch Video Solution

93. A circular disc of radius $0.2m$ is placed in a uniform magnetic fied of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60° with The magnetic flux linked with the disc is

A. 0.08 Wb

B. 0.01 Wb

C. 0.02 Wb

D. 0.06 Wb

Answer: C

Watch Video Solution

94. The ratio of the radii of gyration of a circular disc to that of a circular ring, each of same mass and radius, around their respective axes is.

A. $\sqrt{2}:1$

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

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

D. $1:\sqrt{2}$

Answer: D

Watch Video Solution

95. A cell can be balanced against $110cm$ and $100cm$ of potentiometer wire, respectively with and without being short circuited through a resistance of 10Ω. Its internal resistance is

A. 2.0 ohm

B. zero

C. 1.0 ohm

D. 0.5 ohm

Answer: C

Watch Video Solution

96. Which one of the following arrangements does not give the correct picture of the trends indicated against it ?

A. $F_2 > Cl_2 > Br_2 > I_2$ Bond dissoviation energy

B. $F_2 > Cl_2 > Br_2 > I_2$ Electronegativity

C. $F_2 > Cl_2 > Br_2 > I_2$ Oxidizing power

D. $F_2 > Cl_2 > Br_2 > I_2$ Electron gain enthalpy

Answer: A

Watch Video Solution

97. If a gas expands at constant temperature, it indicates that

A. kinetic energy of molecules remains the same

B. number of the molecules of gas increases

C. kinetic energy of molecules decreases

D. pressure of the gas increases

Answer: A

Watch Video Solution

98. The dissociation equilibrium of a gas AB_2 can be represented as

$2AB_2(g) \Leftrightarrow 2AB(g) + B_2(g)$

The degree of dissociation is x and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium contant K_p and total pressure p is

A. $\left(2K_p / P\right)^{1/2}$

B. $\left(K_p / P\right)$

C. $\left(2K_p / P\right)$

D. $\left(2K_p / P\right)^{1/3}$

Answer: D

Watch Video Solution

99. The bromination of acetone that occurs in acid solution is represented by this equation.

$CH_3COCH_3(aq) + Br_2(aq) \rightarrow$

$CH_3COCH_2Br(aq) + H^+(aq) + Br(aq)$

These kinetic data were obtained for given reaction concentrations.

Initial concentration, M

$[CH_2COCH_3]$	$[Br_2]$	$[H^+]$	(Initail rate) (disappearance of Br_2)
0.30	0.05	0.05	5.7×10^{-5}
0.30	0.10	0.05	5.7×10^{-5}
0.30	0.10	0.10	1.2×10^{-4}
0.40	0.5	0.20	3.1×10^{-4}

A. Rate $= k[CH_3COCH_3][Br_2][H^+]^2$

B. Rate $= k[CH_3COCH_3][Br_2][H^+]$

C. Rate $= k[CH_3COCH_3][H^+]$

D. Rate $= k[CH = COCH_3][Br_2]$

Answer: C

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100. A thin circular ring of mass M and radius R is rotating about its axis with constant angular velocity ω. The objects each of mass m are attached gently to the ring. The wheel now rotates with an angular velocity.

A. $\dfrac{2M\omega}{M+2m}$

B. $\dfrac{(M+2m)\omega}{M}$

C. $\dfrac{M\omega}{M+2m}$

D. $\dfrac{(M+2m)\omega}{2m}$

Answer: C

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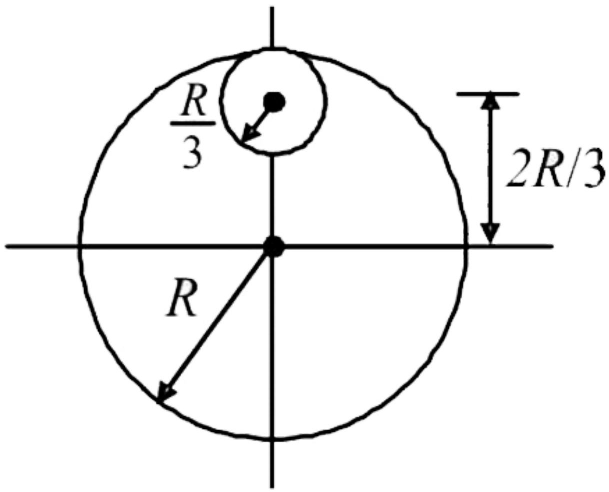
101. From a circular disc of radius R and mass 9 M , a small disc of radius R/3 is removed from the disc. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through O is



A. MR^2

B. $4MR^2$

C. $\frac{4}{9}MR^2$

D. $\frac{40}{9}MR^2$

Answer: D

Watch Video Solution

102. A particle of mass M starting from rest undergoes uniform acceleration. If the speed acquired in time T is V, the power delivered to the particle is -

A. $\frac{1}{2}\frac{MV^2}{T^2}$

B. $\frac{MV^2}{T^2}$

C. $\frac{1}{2}\frac{MV^2}{T}$

D. $\frac{MV^2}{T}$

Answer: C

Watch Video Solution

103. A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on an inclined plane. Both roll down without slipping. Which one will reach the bottom first ?

A. Both together

B. Hollow cylinder

C. Solid cylinder

D. Both together only when angle of inclination of plane is 45°

Answer: C

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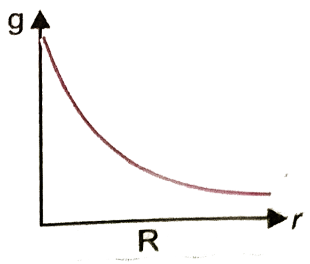
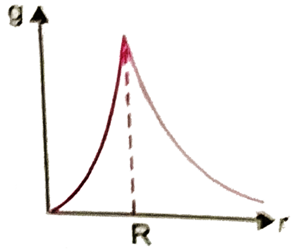
104. The dependence of acceleration due to gravity g on the distance r from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in Fig. below:

(1)



(2)



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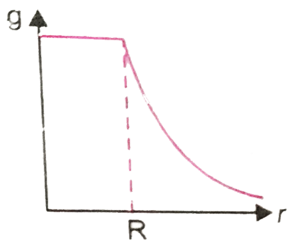

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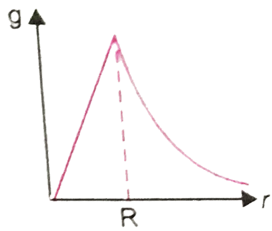

The correct figure is

A. a

B. b

C. c

D. d

Answer: D

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105. The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it forms a circular orbit of radius R_1 to another of radius $R_2\left(R_2 > R_1\right)$ is

A. $GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

B. $2GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

C. $\frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

D. $GmM\left(\frac{1}{R_1^2} - \frac{1}{R_2^2}\right)$

Answer: C

Watch Video Solution

106. A student measures that distance traversed in free fall of a body, initially at rest in given time. He uses this data to estimated g, the acceleration due to gravity. If the maximum percentage error in measurement of the distance and the time are e_1 and e_2, respectively, the percentage error in the estimation of g is

A. $e_1 + 2e_2$

B. $e_1 + e_2$

C. $e_1 - 2e_2$

D. $e_2 - e_1$

Answer: A

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107. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is .

A. 15°

B. 30°

C. 45°

D. 60°

Answer: D

Watch Video Solution

108. (1) Centre of gravity (C.G.) of a body is the point at which the weight of the body acts,

(2) Centre of mass coincides with the centre of gravity if the earth is assumed to have infinitely large radius,

(3) To evaluate the gravitational field intensity due to any body at an external point, the entire mass of the body can be cosidered to be concentrated at its C.G..,

(4) The radius of gyration of any body rotating about ab axis is the length of the perpendicular dropped from thr C.G. the body to the axis. which one of the following paries of statements is correct ?

A. (a) and (b)

B. (b) and (c)

C. (c) and (d)

D. (d) and (a)

Answer: A

Watch Video Solution

109. The electric field on an electromagnetic wave in free space is given by

$$E = 10\cos\left(10^7 t + kx\right)\hat{j}V/m,$$

Where t and x are in seconds and metres respectively. It can be inferred that

(1) the wavelength λ is $188.4m$.

(2) the wave number k is $0.33rad/m$

(3) the wave amplitude is $10V/m$

(4) the wave is propagating along +x direction.

which one of the following pairs of statement is correct?

A. (a) and (b)

B. (b) and (c)

C. (a) and (c)

D. (c) and (d)

Answer: C

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110. A particule moves in x - y plane acording to rule x = a sin ωt and y = a cos ωt. The particle follows

A. a circular path

B. a parabolic path

C. a straight line path inclined equally to x and y-axes

D. an elliptical path

Answer: A

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111. The speed of light in media M_1 and M_2 are $1.5 \times 10^8 m/s$ and $2.0 \times 10^8 m/s$ respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle i. If the ray suffers total internal reflection, the value of i is.

A. Equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$

B. Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$

C. less than $\sin^{-1}\left(\frac{2}{3}\right)$

D. Equal to $\sin^{-1}\left(\frac{2}{3}\right)$

Answer: B

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112. A ray of light is incident on a 60° prism at the minimum deviation position. The angle of refraction at the first face (i.e. incident face) of the prism is-

A. 30°

B. 45°

C. 60°

D. Zero

Answer: A

Watch Video Solution

113. A monoatomic gas at pressure P_1 and volume V_1 is compressed adiabatically to $\frac{1}{8}th$ of its original volume. What is the final pressure of gas.

A. P_1

B. $16P_1$

C. $32P_1$

D. $64P_1$

Answer: C

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114. If C_p and C_v denote the specific heats (per unit mass of an ideal gas of molecular weight M), then

where R is the molar gas constant.

A. $C_p - C_v = R$

B. $C_p - C_v = R/M$

C. $C_p - Cv = MR$

D. $C_p - C_v = R/M^2$

Answer: B

Watch Video Solution

115. What is the net magnetic moment of an atom of a diamagnetic material?

A. 1

B. between zero and one

C. equal to zero

D. much greater than one

Answer: C

Watch Video Solution

116. A current loop consists of two identical semicircular parts each of radius R, one lying in the x-y plane and the other in x-y plane. If the current in the loop is i, the resultant magnetic field due to two semicircular parts at their common centre is

A. $\frac{\mu_0 i}{2R}$

B. $\frac{\mu_0 i}{4R}$

C. $\frac{\mu_0 i}{\sqrt{2}R}$

D. $\frac{\mu_0 i}{2\sqrt{2}R}$

Answer: D

Watch Video Solution

117. A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4} m^2$ carries a current of 2.0 a. it suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be:

A. $1.5 \times 10^{-3} N.m$

B. $1.5 \times 10^{-2} N.m$

C. $3 \times 10^{-2} N.m$

D. $3 \times 10^{-3} N.m$

Answer: B

Watch Video Solution

118. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor wehnn the potential difference across the condenser reduces to V_2 is

A. $\dfrac{C\left(V_1^2 - V_2^2\right)}{L}$

B. $\dfrac{C\left(V_1^2 + V_2^2\right)}{L}$

C. $\left(\dfrac{C\left(V_1^2 - V_2^2\right)}{L}\right)^{1/2}$

D. $\left(\dfrac{C\left(V_1 - V_2\right)^2}{L}\right)^{1/2}$

Answer: C

Watch Video Solution

119. Two parallel metal plates having charges $+Q$ and $-Q$ face each other at a certain distance between them.If the plates are now dipped in kerosene oil tank ,the electric field between the plates will

A. increase

B. decrease

C. remain same

D. become zero

Answer: B

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120. The electric field at a distance $3R/2$ from the centre of a charge conducting spherical shell of radius R is E. The electric field at a distance $R/2$ from the centre of the sphere is

A. E

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

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

D. Zero

Answer: D

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121. The thermo e.m.f. E in volts of a certain thermocouple is found to vary with temperature difference q in . $^{\circ}C$ between the two junctions according to the relation $E = 30\theta - \frac{\theta^2}{15}$

The neutral temperature for the thermo-couple will be:-

A. $400\,^\circ C$

B. $225\,^\circ C$

C. $30\,^\circ C$

D. $450\,^\circ C$

Answer: B

Watch Video Solution

122. A particle having a mass of $10^{-2} kg$ carries a charge of $5 \times 10^{-8} C$. The particle is given an initial horizontal velocity of $10^5 m sec^{-1}$ in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that

A. $\vec{B}$ should be perpendicular to the direction of velocity and $\vec{E}$ should be along the direction of velocity

B. Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity

C. Both $\vec{B}$ and $\vec{E}$ are mutually perpendicular and perpendicular to the direction of velocity

D. $\vec{B}$ should be along the direction of velocity and $\vec{E}$ should be perpendicular to the direction of velocity

A. (c) and (d)

B. (b) and (c)

C. (b) and (d)

D. (a) and (c)

Answer: B

Watch Video Solution

123. When monochromatic radiation of intensity I falls on a metal surface, the number of photoelectrons and their maximum kinetic are N and T respectively. If the intensity of radiation is 2 I, the number of emitted electrons and their maximum kinetic energy are respectively.

A. 2N and T

B. 2N and 2T

C. N and T

D. N and 2T

Answer: A

Watch Video Solution

124. The electron in the hydrogen atom jumps from excited state (n=3) to its ground state (n=1) and the photons thus emitted irradiate a photosensitive material. If the work function of the material is 5.1eV, the stopping potential is estimated to be: (The energy of the electron in nth state is $E_n = -13.6/n^2 eV$)

A. $12.1V$

B. $17.2V$

C. 7 V

D. $5.1V$

Answer: C

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125. The binding energy per nucleon of deuterium and helium atom is $1.1 MeV$ and $7.0 MeV$. If two deuterium nuclei fuse to form helium atom, the energy released is.

A. 2.2 MeV

B. 28.0 MeV

C. 30.2 MeV

D. 23.6 MeV

Answer: D

Watch Video Solution

126. The decay constant of radio isotope is λ. If A_1 and A_2 are its activities at times t_1 and t_2 respectively, the number of nuclei which have decayed during the time $\left(t_1 - t_2\right)$

A. $A_1 - A_2$

B. $\left(A_1 - A_2\right)/\lambda$

C. $\lambda\left(A_1 - A_2\right)$

D. $\left(A_1t_1 - A_2t_2\right.$

Answer: B

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127. In a normal operation of a transistor,

(i) base-emitter junction is forward-biased

(ii) base-collector junction is forward-biased

(iii) base-emitter junction is reverse-baised

(iv) base-collector junction is reverse-biased

A. (a), (b)

B. (b), (c)

C. (c), (d)

D. (d), (a)

Answer: B

Watch Video Solution

128. In a circuit, the instantaneous values of alternating current and voltages in a circuit is given by

$I = \frac{1}{\sqrt{2}}\sin(100\pi t)A$ and

$E = \frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right)V.$

The average power in watts consumed in the circui is

A. $\frac{\sqrt{3}}{4}$

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

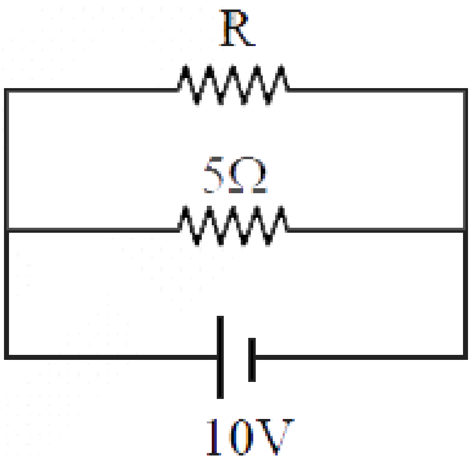
C. $\frac{1}{8}$

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

Answer: C

Watch Video Solution

129. The power dissipated in the circuit shown in the figure is 30 Watts. The value of R is -



A. 15Ω

B. 10Ω

C. 30Ω

D. 20Ω

Answer: B

View Text Solution

130. The dimensions of $\left(\mu_0\varepsilon_0\right)^{-1/2}$ are

A. $\left[L^{-1}T\right]$

B. $\left[LT^{-1}\right]$

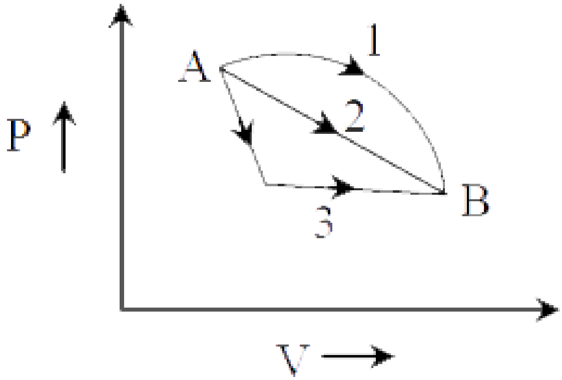
C. $\left[L^{1/2}T^{1/2}\right]$

D. $\left[L^{1/2}T^{-1/2}\right]$

Answer: B

Watch Video Solution

131. An ideal gas goes from state A to state B via three different processes as indicated in the P-V diagram -



If Q_1, Q_2, Q_3 indicate the heat absorbed by the gas along the three process and $\Delta U_1, \Delta U_2, \Delta U_3$, indicate the change in internal energy along the three processes respectively, then -

A. $Q_3 > Q_2 > Q_1$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$

B. $Q_1 = Q_2 = Q_3$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$

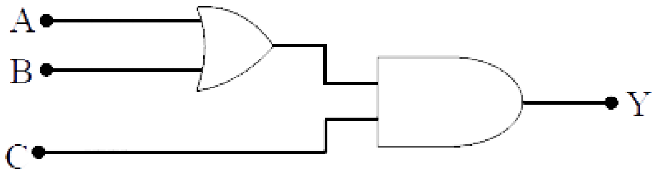
C. $Q_3 > Q_2 > Q_1$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$

D. $Q_1 > Q_2 > Q_3$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$

Answer: D

View Text Solution

132. To get an output Y = 1 in given circuit which of the following input will be correct -



A. $\begin{matrix} A & B & C \\ 1 & 0 & 1 \end{matrix}$

B. $\begin{matrix} A & B & C \\ 1 & 1 & 0 \end{matrix}$

C. $\begin{matrix} A & B & C \\ 0 & 1 & 0 \end{matrix}$

D. $\begin{matrix} A & B & C \\ 1 & 0 & 0 \end{matrix}$

Answer: A

View Text Solution

133. Two metallic spheres of radii $1cm$ and $2cm$ are given charges $10^{-2}C$ and $5 \times 10^{-2}C$ respectively. If they are connected by a conducting wire, the final charge on the smaller sphere is

A. $3 \times 10^{-2}C$

B. $4 \times 10^{-2}C$

C. $1 \times 10^{-2}C$

D. $2 \times 10^{-2}C$

Answer: A

Watch Video Solution

134. Lights of two different frequencies whose photons have energies 1 and 2.5 eV, respectively, successively illuminate a metal whose work function is 0.5 eV. The ratio of the maximum speeds of the emitted electrons

A. $1:2$

B. $1:1$

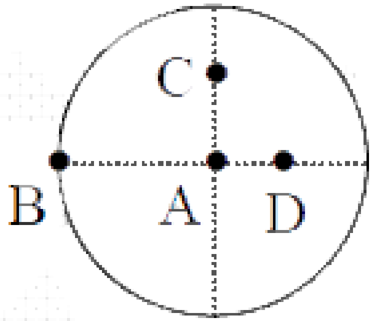
C. $1:5$

D. $1:4$

Answer: A

Watch Video Solution

135. The moment of inertia of a uniform circular disc is maximum about an axis perpendicular to the disc and passing through -



A. C

B. D

C. A

D. B

Answer: D

View Text Solution

136. A train moving at a speed of $220ms^{-1}$ towards a stationary object emits a sound of frequency 1000 Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is (speed of sound in air is $330ms^{-1}$)

A. 4000 Hz

B. 5000 Hz

C. 3000 Hz

D. 3500 Hz

Answer: B

Watch Video Solution

137. The half-life of a radioactive nucleus is 50 days. The time interval $\left(t_2 - t_1\right)$ between the time t_2 when $\frac{2}{3}$ of it has decayed and the time t_1 when $\frac{1}{3}$ of it had decayed is

A. 50 days

B. 60 days

C. 15 days

D. 30 days

Answer: A

Watch Video Solution

138. A car of mass m is moving on a level circular track of radius R if μ_s represents the static friction between the road and tyres of the car, the maximum speed of the car in circular motion is given by.

A. $\sqrt{Rg/\mu_s}$

B. $\sqrt{mRg/\mu_s}$

C. $\sqrt{\mu_s Rg}$

D. $\sqrt{\mu_s mRg}$

Answer: C

Watch Video Solution

139. A circular platform is mounted on a frictionless vertical axle. Its radius $R = 2m$ and its moment of inertia about the axle is $200kgm^2$. It is initially at rest. A $50kg$ man stands on the edge at the platform and begins to walk along the edge at the speed of

$1ms^{-1}$ relative to the ground. Time taken by the man to complete one revolution is :

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

B. $2\pi s$

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

D. πs

Answer: B

Watch Video Solution

140. If the momentum of an electron is changed by p, then the de - Broglie wavelength associated with it changes by 0.5%. The initial momentum of electron will be

A. 400 P

B. $\frac{P}{200}$

C. 100 P

D. 200 P

Answer: D

Watch Video Solution

141. If v_e is escape velocity and v_0, is orbital velocity of satellite for orbit close to the earth's surface. Then are related by

A. $v_o = v_e$

B. $v_e = \sqrt{2v_o}$

C. $v_e = \sqrt{2}v_o$

D. $v_o = \sqrt{2}v_e$

Answer: C

Watch Video Solution

142. The equation of a simple harmonic wave is given by

$$y = 3\sin\frac{\pi}{2}(50t - x)$$

where x and y are in meters and x is in second .The ratio of maximum particle velocity to the wave velocity is

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

B. 3π

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

D. 2π

Answer: A

Watch Video Solution

143. A proton carrying $1MeV$ kinetic energy is moving in a circular path of radius R in unifrom magentic field. What should be the energy of an α - particle to describe a circle of the same radius in the same field?

A. 1 MeV

B. 0.5 MeV

C. 4 MeV

D. 2 MeV

Answer: A

Watch Video Solution

144. Three masses are placed on the x-axis : $300g$ at origin. $500g$ at $x = 40cm$ and $400g$ at $x = 70cm$. The distance of the centre of mass from the origin is.

A. 45 cm

B. 50 cm

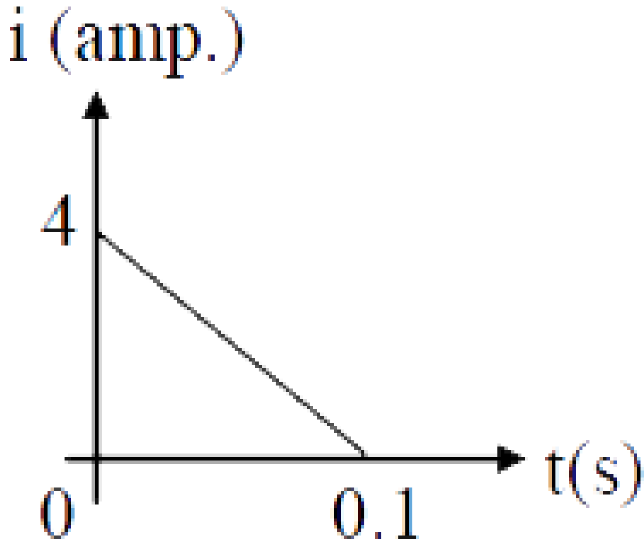
C. 30 cm

D. 40 cm

Answer: D

Watch Video Solution

145. In a coil of resistance 10Ω, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is -



A. 2

B. 6

C. 4

D. 8

Answer: A

View Text Solution

146. A parallel plate capacitor of plate area A and plates separation distance d is charged by applying a potential V_0 between the plates. The dielectric constant of the medium between the plates is K. What is the uniform electric field E between the plates of the capacitor ?

A. E^2Ad/ε_0

B. $\frac{1}{2}\varepsilon_0 E^2 Ad$

C. $\varepsilon_0 EAd$

D. $\frac{1}{2}\varepsilon_0 E^2$

Answer: B

Watch Video Solution

147. A car of mass m starta from rest and accelerates so that the instyantaneous power delivered to the car has a constant magnitude P_0. The instaneous velocity of this car is proportional to

A. $t^{1/2}$

B. $t^{-1/2}$

C. $t/\sqrt{m}$

D. $t^2 P_0$

Answer: A

Watch Video Solution

148. Which one of the following plots represents the variation of the gravitational field on a particle with distance r due to a thin spherical shell of raduis R? (r is measured from the centre of the spherical shell).

A.

B.

C.

D.

Answer: A

Watch Video Solution

149. The input resistance of a silicon transistor is 100Ω. Base current is changed by $40\mu A$ which results in a change in collector current by $2mA$. This transistor is used as a common-emitter amplifier with a load resistance of $4k\Omega$. The voltage gain of the amplifier is

A. 3000

B. 4000

C. 1000

D. 2000

Answer: D

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150. For the angle of minimum deviation of a prism to be equal to its refracting angle, the prism must be made of a material whose refractive index

A. lies between 2 and $\sqrt{2}$

B. is less than 1

C. is greater than 2

D. lies between$\sqrt{2}$ and 1

Answer: A

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151. The transition form the state $n = 3$ to $n = 1$ in a hydrogen-like atom results in ultraviolet radiation. Infared radiation will be obtained in the transition from

A. $3 \rightarrow 2$

B. $4 \rightarrow 2$

C. $4 \rightarrow 3$

D. $2 \rightarrow 1$

Answer: C

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152. A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that the end closer to the pole is 20 cm away from it. Find the length of the image.

A. 15 cm

B. 2.5 cm

C. 5 cm

D. 10 cm

Answer: C

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153. A slab of stone of area of $0.36m^2$ and thickness $0.1m$ is exposed on the lower surface to steam at $100\,^\circ C$. A block of ice at $0\,^\circ C$ rests on the upper surface of the slab. In one hour $4.8kg$ of ice is melted. The thermal conductivity of slab is

(Given latent heat of fusion of ice $= 3.63 \times 10^5 Jkg^{-1}$)

A. $1.29J/m/s/^\circ C$

B. $2.05J/m/s/^\circ C$

C. $1.02J/m/s/^\circ C$

D. $1.24J/m/s/^\circ C$

Answer: D

Watch Video Solution

154. A stone is dropped from a height h . It hits the ground with a certain momentum P . If the same stone is dropped from a height $100\,\%$ more thanthe preyiious height, the momentum when it hits the ground will change by

A. $41\,\%$

B. $200\,\%$

C. $100\,\%$

D. $68\,\%$

Answer: A

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155. $2A$ cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by

A.

B.

C.

D.

Answer: B

Watch Video Solution

156. A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}J$ of work to turn it through 60°. The torque needed to maintain the needle in this postion will be:

A. 3 J

B. $\sqrt{3}J$

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

D. $2\sqrt{3}J$

Answer: A

Watch Video Solution

157. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacumm is equal to

A. reciprocal of speed of light in vacuum

B. the ratio of magnetic permeability to the electric susceptibility of vacuum

C. unity

D. the speed of light in vacuum

Answer: A

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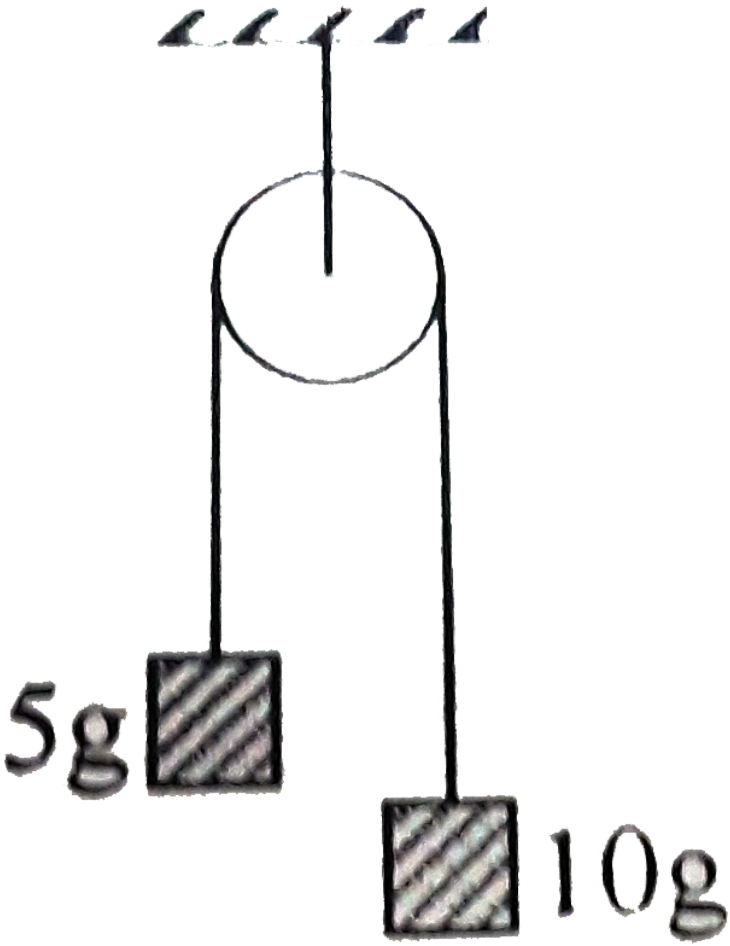
MCQs

1. Two masses as shown are suspended from a massless pulley. Calculate the acceleration of the system when masses aere left free:



A. 2g/3

B. g/3

C. g/9

D. g/7

Answer: B

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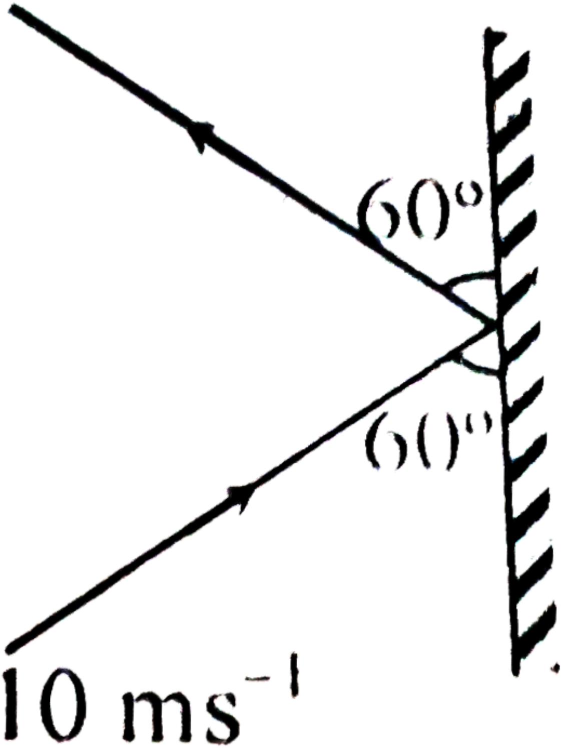
2. A body of mass 3 kg hits a wall at an angle of 60° & returns at the same angle. The impact time was 0.2s. Calculate the force exerted on the wall:



A. $150\sqrt{3}N$

B. $50\sqrt{3}N$

C. 100 N

D. $75\sqrt{3}N$

Answer: A

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3. A mass of 1 kg is thrown up with a velocity of 100 m/s. After 5 seconds. It explodes into two parts. One parts of mass 400 g comes down with a velocity 25 m/s Calaculate the velocity of other parts:

A. 40 m/s upward

B. 40 m/s downward

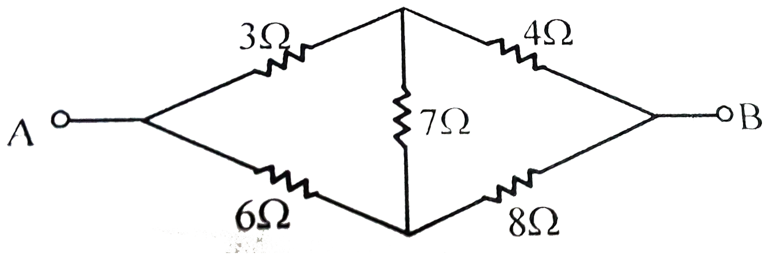
C. 100 m/s upward

D. 60 m/s downward

Answer: C

Watch Video Solution

4. Calculate the net resistance of the circuit between A and B:



A. 8/3 Ω

B. 14/3 Ω

C. 16/3 Ω

D. 22/3 Ω

Answer: B

Watch Video Solution

5. A capacitor is charged with a battery and energy stored is U. After disconnecting battery another capacitor of same capacity is connected in parallel with it. Then energy stored in each capacitor is:

A. U/2

B. U/4

C. 4 U

D. 2 U

Answer: B

Watch Video Solution

6. Two projectiles of same mass and with same velocity are thrown at an angle 60° and 30° with the horizontal, then which quantity will remain same:-

A. Time of flight

B. Horizontal range of projectile

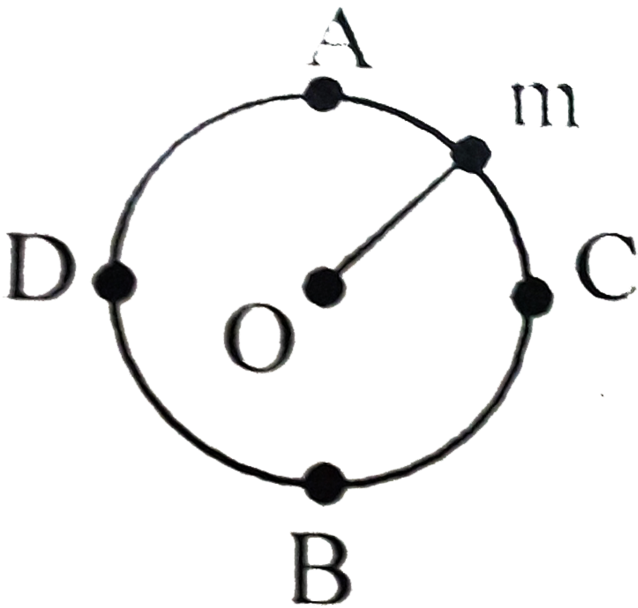
C. Max height acquired

D. All of them

Answer: B

Watch Video Solution

7. A mass is performing vertical ciruclar motion . If the average velocity of the particle is increased, then at which point the string will break:



A. A

B. B

C. C

D. D

Answer: B

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8. A nuclear decay is expressed as ltbr. $._6C^{11} \rightarrow ._5B^{11} + \beta^+ + X$

Then the unknown particle X is

A. Neutron

B. Anti neutrino

C. Neutrino

D. Proton

Answer: C

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9. A man is slipping on a frictions inclined plane & a bag falls down from the same height. Then the speed of both is related as:

A. $V_B > V_m$

B. $V_B < V_m$

C. $V_B = V_m$

D. V_B and V_m can't related

Answer: C

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10. A body weighs 72 N on the surface of the earth. What is the gravitational force on it due to earth at a height equal to half the radius of the earth from the surface

A. 36N

B. 32 N

C. 144 N

D. 50 N

Answer: B

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11. What is a rainbow ? What is its two types ? How are they formed ? Discuss briefly.

A. Scattering & refraction

B. Total internal reflection & dispersion

C. Reflection only

D. Diffraction and dispersion

Answer: B

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12. Gravitational force is required for:

A. Stirring of liquid

B. Convection

C. Conduction

D. Radiation

Answer: B

Watch Video Solution

13. For a plane convex lens $(\mu 1.5)$ has radius of curvature 10 cm. It is slivered on its plane surface. Find focal length after silvering:

A. 10 cm

B. 20 cm

C. 15 cm

D. 25 cm

Answer: A

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14. By photoelectric effect, Einstein, proved

A. E = hV

B. $KE = \frac{1}{2}mv^2$

C. $E = mc^2$

D. $E = \left(Rhc^2\right)/\left(n^2\right)$

Answer: A

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15. Maximum frequency of emission is obtained for the transition:

A. n = 2 to n = 1

B. n = 6 to n = 2

C. n = 1 to n = 2

D. n = 2 to n = 6

Answer: A

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16. To find out degree of freedom, the correct expression is:

A. solid cylinder

B. Hollow cylinder

C. Both simultaneosly

D. Can't say anything

Answer: A

Watch Video Solution

17. To find out degree of freedom, the correct expression is:

A. $f = \frac{2}{\gamma - 1}$

B. $f = \frac{\gamma + 1}{2}$

C. $f = \frac{2}{\gamma + 1}$

D. $f = \frac{1}{\gamma + 1}$

Answer: A

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18. The frequency order of for γ-rays (b) X-rays (a) UV-rays (c):

A. $b > a > c$

B. $a > b > c$

C. $c > b > a$

D. $a > c > b$

Answer: A

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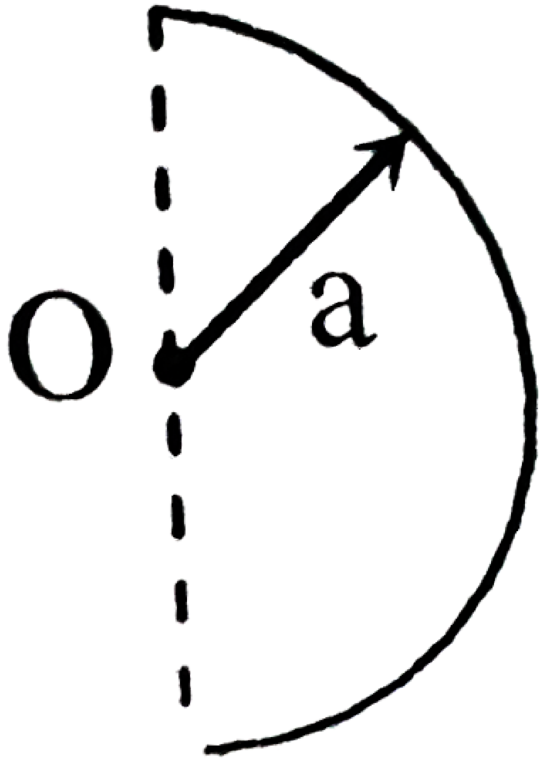
19. Electric field at centre O of semicircule of radius 'a' having linear charge density λ given is given by



A. $\dfrac{2\lambda}{\in_0 a}$

B. $\dfrac{\lambda\pi}{\in_0 a}$

C. $\dfrac{\lambda}{2\pi \in_0 a}$

D. $\dfrac{\lambda}{\pi \in_0 a}$

Answer: C

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20. The width of river is 1 km. The velocity of boat is 5 km/hr. The boat covered the width of river with shortest will possible path in 15 min. Then the velocity of river stream is:

A. 3 km/hr

B. 4 km/hr

C. $\sqrt{29}$ km/hr

D. $\sqrt{41}$ km/hr

Answer: A

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21. Motion of a particle is given by equation $S = \left(3t^3 + 7t^2 + 14 + t + 8\right)$m, The value of acceleration of the particle at t = 1 sec, is:

A. $10m/s^2$

B. $32m/s^2$

C. $23m/s^2$

D. $16m/s^2$

Answer: B

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22. A charge Q is situated at the corner of a cube the electric flux passed through all the six faces of the cube is :

A. $\frac{Q}{6 \in_0}$

B. $\frac{Q}{8 \in_0}$

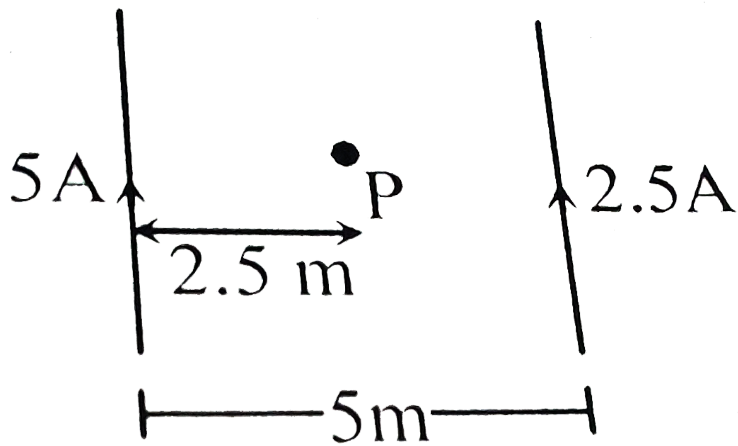
C. $\frac{Q}{\in_0}$

D. $\frac{Q}{2 \in_0}$

Answer: B

Watch Video Solution

23. For adjoining fig, The magnetic field at point, 'P' will be:



A. $\frac{\mu_0}{4\pi} \odot$

B. $\frac{\mu_0}{\pi} \otimes$

C. $\frac{\mu_0}{2\pi} \otimes$

D. $\frac{\mu_0}{2\pi} \odot$

Answer: C

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24. A charge having q/m equal to 10^9 c/kg and with velocity 3×10^5 m/s enters into a uniform magnetic field B = 0.3 tesla at an angle 30° with direction of field. Then radius of curvature will be:

A. 0.01 cm

B. 0.5 cm

C. 1 cm

D. 2 cm

Answer: B

Watch Video Solution

25. The value of quality factor is:

A. $\frac{\omega L}{R}$

B. $\frac{\omega}{RC}$

C. $\sqrt{LC}$

D. L/R

Answer: A

Watch Video Solution

26. Two sound sources emitting sound each of wavelength λ are fixed at a given distance apart. A listener moves with a velocity u along the line joining the two suorces. The number of beats heard by him per second is

A. $\frac{2u}{\lambda}$

B. $\frac{u}{\lambda}$

C. $\sqrt{u\lambda}$

D. $\frac{u}{2\lambda}$

Answer: A

Watch Video Solution

27. A string is cut into three parts, having fundamental frequencies n_1, n_2 and n_3 respectively, Then original fundamental frequency 'n' related by the expression as:

A. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

B. $n = n_1 + n_2 + \times n_3$

C. $n = n_1 + n_2 + n_3$

D. $n = \frac{n_1 + n_2 + n_3}{3}$

Answer: A

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28. The equations of two waves given as $x = a\cos(\omega t = \delta)$ and $y = a\cos(\omega t + \alpha)$, where $\delta = \alpha + \frac{\pi}{2}$, then resultant wave represent:

A. a circle (c.w)

B. A circle (a.c.w)

C. an Ellipse (c.w)

D. an ellipse (a.c.w)

Answer: B

Watch Video Solution

29. The relation between half - life period $\left(t_{1/2}\right)$ and disintegration constant (λ) is expressed as a)$\lambda = \frac{0.693}{t_{1/2}}$ b) $\lambda = \frac{0.693}{t_{1/2}}$ c)$\lambda = \frac{693}{t_{1/2}}$ d)$\lambda = 693t_{1/2}$

A. $T_{1/2} = \frac{\ln 2}{\lambda}$

B. $T_{1/2}\ln 2 = \lambda$

C. $T_{1/2} = \frac{1}{\lambda}$

D. $\left(\lambda + T_{1/2}\right) = \frac{\ln}{2}$

Answer: A

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30. A cannot engine has efficiency $\frac{1}{6}$. If temperature of sink is decreased by $62^\circ C$ then its efficiency becomes $\frac{1}{3}$ then the temperature of source and sink:

A. $33^\circ C, 67^\circ C$

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

C. $67^\circ C, 33^\circ C$

D. $97K, 37K$

Answer: B

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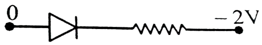
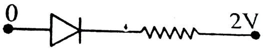
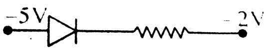
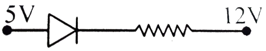
31. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: A

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32. Given Truth table is correct for :

A	B	Y
1	1	1
1	0	0
0	1	0
0	0	0

A. NAND

B. AND

C. NOR

D. OR

Answer: B

Watch Video Solution

33. A pendulum is displaced to an angle θ from its equilibrium position, then it will pass through its mean position with a velocity v equal to

A. $\sqrt{2gl(1 - \cos\theta)}$

B. $\sqrt{2gl(1 + \cos\theta)}$

C. $\sqrt{2gl\cos\theta}$

D. $\sqrt{2gl}$

Answer: A

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34. If $\vec{F} = \left(60\hat{i} + 15\hat{j} - 3\hat{k}\right)N$ and $\vec{V} = \left(2\hat{i} - 4\hat{j} + 5\hat{k}\right)$ m/s, then instantaneous power is:

A. 195 watt

B. 45 watt

C. 75 watt

D. 100 watt

Answer: B

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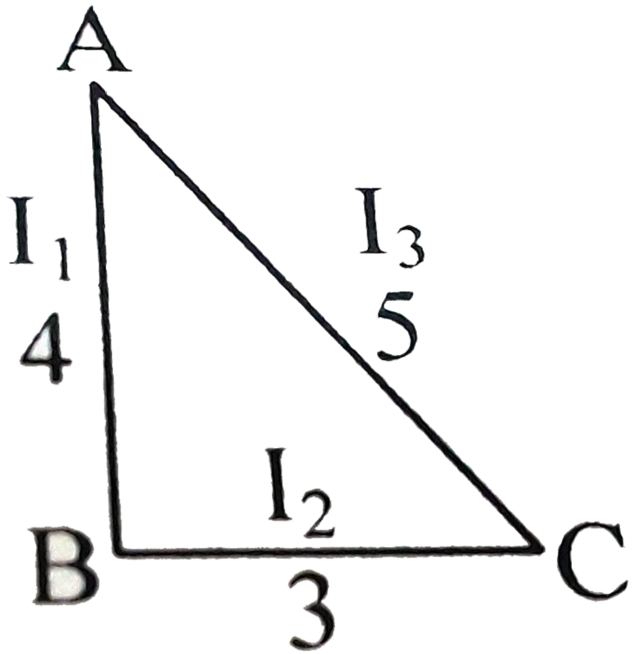
35. For the adjoining diagram, a triangular lamina is shown the correct relation between I_1, I_2 & I_3 is (I - moment of inertia)



A. $I_1 > I_2$

B. $I_2 > I_1$

C. $I_3 > I_1$

D. $I_3 > I_2$

Answer: B

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36. Masses M_A and M_B hanging from the ends of strings of lengths L_A and L_B are executing simple harmonic motions. If their frequencies are $f_A = 2f_B$, then

A. $l_A = \frac{l_B}{4}$

B. $l_A = 4l_B$

C. $l_A = 2l_B$ & $M_A = 2M_B$

D. $l_A = \frac{l_B}{2}$ & $M_A = \frac{M_B}{2}$

Answer: A

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37. Nuclear fission can be explained by

A. Liquid droplet theory

B. Yakawa π - meson theory

C. Independent particle model of the nucleus

D. Proton-proton cycle

Answer: A

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38. Who evaluted the mass of electron indirectly with help of charge:

A. Thomson

B. Millikan

C. Rutherfored

D. Newton

Answer: B

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39. A car battery of emf 12V and internal resistance 0.05ω receives a current of 60 A from an external source, then the terminal potential difference of the battery is

A. 12 V

B. 9 V

C. 15 V

D. 20 V

Answer: C

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40. Two bulbs of (40 W, 200 V) and (100 W, 200 V). Then correct relation for their resistance:

A. $R_{40} < R_{100}$

B. $R_{4} > R_{100}$

C. $R_{40} = R_{100}$

D. Non relation can be predicted

Answer: B

Watch Video Solution

41. According to the Faraday Law of electrolysis, the mass deposited at electrode proportional to:

A. $m \propto I^2$

B. $m \propto Q$

C. $m \propto Q^2$

D. m does not depend on Q

Answer: B

Watch Video Solution

42. A man is 6 ft tall In order to see his entire image, he requires a plane mirror of minimum length equal to

A. 12 feet

B. 3 feet

C. 6 feet

D. An length

Answer: B

Watch Video Solution

43. A potentiometer is an ideal device of measuring potential difference because

A. It has a sensitive galvanometer

B. It has wire of hire resistance

C. It measure p.d like in closed circuit

D. It measure p.d like in open circuit

Answer: D

Watch Video Solution

44. Escape velocity on the surface of earth is 11.2 km/s . Escape velocity from a planet whose mass is the same as that of earth and radius 1/4 that of earth is

A. 11.2 km/s

B. 22.4 km/s

C. 5.6 km/s

D. 44.8 km/s

Answer: B

Watch Video Solution

45. Choose the corrector relation between the transistor parameters α and β.

A. $\beta = \dfrac{1 - \alpha}{\alpha}$

B. $\beta = \dfrac{\alpha}{1 - \alpha}$

C. $\alpha = \dfrac{\beta - 1}{\beta}$

D. $\alpha\beta = 1$

Answer: B

Watch Video Solution

46. The life span of atomic hydrogen is:

A. Fraction of one sec

B. One year

C. One hour

D. One day

Answer: A

Watch Video Solution

47. The cations and anions are arranged n alternate form in:

A. Metallic crystal

B. Ionic crystal

C. C-valent crystal

D. Semi-conductor crystal

Answer: B

Watch Video Solution

48. When an electron do transition from n = 4 to n = 2, then emitted line in spectrum will be:

A. First line of Lyman-series

B. Second lien of Balmer

C. First line of pashen series

D. Second lien of paschen series

Answer: B

Watch Video Solution

49. A bubble in glass slab $(\mu = 1.5)$ when viewed from one side appears at 5 cm and 2 cm from other side, then thickness of slab is :

A. 3.75 cm

B. 3 cm

C. 10.5 cm

D. 2.5 cm

Answer: C

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50. Which pair have not equal dimensions :

A. Energy and torque

B. Force and impulse

C. Angular momentum and plank's constant

D. Elastic modulus and pressure

Answer: B

Watch Video Solution

51. The dimension of Planck's constant are the same as that of

A. Energy

B. Momentum

C. Angular momentum

D. Power

Answer: C

Watch Video Solution

52. Which rays contain (+ Ve) charged particle : -

A. α-rays

B. β-rays

C. γ-rays

D. X-rays

Answer: A

Watch Video Solution

53. An electron having mass 'm' and kinetic energy E enter in uniform magnetic field B perpendicularly, then its frequency will be : -

A. $\frac{eE}{qVB}$

B. $\frac{2\pi m}{eB}$

C. $\frac{eB}{2\pi m}$

D. $\frac{2m}{eBE}$

Answer: C

Watch Video Solution

54. A particle is thrown vertically upward. Its velocity at half of the height is 10 m/s. Then the maximum height attained by it : -

$\left(g = 10m/s^2\right)$

A. 8 m

B. 20 m

C. 10 m

D. 16 m

Answer: C

Watch Video Solution

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55. A stone is thrown at an angle of 45° to the horizontal with kinetic energy K. The kinetic energy at the highest point is

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

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

C. 2K

D. K

Answer: B

Watch Video Solution

56. A black body has maximum wavelength λ_m at temperature $2000K$. Its corresponding wavelength at temperature 3000 will be

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

B. $\frac{2}{3}\lambda_m$

C. $\frac{16}{81}\lambda_m$

D. $\frac{81}{16}\lambda_m$

Answer: B

Watch Video Solution

57. Two particles having mass 'M' and 'm' are moving in a circular path having radius R & r respectively. If their time period are same then the ratio of angular velocity will be : -

A. $\frac{r}{R}$

B. $\frac{R}{r}$

C. 1

D. $\sqrt{\frac{R}{r}}$

Answer: C

Watch Video Solution

58. A child is swinging a swing. Minimum and maximum heights fo swing from the earth's surface are 0.75 m and 2 m respectively. The maximum velocity of this swing is

A. 10 m/s

B. 5 m/s

C. 8 m/s

D. 15 m/s

Answer: B

Watch Video Solution

59. The current (I) in the circuit will be : -

A. $\frac{5}{40}A$

B. $\frac{5}{50}A$

C. $\frac{5}{10}A$

D. $\frac{5}{20}A$

Answer: B

View Text Solution

60. Biological importance of Ozone layer is

A. It stops ultraviolet rays

B. Ozone layer reduces green house effect

C. Ozone layer reflects radio waves

D. Ozone layer controls O_2 / H_2 ratio in atmosphere

Answer: A

Watch Video Solution

61. Two spreings A and B$\left(k_A = 2k_B\right)$ ar stretched by applying forces of equa magnitudes at the foru ends. If the energy stored in A is E, that in B is

A. 2E

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

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

D. $4E$

Answer: A

Watch Video Solution

62. A charge Q μc is placed at the centre of cube, the flux coming out from any surfaces will be : -

A. $\frac{Q}{6\varepsilon_0} \times 10^{-6}$

B. $\frac{Q}{6\varepsilon_0} \times 10^{-3}$

C. $\frac{Q}{2\varepsilon_0}$

D. $\frac{Q}{8\varepsilon_0}$

Answer: A

Watch Video Solution

63. In the nuclear reaction : $X(n, \alpha)_3Li^7$ the term X will be 3

A. $._{5}^{10}B$

B. $._{5}^{9}B$

C. $._{4}^{11}Be$

D. $._{2}^{4}He$

Answer: A

Watch Video Solution

64. Half life of a radioactive elemets is 12.5 hour and its quantity is 256 gm. After how much time is quantity will remain 1 gm ?

A. 50 Hrs

B. 100 Hrs

C. 150 Hrs

D. 200 Hrs

Answer: B

Watch Video Solution

65. A scientist says that the efficiency of his heat engine which operates at source temperature $127^\circ C$ and sink temperature $27^\circ Cis26\%$, then

A. It is impossible

B. It is possible but less probable

C. It is quite probable

D. Data are incomplete

Answer: A

Watch Video Solution

66. A cricketer catches a ball of mass 150 gm. in 0.1 second moving with speed $20ms^{-1}$. Then he experiences force of : -

A. 300 N

B. 30 N

C. 3 N

D. 0.3 N

Answer: B

Watch Video Solution

67. If the tension and diameter of a sonometer wire of fundamental frequency n are doubled and density is halved then its fundamental frequency will become

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

B. $\sqrt{2}n$

C. n

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

Answer: C

Watch Video Solution

68. The total energy of particle performing SHM depend on : -

A. K, a, m

B. K, a

C. K, a, x

D. K, x

Answer: B

Watch Video Solution

69. With what velocity should a particle be projected so that its height becomes equal to radius of earth?

A. $\left(\frac{GM}{R}\right)^{1/2}$

B. $\left(\frac{8GM}{R}\right)^{1/2}$

C. $\left(\frac{2GM}{R}\right)^{1/2}$

D. $\left(\frac{4GM}{R}\right)^{1/2}$

Answer: A

Watch Video Solution

70. A disc is placed on a surface of pond which has refractive index $\frac{3}{5}$. A source of light is placed 4 m below the surface of liquid. The minimum radius of disc will be so light is not coming out

A. ∞

B. 3m

C. 6m

D. 4m

Answer: B

Watch Video Solution

71. A ray of light travelling in air haves wavelength λ, frequency n, velocity v and intensity I. If this ray enters into water then these parameter are λ', n' , v' and I' respectively. Which relation is correct

A. $\lambda = \lambda'$

B. $n = n'$

C. $v = v'$

D. $I = I'$

Answer: B

Watch Video Solution

72. A cylindrical rod having temperature T_1 and T_2 at its ends. The rate of flow of heat is $Q_1 cal/\sec$. If all the linear dimensions are doubled keeping temperature constant, then rate of flow of heat Q_2 will be

A. $4Q_1$

B. $2Q_2$

C. $\frac{Q_1}{4}$

D. $\frac{Q_1}{2}$

Answer: B

Watch Video Solution

73. If $\left|\vec{A}+\vec{B}\right| = \left|\vec{A}\right| + \left|\vec{B}\right|$, then angle between $\vec{A}$ and $\vec{B}$ will be

A. 90°

B. 120°

C. 0°

D. 60°

Answer: B

Watch Video Solution

74. Optical fibers are based on the phenomenon of

A. Total internal relfection

B. Less scattering

C. Refraction

D. Less absorbtion coefficient

Answer: A

Watch Video Solution

75. Which of the following pheniomeana exhibits particle nature of light ?

A. P.E.E.

B. Interference

C. Refraction

D. Polirazation

Answer: A

Watch Video Solution

76. Two waves having equaitons

$x_1 = a\sin(\omega t + \phi_1), x = a\sin(\omega + \phi_2)$

If in the resultant wave the frequency and amplitude remain equal to those of superimposing waves. Then phase difference between them is

A. $\frac{\pi}{6}$

B. $\frac{2\pi}{3}$

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

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

Answer: B

Watch Video Solution

77. In Thomson mass spectrograph $\vec{E} \perp \vec{B}$ then the velocity of underflected electron beam will be :

A. $\frac{|\vec{E}|}{|\vec{B}|}$

B. $\vec{E} \times \vec{B}$

C. $\frac{|\vec{B}|}{|\vec{E}|}$

D. $\frac{E^2}{B^2}$

Answer: A

Watch Video Solution

78. Energy per unit volume for a capacitor having area A and separation d kept at potential diffeence V is given by : -

A. $\frac{1}{2}\varepsilon_0\frac{V^2}{d^2}$

B. $\frac{1}{2\varepsilon_0}\frac{V^2}{d^2}$

C. $\frac{1}{2}CV^2$

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

Answer: A

Watch Video Solution

79. On the horizontal surface of a truck $(\mu = 0.6)$ a block of mass 1 kg is placed. If the truck is accelerating at the rate of $5m/\sec^2$ then friction force on the block will be

A. 5N

B. 6N

C. 5.88N

D. 8N

Answer: A

Watch Video Solution

80. Tangent galvanometer is used to measure

A. Potential difference

B. Current

C. Resistance

D. In measuring charge

Answer: B

Watch Video Solution

81. A capacitor has capacity C and reactance X. If capacitance and frequency become double, then reactance will be

A. 4X

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

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

D. 2X

Answer: C

Watch Video Solution

82. A disc is rolling the velocity of its centre of mass is V_{cm} then which one will be correct : -

A. The velocity of highest point is $2V_{\text{cm}}$ and point of contact is zero

B. The velocity of highest point is V_{cm} and point of contact is V_{cm}

C. The velocity of highest point is $2V_{\text{cm}}$ and point of contact is V_{cm}

D. The velocity of highest point is $2V_{\text{cm}}$ and point of contact of contact is $2V_{\text{cm}}$

Answer: A

Watch Video Solution

83. If specific resistance of a potentiometer wire is $10^{-7}\Omega m$, the current flow through it is $0.1A$ and the cross-sectional area of wire is $10^{-6}m^2$ then potential gradient will be

A. 10^{-2} V/m

B. 10^{-4} V/m

C. 10^{-6} V/m

D. 10^{-8} V/m

Answer: A

Watch Video Solution

84. In an inductor of self-inductance L=2 mH, current changes with time according to relation $i = t^2 e^{-t}$. At what time emf is zero ?

A. 2s

B. 1s

C. 4s

D. 3s

Answer: A

Watch Video Solution

85. In a common-base configuration of a transistor $\frac{\Delta i}{\Delta i_e} = 0.98,$ then current gain in common emitter configuration of transistor will be

A. 49

B. 98

C. 4.9

D. 25.5

Answer: A

Watch Video Solution

86. A dipole of moment $\vec{p}$ is placed in a uniform electric field $\vec{E}$. The force on the dipole is $\vec{F}$ and the torque is $\vec{\tau}$

A. $\vec{\tau} = \vec{p}.\vec{E}$

B. $\vec{\tau} = \vec{p} \times \vec{E}$

C. $\vec{\tau} = \vec{p} + \vec{E}$

D. $\vec{\tau} = \vec{p} - \vec{E}$

Answer: B

Watch Video Solution

87. A small coil of N turns has area A and a current I flows through it. The magnetic dipole moment of this coil will be

A. niA

B. $n^2 iA$

C. niA^2

D. $\frac{\text{ni}}{\sqrt{A}}$

Answer: A

Watch Video Solution

88. The equation of a wave is represented by $y = 10^{-4}\sin\left[100t - \frac{x}{10}\right]$. The velocity of the wave will be

A. 100 m/s

B. 4 m/s

C. 1000 m/s

D. 0.00 m/s

Answer: C

Watch Video Solution

89. The interplaner distance in a crystal is 2.8×10^{-8} m. The value of maximum wavelength which can be diffracted : -

A. 2.8×10^{-8} m

B. 5.6×10^{-8} m

C. 1.4×10^{-8} m

D. 7.6×10^{-8} m

Answer: B

Watch Video Solution

90. If the energy of a hydrogen atom in nth orbit is E_n, then energy in the nth orbit of a singly ionised helium atom will be

A. $4E_n$

B. $E_n/4$

C. $2E_n$

D. $E_n/2$

Answer: A

Watch Video Solution

91. In which type of material the magnetic susceptibility does not depend on temperature?

A. Dia-magnetis

B. Paramagnetis

C. Ferro-magnetism

D. Ferrite

Answer: A

Watch Video Solution

92. The resistance of each arm of the wheat stone bridge is 10Ω. A resistance of 10Ω is connected in series with galvanometer then the equivalent resistance across the battery will be:-

A. 10 ohm

B. 15 ohm

C. 20 ohm

D. 40 ohm

Answer: A

Watch Video Solution

93. Copper and silicon is cooled from 300 K to 60 K, the specific resistance

A. Decrease in copper but increase in silicon

B. Increase in copper but decrease in silicon

C. Increase in both

D. Decrease in both

Answer: A

Watch Video Solution

94. In bcc structure of lattice constant a, the minimum distance between atoms is

A. $\sqrt{3}a$

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

C. $\frac{\sqrt{3}}{4}a$

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

Answer: B

Watch Video Solution

95. 250 N force is required to raise 75 kg mass from a pulley. If rope is pulled 12 m then the load is lifted to 3m, the efficiency of pulley system will be : -

A. 25%

B. 33.3%

C. 75%

D. 90%

Answer: C

Watch Video Solution

96. A photo cell is receiving light from a source placed at a distance of $1m$. If the same source is to be placed at a distance of $2m$, then the ejected electron

A. Remain same

B. Four times

C. Two times

D. One-fourth

Answer: B

Watch Video Solution

97. M_n and M_p represent mass of neutron and proton respectively. If an element having atomic mass M has N - neutron and Z-proton, then the correct relation will be :

A. $M < \{N. M_n + Z. M_p\}$

B. $M > \{N. M_n + Z. M_p\}$

C. $M = \{N. M_n + Z. M_p\}$

D. $M = N\{M_n + M_p\}$

Answer: A

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Watch Video Solution

98. A 1 kg stationary bomb is exploded in three parts having mass 1 : 1 : 3 respectively. Parts having same mass move in perpendicular direction with velocity $30ms^{-1}$, then the velocity of bigger part will be : -

A. $10\sqrt{2}ms^{-1}$

B. $\frac{10}{\sqrt{2}}ms^{-1}$

C. $15\sqrt{2}ms^{-1}$

D. $\frac{15}{\sqrt{2}}ms^{-1}$

Answer: A

Watch Video Solution

99. Why a huge amount of energy is released in nuclear fission of nuclear fusion solution.

A. Few mass is converted into energy

B. Total binding energy of fragements is more than the B.E. of parantel element

C. Total B.E. of fragements is less than the B.E. of parantel element

D. Total B.E. of fragements is equals to the B.E. of parantal element is

Answer: B

Watch Video Solution

100. A mass is suspended separately by two different springs in successive order then time period is t_1 and t_2 respectively. If it is connected by both spring as shown in figure then time period is t_0, the correct relation is : -

A. $t_0^2 = t_1^2 + t_2^2$

B. $t_0^2 = t_1^{-2} + t_2^{-2}$

C. $t_0^{-1} = t_1^{-1} + t_2^{-1}$

D. $t_0 = t_1 + t_2$

Answer: B

View Text Solution

101. When an oscillator completes 100 oscillations its amplitude reduced to $\frac{1}{3}$ of initial values. What will be amplitude, when it completes 200 oscillations :

A. $\frac{1}{8}$

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

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

D. $\frac{1}{9}$

Answer: D

Watch Video Solution

102. A circular disc is to be made by using iron and aluminium, so that it acquires maximum moment of inertia about its geometrical axis. It is possible with

A. Aluminium at interior and iron surround to it

B. Iron at interior and aluminium surround to it

C. Using iron and aluminium layers in alternate order

D. Sheet of iron is used at both external surface and aluminium sheet as internal layers

Answer: A

Watch Video Solution

103. For the given incident ray as shown in figure, the condition of total internal reflection of this ray the minimum refractive index of prism will be : -

A. $\frac{\sqrt{3}+1}{2}$

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

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

D. $\sqrt{\frac{7}{6}}$

Answer: C

View Text Solution

104. The value of plank's constant is : -

A. 6.63×10^{-34} J/s

B. $6.63 \times 10^{-34} kg - m^2/s$

C. $6.63 \times 10^{-34} kg - m^2$

D. $6.63 \times 10^{-34} Js^{-1}$

Answer: B

Watch Video Solution

105. Displacement between max. P.E. position and max. K.E. position for a particle excuting simple harmonic motion is : -

A. $\pm\frac{a}{2}$

B. $+a$

C. $\pm a$

D. -1

Answer: C

Watch Video Solution

106. A disc is rotating with angular velocity ω. If a child sits on it, what is conserved?

A. Linear momentum

B. Angular momentum

C. Kinetic energy

D. Potential energy

Answer: B

Watch Video Solution

107. Which one of the following have minimum wavelength

A. X-rays

B. Ultra violet rays

C. γ-rays

D. Cosmic rays

Answer: D

Watch Video Solution

108. If particles are moving with same velocity , then maximum de - Broglie wavelength will be for

A. Proton

B. α-particle

C. Neutron

D. β-particle

Answer: D

Watch Video Solution

109. When ultraviolet rays incident on metal plate then photoelectric effect does not occur, it occurs by incidence of : -

A. Infrared rays

B. X-rays

C. Radio wave

D. Light wave

Answer: B

Watch Video Solution

110. What is the cause of "Green house effect"?

A. Infra-red rays

B. Ultra violet rays

C. X-rays

D. Radio waves

Answer: A

Watch Video Solution

111. Which of the following is not the property of a cathode rays

A. It produces heating effect

B. It does not deflecte in electric field

C. It casts shadow

D. It produces flurosence

Answer: B

Watch Video Solution

112. A solid sphere of radius R is placed on a smooth horizontal surface. A horizontal force F is applied at height h from the lowest point. For the maximum acceleration of the centre of mass

A. h = R

B. h = 2R

C. h = 0

D. No relation between h and R

Answer: D

Watch Video Solution

113. The diameter of human eye lens is $2mm$. What should be the minimum separation between two points situated at $50m$ from eye, to resolve tham. Take wavelength of light $= 5000\text{Å}$.

A. 2.32 m

B. 4.28 mm

C. 1.25 cm

D. 12.48 cm

Answer: C

Watch Video Solution

114. A body is located on a wall. Its image of equal size is to be obtained on a parallel wall with the help of a convex leng. The lens is placed at a distance d ahead of second wall, then the required focal length will be:

A. Only $\frac{d}{4}$

B. Only $\frac{d}{2}$

C. More than $\frac{d}{4}$ but less than $\frac{d}{2}$

D. Less than or equal to $\frac{d}{4}$

Answer: D

Watch Video Solution

115. The Wien's displacement law express relation between

A. Wavelength corresponding to maximum energy and temperature

B. Radiation energy and wavelength

C. Temperature and wavelength

D. Colour of light and temperature

Answer: A

Watch Video Solution

116. The best laboratory approximation to an ideal black body is .

A. Black lamp

B. Cavity maintained at constant temperature

C. Platinum black

D. A lump of charcoal heated to high temp.

Answer: B

Watch Video Solution

117. For a black body at temperature $727^{\circ} C$, its radiating power is 60 watt and temperature of surrounding is $227^{\circ} C$. If temperature of black body is changed to $1227^{\circ} C$ then its radiating power will be-

A. 304 W

B. 320 W

C. 240 W

D. 120 W

Answer: B

Watch Video Solution

118. Consider two rods of same length and different specific heats (S_1 and S_2), conductivities K_1 and K_2 and area of cross section (A_1 and A_2) and both having temperature T_1 and T_2 at their ends. If the rate of heat loss due to conduction is equal then

A. $K_1A_1 = K_2A_2$

B. $\frac{K_1A_1}{S_1} = \frac{K_2A_2}{S_2}$

C. $K_2A_1 = K_1A_2$

D. $\frac{K_2A_1}{S_2} = \frac{K_1A_2}{S_2}$

Answer: A

Watch Video Solution

119. The efficiency of carnot engine is 50% and temperature of sink is 500K. If temperature of source is kept constant and its efficiency raised to 60%, then the required temperature of the sink will be : -

A. 100 K

B. 600 K

C. 400 K

D. 500 K

Answer: C

Watch Video Solution

120. Unit of Stefan's constant is

A. Watt-m^2-K^4

B. Watt-m^2/K^4

C. Watt/m^2–K

D. Watt/m^2K^4

Answer: D

Watch Video Solution

121. What is the number of atoms per unit cell in a body centred cubic structure ?

A. 9

B. 4

C. 2

D. 1

Answer: C

Watch Video Solution

122. An object of mass $3kg$ is at rest. Now a force of $\vec{F} = 6t^2\hat{I} + 4t\hat{j}$ is applied on the object, the velocity of object at $t = 3s$ is.

A. $18\hat{j} + 3\hat{j}$

B. $18\hat{i} + 6\hat{j}$

C. $3\hat{i} + 18\hat{j}$

D. $18\hat{i} + 4\hat{j}$

Answer: B

Watch Video Solution

123. A body of mass m is placed on the earth surface is taken to a height of $h = 3R$, then, change in gravitational potential energy is

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

B. $\frac{2}{3}mgR$

C. $\frac{3}{4}mgR$

D. $\frac{\mathrm{mgR}}{2}$

Answer: C

Watch Video Solution

124. A point P consider at contact point of a wheel on ground which rolls on ground without sliping then value of displacement of point P when wheel completes half of rotation (If radius of wheel is 1m) : -

A. 2m

B. $\sqrt{\pi^2 + 4}$ m

C. π m

D. $\sqrt{\pi^2 + 2}$ m

Answer: B

Watch Video Solution

125. A block of mass $10kg$ is placed on a rough horizontal surface having coefficient of friction $\mu = 0.5$. If a horizontal force of $100N$ is acting on it, then acceleration of the will be.

A. 10 m/s^2

B. 5 m/s^2

C. 15 m/s^2

D. 0.5 m/s^2

Answer: B

Watch Video Solution

126. A lift of mass $1000kg$ is moving with an acceleration of $1m/s^2$ in upward direction. Tension developed in the string, which is connected to the lift, is.

A. 9,800 N

B. 10,800 N

C. 11,000 N

D. 10,000 N

Answer: B

Watch Video Solution

127. A particle (A) is dropped from a height and another particles (B) is thrown into horizontal direction with speed of 5m/s sec from the same height. The correct statement is

A. Particle (A) will reach at ground first with respect to particle (B)

B. Particle (B) will reach at ground first with respect to particle (A)

C. Both particles will reach at ground simultaneously

D. Both particles will reach at ground with same speed

Answer: C

Watch Video Solution

128. A rod is of length 3 m and its mass acting per unit length is directly proportional to distance x from its one end. The centre of gravity of the rod from that end will be at

A. 1.5 m

B. 2 m

C. 2.5 m

D. 3.0 m

Answer: B

Watch Video Solution

129. If kinetic energy of a body is increased by 300%, then percentage change in momentum will be

A. 100 %

B. 150 %

C. 265 %

D. 73.2 %

Answer: A

Watch Video Solution

130. For a transistor $\frac{I_C}{I_E} = 0.96$, then current gain for common emitter configuration

A. 12

B. 6

C. 48

D. 24

Answer: D

Watch Video Solution

131. A wave travelling in positive X-direction with $A = 0.2m$ has a velocity of $360m/\sec$ if $\lambda = 60m$, then correct exression for the wave is

A. $y = 0.2\sin\left[2\pi\left(6t + \frac{x}{60}\right)\right]$

B. $y = 0.2\sin\left[\pi\left(6t + \frac{x}{60}\right)\right]$

C. $y = 0.2\sin\left[2\pi\left(6t - \frac{x}{60}\right)\right]$

D. $y = 0.2\sin\left[\pi\left(6t - \frac{x}{60}\right)\right]$

Answer: C

Watch Video Solution

132. A whistle revolves in a circle with an angular speed of $20 rad/\sec$ using a string of length $50cm$. If the frequency of sound from the whistle is $385Hz$, then what is the minimum frequency heard by an observer which is far away from the centre in the same plane? $v = 340m/s$

A. 385 Hz

B. 374 Hz

C. 394 Hz

D. 333 Hz

Answer: B

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133. In a PN -junction diode

A. High potential at N side and low potential at P side

B. High potential at P side and low potential at N side

C. P and N both are at same potential

D. Undetermined

Answer: A

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134. The specific resistance of a conductor increases with:

A. Increase in temperature

B. Increase in cross section area

C. Increase in cross section and decrease in length

D. Decrease in cross section area

Answer: A

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135. In a series LCR circuit, at resonance, power factor is ....

A. $\dfrac{V^2}{\left[\omega L - \dfrac{1}{\omega C}\right]}$

B. $I^2 L\omega$

C. $I^2 R$

D. $\dfrac{V^2}{C\omega}$

Answer: C

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136. Some charge is being given to a conductor. Then its potential : -

A. Is maximum at surface

B. Is maximum at centre

C. Is remain same throughout the conductor

D. Is maximum somewhere between surface and centre

Answer: C

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137. For a cell terminal potential difference is 2.2 V when circuit is open and reduces to 1.8V when cell is connected to a resistance of $R=5\Omega$ then determine internal resistance of cell is:-

A. $\frac{10}{9}\Omega$

B. $\frac{9}{10}\Omega$

C. $\frac{11}{9}\Omega$

D. $\frac{5}{9}\Omega$

Answer: A

Watch Video Solution

138. To convert a galvanometer into a voltmeter, one should connect a

A. High resistance in series with galvanometer

B. Low resistance in series with galvanometer

C. High resistance in parallel with galvanometer

D. Low resistance in parallel with galvanometer

Answer: A

Watch Video Solution

139. A capacity of capacity C_1 is charged up to V volt and then connected to an uncharged capacitor of capacity C_2. Then final potential difference across each will be

A. $\dfrac{C_2V}{C_1 + C_2}$

B. $\dfrac{C_1V}{C_1 + C_2}$

C. $\left(1 + \dfrac{C_2}{C_1}\right)$

D. $\left(1 - \dfrac{C_2}{C_1}\right)V$

Answer: B

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140. If identical charges $(-q)$ are placed at each corner of a cube of side b, then electric potential energy of charge $(+q)$ which is palced at centre of the cube will be

A. $\frac{-4\sqrt{2}q^2}{\pi\varepsilon_0 b}$

B. $\frac{-8\sqrt{2}q^2}{\pi\varepsilon_0 b}$

C. $\frac{-4q^2}{\sqrt{3}\pi\varepsilon_0 b}$

D. $\frac{8\sqrt{2}q^2}{4\pi\varepsilon_0 b}$

Answer: C

Watch Video Solution

141. Which of the following are suitable for the fusion process ?

A. Light nuclei

B. heavy nuclei

C. Element must be lying in the middle of the periodic table

D. Middle elements, which are lying on binding energy curve

Answer: A

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142. The magnetic field of a given length of wire carrying a current of a single turn circular coil at cebtre is B, then its value for two turns for the same wire when same current passing through it is

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

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

C. $4B$

D. $2B$

Answer: C

Watch Video Solution

143. A charge q moves region in a electric field E and the magnetic field B both exist, then the force on its is

A. $q\left(\vec{V} \times \vec{B}\right)$

B. $q\vec{E} + q\left(\vec{V} + \vec{B}\right)$

C. $q\vec{E} + q\left(\vec{B} + \vec{V}\right)$

D. $q\vec{B} + q\left(\vec{E} + \vec{V}\right)$

Answer: B

Watch Video Solution

144. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way what their similar poles are same side then its time period of oscillation is T_1. Now the polarity of one of the magnet is reversed then time period of oscillation will be:-

A. $T_1 < T_2$

B. $T_1 = T_2$

C. $T_1 > T_2$

D. $T_2 = \infty$

Answer: A

Watch Video Solution

145. The velocity of electromagnetic wave is along the direction of

A. $\vec{B} \times \vec{E}$

B. $\vec{E} \times \vec{B}$

C. $\vec{E}$

D. $\vec{B}$

Answer: B

Watch Video Solution

146. A saample of radioactive elements contains 4×10^{10} active nuclei. If half-life of element is 10 days, then the number of decayed nuclei after 30 days is

A. 0.5×10^{16}

B. 2×10^{16}

C. 3.5×10^{16}

D. 1×10^{16}

Answer: C

Watch Video Solution

147. When a deuterium is bombarded on $._8O^{16}$ nucleus, an α-particle is emitted, then the product nucleus is

A. $._7N^{13}$

B. $._5B^{10}$

C. $._4Be^9$

D. $._7N^{14}$

Answer: D

Watch Video Solution

148. If a ball is thrown vertically upwards with speed u, the distance covered during the last t second of its ascent is

A. ut

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

C. $ut - \frac{1}{2}gt^2$

D. (u + gt)t

Answer: B

Watch Video Solution

149. A particle moves along a circle if radius (20 //pi) m with constant tangential acceleration. If the velocity of the particle is $80 m/s$ at the end of the second revolution after motion has begun the tangential acceleration is .

A. 40 m/s^{-2}

B. $640\pi \text{m/s}^{-2}$

C. $160\pi \text{m/s}^{-2}$

D. $40\pi \text{m/s}^{-2}$

Answer: A

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150. A thin circular ring of mass M and radius R is rotating about its axis with a constant angular velocity omega. Four objects each of mass m, are kept gently to the opposite ends of two perpendicular diameters of the ring. The angular velocity of the ring will be

A. $\frac{M\omega}{4m}$

B. $\frac{M\omega}{M+4m}$

C. $\frac{(M+4m)\omega}{M}$

D. $\frac{(M+4m)\omega}{M+4m}$

Answer: B

Watch Video Solution

151. A stationary partical explodes into two partical of a masses m_1 and m_2 which move in opposite direction with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is

A. m_2/m_1

B. m_1/m_2

C. 1

D. m_1v_2/m_2v_1

Answer: A

Watch Video Solution

152. A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h. What is the speed of its center of mass when the cylinder reaches its bottom

A. $\sqrt{2gh}$

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

C. $\sqrt{\frac{4}{3}gh}$

D. $\sqrt{4gh}$

Answer: C

Watch Video Solution

153. A long elastic spring is stretched by $2cm$ and its potential energy is U. If the spring is stretched by $10cm$, the PE will be

A. U/5

B. 5 U

C. 10 U

D. 25 U

Answer: D

Watch Video Solution

154. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of $2m$ on the surface of A. What is the height of jump by the same person on the planet B?

A. 2/9 m

B. 18 m

C. 6 m

D. 2/3 m

Answer: B

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155. A monkey of mass $20kg$ is holding a vertical rope. The rope will not break when a mass of $25kg$ is suspended from it but will break it the mass exeeds $25kg$. What is the maximum acceleration with which the monkey can climb up along the rope? $\left(g = 10m/s^2\right)$.

A. $5m/s^2$

B. $10m/s^2$

C. $25m/s^2$

D. $2.5m/s^2$

Answer: D

Watch Video Solution

156. A man weighs $80kg$. He stands on a weighing scale in a lift which is moving upwords with a uniform acceleration of $5m/s^2$. What would be the reading on the scale?

A. Zero

B. 400 N

C. 800 N

D. 1200 N

Answer: D

Watch Video Solution

157. A ball rolls without slipping. The radius of gyration of the ball about an axis passing through its centre of mass is k. If radius of the ball be R, then the fraction of total energy associated with its rotation will be.

A. $\dfrac{K^2 + R^2}{R^2}$

B. $\dfrac{K^2}{R^2}$

C. $\dfrac{K^2}{K^2 + R^2}$

D. $\dfrac{R^2}{K^2 + R^2}$

Answer: C

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158. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces

A. Are equal to each other

B. Are equal to each other in magnitude

C. Are not equal to each other in magnitude

D. Cannot be predicted

Answer: B

Watch Video Solution

159. Two sphere of masses m and M are situated in air and the gravitational force between them is F. The space around the masses in now filled with a liquid of specific gravity 3. The gravitational force will now be

A. 3F

B. F

C. F/3

D. F/9

Answer: B

Watch Video Solution

160. A man throws balls with the same speed vertically upwards one after the other at an interval of 2s. What should be the speed of the throw so that more than two balls are in the sky at any time ? (Given $g = 9.8 m/s^2$)

A. More than 19.6 m/s

B. At least 9.8 m/s

C. Any speed less than 19.6 m/s

D. Only with speed 19.6 m/s

Answer: A

Watch Video Solution

161. A convex lens is dipped in a liquid whose refractive index is equal to the refractive of the lens. Then its focal length will

A. Become zero

B. Become infinite

C. Become small, but non-zero

D. Remain unchanged

Answer: B

Watch Video Solution

162. An observer moves towards a stationary source of sound with a speed $\left(\frac{1}{5}\right)$th of the speed of sound. The wavelength and frequency of the source emitted are λ and f, respectively. The apparent frequency and wavelength recorded by the observer are, respectively.

A. $1.2f, 1.2\lambda$

B. $1.2f, \lambda$

C. $f, 1.2\lambda$

D. $0.8f, 0.8\lambda$

Answer: B

Watch Video Solution

163. The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be

A. T/4

B. T

C. T/2

D. 2T

Answer: C

Watch Video Solution

164. A particle of mass m oscillates with simple harmonic motion between points x_1 and x_2, the equilibrium position being O. Its potential energy is plotted. It will be as given below in the graph

A.

B.

C.

D.

Answer: A

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Watch Video Solution

165. In case of a forced vibration, the resonance wave becomes very sharp when the

A. Damping force is small

B. Restoring force is small

C. Applied periodic force is small

D. Quality factor is small

Answer: A

Watch Video Solution

166. A equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f' f" be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively

Choose the correct statement from the following-

A. f' = f, f" = 2f

B. f' = 2f, f" = f

C. f' = f, f" = f

D. f' = 2f, f" = 2f

Answer: A

View Text Solution

167. We consider the radition emitted by the human body which of the following statements is true?

A. The radiation emitted is in the infrared region

B. The radiation is emitted only during the day

C. The radiation is emitted during the summers and absorbed during the winters

D. The radiation emitted lies in the ultraviolet region and hence is not visible

Answer: A

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168. An ideal gas heat engine operates in a Carnot cycle between $27^\circ C$ and $127^\circ C$. It absorbs $6kcal$ at the higher temperature. The amount of heat (in kcal) converted into work is equal to

A. 4.8

B. 3.5

C. 1.6

D. 1.2

Answer: D

Watch Video Solution

169. Consider a compound slab consisting of two different material having equal thickness and thermal conductivities K and $2K$ respectively. The equivalent thermal conductivity of the slab is

A. 2/6 K

B. $\sqrt{2}K$

C. 3K

D. 4/3 K

Answer: D

Watch Video Solution

170. The potential energy of a simple harmonic oscillator when the particle is half way to its end point is

(where, E is the total energy)

A. 2/3 E

B. 1/8 E

C. 1/4 E

D. 1/2 E

Answer: C

Watch Video Solution

171. A charge q is located at the centre of a cube. The electric flux through any face is

A. $\dfrac{2\pi q}{6\left(4\pi\varepsilon_0\right)}$

B. $\dfrac{4\pi q}{6\left(4\pi\varepsilon_0\right)}$

C. $\dfrac{\pi q}{6\left(4\pi\varepsilon_0\right)}$

D. $\dfrac{q}{6\left(4\pi\varepsilon_0\right)}$

Answer: B

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172. An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force $\vec{F}$ between the two is (where $k = \frac{1}{4\pi\varepsilon_0}$)

A. $K\frac{e^2}{r^2}\hat{r}$

B. $-K\frac{e^2}{r^3}\hat{r}$

C. $K\frac{e^2}{r^3}\vec{r}$

D. $-K\frac{e^2}{r^3}\vec{r}$

Answer: D

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173. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new vlaue of the magnetic field is

A. B/2

B. B

C. 2B

D. 4B

Answer: B

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174. A charged particle moves through a magnetic field in a direction perpendicular to it. Then the

A. Speed of the particle remains unchanged

B. Direction of the particle remains unchanged

C. Acceleration remains unchanged

D. Velocity remains unchanged

Answer: A

Watch Video Solution

175. A bar magnet is oscillating in the earth's magnetic field with a period T. What happens to its period and motion if its mass is quadrupled

A. Motion remains S.H. with time period = T/2

B. Motion remains S.H. with time period = 2T

C. Motion remains S.H. with time period = 4T

D. Motion remains S.H. with time and period remains nearly constant

Answer: B

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176. Two 220 V,100 W bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 V AC supply line. The power drawn by the combination in each case respectively will be :

A. 50 watt, 100 watt

B. 100 watt, 50 watt

C. 200 watt, 150 watt

D. 50 watt, 200 watt

Answer: D

Watch Video Solution

177. An electric kettle has tow heating coils. When one of the coils connected to an AC source, the water in the kettle boils in 10 min. when the other coil is used the water boils in 40 min. if both the coils are connected in parallel, the time taken by the same quantity of water of boil will be

A. 8 min

B. 4 min

C. 25 min

D. 15 min

Answer: A

Watch Video Solution

178. In a Wheatstone's brigde all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen b the battery is

A. R/4

B. R/2

C. R

D. 2R

Answer: C

Watch Video Solution

179. Three 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 all of them in series

B. connecting them in parallel

C. connecting two in series and one in parallel

D. connecting two in parallel and one in series

Answer: C

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180. Solar energy is mainly caused due to

A. burning of hydrogen in the oxygen

B. fission of uranium present in the sun

C. fusion of protons during synthesis of heavier elements

D. gravitational contraction

Answer: C

Watch Video Solution

181. Fuse wire is a wire of :

A. high resistance and high melting point

B. high resistance and low melting point

C. low resistance and low melting point

D. low resistance and high melting point

Answer: B

Watch Video Solution

182. The volume occupied by an atom is greater than the volume of the nucleus by factor of about

A. 10^{1}

B. 10^{5}

C. 10^{10}

D. 10^{15}

Answer: D

Watch Video Solution

183. A photoelectric cell is illuminated by a point source of light $1m$ away . When the source is shifted to $2m$ then

A. each emitted electron carries one quarter of the initial energy

B. number of electrons emitted is half the initial number

C. each emitted electron carries half the initial energy

D. number of electrons emitted is a quarter of the initial number

Answer: D

Watch Video Solution

184. A sample of radioactive element has a mass of $10g$ at an instant $t = 0$. The approximate mass of this element in the sample after two mean lives is

A. 1.35 gm

B. 2.50 gm

C. 3.70 gm

D. 6.30 gm

Answer: A

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185. In which of the following systems will the radius of the first orbit $(n = 1)$ be minimum ?

A. Doubly ionized lithium

B. Singly ionized helium

C. Deuterium atom

D. Hydrogen atom

Answer: A

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186. Reverse bias applied to a junction diode

A. Lowers the potential barrier

B. raises the potential barrier

C. increases the majority carrier current

D. increases the minority carrier current

Answer: B

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187. J.J. Thomson's cathode-ray tube experiment demonstrated that

A. cathode rays are streams of negatively charged ions

B. all the mass of an atom is essentially in the nucleus

C. the e/m of electrons is much greater than the e/m of protons

D. the e/m ratio of the cathode ray particles changes when a different gas is placed in the discharge tube

Answer: C

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188. Which of the following are not electromagnetic waves ?

A. X-rays

B. γ-rays

C. β-rays

D. Heat rays

Answer: C

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189. A n - p - n transistor conducts when

A. both collector and emitter are positive with respect to the base

B. collector is positive and emitter is negative with respect to the base

C. collector is positive and emitter is at same potential as the base

D. both collector and emitter are negative with respect to the base

Answer: B

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190. According to Curie's law, the magnetic susceptibilty of a paramagnetic substance at an absolute temperature T is proportional to

A. 1/T

B. T

C. $1/T^2$

D. T^2

Answer: A

Watch Video Solution

191. A diamagnetic material in a magnetic field moves

A. from stronger to the weaker parts of the field

B. from weaker to the stronger parts of the field

C. perpendicular to the field

D. in none of the above directions

Answer: A

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192. If a full wave rectifier circuit is operating from $50Hz$ mains, the fundamental frequency in the ripple will be

A. 25 Hz

B. 50 Hz

C. 70.7 Hz

D. 100 Hz

Answer: D

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193. Barrier potential of a p - n junction diode does not depend on

A. diode design

B. temperature

C. forward bias

D. doping density

Answer: A

Watch Video Solution

Watch Video Solution

194. The mass of proton is $1.0073u$ and that of neutron is $1.0087u$ ($u =$ atomic mass unit). The binding energy of $._2He^4$ is (mass of helium nucleus $= 4.0015u$)

A. 0.0305 J

B. 0.0305 erg

C. 28.4 MeV

D. 0.061 u

Answer: C

Watch Video Solution

195. The mass number of a nucleus is.

A. always less than its atomic number

B. always more than its atomic number

C. sometimes equal to its atomic number

D. sometimes less than and sometimes more than its atomic number

Answer: C

Watch Video Solution

196. A nuclear reaction given by

$1_Z X^A \rightarrow .(Z+1)Y^A + ._{-1}e^0 + \vec{p}$ represents.

A. β-decay

B. γ-decay

C. fusion

D. fission

Answer: A

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197. Following diagram performs the logic function of :

A. AND gate

B. NAND gate

C. OR gate

D. XOR gate

Answer: A

View Text Solution

198. When three identical bulbs of $60W, 200V$ rating are connected in series to a $200V$ supply, the power drawn by them will be

A. 180 watt

B. 10 watt

C. 20 watt

D. 60 watt

Answer: C

Watch Video Solution

199. The electric resistance of a certain wire of iron is R . If its length and radius are both doubled, then

A. The resistance will be halved and the specific resistance will remain unchanged

B. The resistance will be halved and the specific resistance will be doubled

C. The resistance and the specific resistance, will both remain unchanged

D. The resistance will be doubled and the specific resistance will be halved

Answer: A

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200. Resistance n, each of $r ohm$, when connected in parallel give an equivalent resistance of $R ohm$. If these resistances were connected series, the combination would have a resistance in ohm, equal to

A. $\frac{R}{n^2}$

B. R/n

C. nR

D. n^2R

Answer: D

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201. The unit of permittivity of free space ε_0 is:

A. $\text{Newton metre}^2/\text{Coulomb}^2$

B. $\text{Coulomb}^2/\text{Newton metre}^2$

C. $\text{Coulomb}^2/(\text{Newton metre})^2$

D. Coulomb/Newton metre

Answer: B

Watch Video Solution

202. A galvanometer can be used as a voltmeter by connecting

A. a high resistance in series with its coil

B. a low resistance in parallel with its coil

C. a low resistance in series with its coil

D. a high resistance in parallel with its coil

Answer: A

Watch Video Solution

203. Which one of the following statement is true for the speed v and the acceleration a of a particle executing simple harmonic motion?

A. Value of a is zero, whatever may be the value of 'v'

B. When 'v' is zero, a is zero

C. When 'v' is maximum, a is zero

D. When 'v' is maximum, a is maximum

Answer: C

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204. Two springs of spring constants K_1 and K_2 are joined in series. The effective spring constant of the combination is given by

A. $\dfrac{\left(k_1 + k_2\right)}{2}$

B. $k_1 + k_2$

C. $\dfrac{k_1 k_2}{\left(k_1 + k_2\right)}$

D. $\sqrt{k_1 k_2}$

Answer: C

Watch Video Solution

205. Of the diodes shown in the following diagrams, which one is reverse biased?

A.

B.

C.

D.

Answer: B

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206. A car is moving towards a high cliff. The car driver sounds a horn of frequency f. The reflected sound heard by the driver has a frequency $2f$. if v be the velocity of sound, then the velocity of the car, in the same velocity units, will be

A. v/3

B. v/4

C. v/2

D. v/ 2

Answer: A

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207. The density of a newly discovered planet is twice that of earth. The acceleration due to gravity at the surface of the planet is equal to that at the surface of the earth. If the radius of the earth is R, the radius of the planet would be

A. 4R

B. 1/4 R

C. 1/2 R

D. 2R

Answer: C

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208. A beam of light composed of red and green ray is incident obliquely at a point on the face of rectangular glass slab. When coming out on the opposite parallel face, the red and green ray emerge form

A. Two points propagating in two different parallel directions

B. One point propagating in two different directions through slab

C. One point propagating in the same direction through slab

D. Two points propagating in two different non parallel directions

Answer: A

Watch Video Solution

209. A particle of mass m1 is moving with a velocity v_1 and another particle of mass m_2 is moving with a velocity v2. Both of them have the same momentum but their different kinetic energies are E1 and E2 respectively. If $m_1 > m_2$ then

A. $\frac{E_1}{E_2} = \frac{m_1}{m_2}$

B. $E_1 > E_2$

C. $E_1 = E_2$

D. $E_1 < E_2$

Answer: D

Watch Video Solution

210. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

A. 60°

B. 0°

C. 30°

D. 45°

Answer: D

Watch Video Solution

211. A stone is tied to a string of length l and is whirled in a vertical circle with the other end of the string as the centre. At a certain instant of time, the stone is at its lowest position and has a speed u. The magnitude of the change in velocity as it reaches a position where the string is horizontal (g being acceleration due to gravity) is

A. $\sqrt{u^2 - gl}$

B. $u - \sqrt{u^2 - 2gl}$

C. $\sqrt{2gl}$

D. $\sqrt{2\left(u^2 - gl\right)}$

Answer: D

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212. In semiconductors at a room temperature

A. The valence band is completely filled and the conduction band is partially filled

B. The valence band is completely filled

C. The conduction band is completely empty

D. The valence band is partially empty and the conduction band is partially filled

Answer: D

Watch Video Solution

213. The peak voltage in the output of a half-wave diode rectifier fed with a sinusiodal signal without filter is $10V$. The dc component of the output voltage is

A. $\frac{10}{\pi}$ V

B. 10 V

C. $\frac{20}{\pi}$ V

D. $\frac{10}{\sqrt{2}}$ V

Answer: A

Watch Video Solution

214. A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50 N/m. The maximum compression of the spring would be :-

A. 0.12 m

B. 1.5 m

C. 0.5 m

D. 0.15 m

Answer: D

View Text Solution

215. If in a nuclear fusion process the masses of the fusing nuclei be m_1 and m_2 and the mass of the resuktant nucleus be m_3, then

A. $m_3 = |m_1 - m_2|$

B. $m_3 < (m_1 + m_2)$

C. $m_3 > (m_1 + m_2)$

D. $m_3 = m_1 + m_2$

Answer: B

Watch Video Solution

216. According to Einstein's photoelectric equation , the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

A.

B.

C.

D.

Answer: C

Watch Video Solution

217. A nucleus represented by the symbol $._{Z}^{A}X$ has.

A. Z protons and A –Z neutrons

B. Z protons and A neutrons

C. A protons and Z –A neutrons

D. Z neutrons and A –Z protons

Answer: A

Watch Video Solution

218. The dimensions of universal gravitational constant are :-

A. $ML^{2}T^{-1}$

B. $M^{-2}L^{3}T^{-2}$

C. $M^{-2}L^{2}T^{-1}$

D. $M^{-1}L^{3}T^{-2}$

Answer: D

Watch Video Solution

219. In India electricity is supplied for domestic use at $220V$. It is supplied at $110V$ in USA. If the resistance of a $60W$ bulb for use in India is R, the resistance of a $60W$ bulb for use in USA will be

A. 2R

B. R/4

C. R/2

D. R

Answer: B

Watch Video Solution

220. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charge Q that passes any point in the circuit during the time Δt is represent by

A. $Q = \dfrac{\Delta\phi}{R}$

B. $Q = \dfrac{\Delta\phi}{\Delta t}$

C. $Q = R.\dfrac{\Delta\phi}{\Delta t}$

D. $Q = \dfrac{1}{R}.\dfrac{\Delta\phi}{\Delta t}$

Answer: A

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221. A bullet of mass $2gm$ is having a charge of $2\mu c$. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of $10m/s$

A. 50 kV

B. 5V

C. 50 V

D. 5kV

Answer: A

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222. The equation of state for 5 g of oxygen at a pressure P and temperature T, when occupying a volume V, will be

A. PV = 5 RT

B. PV = (5/2) RT

C. PV = (5/16) RT

D. PV = (5/32) RT

Answer: D

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223. If λ_m denotes the wavelength at which the radiative emission from a black body at a temperature TK is maximum, then

A. λ_m is independent of T

B. $\lambda_m \propto T$

C. $\lambda_m \propto T^{-1}$

D. $\lambda_m \propto T^{-4}$

Answer: C

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224. The ratio of the radii of gyration of a circular disc about a tangential axis in the plane of the disc and a circular ring of the same radius about a tengential axis in the plane of the ring is

A. $2:1$

B. $\sqrt{5}:\sqrt{6}$

C. $2:3$

D. $1:\sqrt{2}$

Answer: B

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225. A round disc of moment of inertia I_2 about its axis perpendicular to its plane and passing through its centre is placed over another disc of moment of inertia I_1 rotating with an angular velocity ω about the same axis. The final angular velocity of the combination of discs is.

A. ω

B. $\frac{I_1\omega}{I_1 + I_2}$

C. $\frac{(I_1 + I_2)\omega}{I_1}$

D. $\frac{I_2\omega}{I_1 + I_2}$

Answer: B

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226. A ball of mass$2kg$ and another of mass $4kg$ are dropped together from a 60 feet tall building . After a fall of 30 feet each towards earth , their respective kinetic energies will be the ratio of

A. $1:4$

B. $1:2$

C. $1:\sqrt{2}$

D. $\sqrt{2}:1$

Answer: B

Watch Video Solution

227. The half-life of radium is about $1600yr$. Of $100g$ of radium existing now, $25g$ will remain unchanged after

A. 6400 years

B. 2400 years

C. 3200 years

D. 4800 years

Answer: C

Watch Video Solution

228. M_p denotes the mass of a proton and M_n that of a neutron. A given nucleus, of binding energy B, contains Z protons and N neutrons. The mass $M(N, Z)$ of the nucleus is given by.

A. $M(N, Z) = NM_n + ZM_P + Bc^2$

B. $M(N, Z) = NM_n + ZM_P - B/c^2$

C. $M(N, Z) = NM_n + ZM_P + B/c^2$

D. $M(N, Z) = NM_n + ZM_P - Bc^2$

Answer: B

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229. A telescope has an objective lens of $10cm$ diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is 5000Å, of the order of

A. 5 m

B. 5 mm

C. 5 cm

D. 0.5 m

Answer: B

Watch Video Solution

230. The phase difference between two waves represented by $y_1 = 10^{-6}\sin[100t + (x/50) + 0.5]m$, $y_2 = 10^{-6}\cos[100t + (x/50)]m$ where x is expressed in metres and t is expressed in seconds, is approximately

A. 2.07 radians

B. 0.5 radians

C. 1.5 radians

D. 1.07 radians

Answer: D

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231. A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally, so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is acceleration due to gravity) will be

A. mg sin θ

B. mg

C. mg/cos θ

D. mg cos θ

Answer: C

Watch Video Solution

232. Three particles, each of mass m gram, are situated at the vertices of an equilateral triangle ABC of side l cm. (as shown in the figure). The moment of inertia of the system about a line AX perpendicular to AB and in the plane of ABC, in gram cm^2 units will be :-

A. $2ml^2$

B. $\frac{5}{4}ml^2$

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

D. $\frac{3}{4}ml^2$

Answer: B

View Text Solution

233. Energy E of a hydrogen atom with principle quantum number n is given by $E = \frac{-13.6}{n^2}eV$. The energy of a photon ejected when the electron jumps from $n = 3$ state to $n = 2$ state of hydrogen is approximately

A. 0. 85 eV

B. 3.4 eV

C. 1.9 eV

D. 1.5 eV

Answer: C

Watch Video Solution

234. A wheel having moment of inertia $2kgm^2$ about its vertical axis, rotates at the rate of $60r\pm$ about this axis. The torque which can stop the wheel's rotation in one minute would be

A. $\frac{\pi}{12}$ N-m

B. $\frac{\pi}{15}$ N-m

C. $\frac{\pi}{18}$ N-m

D. $\frac{2\pi}{15}$ N-m

Answer: B

Watch Video Solution

235. Consider a sytem of two particles having masses m_1 and m_2. If the particle of mass m_1 is pushed towards the centre of mass of particles through a distance d, by what distance would the particle of mass m_2 move so as to keep the mass centre of particles at the original position?

A. $\frac{m_1}{m_2}d$

B. d

C. $\frac{m_2}{m_1}$

D. $\frac{m_1}{m_1 + m_2}d$

Answer: A

Watch Video Solution

236. If $\left|\vec{A} \times \vec{B}\right| = \sqrt{3}\vec{A}.\vec{B}$, then the value of $\left|\vec{A} + \vec{B}\right|$ is

A. $\left(A^2 + B^2 + \frac{\text{AB}}{\sqrt{3}}\right)^{1/2}$

B. $A + B$

C. $\left(A^2 + B^2 + \sqrt{3}AB\right)^{1/2}$

D. $\left(A^2 + B^2 + AB\right)^{1/2}$

Answer: D

Watch Video Solution

237. The coefficient of static friction, μs, between block A of mass 2 kg and the table as shown in the figure is 0.2. What would be the maximum mass value of block B so that the two blocks do not move ? The string and the pulley are assumed to be smooth and massless

$\left(g = 10 m/s^2\right)$

A. 4.0 kg

B. 0.2 kg

C. 0.4 kg

D. 2.0 kg

Answer: C

View Text Solution

238. In a p - n junction photo cell, the value of the photo electromotive force produced by monochromatic light is proportional to

A. The intensity of the light falling on the cell

B. The frequency of the light falling on the cell

C. The voltage applied at the p–n junction

D. The barrier voltage at the p–n junction

Answer: A

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239. The Bohr model of atoms

A. Uses Einstein's photo electric equation

B. Predicts continuous emission spectra for atoms

C. Predicts the same emission spectra for all types of atoms

D. Assumes that the angular momentum of electrons is quantized

Answer: D

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240. The output of OR gate is 1

A. If either or both inputs are 1

B. Only if both inputs are 1

C. If either input is zero

D. If both inputs are zero

Answer: A

Watch Video Solution

241. An electric dipole has the magnitude of its charge as q and its dipole moment is p. It is placed in a uniform electric field E. If its dipole moment is along the direction of the field, the force on it and its potential energy are respectively

A. q. E and p. E

B. zero and minimum

C. q. E and maximum

D. 2q. E and minimum

Answer: B

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242. A coil of $40H$ inductance is connected in series with a resistance of 8 ohm and the combination is joined to the terminals of a $2V$ battery. The time constant of the circuit

A. 1/5 seconds

B. 40 seconds

C. 20 seconds

D. 5 seconds

Answer: D

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243. One mole of an ideal gas at an initial temperature true of TK does $6R$ joule of work adiabatically. If the ratio of specific heats of this gas at constant pressure and at constant volume is $5/3$, the final temperature of the gas will be

A. (T –2.4) K

B. (T + 4)K

C. (T – 4) K

D. (T + 2.4)K

Answer: C

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244. A battery is charged at a potential of $15V$ for 8 hours when the current flowing is $10A$. The battery on discharge supplies a current of $5A$ for 15 hours. The terminal voltage during discharge is $14V$. The 'Watt-hour" efficiency of the battery is.

A. 80 %

B. 90 %

C. 87.5 %

D. 82.5 %

Answer: C

Watch Video Solution

245. Five equal resistances each of resistance R are connected as shown in the Figure. A battery of V volts is connected between A and B. The current flowing in AFCEB will be

A. V/R

B. V/2R

C. 2V/R

D. 3V/R

Answer: B

View Text Solution

246. A glavanometer of 50Ω resistance has 25 divisions. A current of 4×10^{-4} A gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of $25V$, it should be connected with a resistance of

A. 245 Ω as a shunt

B. 2550 Ω in series

C. 2450 Ω in series

D. 2500 Ω as a shunt

Answer: C

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247. A 6 V battery is connected to the terminals of a 3 m long wire of uniform thickness and resistance of 100Ω. The difference of potential between two points on the wire separated by a distance of 50 cm will be

A. 3 v

B. 1v

C. 1.5 v

D. 2 v

Answer: B

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248. The work function for metals A, B and C are respectively $1.92 eV, 2.0 eV$ and $5 eV$. According to Einstein's equation , the metals which will emit photoelectrons for a radiation of wavelength 4100Å are

A. None

B. A only

C. A and B only

D. All the three metals

Answer: C

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249. Zener diode is used for

A. Rectification

B. Stabilisation

C. Amplification

D. Producing oscillations in an oscillator

Answer: B

Watch Video Solution

250. In the reaction $._1^2H + ._1^3H \rightarrow ._2^4He + ._0^1n$, if the binding energies of $._1^2H, ._1^3H$ and $._2^4He$ are respectively a, b and c (in MeV), then the energy (in MeV) released in this reaction is.

A. a+b+c

B. c+a-b

C. c-a-b

D. a+b-c

Answer: C

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251. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current lead the voltages by 45°. The value of C is :

A. $\dfrac{1}{2\pi f(2\pi L - R)}$

B. $\dfrac{1}{2\pi f(2\pi L + R)}$

C. $\dfrac{1}{2\pi(2\pi fL - R)}$

D. $\dfrac{1}{2\pi(2\pi fL + R)}$

Answer: B

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Watch Video Solution

252. Which of the following processes is reversible?

A. Transfer of heat by radiation

B. Tranfer of heat by condution

C. Isothermal compression

D. Electrical heating of a nichrome wire

Answer: C

Watch Video Solution

253. Two batteries, one of emf 18 volts and internal resistance 2Ω and the other of emf 12 volt and internal resistance 1Ω , are connected as shown. The voltmeter V will record a reading of.

A. 18 volt

B. 30 volt

C. 14 volt

D. 15 volt

Answer: C

View Text Solution

254. Two o charges q_1 and q_2 are placed 30 cm apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi \in_0} K$, where k is -

A. $8q_2$

B. $6q_2$

C. $8q_1$

D. $6q_1$

Answer: A

View Text Solution

255. An electron moves in a circular orbit with a uniform speed v .It produces a magnetic field B at the centre of the circle. The radius of the circle is proportional to

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

B. $\frac{v}{B}$

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

D. $\sqrt{\frac{B}{v}}$

Answer: A

Watch Video Solution

256. A 5 - A wire can withstand a maximum power of $1W$ in circuit. The resistance of the fuse wire is

A. 0 ohm

B. 0.04 ohm

C. 0.2 ohm

D. 0.4 ohm

Answer: B

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257. As per this diagram a point charge +q is placed at the origin O. Work done in taking another point charge -Q from the point A coordinates (0, a) to another point B coordinates (a, 0) along the straight path AB is

A. $\left(\frac{-qQ}{4\pi \in_0} \frac{1}{a^2}\right)\sqrt{2}a$

B. zero

C. $\left(\frac{qQ}{4\pi \in_0} \frac{1}{a^2}\right)\frac{1}{\sqrt{2}}$

D. $\left(\frac{aQ}{4\pi \in_0} \frac{1}{a^2}\right)\sqrt{2}a$

Answer: B

View Text Solution

258. A very long straight wire carries a current I. At the instant when a charge +Q at point P has velocity $\vec{V}$, as shown, the force on the charge is-

- Along ox
- Opposite to oy
- Along oy
- Opposite to ox

Answer: C

View Text Solution

259. If the magnetic dipole of moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are donated by μ_d, μ_p and μ_f respectively, then:

A. $\mu_p = 0$ and $\mu_f \neq 0$

B. $\mu_d \neq 0$ and $\mu_p = 0$

C. $\mu_d \neq 0$ and $\mu_f \neq 0$

D. $\mu_d = 0$ and $\mu_p \neq 0$

Answer: D

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260. Two vibrating tuning fork produce progressive waves given by $y_1 = 4\sin 500\pi t$ and $y_2 = 2\sin 506\pi t$. Number of beats produced per minute is :-

A. 3

B. 360

C. 180

D. 60

Answer: C

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261. When a wire of uniform cross-section a, length l and resistance R is bent into a complete circle, resistance between any two of diametrically opposite points will be

A. R/2

B. R/4

C. R/8

D. 4R

Answer: B

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262. A particle executing simple harmonic motion of amplitude 5 cm has maximum speed of 31.4 cm / s . The frequency of its oscillation is

A. 1 Hz

B. 3 Hz

C. 2 Hz

D. 4 Hz

Answer: A

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263. The temperature of inversion of a thermocouple is $620^\circ C$ and the neutral temperature is $300^\circ C$. What is the temperature of cold junction?

A. $40^\circ C$

B. $20^\circ C$

C. $320^\circ C$

D. $-20^\circ C$

Answer: D

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264. The ratio of the dimension of Planck's constant and that of moment of inertia is the dimension of

A. Velocity

B. Angular momentum

C. Time

D. Frequency

Answer: D

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265. A bomb of mass $30kg$ at rest explodes into two pieces of mass $18kg$ and $12kg$. The velocity of mass $18kgis6m/s$. The kinetic energy of the other mass is

A. 524 J

B. 256J

C. 486 J

D. 324J

Answer: C

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266. The nuclei of which one of the following pairs of nuclei are isotons ?

A. $_{34}S^{74}, _{31}Ga^{71}$

B. $_{38}Sr^{84}, _{38}Sr^{86}$

C. $_{42}Mo^{92}, _{40}Zr^{92}$

D. $_{20}Ca^{40}, _{16}S^{32}$

Answer: A

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267. A photosensitive metallic surface has work funtion $h\nu_0$. If photons of energy $2h\nu_0$ fall on this surface the electrons come out with a maximum velocity of $4 \times 10^6 m/s$. When the photon energy is increases to $5h\nu_0$ then maximum velocity of photo electron will be

A. $2 \times 10^7 m/s$

B. $2 \times 10^6 m/s$

C. $8 \times 10^5 m/s$

D. $8 \times 10^6 m/s$

Answer: D

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268. As a result of change in the magnetic flux linked to the closed loop shown in the figure, an e.m.f. V volt is induced in the loop. The work done (joules) in taking a charge Q coulomb once along the loop is-

A. QV

B. QV/2

C. 2QV

D. Zero

Answer: A

View Text Solution

269. An ideal gas heat engine operates in Carnot cycle between $227\,^{\circ}C$ and $127\,^{\circ}C$. It absorbs $6x10^{4}cals$ of heat at higher temperature. Amount of heat converted to work is

A. 4.8×10^{4} cals

B. 2.4×10^{4} cals

C. 1.2×10^{4} cals

D. 6×10^{4} cals

Answer: B

Watch Video Solution

270. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of permanent magnet. Such that $\vec{B}$ is in plane of the coil. If due to a current I in the triangle, a torque τ acts on it, the side l of the triangel is:

A. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$

B. $\frac{1}{\sqrt{3}}\frac{\tau}{Bi}$

C. $2\left(\frac{\tau}{\sqrt{3}Bi}\right)^{\frac{1}{2}}$

D. $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{\frac{1}{2}}$

Answer: B

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271. if $\lambda_{v'}, \lambda_x$ and λ_m represent the wavelengths of visible light X-rays and microwaves respectively then:

A. $\lambda_m > \lambda_x > \lambda_v$

B. $\lambda_v > \lambda_m > \lambda_x$

C. $\lambda_v > \lambda_x > \lambda_m$

D. $\lambda_m > \lambda_v > \lambda_x$

Answer: D

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272. For a satellite moving in an orbit around the earth, ratio of kinetic energy to potential energy is

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

B. 2

C. $\sqrt{2}$

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

Answer: D

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273. For the network shown in the figure the value of the current i is -

A. $\frac{18V}{5}$

B. $\frac{5V}{9}$

C. $\frac{9V}{35}$

D. $\frac{5V}{18}$

Answer: D

View Text Solution

274. The moment of inertia of a uniform circular disc of radius R and mass M about an axis passing from the edge of the disc and normal to the disc is.

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

B. $\frac{7}{2}MR^2$

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

D. MR^2

Answer: C

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275. In any fission the ratio

$\frac{\text{mass of fission produts}}{\text{mass of parent nucleus}}$ is

A. Greater than 1

B. Depends on the mass of the parent nucleus

C. Equal to 1

D. Less than 1

Answer: D

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276. Copper has face centred cubic (fcc) lattice with interatomic spacing equal to 2.54Å. The value of the lattice constant for this lattice is

A. 3.59Å

B. 2.54 Å

C. 1.27Å

D. 5.08Å

Answer: A

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277. Fission of nuclei is possible because the binding energy per nuclei in them

A. Decreases with mass number at low mass numbers

B. Increases with mass number at low mass numbers

C. Decreases with mass number at high mass numbers

D. Increases with mass number at high mass numbers

Answer: C

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278. The angular resolution of a $10cm$ diameter telescope at a wavelength 5000Å is of the order

A. 10^{-4} rad

B. 10^{-6} rad

C. 10^{6} rad

D. 10^{-2} rad

Answer: B

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279. A network of four capacitors of capacity equal to $C_1 = C, C_2 = 2C, C_3 = 3C$ and $C_4 = 4C$ are conducted to a battery as showin in the figure . The ratio of the charge on

C_2 and C_4 is -

A. $\frac{7}{4}$

B. $\frac{22}{3}$

C. $\frac{3}{22}$

D. $\frac{4}{7}$

Answer: C

View Text Solution

280. A drum of radius R and mass M, rolls down without slipping along an inclined plane of angle θ. The frictional force-

A. Decreases the rotational and translational motion

B. Dissipates energy as heat

C. Decreases the rotational motion

D. Converts translational energy to rotational energy

Answer: D

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281. A stone tied to the end of string 1m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolution in 44s, What is the magnitude and direction of acceleration of the ston is ?

A. $\pi^2 ms^{-2}$ and direction along the tangent to the circle

B. $\pi^2 ms^{-2}$ and direction along the radius towards the centre.

C. $\frac{\pi^2}{4} ms^{-2}$ and direction along the radius towards the centre.

D. $\pi^2 ms^{-2}$ and direction along the radius away from the centre .

Answer: B

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282. Choose the only false statement form the following

A. The resistivity of a semiconductor increases with increase in temperature

B. Substances with energy gap of the order of 10eV are insulators.

C. In conductors the valence and conduction bands may over lap

D. The conductivity of a semiconductor increases with increases in temperature.

Answer: A

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283. the circular motion of a particle with constant speed is

A. Periodic and simple harmonic

B. Simple harmonic but not periodic

C. Neither periodic nor simple harmonic

D. Periodic but not simple harmonic

Answer: D

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284. The total energy of the electron in the first excited state of hydrogen is -$3.4eV$. What is the kinetic energy of the electron in this state?

A. -$6.8eV$

B. $3.4eV$

C. $6.8eV$

D. -$3.4eV$

Answer: B

Watch Video Solution

285. Carbon, silicon and germanium atoms have four valence electrons each. Their valence and conduction bands are separated by energy band gaps represented by $\left(E_g\right)_C$, $\left(E_g\right)_{Si}$ and $\left(E_g\right)_{Ge}$, respectively. Which one of the following relationship is true in their case?

A. $\left(E_g\right)_C < \left(E_g\right)_{Ge}$

B. $\left(E_g\right)_C > \left(E_g\right)_{Si}$

C. $\left(E_g\right)_C = \left(E_g\right)_{Si}$

D. $\left(E_g\right)_C < \left(E_g\right)_{Si}$

Answer: B

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286. Which of the following circular rods (given radius r and length l) each made of the same material and whose ends are maintained at the same temperature will conduct most heat?

A. $r = 2r_0, l = 2l_0$

B. $r = 2r_0, l = l_0$

C. $r = r_0, l = 2l_0$

D. $r = r_0, l = l_0$

Answer: B

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287. If a vector $2\hat{i} + 3\hat{j} + 8\hat{k}$ is perpendicular to the vector $4\hat{j}$ - $4hai + \alpha\hat{k}$, then the value of α

A. - 1

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

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

D. 1

Answer: B

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288. imagine a new planet having the same density as that of earth but it is 3 times bigger than the earth is size. If the acceleration due to gravity on the surface of earth is g and that on the surface of the new planet is g', then find the relation between g and g'.

A. g'=3g

B. g,=9g

C. g'=g/9

D. g'=27g

Answer: A

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289. The angle between the vector $\vec{A}$ and $\vec{B}$ is θ. The value of the triple product $\vec{A}.\left(\vec{B}\times\vec{A}\right)$ is

A. Zero

B. $BA^2\sin\theta\cos\theta$

C. $BA^2\cos\theta$

D. $BA^2\sin\theta$

Answer: A

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290. A point source emits sound equally in all directions in a non-absorbing medium. Two point P and Q are at distance of $2m$ and

$3m$ respectively from the source. The ratio of the intensities of the wave at P and Q is :

A. $3:2$

B. $2:3$

C. $9:4$

D. $4:9$

Answer: C

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291. A force F acting on an object varies with distance x as shown here.

The force is in N and x in m. The work done by the force in moving the object from x = 0 to x = 6 m is

A. 18.0 J

B. 13.5 J

C. 4.5 J

D. 9.0 J

Answer: B

View Text Solution

292. Application of a forward biase to a p - n junction:

A. Widens the depletion zone

B. Increases the number of donors on the n side

C. Increases the potential difference across the depletion zone

D. Increases the electric field in the depletion zone

Answer: B

Watch Video Solution

293. Energy levels A,B,C of a certain atoms corresponding to increasing values of energy level i.e., $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are the wavelengths of radiations corresponding to the transitions C to B,B to A and C to A respectively which of the following statement is correct?

A. $\lambda_3 = \lambda_1 + \lambda_2$

B. $\lambda_1 + \lambda_2 + \lambda_3 = 0$

C. $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

D. $\lambda_3 = \dfrac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

Answer: D

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294. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$. Where a, b, α and β positive constant.

The velocity of the particle will.

A. Be independent of α and β

B. Go on increasing with time

C. Drop to zero when $\alpha = \beta$

D. Go on decreasing with time

Answer: B

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295. Two boys are standing at the ends A and B of a ground, where $AB = a$. The boy at B starts running in a direction perpendicular to AB with velocity v_1. The boy at A starts running simultaneously with velocity v and catches the other boy in a time t, where t is :

A. $\dfrac{a}{\sqrt{v^2 + v_1^2}}$

B. $\sqrt{\dfrac{a^2}{\sqrt{v^2 - v_1^2}}}$

C. $\dfrac{a}{(v - v_1)}$

D. $\dfrac{a}{(v + v_1)}$

Answer: B

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296. Two bodies have their moments of inertia I and $2I$ respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio.

A. $1:2$

B. $\sqrt{2}:1$

C. $1:\sqrt{2}$

D. $2:1$

Answer: C

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297. A ball is throw vertically upward. It has a speed of $10m/s$ when it has reached on half of its maximum height. How high does the ball rise ? (Taking $g = 10m/s^2$).

A. 5m

B. 15m

C. 10m

D. 20m

Answer: C

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298. Dimension of resistance in an elecatrical circuit, in terms of dimension of mass M, of length L, of time T, and of current I, would be

A. $ML^2T^{-3}I^{-2}$

B. $ML^2T^{-3}I^{-2}$

C. ML^2T^{-2}

D. $ML^2T^{-1}I^{-1}$

Answer: A

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299. A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constant. The particle at $t = 0$ has zero velocity. In the time interval between $t = 0$ and the instant when $f = 0$, the particle's velocity $\left(v_x\right)$ is :

A. $\frac{1}{2}f_0T$

B. f_0T

C. $\frac{1}{2}f_0T^2$

D. f_0T^2

Answer: A

Watch Video Solution

300. A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform speed v_d. The average speed for this round trip is :

A. $\dfrac{v_u + v_d}{2}$

B. $\dfrac{2v_d v_u}{v_d + v_u}$

C. $\sqrt{v_u v_d}$

D. $\dfrac{v_d v_u}{v_d + v_u}$

Answer: B

Watch Video Solution

301. A paricle starting from the origin (0,0) moves in a straight line in (x, y) plane. Its coordinates at a later time are $\left(\sqrt{3}, 3\right)$. The path of the particle makes with the x-axis an angle of

A. 0°

B. 30°

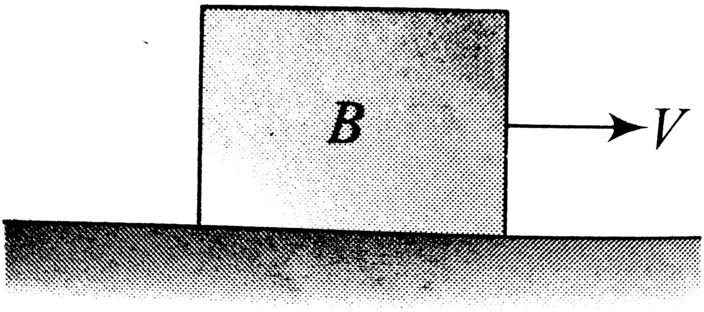
C. 45°

D. 60°

Answer: D

Watch Video Solution

302. A block B is pushed momentarily along a horizontal surface with an initial velocity v . If mu is the coefficient of sliding friction between B and the surface, block B will come to rest after a time:



A. v/g

B. $v/(g\mu)$

C. $g\mu/v$

D. g/v

Answer: B

Watch Video Solution

303. A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring , so that the spring is compressed by a distance d. The net work done in the process is

A. $mg(h - d) + \frac{1}{2}Kd^2$

B. $mg(h + d) + \frac{1}{2}Kd^2$

C. $mg(h + d) - \frac{1}{2}Kd^2$

D. $mg(h - d) - \frac{1}{2}Kd^2$

Answer: C

Watch Video Solution

304. A wheel has angular acceleration of $3.0 rad/s^2$ and an initial angular speed of $2.00 rad/s$. In a tine of $2s$ it has rotated through an angle (in radian) of

A. 4

B. 6

C. 10

D. 12

Answer: C

Watch Video Solution

305. $\vec{A}$ and $\vec{B}$ are two vectors and θ is the angle between them, if $\left|\vec{A}\times\vec{B}\right| = \sqrt{3}\left(\vec{A}.\vec{B}\right)$ the value of θ is:-

A. 90°

B. 60°

C. 45°

D. 30°

Answer: B

Watch Video Solution

306. The position x of a particle with respect to time t along the x-axis is given by $x = 9t^2 - t^3$ where x is in meter and t in second. What will be the position of this particle when it achieves maximum speed along the positive x direction

A. 24 m

B. 32 m

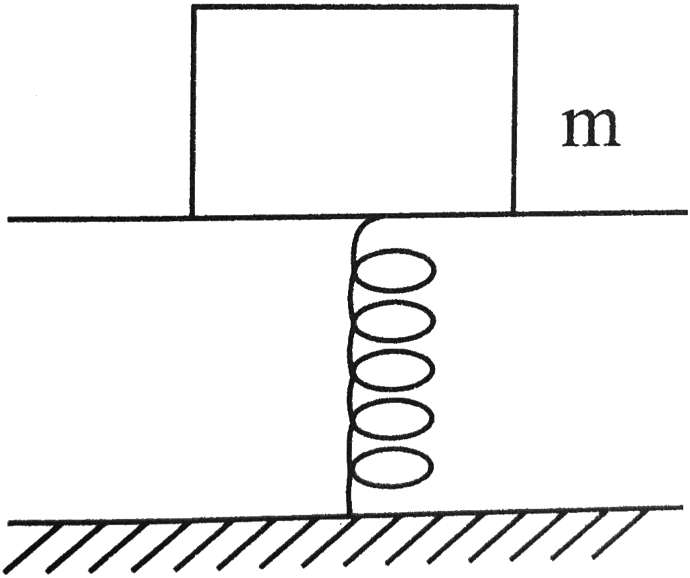
C. 54 m

D. 81 m

Answer: C

Watch Video Solution

307. A mass of $2.0kg$is put on a that pan attached to a vertical spring fixed on the ground as shown in the figure The mass of the spring and the pen is negligible the mass executing a simple harmonic motion The spring constant is $200N/m$ what should be the minimum amplitude of the motion so that the mass get detached from the pan? $\left(Tak \in gg = 10m/s^2\right)$



A. 4.0 cm

B. 8.0 cm

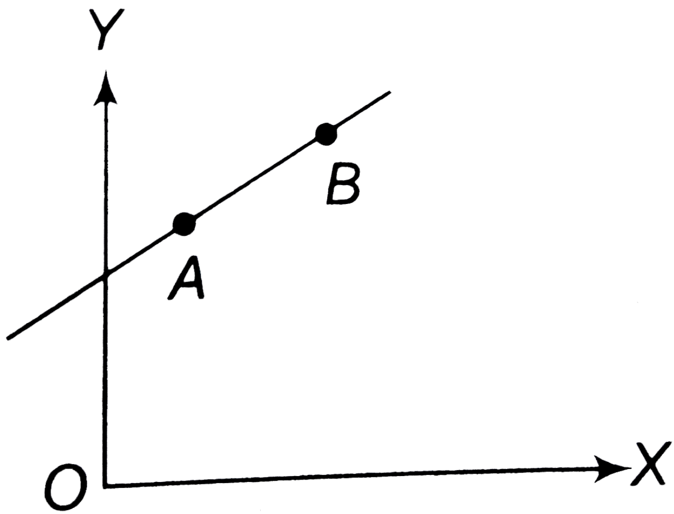
C. 10.0 cm

D. Any value less than 12.0 cm

Answer: C

Watch Video Solution

308. A particle of mass m moves in the XY plane with a velocity v along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B, then



A. $L_A < L$

B. $L_A > L_B$

C. $L_A = L_B$

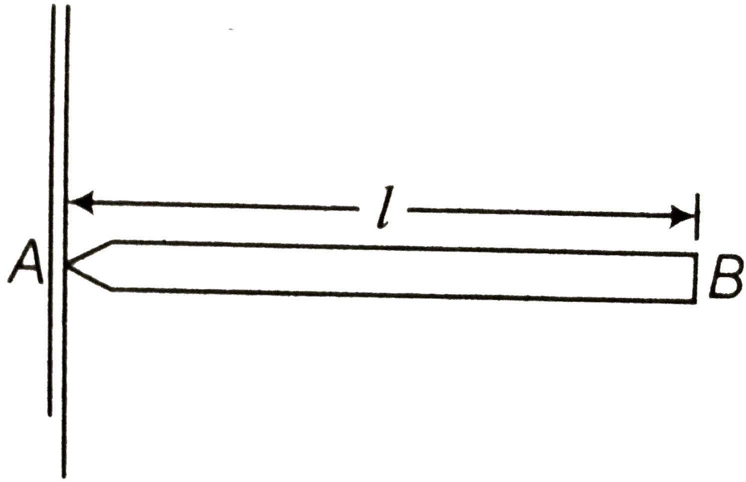
D. The relationship between L_A and L_B depends upon the slope of the line AB

Answer: C

Watch Video Solution

309. A uniform rod AB of length l and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is

$\frac{ml^2}{3}$, the initial angular acceleration of the rod will be



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

B. $\frac{2g}{3l}$

C. $mg\frac{l}{2}$

D. $\frac{3}{2}gl$

Answer: A

Watch Video Solution

310. Two satellites of earth S_1 and S_2 are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true?

A. The kinetic energies of the two satellites are equal

B. The time period of S_1 is four times that of S_2

C. The potential energies of earth and satellite in the two cases are equal

D. S_1 and S_2 are moving with the same speed

Answer: D

Watch Video Solution

311. Assuming the sun to have a spherical outer surface of radius r radiating like a black body at temperature $t^{\circ}C$. The power received by a unit surface (normal to the incident rays) at a distance R from the centre of the sun is

where σ is the Stefan's constant.

A. $r(2)\sigma(t+273)^4/R^2$

B. $4\pi r^2\sigma t^4/R^2$

C. $r^2\sigma(t+273)^4/4\pi R^2$

D. $16\pi^2 r^2\sigma t^4/R^2$

Answer: A

Watch Video Solution

312. 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. $99^{\circ} C$

B. $124^{\circ} C$

C. $37^{\circ} C$

D. $62^{\circ} C$

Answer: A

Watch Video Solution

313. A black body is at $727^{\circ} C$. It emits energy at a rate which is proportional to

A. $(727)^{4}$

B. $(727)^{2}$

C. $(1000)^{4}$

D. $(1000)^{2}$

Answer: C

Watch Video Solution

314. The frequency of a light wave in a material is $2 \times 10^{14} Hz$ and wavelength is 5000Å. The refractive index of material will be

A. 1.33

B. 1.40

C. 1.50

D. 3.00

Answer: D

Watch Video Solution

315. The phase difference between the instantaneous Velocity and acceleration of a particle executing simple harmonic motion is

A. Zero

B. 0.5π

C. π

D. 0.707π

Answer: B

Watch Video Solution

316. The particle executing simple harmonic motion has a kinetic energy $K_0 \cos^2 \omega t$. The maximum values of the potential energy and the energy are respectively

A. K_0 and K_0

B. 0 and $2K_0$

C. $\frac{K_0}{2}$ and K_0

D. K_0 and $2K_0$

Answer: A

Watch Video Solution

317. A particle executes simple harmonic oscillation with an amplitudes a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is

A. T/2

B. T/4

C. T/8

D. T/12

Answer: D

Watch Video Solution

318. The electric and magnetic field of an electromagnetic wave is

A. in phase and perpendicular to each other

B. in phase and parallel to each other

C. in opposite phase and perpendicular to each other

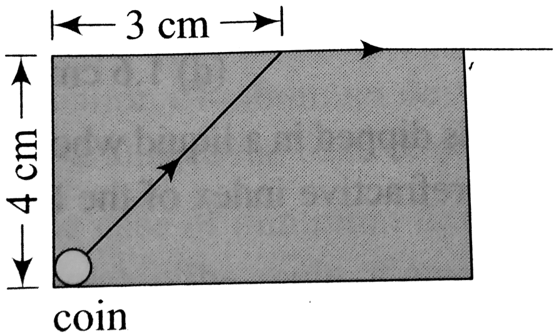
D. in opposite phase and parallel to each other

Answer: A

Watch Video Solution

319. A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels up to the surface of the liquid and moves along its surface (see figure).

How fast is the light travelling in the liquid ?



A. $1.2 \times 10^8 m/s$

B. $1.8 \times 10^8 m/s$

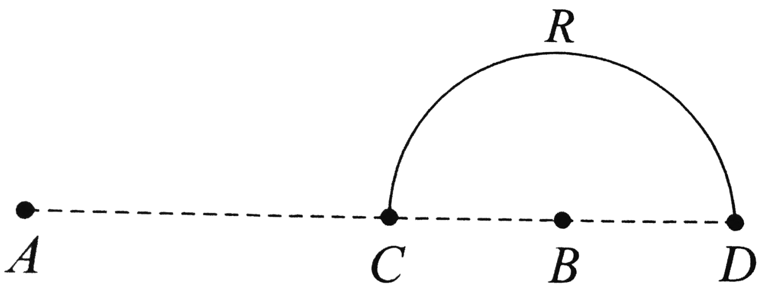
C. $2.4 \times 10^8 m/s$

D. $3.0 \times 10^8 m/s$

Answer: B

Watch Video Solution

320. Charges $+q$ and $-q$ are placed at points A and B respectively which are a distance $2L$ apart, C is the midpoint between A and B. The work done in moving a charge $+Q$ along the semicircle CRD is



A. $-\dfrac{qQ}{6\pi \in_0 L}$

B. $\dfrac{qQ}{4\pi \in_0 L}$

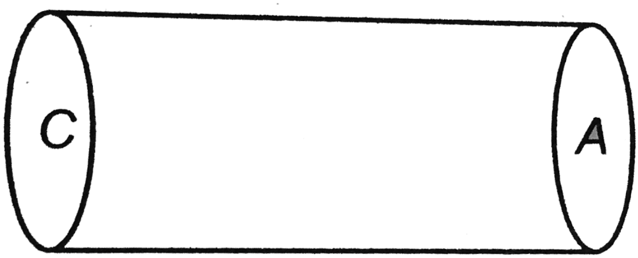
C. $\dfrac{qQ}{2\pi \in_0 L}$

D. $\dfrac{qQ}{6\pi \in_0 L}$

Answer: A

Watch Video Solution

321. A hollow cylinder has a charge qC within it. If ϕ is the electric flux in unit of voltmeter associated with the curved surface B the flux linked with the plance surface A in unit of voltmeter will be



A. $\dfrac{q}{\epsilon_0} - \phi$

B. $\dfrac{1}{2}\left(\dfrac{q}{\epsilon_0} - \phi\right)$

C. $\dfrac{q}{2\epsilon_0}$

D. $\dfrac{\phi}{3}$

Answer: B

Watch Video Solution

322. Three point charges +q, –2q and +q are placed at points (x = 0, y = a, z = 0), (x = 0,y = 0, z = 0) and (x = a, y = 0, z = 0) respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are:-

A. $\sqrt{2}$ qa along + x direction

B. $\sqrt{2}$ qa along + y direction

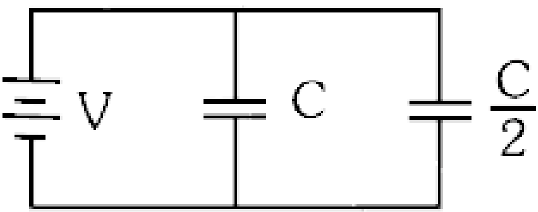
C. $\sqrt{2}$ qa along the line joining points (x=0,y=0,z=0) and (x=a,y=a,z=0)

D. qa along the line joining points (x=0,y=0,z=0) and (z=a , y=a ,z=0)

Answer: C

Watch Video Solution

323. Two condensers, one of capacity C and the other of capacity $\frac{C}{2}$, are connected to a V-volt battery, , as shown



The work done in charging fully both the condensers is

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

B. $2CV^2$

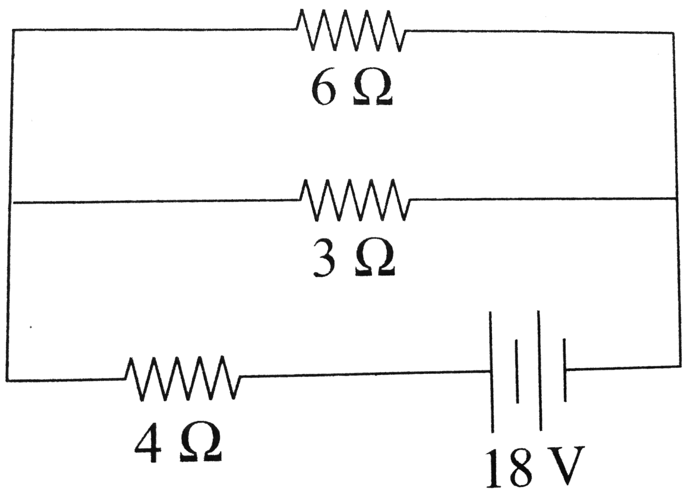
C. $\frac{1}{4}CV^2$

D. $\frac{3}{4}CV^2$

Answer: D

Watch Video Solution

324. The total power dissipated in watts in the circuit shown here is



A. 4W

B. 16W

C. 40W

D. 54W

Answer: D

Watch Video Solution

325. A steady current of $1.5A$ flows through a copper voltameter for 10 min. If the electrochemical equivalent of copper is $30 \times 10^{-5} gC^{-1}$, the mass of copper deposited on the electrode will be

A. 0.27 gm

B. 0.40 gm

C. 0.50 gm

D. 0.67 gm

Answer: A

Watch Video Solution

326. If the cold junction of thermocouple is kept at $0^{\circ} C$ and the hot junction is kept at $T^{\circ} C$, then the relation between neutral temperature $\left(T_n\right)$ and temperature of inversion $\left(T_i\right)$ is

A. $T_n = T_i + T$

B. $T_n = T_i / 2$

C. $T_n = 2T_i$

D. $T_n = T_i - T$

Answer: B

Watch Video Solution

327. Three resistance P, Q, R each of 2Ω and an unknown resistance S from the four amrs of a Wheatstone's bridge circuit. When a resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S ?

A. 1Ω

B. 2Ω

C. 3Ω

D. 6Ω

Answer: C

Watch Video Solution

328. The resistance of an ammeter is 13Ω and its scale is graduated for a current upto $100A$. After an additional shunt has been connected to this ammeter it becomes possible to measure currents upto $750A$ by this meter. The value of shunt resistance is

A. 2Ω

B. 20Ω

C. 2Ω

D. 0.2Ω

Answer: C

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329. Under the influence of a unifrom magnetic field a charged particle is moving on a circle of radius R with Constnant speed v. The time period of the motion

A. depends on R and not on v

B. depends on v and not on R

C. depends on both R and v

D. is independent of both R and v

Answer: D

Watch Video Solution

330. A charged particle (charge q) is moving in a circle of radius R with unifrom speed v. The associated magnetic moment μ is given by

A. q v R

B. q v R/2

C. qvR^2

D. $qv\frac{R^2}{2}$

Answer: B

Watch Video Solution

331. A beam of electrons passes underfected throgh unifromly perpendicular electric and magnetic fields. If the electric fiedl is swiched off, and the same magnetic field is mainted fiedl is maintetained the electrons move:

A. along a straight line

B. in an elliptical orbit

C. in a circular orbit

D. along a parabolic path

Answer: C

Watch Video Solution

332. The primary and secondary coils of a transmformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in weber, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is

A. 30 volts

B. 90 volts

C. 120 volts

D. 220 volts

Answer: C

Watch Video Solution

333. What is the value of inductance L for which the current is a maximum in series LCR circuit with $C = 10\mu F$ and $\omega = 1000 \frac{rad}{s}$?

A. 10 mH

B. 100 mH

C. 1 mH

D. cannot be calculated unless R is known

Answer: B

Watch Video Solution

334. A transformer is used to light a $100W$ and $110V$ lamp from a $220V$ mains. If the main current is $0.5A$, the Efficiency of the transformer is approximately:

A. 10 %

B. 30 %

C. 50 %

D. 90 %

Answer: D

Watch Video Solution

335. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond curie temperature, then it will show

A. diamagnetism

B. paramagnetism

C. anti ferromagnetism

D. no magnetic property

Answer: B

Watch Video Solution

336. A $5W$ source emits monochromatic light of wavelength 5000Å. When placed $0.5m$ away , it liberates photoelectrons from a photosensitive metallic surface . When the source is moved to a distance of $1.0m$ the number of photoelectrons liberated will be reduced by a factor of

A. be reduced by a factor of 2

B. be reduced by a factor of 4

C. be reduced by a factor of 8

D. be reduced by a factor of 16

Answer: B

Watch Video Solution

337. Monochromatic light of frequency $6.0 \times 10^{14} Hz$ is produced by a laser. The power emitted is 2×10^{-3} w. The number of photons emitted, on the average, by the sources per second is

A. 5×10^{14}

B. 5×10^{15}

C. 5×10^{16}

D. 5×10^{17}

Answer: B

Watch Video Solution

338. In mass spectrometer used for measuring the masses of ions, the ions are initaily accerlerated by an electric potential V and then made to describe semicircular paths of radius R using a magnetic field B.if V and B are kept constant, the ratio $\left(\frac{\text{charg e on the ion}}{\text{mass of the ion}}\right)$ will be propertional to:

A. R

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

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

D. R^2

Answer: C

Watch Video Solution

339. If radius of the $._{13}^{27}Al$ nucleus is estimated to be 3.6 Fermi, then the radius of $._{52}^{125}Te$ nucleus be nerarly:

A. 4.8 fm

B. 6.0 fm

C. 9.6 fm

D. 12.0 fm

Answer: B

Watch Video Solution

340. In radioactive decay process, the negatively changed emitted β - particle are

A. the electrons orbiting around the nucleus

B. the electrons present inside the nucleus

C. the electrons produced as a result of the decay of neutrons inside the nucleus

D. the electrons produced as a result of collisions between atoms

Answer: C

Watch Video Solution

341. A nucleus $._{Z}^{A}X$ has mass represented by $m(A, Z)$. If m_p and m_n denote the mass of proton and neutron respectively and BE the blinding energy (in MeV), then

A. $B.E. = M(A, Z) - ZM_p - (A - Z)M_n$

B. $B.E. = \left[M(A, Z) - ZM_p - (A - Z)M_n\right]C^2$

C. $B.E. = \left[ZM_p + (A - Z)M_n - M(A, Z)\right]C^2$

D. $B.E. = \left[ZM + AM_n - M(A, Z)\right]C^2$

Answer: C

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342. Two radioactive substance A and B have decay constants 5λ and λ respectively. At $t = 0$ they have the same number of nuclei. The ratio of number of nuclei of nuclei of A to those of B will be $\left(\frac{1}{e}\right)^2$ after a time interval

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

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

C. 4λ

D. 2λ

Answer: A

Watch Video Solution

343. The total energy of eletcron in the ground state of hydrogen atom is $-13.6eV$. The kinetic enegry of an electron in the first excited state is

A. 1.7 ev

B. 3.4 eV

C. 6.8 eV

D. 13.6 eV

Answer: B

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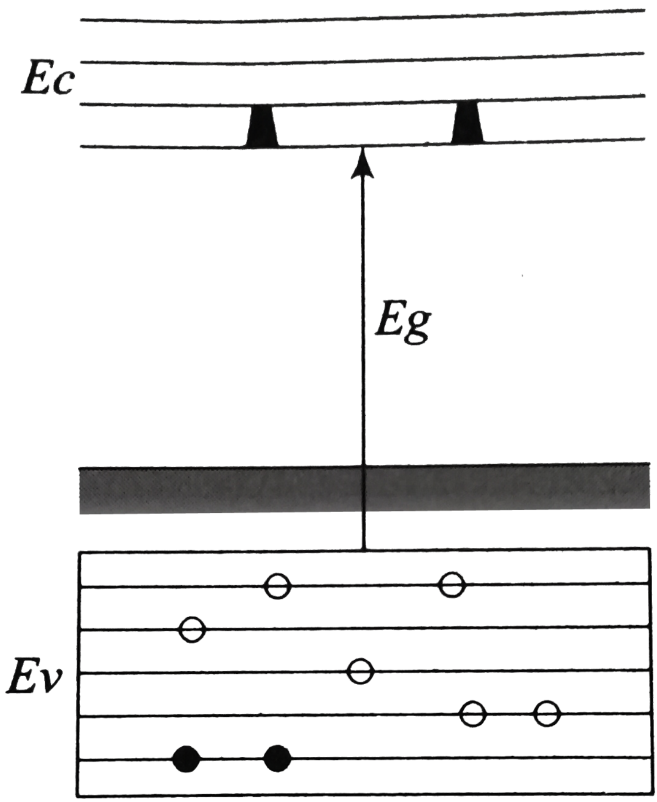
344. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is a/an



A. an n-type semiconductor

B. a p-type semiconductor

C. an insulator

D. a metal

Answer: B

Watch Video Solution

345. A common emitter amplifier has a voltage gain of 50, an input impedence of 100Ω and an output impedence of 200Ω. The power gain of the of the amplifier is

A. 100

B. 500

C. 1000

D. 1250

Answer: D

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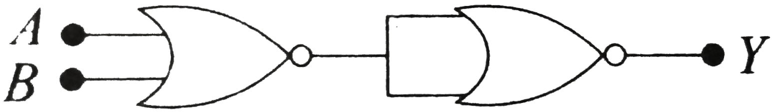
346. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:



A. (1)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

B. (2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

C. (3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0.

D. (4)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

Answer: A

Watch Video Solution

347. For a cubic crystal structure which one of the following relations indicating the cell characterstic is correct?

A. $a = b = c$ and $\alpha = \beta = \gamma = 90^{\circ}$

B. $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$

C. $a \neq be \neq c$ and $\alpha = \beta = \gamma = 90^{\circ}$

D. $a = b = c$ and $\alpha \neq \beta \neq \gamma = 90^{\circ}$

Answer: A

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348. If the dimension of a physical quantity are given by $M^a L^b T^c$, then the physical quantity will be

A. Force if a = 0, b = –1, c = –2

B. Pressure if a = 1, b = –1, c = –2

C. Velocity if a = 1, b = 0, c = –1

D. Acceleration if a = 1, b = 1, c = –2

Answer: B

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349. A particle starts its motion from rest under the action of a constant force. If the distance covered in first $10s$ is s_1 and the covered in the first $20s$ is s_2, then.

A. $S_2 = S_1$

B. $S_2 = 2S_1$

C. $S_2 = 3S_1$

D. $S_2 = 4S_1$

Answer: D

Watch Video Solution

350. A bus is moving with a speed of $10ms^{-1}$ on a straight road. A scooterist wishes to overtake the bus in $10s$. If the bus is at a distance of $1km$ from the scooterist with what speed should the scooterist chase the bus ?

A. $10ms^{-1}$

B. $20ms^{-1}$

C. $40ms^{-1}$

D. $25ms^{-1}$

Answer: B

Watch Video Solution

351. The mass of a lift is $2000kg$. When the tensioon in the supporting cable is $28000N$, then its acceleration is.

A. $14ms^{-2}$ upwards

B. $30ms^{-2}$ downwards

C. $4ms^{-2}$ upwards

D. $4ms^{-2}$ downwards

Answer: C

Watch Video Solution

352. An explosion blows a rock into three parts. Two parts go off at right angles to each other . These two are $1kg$ first part moving with a velocity of $12ms^{-1}$ and $2kg$ second part moving with a velocity of $8ms^{-1}$. If the third part flies off with a velocity of $4ms^{-1}$. Its mass would be

A. 3 kg

B. 5 kg

C. 7 kg

D. 17 kg

Answer: B

Watch Video Solution

353. An ideal spring with spring constant k is hung from the ceiling and a block of mass M is attached to its lower end. The mass is released with the spring initially unstretched. Then the maximum extension in the spring is

A. Mg/2k

B. Mg/k

C. 2 Mg/k

D. 4 Mg/k

Answer: C

Watch Video Solution

354. Area of a parallelogram formed by vectors $\left(3\hat{i} - 2\hat{j} + \hat{k}\right)m$ and $\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$ m as adjacent sides is

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

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

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

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

Answer: C

Watch Video Solution

355. Four identical thin rods each of mass M and length l, from a square frame. Moment of inertia of this frame about an axis through the centre of the square and perpendicular to its plane is

A. $\frac{1}{3}Ml^2$

B. $\frac{4}{3}Ml^2$

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

D. $\frac{13}{3}Ml^2$

Answer: B

Watch Video Solution

356. A thin circular ring of mass M and radius R is rotating in a horizontal plane about an axis vertical to its plane with a constant angular velocity ω. If two objects each of mass m be attached gently to the opposite ends of a diameter of the ring, the ring will then rotate with an angular velocity

A. $\dfrac{\omega W}{M + m}$

B. $\dfrac{\omega(M - 2m)}{M + 2m}$

C. $\dfrac{\omega M}{M + 2m}$

D. $\dfrac{\omega(M + 2m)}{M}$

Answer: C

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357. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of $1ms^{-2}$. The mass of this body must be.

A. $10\sqrt{2}kg$

B. $2\sqrt{10}kg$

C. $10kg$

D. 20 kg

Answer: A

Watch Video Solution

358. Let $\vec{F}$ be a force acting on a particle having positon vector $\vec{r}$. $Let \vec{r}$ be the torque of this force about the origin then

A. $\vec{r}.\vec{\tau} = 0$ and $\vec{F}.\vec{\tau} \neq 0$

B. $\vec{r}.\vec{\tau} \neq 0$ and $\vec{F}.\vec{\tau} = 0$

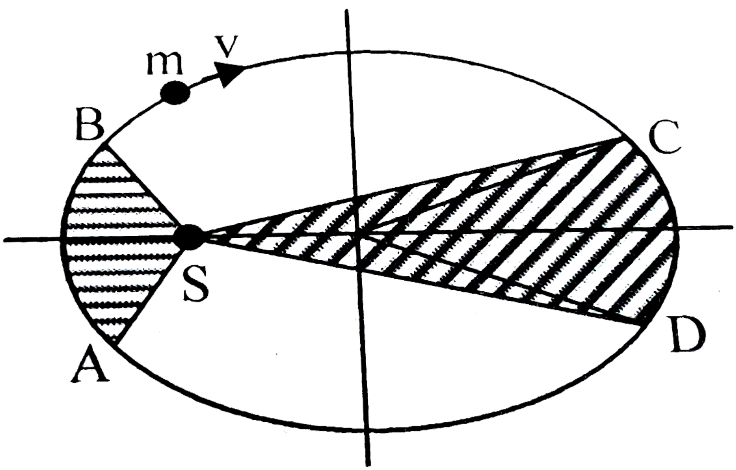
C. $\vec{r}.\vec{\tau} > 0$ and $\vec{F}.\vec{\tau} < 0$

D. $\vec{r}.\vec{\tau} = 0$ and $\vec{F}.\vec{\tau} = 0$

Answer: D

Watch Video Solution

359. The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded are SAB. It t_1 is 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. $t_1 = t_2$

B. $t_1 > t_2$

C. $t_1 = t_2$

D. $t_1 = 2t_2$

Answer: D

View Text Solution

360. An engine pumps water continously through a hose. Water leave the hose with a velocity v and m is the mass per unit length of the Water jet. What is the rate at Which kinetic energy is imparted to water?

A. $\frac{1}{2}m^2v^2$

B. $\frac{1}{2}mv^3$

C. mv^3

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

Answer: B

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361. A body of mass $1kg$ is thrown upwards with a velocity $20ms^{-1}$. It momentarily comes to rest after attaining a height of $18m$. How much energy is lost due to air friction? $\left(g = 10ms^{-2}\right)$

A. 10J

B. 20J

C. 30J

D. 40J

Answer: B

Watch Video Solution

362. The two ends of a rod of length L and a uniform cross-sectional area A are kept at two temperature T_1 and T_2 $(T_1 > T_2)$. The rate of heat transfer. $\frac{dQ}{dt}$, through the rod in a steady state is given by

A. $\frac{dQ}{dt} = \frac{kA(T_1 - T_2)}{L}$

B. $\frac{dQ}{dt} = \frac{kL(T_1 - T_2)}{L}$

C. $\frac{dQ}{dt} = \frac{k(T_1 - T_2)}{LA}$

D. $\frac{dQ}{dt} = kLA(T_1 - T_2)$

Answer: A

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363. In thermodynamic processes which of the following statement is not true?

A. In an adiabatic process PV^{γ} = constant

B. In an adiabatic process the system is insulated from the surroundings

C. In an isochoric process pressure remains constant

D. In an isothermal process the temperature remains constant

Answer: C

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364. A black body at $227^{\circ}C$ radiates heat at the rate of $7 cal cm^{-2} s^{-1}$. At a temperature of $727^{\circ}C$, the rate of heat radiated in the same unit will be

A. 80

B. 60

C. 50

D. 112

Answer: D

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365. The internal energy change in a system that has absorbed $2 kcal$ of heat and done $500 J$ of work is

A. 7900J

B. 8900J

C. 6400J

D. 5400J

Answer: A

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366. The driver of a car travelling with speed $30ms^{-1}$ towards a hill sounds a horn of frequency 600 Hz. If the velocity of sound in air is $330ms^{-1}$, the frequency of reflected sound as heard by driver is

A. 500 Hz

B. 550Hz

C. 555.5Hz

D. 720 Hz

Answer: D

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367. A simple pendulum simple harmonic motion about $x = 0$ with an amplitude a and time period T speed of the pendulum at $x = a/2$ will be

A. $\frac{\pi a\sqrt{3}}{T}$

B. $\frac{\pi a\sqrt{3}}{2T}$

C. $\frac{\pi a}{T}$

D. $\frac{3\pi^2 a}{T}$

Answer: A

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368. Which one of the following equations of motion represents simple harmonic motion ?

A. Acceleration = kx

B. Acceleration $=$ $= k_0x + k_1x^2$

C. Acceleration = – k (x + a)

D. Acceleration = k(x + a)

Answer: C

Watch Video Solution

369. The electric field part of an electromagnetic wave in a medium is represented by

$E_x = 0,$

$$E_y = 2.5\frac{N}{C}\cos\left[\left(2\pi \times 10^6\frac{rad}{m}\right)t - \left(\pi \times 10^{-2}\frac{rad}{s}\right)x\right]$$

$E_z = 0.$

The wave is

A. Moving along –x direction with frequency 10^6 Hz and wavelength 200m

B. Moving along y direction with frequency $2\pi \times 10^6$ Hz and wavelength 200m

C. Moving along x direction with frequency 10^6 Hz and wavelength 100m

D. Moving along x direction with frequency 10^6 Hz and wavelength 200m

Answer: D

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370. A wave in a string has an amplitude of $2cm$. The wave travels in the $+ve$ direction of x axis with a speed of $128ms^{-1}$ and it is noted that 5 complete waves fit in $4m$ length of the string. The equation describing the wave is

A. y = (0.02)m sin (7.58x – 1005 t)

B. y = (0.02)m sin (7.85x + 1005 t)

C. y = (0.02)m sin (15.7x – 2010 t)

D. y = (0.02)m sin (15.7x + 2010 t)

Answer: A

Watch Video Solution

371. Each of the two strings of length $51.6cm$ and $49.1cm$ are tensioned separately by $20N$ force. Mass per unit length of both the strings is same and equal to $1g/m$. When both the strings vibrate simultaneously, the number of beats is

A. 3

B. 5

C. 7

D. 8

Answer: C

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372. Three capacitors each of capacitance C and of breakdown voltage V are joined in series. The capacitance and breakdown voltage of the combination will be

A. 3C, 3V

B. $\frac{C}{3}, \frac{V}{3}$

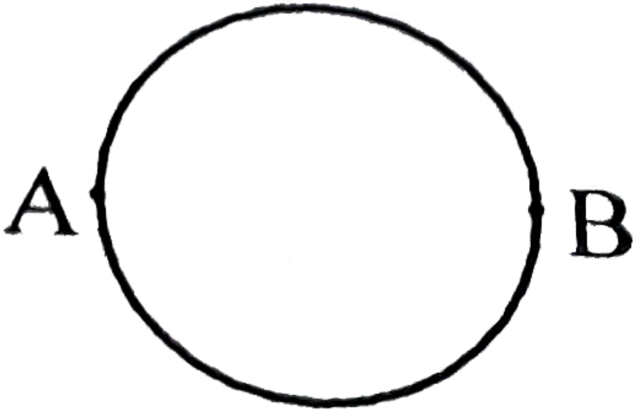
C. $3C, \frac{V}{3}$

D. $\frac{C}{3}, 3V$

Answer: D

Watch Video Solution

373. A wire of resistance 12 ohms per metre is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is :



A. 6Ω

B. $0.6 \pi \Omega$

C. 3Ω

D. $6 \pi \Omega$

Answer: B

View Text Solution

374. A bar magnet having a magnetic moment of $2 \times 10^4 JT^{-1}$ is free to rotate in a horizontal plane. A horizontal magnetic field $B = 6 \times 10^{-4} T$ exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction $60\,^\circ$ from the field is

A. 2J

B. 0.6J

C. 12J

D. 6J

Answer: D

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375. The magnetic force acting on a charged particle of charge $-2\mu C$ in a magnetic field of $2T$ acting y direction, when the particle velocity is $\left(2i + 3\hat{j}\right) \times 10^{6} ms^{-1}$, is

A. 8N in z – direction

B. 8N in z – direction

C. 4N in z – direction

D. 8N in y – direction

Answer: B

Watch Video Solution

376. A conducting circular loop is placed in a uniform magnetic field $0.04T$ with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at $2mm/\sec$. The induced emf in the loop when the radius is $2cm$ is

A. $1.6\pi\mu v$

B. $3.2\pi\mu v$

C. $4.8\pi\mu v$

D. $0.8\pi\mu v$

Answer: B

Watch Video Solution

377. The electric potential at a point (x,y,z) is given by $V = -s^2$

A. $\vec{E} = \hat{i}\left(2xy - z^3\right) + \hat{j}xy^2 + \hat{k}3z^2x$

B. $\vec{E} = \hat{i}\left(2xy + z^3\right) + \hat{j}x^2 + \hat{k}3xz^2$

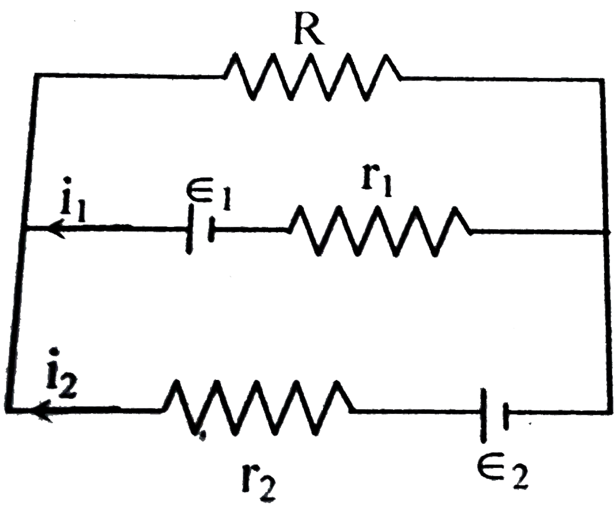
C. $\vec{E} = \hat{i}2xy + \hat{j}\left(x^2 + y^2\right) + \hat{k}\left(3xz - y^2\right)$

D. $\vec{E} = \hat{i}z + \hat{j}xyz + \hat{k}z^2$

Answer: B

Watch Video Solution

378. See the electrical circuit shown in this figure. Which of the following equations is a correct equation for it ?



A. $\in_1 - (i_1 + i_2)R + i_1 r_1 = 0$

B. $\in_1 - (i_1 + i_2)R - i_1 r_1 = 0$

C. $\in_2 - i_1 r_2 - \varepsilon_1 - i_1 r_1 = 0$

D. $- \in_2 - (i_1 + i_2)R + i_2 r_2 = 0$

Answer: B

Watch Video Solution

379. A galvanometer having a coil resistance of 60Ω shows full scale defection when a current of $1.0A$ passes thoguth it. It can vbe convered into an ammeter to read currents up to $5.0A$ by

A. Putting in parallel a resistance of 15 Ω

B. Putting in parallel a resistance of 240 Ω

C. Putting in series a resistance of 15 Ω

D. Putting in series a resistance of 240 Ω

Answer: A

Watch Video Solution

380. Under the influence of a unifrom magnetic field a charged particle is moving on a circle of radius R with Constnant speed v. The time period of the motion

A. Depends on both v and R

B. Depends on v and not on R

C. Depends on R and not on v

D. Is independent of both v and R

Answer: D

Watch Video Solution

381. Power dissipated in an L - C - R series circuit connected to an AC source of emf ε is

A. $\varepsilon^2 R / \sqrt{R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2}$

B. $\varepsilon^2 R / \left[R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right]$

C. $\varepsilon^2 R / \sqrt{\left[R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right] / R}$

D. $\dfrac{\varepsilon^2 \left[R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right]}{R}$

Answer: B

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382. Three concentric spherical shells have radii a,b and $c(a < b < c)$ and have surface charge densities σ, - σ and σ respectively. If V_A, v_B and V_c denote the potentials of the three shells, then, for $V_A = V_C$, we get-

A. $V_C = V_B = V_A$

B. $V_C = V_A \neq V_B$

C. $V_C = V_B \neq V_A$

D. $V_C \neq CV_B \neq V_A$

Answer: B

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383. A student measures the terminal potential difference (V) of a cell (of emf ε and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept of the graph between V and I, then respectively, equal

A. $-\in$ and r

B. $\in$ and $-r$

C. $-r$ and $\in$

D. r and $-\in$

Answer: C

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384. A rectangular, a square , a circular and an elliptical loop, all in the $(x - y)$ plane, are moving out of a uniform magnetic field with a constant velocity $\vec{v} = v\hat{i}$. The magnetic field is directed along the negative z-axis direction. The induced emf, during the passage of these loops , out of the field region, will not remain constant for :

A. any of the four loops

B. The rectangular, circular and elliptical loops

C. The circular and the elliptical loops

D. Only the elliptical loop

Answer: C

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385. If a diamagnetic substance is brought near north or south pole of a bar magnet, it is

A. Attracted by both the poles

B. Repelled by both the poles

C. Repelled by the north pole and attracted by the south pole

D. Attracted by the north pole and repelled by the south pole

Answer: B

Watch Video Solution

386. The number of photoelectrons emitted for light of a frequency v (higher than the threshold frequency V_0) is proportional to

A. Frequency of light (v)

B. v - v_0

C. Threshold frequency $\left(v_0\right)$

D. Intensity of light

Answer: D

Watch Video Solution

387. Monochromatic light of wavelength $667nm$ is produced by a helium neon laser . The power emitted is $9mW$. The number of photons arriving per second on the average at a target irradiated by this beam is

A. 3×10^{19}

B. 9×10^{17}

C. 3×10^{16}

D. 9×10^{15}

Answer: C

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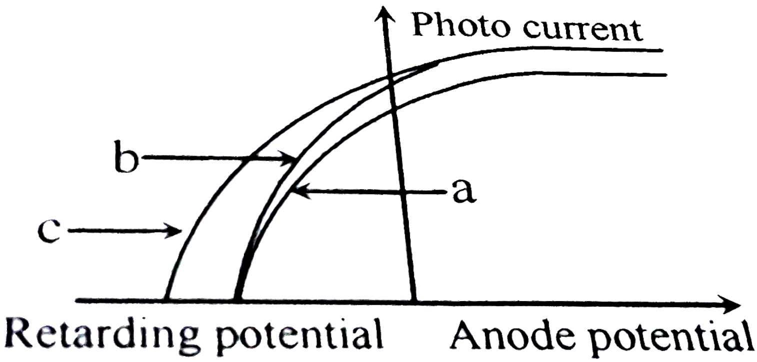
388. The figure shows a plot of photo current versus anode potential for a photo sensitive surface for three different radiations. Which one of the following is a correct statement ?



A. Curves (b) and (c) represent incident radiations same frequencies having same intensity.

B. Curves (a) and (b) represent incident radiations of different frequencies and different intensities

C. Curves (a) and (b) represent incident radiations of same frequencies but of different intensities

D. Curves (b) and (c) represent incident radiations of different frequencies and different intensities

Answer: C

View Text Solution

389. The number of beta particles emitter by radioactive sustance is twice the number of alpha particles emitter by it. The resulting daughter is an

A. Isotope of parent

B. Isobar of parent

C. Isomer of parent

D. Isotone of parent

Answer: A

Watch Video Solution

390. The ionization enegry of the electron in the hydrogen atom in its ground state is $13.6ev$. The atoms are excited to higher energy levels to emit radiations of 6 wavelengths. Maximum wavelength of emitted radiation corresponds to the transition between

A. n = 4 to n = 3 states

B. n = 3 to n = 2 states

C. n = 3 to n = 1 states

D. n = 2 to n = 1 states

Answer: A

Watch Video Solution

391. In a Rutherford scattering experiment when a projectile of change Z_1 and mass M_1 approaches s target nucleus of change Z_2 and mass M_2, te distance of closed approach is r_0. The energy of the projectile is

A. Directly proportional to mass M_1

B. Directly proportional to $M_1 \times M_2$

C. Directly proportional to $Z_1 Z_2$

D. Inversely proportional to Z_1

Answer: C

Watch Video Solution

392. In the nuclear decay given below

$$ {}_{Z}^{A}X \rightarrow {}_{Z-1}{}^{A}Y \rightarrow {}_{Z-1}^{A-4}B^{*} \rightarrow {}_{Z-1}^{A-1}B, $$

the particle emitted in the sequence are

A. α, β, γ

B. β, α, γ

C. γ, β, α

D. β, γ, α

Answer: B

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393. The mean free path of electrons in a metal is $4 \times 10^{-8} m$ The electric field which can give on an average $2eV$ energy to an electron in the metal will be in the units V/m

A. 5×10^{7}

B. 8×10^{7}

C. 5×10^{-11}

D. 8×10^{-11}

Answer: A

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394. Sodium has body centred packing. Distance between two nearest atoms is 3.7Å. The lattice parameter is

A. 8.6Å

B. 6.8Å

C. 4.3Å

D. 3.0Å

Answer: C

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395. A p - n photodiode is fabricated from a semiconductor with a band gap of $2.5eV$. It can detect a signal of wavelength

A. 496Å

B. 6000Å

C. 4000 nm

D. 6000 nm

Answer: A

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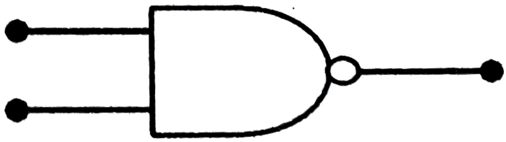
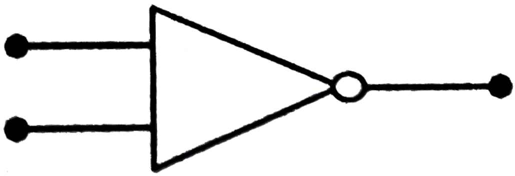
396. The symbolic representation of four logic gates are given below :

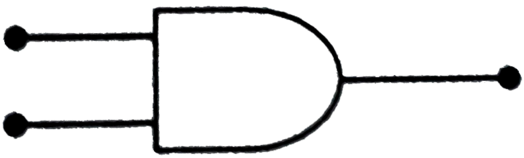
(i)



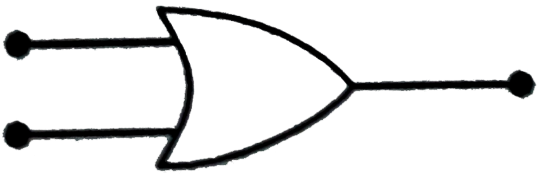
(ii)



(iii)



(iv)



The logic symbols for OR, NOT and NAND gates are respectively :

A. (i),(iii),(iv)

B. (iii), (iv), (ii)

C. (iv), (i), (iii)

D. (iv), (ii), (i)

Answer: D

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397. A transistor is operated in common emitter configuration at $V_c = 2V$ such that a change in the base current from $100\mu A$ to $200\mu A$ produces a change in the collector current from $5mA$ to $10mA$. The current gain is

A. 50

B. 75

C. 100

D. 150

Answer: A

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398. The dinesity of meterial in CGS system of mass is $4gcm^3$ in a system of unit in which unit of length is $10cm$ and unit of mass is $100g$ the value of density of meterial will be

A. 0.04

B. 0.4

C. 40

D. 400

Answer: C

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399. A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is.

A. $\dfrac{v_1 + v_2}{2}$

B. $\dfrac{v_1 v_2}{v_1 + v_2}$

C. $\dfrac{2v_1 v_2}{v_1 + v_2}$

D. $\dfrac{v_1^2 v_2^2}{v_1^2 + v_2^2}$

Answer: C

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400. A mass m moving horizontal (along the x-axis) with velocity v collides and stricks to mass of $3m$ moving vertically upward (along the y-axis) with velocity $2v$. The final velocity of the combination is

A. $\frac{3}{2}v\hat{i} + \frac{1}{4}v\hat{j}$

B. $\frac{1}{4}v\hat{i} + \frac{3}{2}v\hat{j}$

C. $\frac{1}{3}v\hat{i} + \frac{2}{3}v\hat{j}$

D. $\frac{2}{3}v\hat{i} + \frac{1}{3}v\hat{j}$

Answer: B

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401. A conveyor belt is moving at a constant speed of $2m/s$. A box is gently dropped on it. The coefficient of friction between them is $\mu = 0.5$. The distance that the box will move relative to belt before coming to rest on it taking $g = 10ms^{-2}$ is:

A. 0.4m

B. 1.2m

C. 0.6m

D. 0

Answer: A

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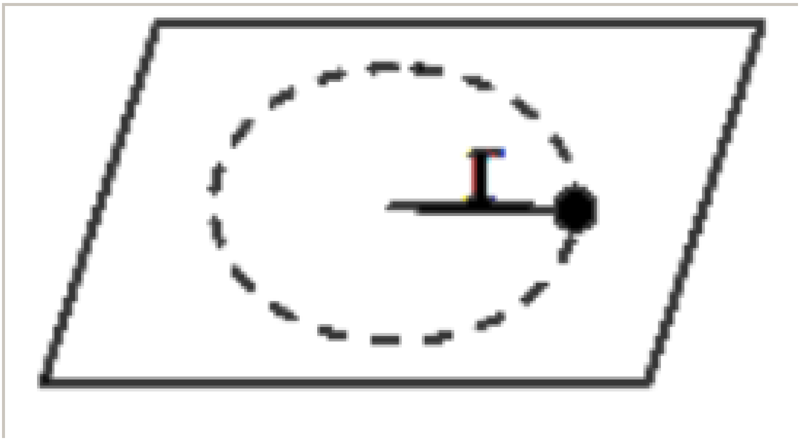
402. A small mass attached to a string rotates on a frictionless table top as shown. If the tension in the string is increased by pulling the string causing the radius of the circular motion to decrease by a factor of 2, the kinetic energy of the mass will



A. Decrease by a factor of 2

B. Remain constant

C. increase by a factor of 2

D. Increase by a factor of 4

Answer: D

View Text Solution

403. A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are, respectively, M and R. G is gravitational constant g is acceleration due to gravity on the surface of earth. The minimum value of u so that the particle does not return back to earth is

A. $\sqrt{\frac{2GM}{R^2}}$

B. $\sqrt{\frac{2GM}{R}}$

C. $\sqrt{\frac{2gM}{R^2}}$

D. $\sqrt{2gR^2}$

Answer: B

Watch Video Solution

404. A particle of mass M is placed at the centre of a spherical shell of same mass and radius a. What will be the magnitude of the gravitational potential at a point situated at a/2 distance from the centre ?

A. $\frac{GM}{a}$

B. $\frac{2GM}{a}$

C. $\frac{3GM}{a}$

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

Answer: C

Watch Video Solution

405. A projectile is fired at an angle of 45° with the horizontal. Elevation angle of the projection at its highest point as seen from the point of projection is

A. 45°

B. 60°

C. $\frac{\tan^{-1}(1)}{2}$

D. $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Answer: C

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406. A mass of diatomic gas$(\gamma = 1.4)$ at a pressure of 2 atomphere is compressed adiabitically so that its temperature rises from $27^{\circ}C$ to $927^{\circ}C$. The pressure of the gas in the final state is

A. 8 atm

B. 28 atm

C. 68.7 atm

D. 256 atm

Answer: D

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407. Two particles execute simple harmonic motion of the same amplitude and frequency along close parallel lines. They pass each other moving in opposite directions each time their displacement is half their amplitude. Their phase difference is

A. $\frac{\pi}{6}$

B. 0

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

D. π

Answer: C

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408. The identical piano wires kept under the same tension T have a fundamental frequency of 600 Hz. The fractional increase in the tension of one of the wires which will lead to occurrence of 6 beats//s when both the wires oscillate together would be

A. 0.01

B. 0.02

C. 0.03

D. 0.04

Answer: B

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409. A thin prism of angle 15° made of glass of refractive index $\mu_1 = 1.5$ is combined with another prism of glass of refractive index $\mu_2 = 1.75$. The combination of the prism produces dispersion without deviation. The angle of the second prism should be

A. 5°

B. 7°

C. 10°

D. 12°

Answer: C

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410. A converging beam of rays is incident on a diverging thin lens. Having passed through the lens the rays intersect at a point 15cm from the lens. If lens is removed the point where the rays meet will move 5cm closer towards the mounting that holds the lens. The focal length of lens is

A. 5 cm

B. $-10cm$

C. 20 cm

D. $-30cm$

Answer: D

Watch Video Solution

411. Three charges each +q, are placed at the corners of an isosceles triangle ABC of sides BC and AC, 2a D and E are the mid point of BC and CA. The work done in taking a charge Q and D to E is :

A. $\frac{3qQ}{4\pi \in_0 a}$

B. $\frac{3qQ}{8\pi \in_0 a}$

C. $\frac{qQ}{4\pi \in_0 a}$

D. Zero

Answer: D

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412. The electric potential V at any point (x, y, z), all in meters in space is given by $V = 4x^2$ volt. The electric field at the point

$(1, 0, 2)$ in volt//meter is

A. 8 along negative X - axis

B. 8 along positive X - axis

C. 16 along negative X - axis

D. 16 along positive X - axis

Answer: A

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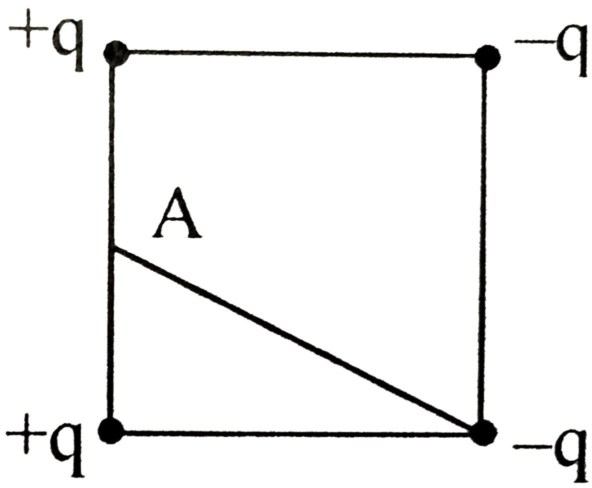
413. In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is



A. $+1V$

B. $-1V$

C. $+2V$

D. $-2V$

Answer: A

View Text Solution

414. A galvanometer of resistance G is shunted by a resistance $Sohm$. To keep the main current in the circuit uncharged, the resistnace to be put in series with the galvonmeter

A. $\frac{G}{(S+G)}$

B. $\frac{S^2}{(S+G)}$

C. $\frac{SG}{(S+G)}$

D. $\frac{G^2}{(S+G)}$

Answer: D

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415. A thermocouple of negligible resistance produces an emf fo $40\mu V/^\circ C$ in the linear range of temperature. A galvanometer of resistance 10Ω whose sensitivity is $1\mu A/\div$ is employed with the thermocouple. The smallest value of temperature difference that can be detected by the system will

A. $0.25^{\circ}C$

B. $0.5^{\circ}C$

C. $1^{\circ}C$

D. $0.1^{\circ}C$

Answer: A

Watch Video Solution

416. A thin ring of radius R metre has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolution/s. The value of magnetic induction in Wbm^{-2} at the centre of the ring is

A. $\frac{\mu_0 q f}{2\pi R}$

B. $\frac{\mu_0 q f}{2R}$

C. $\frac{\mu_0 q}{2fR}$

D. $\frac{\mu_0 q}{2\pi f R}$

Answer: B

Watch Video Solution

417. A short bar magnet of magnetic moment $0 \cdot 4JT^{-1}$ is placed in a uniform magnetic field of $0 \cdot 16T$. The magnet is in stable equilibrium when the potencial energy is

A. 0.064 J

B. $-0.064J$

C. Zero

D. -$0.082J$

Answer: B

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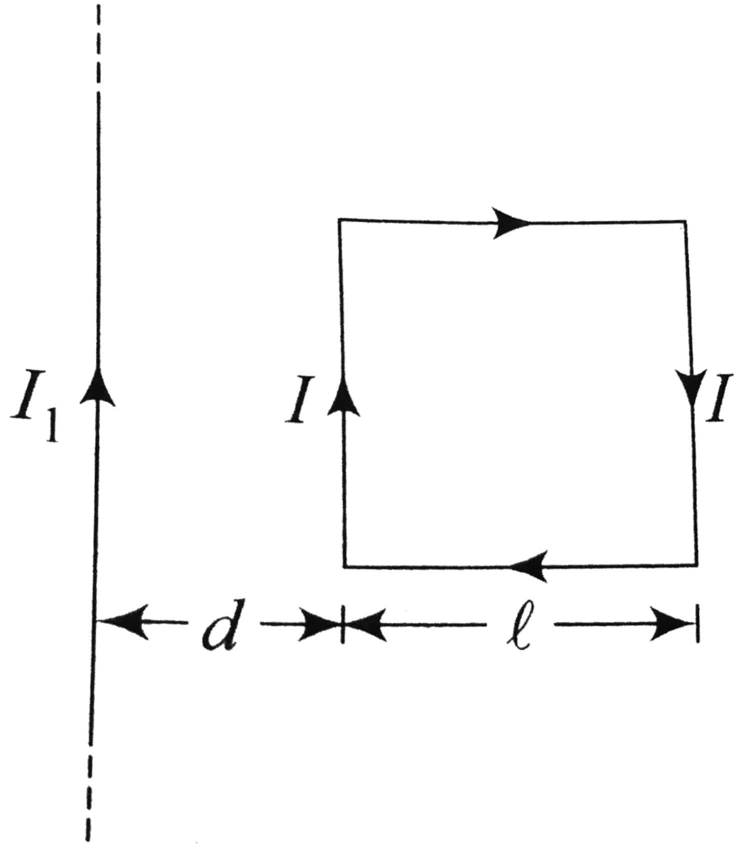
418. A square loop, carrying a steady 1, is placed in a horizontal plane near a long staright conductor carryinf a steady current I, at a distance d from the conductor as shown in Fig. The loop wil experience



A. A net attractive force towards the conductor

B. A net repulsive force away from the conductor

C. A net torque acting upwards perpendicular to the horizontal plane

D. A net torque acting downwards normal to the horizontal plane

Answer: A

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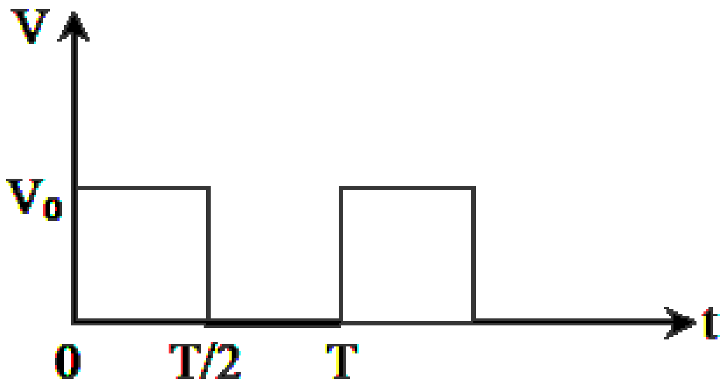
419. The r.m.s. value of potential difference V shown in the figure is :



A. $\frac{V_0}{\sqrt{3}}$

B. V_0

C. $\frac{V_0}{\sqrt{2}}$

D. $\frac{V_0}{2}$

Answer: C

View Text Solution

420. A coil has resistance $30 ohm$ and inductive reactance $20 ohm$ at $50 Hz$ frequency. If an ac source of 200 volts. $100 Hz$, is connected across the coil, the current in the coil will be

A. 2.0 A

B. 4.0 A

C. 8.0 A

D. $\frac{20}{\sqrt{13}}$ A

Answer: B

Watch Video Solution

421. The threshold frequency of a certain metal is $3.3 \times 10^{14} Hz$. If light of frequency $8.2 \times 10^{14} Hz$ is incident on the metal, predict the cut off voltage for photoelectric emission. Given Planck's constant, $h = 6.62 \times 10^{-34} Js$.

A. 1V

B. 2V

C. 3V

D. 5V

Answer: B

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422. An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photo-sensitive material having work function $2.75eV$. If the stopping potential of the photoelectron is $10V$, the value of n is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

423. Two radioactive nuclei P and Q, in a given sample decay into a stable nucleus R. At time $t = 0$, number of P species are $4N_0$ and that of Q are N_0. Half-life of P (for conversation to R) is $1mm$ whereas that of Q is 2 min. Initially there are no nuclei of R present in the sample. When number of nuclei of P and Q are equal, the number of nuclei of R present in the sample would be :

A. $2N_0$

B. $3N_0$

C. $\frac{9N_0}{2}$

D. $\frac{5N_0}{2}$

Answer: C

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424. Out of the following which one is not a possible energy for a photon to be emitted by hydrogen atom according to Bohr's atomic model?

A. 0.65eV

B. 1.9eV

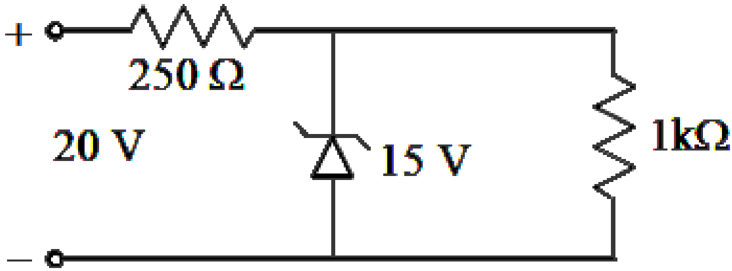
C. 11.1eV

D. 13.6eV

Answer: C

Watch Video Solution

425. A zener diode, having breakdown voltage equal to 15 V, is used in a voltage regulator circuit shown in figure. The current through the diode is :



A. 5mA

B. 10mA

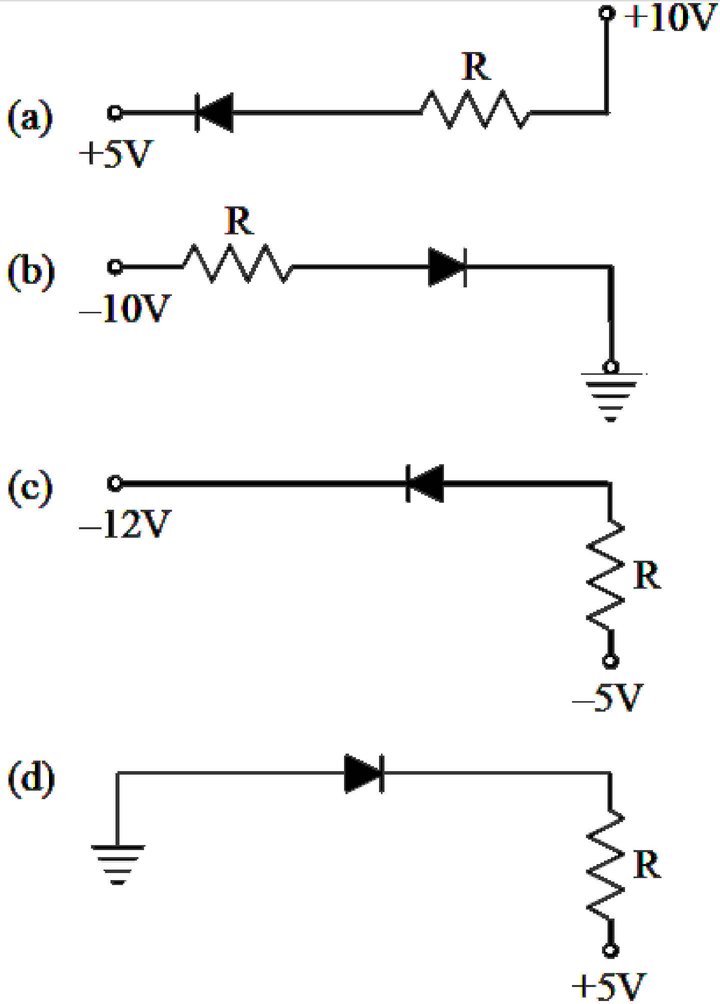
C. 15mA

D. 20mA

Answer: A

View Text Solution

426. In the following figure, the diodes which are forwards biased are :



A. a, b and d

B. c only

C. c and a

D. b and d

Answer: C

View Text Solution

427. The energy of the electromagetic wave is of the order of 15 keV. To which part of the spectrum dose it belong?

A. γ-rays

B. X-rays

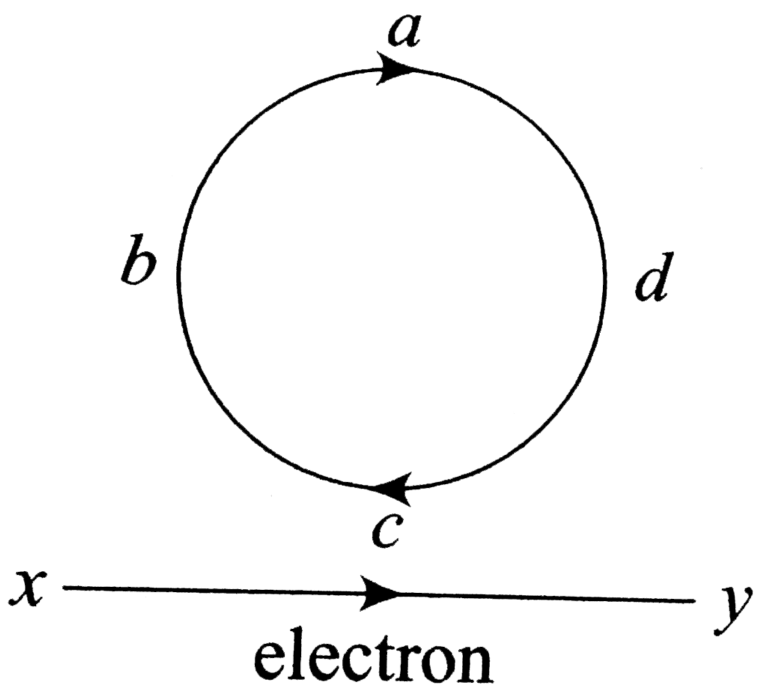
C. Infra-red rays

D. Ultraviolet rays

Answer: B

Watch Video Solution

428. An electron moves on a straight line path XY as shown. The $abcd$ is a adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?



A. No current induced

B. abcd

C. adcb

D. The current will reverse its direction as the electron goes past the coil

Answer: D

Watch Video Solution

429. The cylinderical tube of a spray pump has radius R, One end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is V, the speed of the ejection of the liquid through the holes is :

A. $\dfrac{V^2R}{nr}$

B. $\dfrac{VR^2}{n^2r^2}$

C. $\dfrac{VR^2}{nr^2}$

D. $\dfrac{VR^2}{n^3r^2}$

Answer: C

Watch Video Solution

430. The Young's modulus of steel is twice that of brass. Two wires of the same length and of the same area of cross section, one of steel and another of brass are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weight added to the steel and brass wires must be in the ratio of

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:1$

Answer: C

Watch Video Solution

431. A potentiometer wire of Length L and a resistance r are connected in series with a battery of e.m.f. E_0 and a resistance r_1. An unknown e.m.f. E is balanced at a length l of the potentiometer wire. The e.m.f. E will be given by :

A. $\dfrac{LE_0 r}{(r + r_1)l}$

B. $\dfrac{LE_0 r}{lr_1}$

C. $\dfrac{E_0 r}{(r + r_1)} \dfrac{l}{L}$

D. $\dfrac{E_0 l}{L}$

Answer: C

Watch Video Solution

432. A particle is executing a simple harmonic motion. Its maximum acceleration is α and maximum velocity is β. Then, its time period of vibration will be

A. $\frac{2\pi\beta}{\alpha}$

B. $\frac{\beta^2}{\alpha^2}$

C. $\frac{\alpha}{\beta}$

D. $\frac{\beta^2}{\alpha}$

Answer: A

Watch Video Solution

433. If Vectors $\vec{A} = \cos\omega\hat{i} + \sin\omega\hat{j}$ and $\vec{B} = (\cos)\frac{\omega t}{2}\hat{i} + (\sin)\frac{\omega t}{2}\hat{j}$are functions of time. Then the value of t at which they are orthogonal to each other is

A. t=0

B. $t = \frac{\pi}{4\omega}$

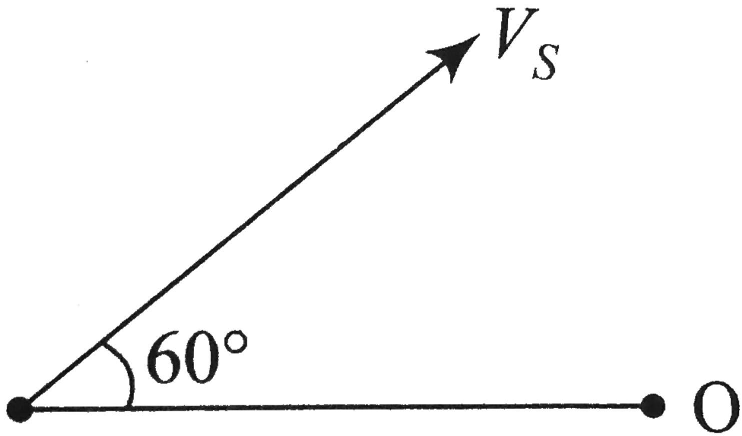
C. $t = \frac{\pi}{2\omega}$

D. $t = \frac{\pi}{\omega}$

Answer: D

Watch Video Solution

434.



A source of sound S emitting waves of frequency $100 Hz$ and an observer O are located at some distance from each other. The source is moving with a speed of $19.4 ms^{-1}$ at an angle of $60°$ with the source observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air $330 ms^{-1}$) is

A. 97 Hz

B. 100 Hz

C. 103 Hz

D. 106 Hz

Answer: C

Watch Video Solution

435. An autmobile moves on road with a speed of $54km/h$. The radius of its wheel is $0.45m$ and the moment of inertia of the wheel about its axis of rotation is $3kgm^2$. If the vehicle is brought to rest in $15s$, the magnitude of average torque tansmitted by its brakes to the wheel is :

A. 2.86 kg m^2s^{-2}

B. 6.66 kg m^2s^{-2}

C. 8.58 kg m^2s^{-2}

D. 10.86 kg m^2s^{-2}

Answer: B

Watch Video Solution

436. A recantagular coil of length $0.12m$ and width $0.1m$ having 50 turns of wire is suspended vertically in unifrom magnetic field of srenght 0.2 $Weber/m^2$. The coil carres a current of 2 A. If the plane of the coil is inclined at an angl,e of 30° with the direction of the feld the torque required to keep the coil in stable equilibrium will be

A. 0.12 Nm

B. 0.15 Nm

C. 0.20 Nm

D. 0.24 Nm

Answer: C

Watch Video Solution

437. A parallel plate air capacitor has capcity C distance of separtion between plates is d and potential difference V is applied between the plates force of attraction between the plates of the parallel plate air capacitor is

A. $\frac{C^2V^2}{2d^2}$

B. $\frac{C^2V^2}{2d}$

C. $\frac{CV^2}{2d}$

D. $\frac{CV^2}{d}$

Answer: C

Watch Video Solution

438. Two vessel separately contains two ideal gases A and B at the same temperature, the pressure of A being twice that of B. under such conditions, the density of A is found to be 1.5 times the density of B. the ratio of molecular weight of A and B is

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

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

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

D. 2

Answer: C

Watch Video Solution

439. A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth.

A. The acceleration of S is always directed towards the centre of the earth.

B. The angular momentum of S about the centre of the earth changes in direction, but its magnitude remains constant.

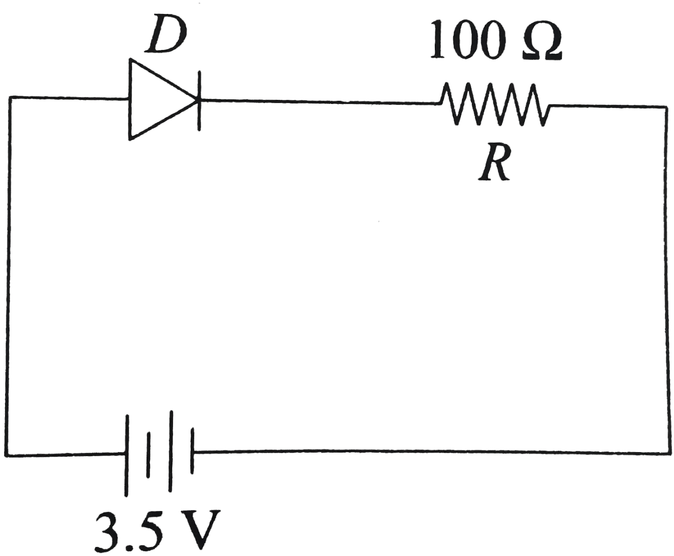
C. The total mechanical energy of S varies periodically with time

D. The linear momentum of S remains constant in magnitude

Answer: A

Watch Video Solution

440. In the given figure, a diode D is connected to an external resistance $R = 100\Omega$ and an emf of $3.5V$. If the barrier potential developed across the diode is $0.5V$, the current in the circuit will be :



A. 35 mA

B. 30 mA

C. 40 mA

D. 20 mA

Answer: B

Watch Video Solution

441. A remote-sensing satellite of earth revolves in a circular orbit at a hight of $0.25 \times 10^6 m$ above the surface of earth. If earth's radius is $6.38 \times 10^6 m$ and $g = 9.8 ms^{-2}$, then the orbital speed of the satellite is

A. 6.67 km s^{-1}

B. 7.76 km s^{-1}

C. 8.56 km s^{-1}

D. 9.13 km s^{-1}

Answer: B

Watch Video Solution

442. The position vector of a particle $\vec{R}$ as a funtion of time is given by:

$\vec{R} = 4\sin(2\pi t)\hat{i} + 4\cos(2\pi t)\hat{j}$

Where R is in meters, t is in seconds and $\hat{i}$ and $\hat{j}$ denote until vectors along x-and y- directions, respectively Which one of the following statements is wrong for the motion of particle ?

A. Path of the particle is a circle of radius 4 meter

B. Acceleration vector is along $-\vec{R}$

C. Magnitude of acceleration vector is $\frac{v^2}{R}$ where v is the velocity of particle

D. Magnitude of the velocity of particle is 8 meter/second

Answer: D

Watch Video Solution

443. A string is stretched between fixed points separated by $75.0 cm$. It is observed to have resonant frequencies of $420 Hz$ and $315 Hz$. There are no other resonant frequencies between these two. Then, the lowest resonant frequency for this string is

A. 105 Hz

B. 155 Hz

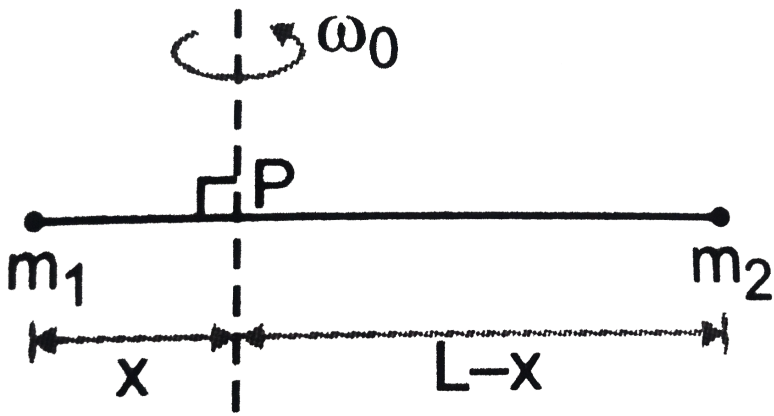
C. 205 Hz

D. 10.5 Hz

Answer: A

Watch Video Solution

444. Point masses m_1 and m_2 are placed at the opposite ends of a rigid rod of length L, and negligible mass. The rod is to be set rotating about an axis perpendicualr to it. The position of point P on this rod through which the axis should pass so that the work required to set the rod rotating with angular velocity ω_0 is minimum, is given by :



A. $x = \dfrac{m_2 L}{m_1 + m_2}$

B. $x = \dfrac{m_1 L}{m_1 + m_2}$

C. $x = \dfrac{m_1}{m_2} L$

D. $x = \frac{m_2}{m_1} L$

Answer: A

Watch Video Solution

445. At the first minimum adjacent to the central maximum of a single-slit diffraction pattern the phase difference between the Huygens wavelet from the edge of the slit and the wavelet from the mid-point of the slit is

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

B. $\frac{\pi}{4}$ radian

C. $\frac{\pi}{2}$ radian

D. π radian

Answer: D

Watch Video Solution

446. A force $\vec{F} = \alpha\hat{i} + 3\hat{j} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{i}$ - $6\hat{j}$ - $12\hat{k}$. The value of α for which angular momentum about origin is conserved is:

A. 1

B. - 1

C. 2

D. zero

Answer: B

Watch Video Solution

447. Two particles, 1 and 2, move with constant velocities v_1 and v_2. At the initial moment their radius vectors are equal to r_1 and r_2. How must these four vectors be interrelated for the particles to collide?

A. $\vec{r}_1 - \vec{r}_2 = \vec{v}_1 - \vec{v}_2$

B. $\dfrac{\vec{r}_1 - \vec{r}_2}{\left|\vec{r}_1 - \vec{r}_2\right|} = \dfrac{\vec{v}_2 - \vec{v}_1}{\left|\vec{\_}(2) - \vec{v}_1\right|}$

C. $\vec{r}_1 \cdot \vec{v}_1 = \vec{r}_2 \cdot \vec{v}_2$

D. $\vec{r}_1 \times \vec{v}_1 = \vec{r}_2 \times \vec{v}_2$

Answer: B

Watch Video Solution

448. A nucleus of uranium decays at rest into nuclei of thorium and helium. Then :

A. the helium nucleus has less kinetic energy than the thorium nucleus

B. the helium nucleus has more kinetic energy than the thorium nucleus

C. the helium nucleus has less momentum thanthe thorium nucleus

D. the helium nucleus has more momentum than the thorium nucleus.

Answer: B

Watch Video Solution

449. Two metal wires of identical dimesnios are connected in series. If σ_1 and σ_2 are the conducties of the metal wires respectively, the effective conductivity of the combination is

A. $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

B. $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

C. $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$

D. $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

Answer: B

Watch Video Solution

450. Light of wavelength $500nm$ is incident on a metal with work function $2.28eV$. The de Broglie wavelength of the emitted electron is

A. $\leq 2.8 \times 10^{-12} m$

B. $< 2.8 \times 10^{-10} m$

C. $< 2.8 \times 10^{-9} m$

D. $\geq 2.8 \times 10^{-9} m$

Answer: D

Watch Video Solution

451. $4.0g$ of a gas occupies 22.4 litres at NTP. The specific heat capacity of the gas at constant volume is $5.0JK^{-1}mol^{-1}$. If the speed of sound in this gas at NTP is $952ms^{-1}$. Then the heat capacity at constant pressure is

A. 8.5 $JK^{-1}mol^{-1}$

B. 8.0 $JK^{-1}mol^{-1}$

C. 7.5 $JK^{-1}mol^{-1}$

D. 7.0 $JK^{-1}mol^{-1}$

Answer: A

Watch Video Solution

452. A series R - C circuit is connected to an alternating voltage source. Consider two situations

(a) When capacitor is air filled.

(b) When capacitor is mica filled.

current through resistor is i and voltage across capacitor is V then

A. $V_a = V_b$

B. $V_a < V_b$

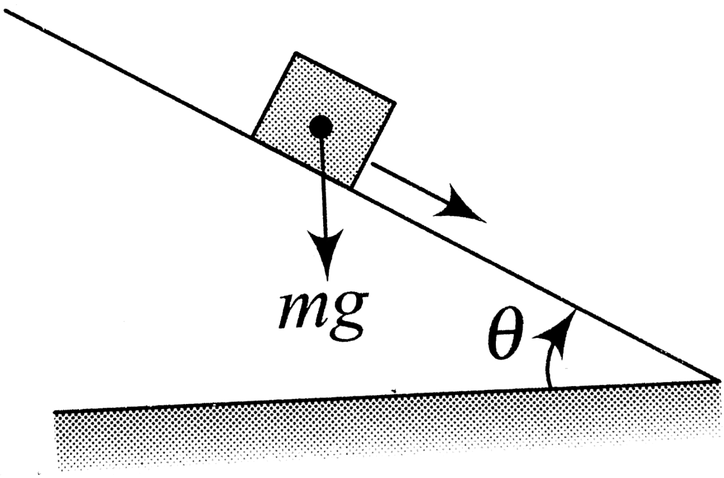
C. $V_a > V_b$

D. $i_a > i_b$

Answer: C

Watch Video Solution

453. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horiznta reaches 30°, the box starts to slip and slide $4.0m$ down the plank in $4.0s$. The coefficients of static and knitic friction between the box and the plank will be, respectively.



A. 0.4 and 0.3

B. 0.6 and 0.6

C. 0.6 and 0.5

D. 0.5 and 0.6

Answer: C

Watch Video Solution

454. Two stone of masses m and $2m$ are whirled in horizontal circles, the heavier one in a radius $r/2$ and the lighter one in radius r. The tangential speed of lighter stone is n times that of the value of heavier stone when the experience same centripetal forces. the value of n is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

455. The cofficient of performance of a refrigerator is 5. If the temperature inside freezer is -$20\,^{\circ}C$, the temperature of the surroundings to which it rejects heat is :

A. $21\,^{\circ}C$

B. $31\,^{\circ}C$

C. $41\,^{\circ}C$

D. $11\,^{\circ}C$

Answer: B

Watch Video Solution

456. An ideal gas is compressed to half its initial volume by means of several peocesses. Which of the process results in the maximum work done on the gas ?

A. Isothermal

B. Adiabatic

C. Isobaric

D. Isochoric

Answer: B

Watch Video Solution

457. A ball is thrown vertically downwards from a height of 20m with an intial velocity v_0. It collides with the ground, loses 50% of its energy in collision and rebounds to the same height. The intial velocity v_0 is (Take, g =10 ms^{-2})

A. 10 ms^{-1}

B. 14 ms^{-1}

C. 20 ms^{-1}

D. 28 ms^{-1}

Answer: C

Watch Video Solution

458. On a friction surface a block a mass M moving at speed v collides elastic with another block of same mass M which is initially at rest . After collision the first block moves at an angle θ to its initial direction and has a speed $\frac{v}{3}$. The second block's speed after the collision is

A. $\frac{\sqrt{3}}{\circ}v$

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

C. $\frac{3}{4}v$

D. $\frac{3}{\sqrt{2}}v$

Answer: B

Watch Video Solution

459. If potential (in volts) in a region is expressed as $V(x, y, z) = 6xy - y + 2yz$, the electric field (in N/C) at point $(1, 1, 0)$ is

A. $-\left(6\hat{i} + 9\hat{j} + \hat{k}\right)$

B. $-\left(3\hat{i} + 5\hat{j} + 3\hat{k}\right)$

C. $-\left(6\hat{i} + 5\hat{j} + 2\hat{k}\right)$

D. $-\left(2\hat{i} + 3\hat{j} + \hat{k}\right)$

Answer: C

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460. Two slits in Young's experiment have widths in the ratio $1:25$. The ratio of intensity at the maxima and minima in the interference pattern $\frac{I_{\max}}{I_{\min}}$ is

A. $\frac{4}{9}$

B. $\frac{9}{4}$

C. $\frac{121}{49}$

D. $\frac{49}{121}$

Answer: B

Watch Video Solution

461. The heart of a man pumps 5 liters of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be $13.6 \times 10^3 kg/m^3$ and $g = 10 m/s^2$ then the power of heat in watt is :

A. 1.5

B. 1.7

C. 2.35

D. 3

Answer: B

Watch Video Solution

462. A proton and an alpha particle both enters a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is $1 MeV$, the energy acquired by the alpha particles will be :

A. 1 MeV

B. 4 MeV

C. 0.5 MeV

D. 1.5 MeV

Answer: A

Watch Video Solution

463. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left(15t + \frac{\pi}{3}\right)$. The corresponding output signal will be

A. $300\cos\left(15t + \frac{4\pi}{3}\right)$

B. $300\cos\left(15t + \frac{\pi}{3}\right)$

C. $75\cos\left(15t + \frac{2\pi}{3}\right)$

D. $2\cos\left(15t + \frac{5t}{6}\right)$

Answer: A

Watch Video Solution

464. In dimension of circal velocity v_0 liquid following through a take are expressed as $\left(\eta^x \rho^y r^z\right)$ where η, ρ and $r$are the coefficient of viscosity of liquid density of liquid and radius of the tube respectively then the value of x, y and z are given by

A. 1,1,1

B. 1,-1,-1

C. $-1, -1, 1$

D. $-1, -1, -1$

Answer: B

Watch Video Solution

465. A circuit contains an ammeter, a battery of $30V$ and a resistance $40.8 ohm$ all connected in series. If the ammeter has a coil of resistance $480 ohm$ and a shunt of $20 ohm$, the reading in the ammeter will be

A. $1A$

B. 0.5 A

C. 0.25 A

D. $2A$

Answer: B

Watch Video Solution

466. Water rises to height h in capillary tube. If the length of capillary tube above the surface of water is made less than h then

A. water does not rise at all.

B. water rises upto the tip of capillary tube and then starts overflowing like a fountain.

C. water rises upto the top of capillary tube and stays there without overflowing.

D. water rises upto a point a little below the top and stays there

Answer: C

Watch Video Solution

467. In an astronomical telescope in normal adjustment a straight black line of length L is drawn on inside part of objective lens. The eye piece forms a real image of this line. The length of this image is I. The magnification of the telescope is

A. $\frac{L}{I}$

B. $\frac{L}{I} + 1$

C. $\frac{L}{I} - 1$

D. $\frac{L + I}{L - I}$

Answer: A

Watch Video Solution

468. The value of coefficient of volume expansion of glycerin is $5 \times 10^{-4} K^{-1}$. The fractional change in the density of glycerin for a rise of $40^{\circ} C$ in its temperature is

A. 0.01

B. 0.015

C. 0.02

D. 0.025

Answer: C

Watch Video Solution

469. A photoelectric surface is illuminated successively by monochromatic light of wavelength λ and $\frac{\lambda}{2}$. If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times than in the first case , the work function of the surface of the material is

(h = Plank's constant , c = speed of light)

A. $\frac{hc}{3\lambda}$

B. $\frac{hc}{2\lambda}$

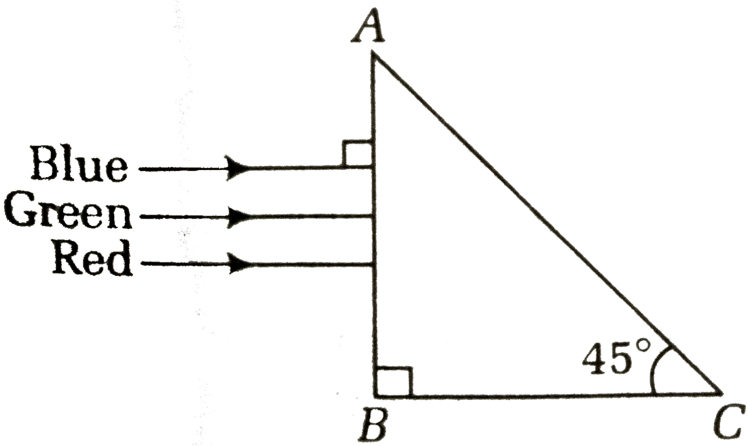
C. $\frac{hc}{\lambda}$

D. $\frac{2hc}{\lambda}$

Answer: B

Watch Video Solution

470. A beam of light consisting of red, green and blue colours is incident on a right angled prism. The refractive index of the material of the prism for the above red, green and blue wavelengths are 1.39, 1.44 and 1.47, respectively.



A. separate the red colour part from the green and blue colours

B. separate the blue colour part from the red and green colours

C. separate all the three colours from one another

D. not separate the three colours at all

Answer: A

Watch Video Solution

471. Plank 's constant (h) speed of length in vacium (C) and newton 's gravitational constant (G) are three fundamental constant .Which of the following combinations of these has the dimension of length?

A. $\frac{\sqrt{hG}}{c^{3/2}}$

B. $\frac{\sqrt{hG}}{c^{5/2}}$

C. $\sqrt{\frac{hc}{G}}$

D. $\frac{\sqrt{(Gc)}}{h^{3/2}}$

Answer: A

Watch Video Solution

472. Two cars P and Q start from a point at the same time in a straight line and their position are represented by $x_p(t) = at + bt^2$ and $x_Q(t) = ft - t^2$. At what time do the cars have the same velocity ?

A. $\dfrac{a - f}{a + b}$

B. $\dfrac{a + f}{2(b - 1)}$

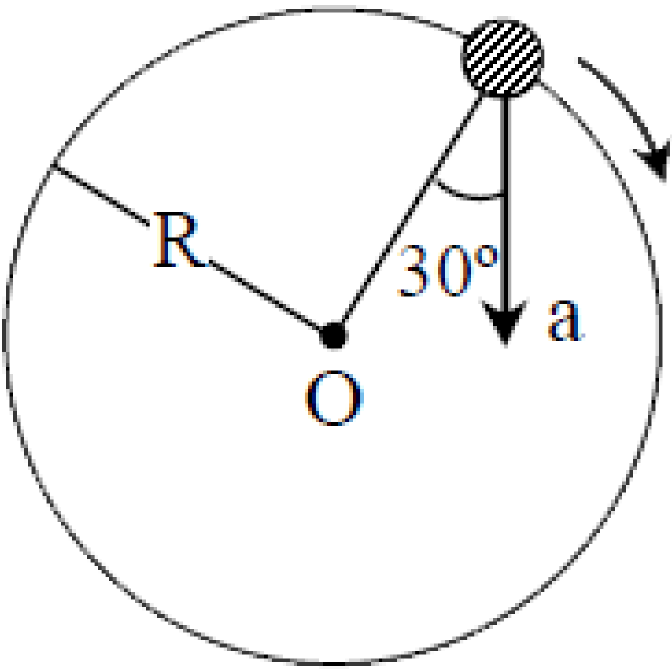
C. $\dfrac{a + f}{2(a + b)}$

D. $\dfrac{f - a}{2(1 + b)}$

Answer: D

Watch Video Solution

473. In the given figure, $a = 15m/s^2$ represents the total acceleration of a particle moving in the clockwise direction in a circle of radius $R = .25m$ at a given instant of time. The speed of the particle is-



A. 4.5m/s

B. 5.0m/s

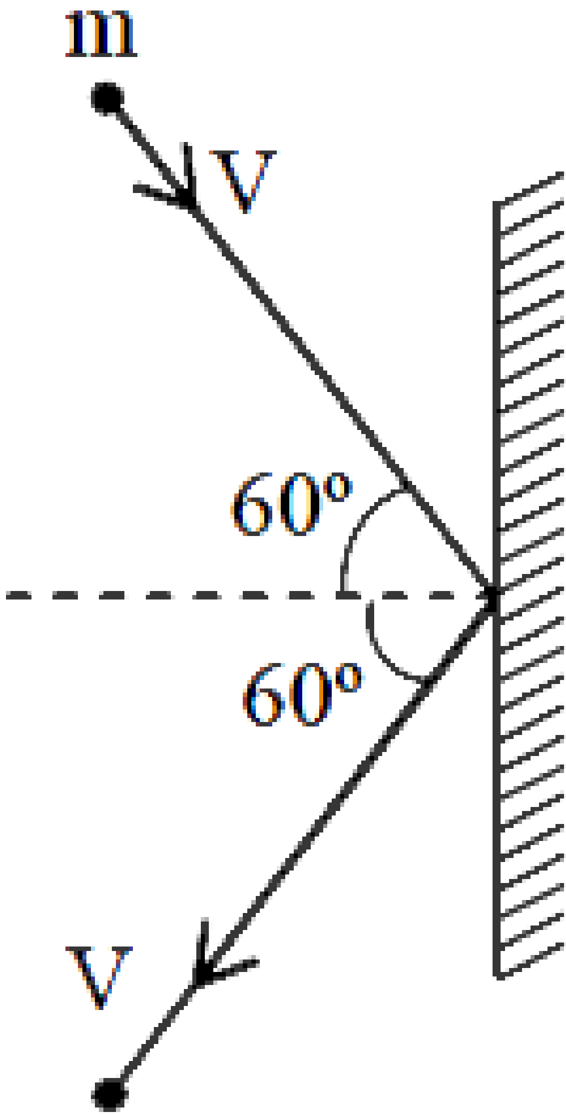
C. 5.7m/s

D. 6.2 m/s

Answer: C

View Text Solution

474. A rigid of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of imppulse imparted by the wall on the ball will be-



A. mV

B. 2mV

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

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

Answer: A

View Text Solution

475. A bullet of mass $10g$ moving horizontally with a velocity of $400ms^{-1}$ strickes a wooden block of mass $2kg$ which is suspended by a light inextensible string of length $5m$. As a result, the center ofgravity of the block is found to rise a vertical distance of $10cm$. The speed of the bullet after it emerges out hirizontally from the block will be

A. 100 ms^{-1}

B. 80 ms^{-1}

C. 120 ms^{-1}

D. 160 ms^{-1}

Answer: C

Watch Video Solution

476. Two identical balls A and B having velocity of $0.5m/s$ and $-0.3m/s$ respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be

A. $-0.5m/s$ and $0.3m/s$

B. $0.5m/s$ and $-0.3m/s$

C. $-0.3m/s$ and $0.5m/s$

D. $0.3m/s$ and $0.5m/s$

Answer: B

Watch Video Solution

477. A partical moves from a point $\left(-2\hat{i}+5\hat{j}\right)$ to $\left(4\hat{i}+3\hat{j}\right)$ when a force of (4hati + 3hatj) N` is applied . How much work has been done by the force?

A. 8J

B. 11J

C. 5J

D. 2J

Answer: C

Watch Video Solution

478. Two rotating bodies A and B of masses m and $2m$ with moments of inertia I_A and $I_B\left(I_B > I_A\right)$ have equal kinetic energy of rotation. If L_A and L_B be their angular momenta respectively, then

A. $L_A = \frac{L_B}{2}$

B. $L_A = 2L_B$

C. $L_B > L_A$

D. $L_A > L_B$

Answer: C

Watch Video Solution

479. A solid sphere of mass m and radius R is rotating about its diameter. A solid cylinder of the same mass and same radius is also rotating about its geometrical axis with an angular speed twice that of the sphere. The ratio of their kinetic emergies of rotation $\left(E_{\text{sphere}}/E_{\text{cylinder}}\right)$ will be.

A. $2:3$

B. $1:5$

C. $1:4$

D. $3:1$

Answer: B

Watch Video Solution

480. A light rod of length l has two masses m_1 and m_2 attached to its two ends. The moment of inertia of the system about an axis perpendicular to the rod and passing through the centre of mass is.

A. $\dfrac{m_1 m_2}{m_1 + m_2} l^2$

B. $\dfrac{m_1 + m_2}{m_1 m_2} l^2$

C. $\left(m_1 + m_2\right) l^2$

D. $\sqrt{m^1 m_2 l^2}$

Answer: A

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481. Starting from the centre of the earth having radius R, the variation of g (acceleration due to gravity) is shown by

A.

B.

C.

D.

Answer: B

Watch Video Solution

482. A satellite of mass m is orbiting the earth (of radius R) at a height h from its surface. The total energy of the satellite in terms of g_0, the value of acceleration due to gravity at the earth's surface,

A. $\dfrac{mg_0R^2}{2(R+h)}$

B. $-\dfrac{mg_0R^2}{2(R+h)}$

C. $\dfrac{2mg_0R^2}{R+h}$

D. $-\dfrac{2mg_0R^2}{R+h}$

Answer: B

Watch Video Solution

483. A rectangular film of liquid is extended from $(4cm \times 2cm)$ to $(5cm \times 4cm)$. If the work done is $3 \times 10^{-4}J$, the value of the surface tension of the liquid is

A. 0.250 Nm^{-1}

B. 0.125 Nm^{-1}

C. 0.2 Nm^{-1}

D. 8.0 Nm^{-1}

Answer: B

Watch Video Solution

484. Three liquids of densities ρ_1, ρ_2 and ρ_3 (with $\rho_1 > \rho_2 > \rho_3$), having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact θ_1, θ_2 and θ_3 obey

A. $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$

B. $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$

C. $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$

D. $\pi > \theta_1 \theta_2 > \theta_3 > \frac{\pi}{2}$

Answer: B

Watch Video Solution

485. Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at

$100^{\circ}C$. While the other one is at $0^{\circ}C$. If the two bodies are brought into contact, then assuming no heat loss, the final common temperature is

A. $50^{\circ}C$

B. more than $50^{\circ}C$

C. less than $50^{\circ}C$ but greater than $0^{\circ}C$

D. $0^{\circ}C$

Answer: B

Watch Video Solution

486. A body cools from a temperature $3T$ to $2T$ in 10 minutes. The room temperature is T. Assume that Newton's law of cooling is applicable. The temperature of the body at the end of next 10 minutes will be

A. $\frac{7}{4}$T

B. $\frac{3}{2}T$

C. $\frac{4}{3}T$

D. T

Answer: B

Watch Video Solution

487. One mole of an ideal monatomic gas undergoes a process described by the equation PV^3= constant. The heat capacity of the gas during this process is

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

B. $\frac{5}{2}R$

C. $2R$

D. R

Answer: D

Watch Video Solution

488. The temperature inside a refrigerator is $t_2^{\circ} C$. The amount of heat delivered to the room for each joule of electrical energy consumed ideally will be

A. $\dfrac{t_1}{t_1 - t_2}$

B. $\dfrac{t_1 + 273}{t_1 - t_2}$

C. $\dfrac{t_2 - 273}{t_1 - t_2}$

D. $\dfrac{t_1 + t_2}{t_1 + 273}$

Answer: B

Watch Video Solution

489. A fiven sample of an ideal gas occupise a volume V at a pressure p and sbsoulte temperature T.The mass of each molecule of the gas is m. Which of the following fives the dinsity of the gas ?

A. P/(kT)

B. Pm/(kT)

C. P/(kTV)

D. mkT

Answer: B

Watch Video Solution

490. A body of mass m is attached to the lower end of a spring whose upper end is fixed. The spring has negligible mass. When the mass m is slightly pulled down and released, it oscillates with a time period of 3s. When the mass m is increased by $1kg$, the time period of oscillations becomes 5s. The value of m in kg is

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

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

C. $\frac{16}{9}$

D. $\frac{9}{16}$

Answer: D

Watch Video Solution

491. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be

A. L

B. 2L

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

D. 4L

Answer: B

Watch Video Solution

492. Three sound waves of equal amplitudes have frequencies $(v - 1), v, (v + 1)$. They superpose to give beats. The number of beats produced per second will be :

A. 1

B. 4

C. 3

D. 2

Answer: D

Watch Video Solution

493. An electric dipole is placed at an angle of 30° with an electric field intensity $2 \times 10^5 N/C$. It experiences a torque equal to $4Nm$. The charge on the dipole, if the dipole is length is $2cm$, is

A. 8 mC

B. 2 mC

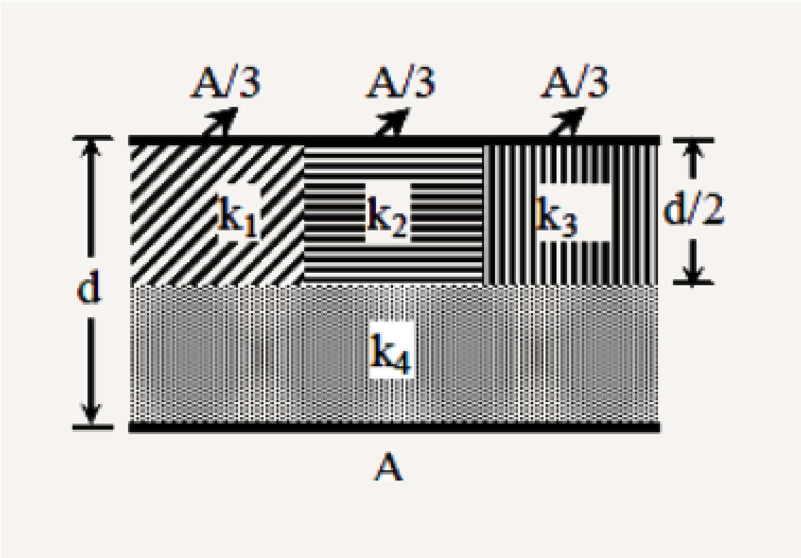
C. 5 mC

D. $7\mu C$

Answer: B

Watch Video Solution

494. A parallel-plate capacitor of area A, plate separation d and capacitance C is filled with four dielectric materials having dielectric constant k_1, k_2, k_3 and k_4 as shown in the figure below. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by



A. $k = k_1 + k_2 + k_3 + 3k_4$

B. $k = \frac{2}{3}\left(k_1 + k_2 + k_3\right) + 2k_4$

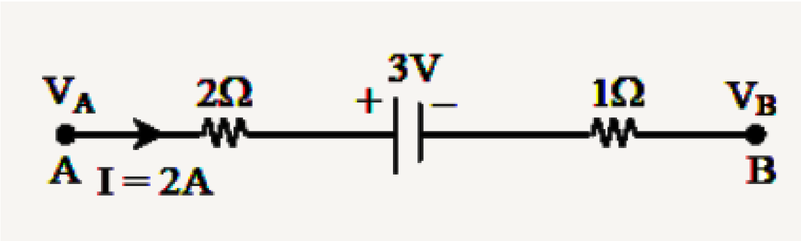
C. $\frac{2}{k} = \frac{3}{k_1 + k_2 + k_3} + \frac{1}{k_4}$

D. $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{3}{2k_4}$

Answer: C

View Text Solution

495. The potential difference $\left(V_A - V_B\right)$ between the points A and B in the given figure is



A. $-3V$

B. $+3V$

C. $+6V$

D. $+9V$

Answer: D

View Text Solution

496. A filament bulb $(500W, 100V)$ is to be used in a $230V$ main supply. When a resistance R is connected in series, it works perfectly and the bulb consumers $500W$. The value of R is

A. 230Ω

B. 46Ω

C. 26Ω

D. 13Ω

Answer: C

Watch Video Solution

497. A long wire carries a steady curent . It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

A. nB

B. n^2B

C. $2nB$

D. $2n^2B$

Answer: B

Watch Video Solution

498. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60^(@) is W. Now the torrue required to keep the magnet in this new position is

A. $\frac{W}{\sqrt{3}}$

B. $\sqrt{3}W$

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

D. $\frac{2W}{\sqrt{3}}$

Answer: B

Watch Video Solution

499. An electron is moving in a circular path under the influence fo a transerve magnetic field of $3.57 \times 10^{-2}T$. If the value of e/m is $1.76 \times 10^{141}C/kg$. The frequency of revolution of the electron is

A. 1 GHz

B. 100 MHz

C. 62.8 MHz

D. 6.28 MHz

Answer: A

Watch Video Solution

500. Which of the following combinations should be selected for better turning of an LCR circuit used for communication ?

A. R=20Ω,L1.5H, C=35μF

B. $R = 25\Omega, L = 2.5H, C = 45\mu F$

C. $R = 15\Omega, L = 3.5H, C = 30\mu F$

D. $R = 25\Omega, L = 1.5H, C = 45\mu F$

Answer: C

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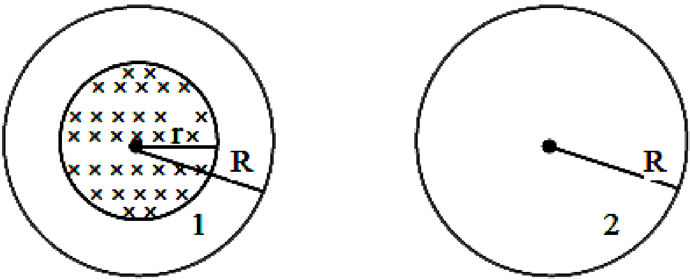
501. A uniform magnetic field is restricted within a region of radius r. the magnetic field changes with time at a rate $\frac{d\vec{B}}{dt}$. Loop 1 of radius $R > r$ enclosed the region r and loop 2 of radius R is outside the region of magnetic field as shown in the figure below. then the e.m.f. generated is



A. zero in loop 1 and zero in loop 2

B. $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 2

C. $-\frac{d\vec{B}}{dt}\pi R^3$ in loop 1 and zero in loop 2

D. $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and zero in loop 2

Answer: D

View Text Solution

502. The potential differences across the resistance, capacitance and inductance are $80V$, $40V$ and $100V$ respectively in an L - C - R circuit. The power factor of this circuit is

A. 0.4

B. 0.5

C. 0.8

D. 1

Answer: C

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503. A 100Ω resistance and a capacitor of 100Ω reactance are connected in series across a 220 V source. When the capacitor is $50\ \%$ charged, the peak value of the displacement current is

A. 2.2 A

B. $11A$

C. 4.4 A

D. $11\sqrt{2}A$

Answer: A

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504. Two identical glass $\left(\mu_g = 3/2\right)$ equiconvex lenses of focal length f are kept in contact. The space between the two lenses is filled with water $\left(\mu_w = 4/3\right)$. The focal length of the combination is

A. f/3

B. f

C. 4f/3

D. 3f/4

Answer: D

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505. An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is $5cm$ deep when viewed from one surface and $3cm$ deep when viewed from the opposite face. The thickness (in cm) of the slab is

A. 8

B. 10

C. 12

D. 16

Answer: C

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506. The interference pattern is obtained with two coherent light sources of intensity ration n. In the interference pattern, the ratio

$\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$ will be

A. $\frac{\sqrt{n}}{n+1}$

B. $\frac{2\sqrt{n}}{n+1}$

C. $\frac{\sqrt{n}}{(n+1)^2}$

D. $\frac{2\sqrt{n}}{(n+1)^2}$

Answer: B

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507. A person can see clearly objects only when they lie between 50 cm and 400 cm from his eyes. In order to increase the miximum distance of distinct vision to infinity , the person has to use, will be

A. convex, +2.25 diopter

B. concave, -0.25 diopter

C. concavve, -0.2 diopter

D. convex +0.15 diopter

Answer: B

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508. A linear aperture whose width is $0.02 cm$ is placed immediately in front of a lens of focal length $60 cm$. The aperture is illuminated normally by a parallel beam of wavelength $5 \times 10^{-5} cm$. The distance of the first dark band of the diffraction pattern from the centre of the screen is

A. 0.10 cm

B. 0.25 cm

C. 0.20 cm

D. 0.15 cm

Answer: D

Watch Video Solution

509. Electrons with de-Broglie wavelength λ fall on the target in an X-ray tube. The cut-off wavelength of the emitted X-ray is

A. $\lambda_0 = \dfrac{2mc\lambda^2}{h}$

B. $\lambda_0 = \dfrac{2h}{mc}$

C. $\lambda_0 = \dfrac{2m^2c^2\lambda^3}{h^2}$

D. $\lambda_0 = \lambda$

Answer: A

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510. Photons with energy $5eV$ are incident on a cathode C in a photoelectric cell . The maximum energy of emitted photoelectrons is $2eV$. When photons of energy $6eV$ are incident on C , no photoelectrons will reach the anode A , if the stopping potential of A relative to C is

A. $+3V$

B. $+4V$

C. -$1V$

D. -$3V$

Answer: D

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511. If an electron in a hydrogen atom jumps from the $3rd$ orbit to the $2nd$ orbit, it emits a photon of wavelength λ. When it jumps form the $4th$ orbit to the $3dr$ orbit, the corresponding wavelength of the photon will be

A. $\frac{16}{25}\lambda$

B. $\frac{9}{16}\lambda$

C. $\frac{20}{7}\lambda$

D. $\frac{20}{13}\lambda$

Answer: C

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512. The half-life of a radioactive substance is 30 minutes, The time (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is.

A. 15

B. 30

C. 45

D. 60

Answer: D

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513. For CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 4V. If the current amplification factor of the transistor is 100 and the base resistance is $1k\Omega$, then the input signal voltage is

A. 10 mV

B. 20 mV

C. 30 mV

D. 15 mV

Answer: B

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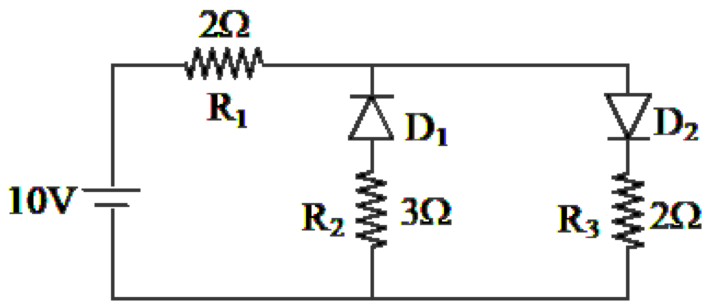
514. The given circuit has two ideal diodes connected as shown in the figure below. The current flowring through the resistance R_1 will be



A. 2.5 A

B. 10.0 A

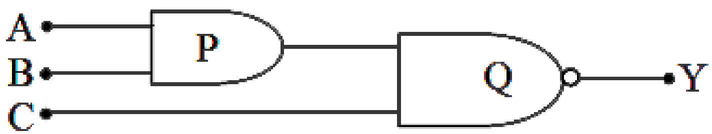
C. 1.43 A

D. 3.13 A

Answer: A

View Text Solution

515. What is the output Y in the following ciruit, when all the three inputs A,B,C are first 0 and then I?



A. 0,1

B. 0,0

C. 1,0

D. 1,1

Answer: C

View Text Solution

516. A potentiometer is an accurate and versatile device to make electrical measurements of $E.M.F.$ because the method involves

A. Cells

B. Potential gradients

C. A condition of no current flow through the galvanometer

D. A combination of cells , galvanometer and resistances

Answer: C

Watch Video Solution

517. A gas mixture consists of 2 moles of oxygen and 4 of Argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

A. 4RT

B. 15RT

C. 9RT

D. 11RT

Answer: D

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518. Radioactive material 'A' has decay constant $'8\lambda'$ and material 'B' has decay constant 'lamda'. Initial they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be $\frac{1}{e}$?

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

B. $\frac{1}{7\lambda}$

C. $\frac{1}{8\lambda}$

D. $\frac{1}{9\lambda}$

Answer: B

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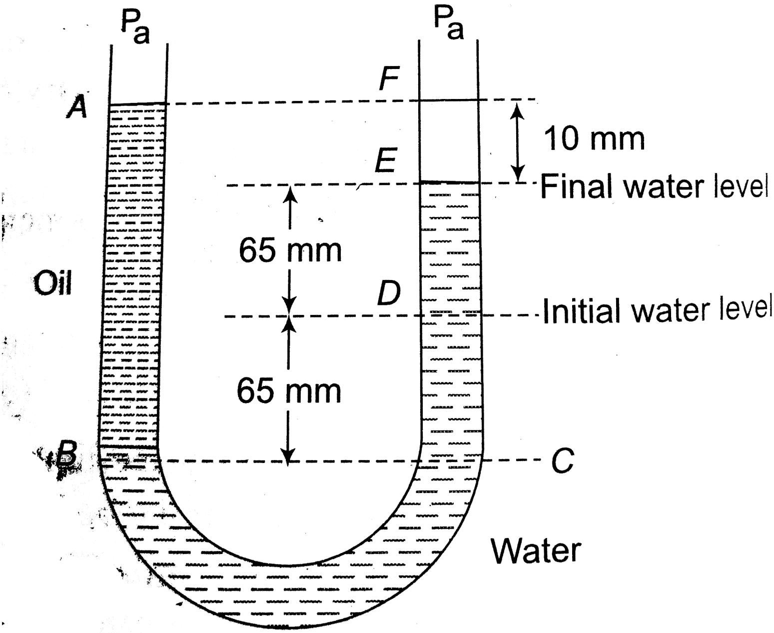
519. A U-tube with both ends open to the atmosphere is partially filled with water. Oil, which is immiscible with water. Is poured into one side until it stands at a distance of $10mm$ above the water level on the other side. Meanwhile the water rises by $65mm$

from its original level (see diagram). The density of the oil is:



A. 650 kg m^{-3}

B. 425 kg m^{-3}

C. 800 kg m^{-3}

D. 928 kg m^{-3}

Answer: D

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520. A 250-turns recantagular coil of length 2.1 cm and width 1.25 cm carries a current of $85\mu A$ and subjected to magnetic field of strength $0.85T$. Work done for rotating the coil by 180° against the torque is

A. $9.1\mu J$

B. $4.55\mu J$

C. $2.3\mu J$

D. $1.15\mu J$

Answer: A

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521. The de - Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature $T(\text{kelvin})$ and mass m, is

A. $\frac{h}{\sqrt{mKT}}$

B. $\frac{h}{\sqrt{3mKT}}$

C. $\frac{2h}{\sqrt{3mKT}}$

D. $\frac{2h}{\sqrt{mKT}}$

Answer: B

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522. One end of string of length l is connected to a particle on mass m and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed

v the net force on the particle (directed toward centre) will be (T reprents the tension in the string):

A. T

B. $T + \frac{mv^2}{l}$

C. $T - \frac{mv^2}{l}$

D. Zero

Answer: A

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523. Figure shows a circuit that contains three identical resistors with reisistance $R = 9.0\Omega$ each, two identical inductors with inductance $L = 2.0mH$ each, and an ideal battery with $emfe = 18V$. The current I through th battery just after the switch closed is

A. 2 mA

B. 0.2 A

C. 2A

D. 0 ampere

Answer: C

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524. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in meters and t in seconds. The acceleration of the particle at t=2s is:

A. 0

B. $5m/s^2$

C. $-4m/s^2$

D. $-8m/s^2$

Answer: C

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525. Suppose the charge of a proton and an electron differ slightly. One of them is $-e$, the other is $(e + \Delta e)$. If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero. Then Δe is of the order of [Given mass of hydrogen $m_h = 1.67 \times 10^{-27} kg$]

A. $10^{-20} C$

B. $10^{-23} C$

C. $10^{-37} C$

D. $10^{-47} C$

Answer: C

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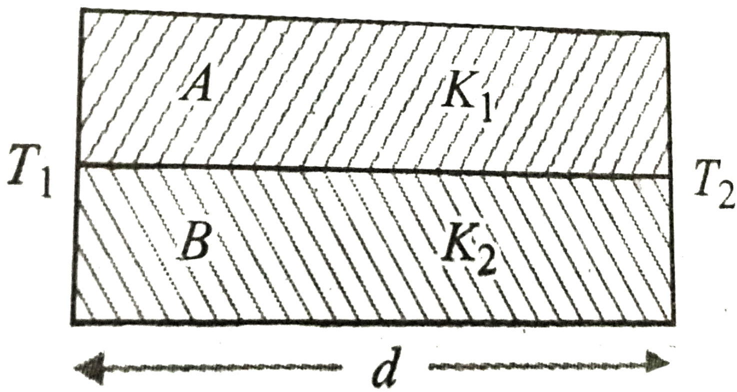
526. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be



A. $\dfrac{K_1 + K_2}{2}$

B. $\frac{3(K_1+K_2)}{2}$

C. K_1+K_2

D. $2(K_1+K_2)$

Answer: A

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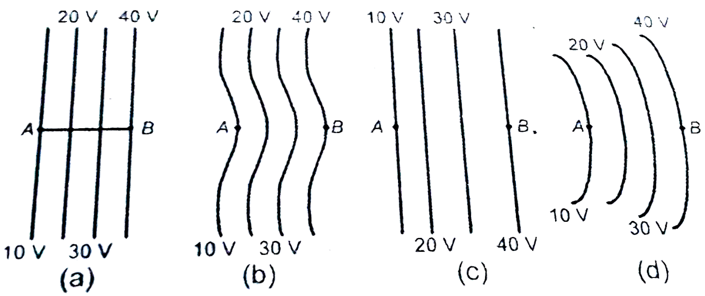
527. The diagram below show region of equipotentials.



A positive charge is moved from A to B in each diagram .

A. Maximum work is required to move q in figure (c).

B. In all the four cases the work done is the same .

C. Minimum work is required to move q in figure (a) .

D. Maximum work is required to move q in figure (b) .

Answer: B

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528. The ratio of wavelength of the lest line of Balmer series and the last line Lyman series is:

A. 2

B. 1

C. 4

D. 0.5

Answer: C

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529. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8^{th} bright fringe in the medium lies where 5^{th} dark fringe lies in air. The refractive index of the medium is nearly

A. 1.25

B. 1.59

C. 1.69

D. 1.78

Answer: D

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530. A particle executes linear simple harmonic motion with an amplitude of $3cm$. When the particle is at $2cm$ from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then, its time period in seconds is

A. $\frac{\sqrt{5}}{\pi}$

B. $\frac{\sqrt{5}}{2\pi}$

C. $\frac{4\pi}{\sqrt{5}}$

D. $\frac{2\pi}{\sqrt{3}}$

Answer: C

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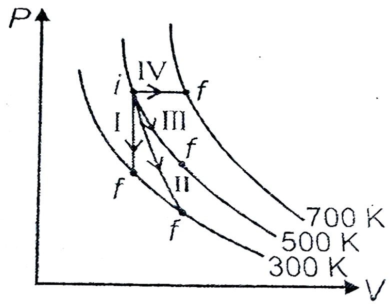
531. Thermodynamic processes are indicated in the following diagram .



Match the following

	Column-1		Column-2
P.	Process I	a.	Adiabatic
Q.	Process II	b.	Isobaric
R.	Process III	c.	Isochoric
S.	Process IV	d.	Isothermal

A. P → a , Q → c , R → d , S → b

B. P → c, Q → a , R → d , S → b

C. P → c, Q → d , R → b , S → a

D. P → d, Q → b , R → a , S → c

Answer: B

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532. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system:

A. Increases by a factor of 4

B. Decreases by factor of 2

C. Remains the same

D. Increases by a factor of 2

Answer: B

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533. The photoelectric threshold wavelength of silver is $3250 \times 10^{-10} m$. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength $2536 \times 10^{-10} m$ is

$\left(Given h = 4.14 \times 10^{6} ms^{-1} eVs \text{ and } c = 3 \times 10^{8} ms^{-1}\right)$

A. $\approx 6 \times 10^{5} ms^{-1}$

B. $\approx 0.6 \times 10^{6} ms^{-1}$

C. $\approx 61 \times 10^{3} ms^{-1}$

D. $\approx 0.3 \times 10^{6} ms^{-1}$

Answer: A::B

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534. A physical energy of the dimension of length that can be formula cut of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is [c is velocity of light G is universal constant of gravilation e is change

A. $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

B. $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

C. $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

D. $\frac{1}{c}G\frac{e^2}{4\pi\varepsilon_0}$

Answer: A

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535. Two car moving in opposite directions approach each other with speed of $22m/s$ and $16.5m/s$ respectively. The driver of the first car blows a horn having a frequency $400Hz$. The frequency heard by the driver of the second car is [velocity of sound $340 m/s$].

A. 350 Hz

B. 361 Hz

C. 411 Hz

D. 448 Hz

Answer: D

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536. In a common emitter transistor transistor amplifier, the audio signal voltage across the collector is $3k\Omega$. If current gain is 100 and the base resistance is $2k\Omega$, the voltage and power gain of the amplifier are

A. 200 and 1000

B. 15 and 200

C. 150 and 15000

D. 20 and 2000

Answer: C

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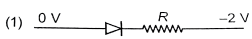
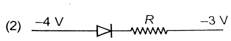
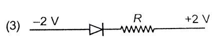
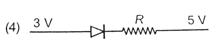
537. Which one of the following represents forward bias diode?

A. 

B. 

C. 

D. 

Answer: A

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538. A spring of force constant k is cut into lengths of ratio $1:2:3$. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k'. Then k' : k" is :

A. $1:6$

B. $1:9$

C. $1:11$

D. $1:14$

Answer: C

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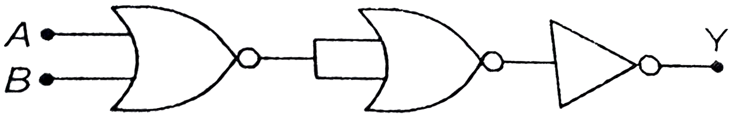
539. The given electrical network is equivalent to



A. AND gate

B. OR gate

C. NOR gate

D. NOT gate

Answer: C

Watch Video Solution

540. The acceleration due to gravity at a height $1km$ above the earth is the same as at a depth d below the surface of earth.

Then :

A. $d = \frac{1}{2}km$

B. $d = 1km$

C. $d = \frac{3}{2}km$

D. $d = 2km$

Answer: D

Watch Video Solution

541. Which of following statements are correct ? ltbgt (a) Centre of mass of a body always coincides with the centre of gravity of the body

(b) Central of mass of a body is the point at which the total garvitational torque on the body is zero

(c) Couple on a body produces both trasnlational and rotation motion in a body

(d) Mechinical advantage greater than one means that small efforts can be used to lift a large load

A. (b) and (d)

B. (a) and (b)

C. (b) and (c)

D. (c) and (d)

Answer: A

Watch Video Solution

542. 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. 1 J

B. 90 J

C. 99 J

D. 100 J

Answer: B

Watch Video Solution

543. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then show that the true angle of dip, θ is given by $\cot^2\theta = \cot^2\theta + \cot^2\theta$.

A. $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

B. $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$

C. $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$

D. $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$.

Answer: A

Watch Video Solution

544. An arrangement of three parallel straight wires placed perpendicular to plane to paper carrying same current 'I' alont the same direction is show in Fig . Magnitude of force per unit length on the middle wire 'B' is given by

A. $\dfrac{\mu_0 I^2}{2\pi d}$

B. $\dfrac{2\mu_0 I^2}{\pi d}$

C. $\dfrac{\sqrt{2}\mu_0 I^2}{\pi d}$

D. $\dfrac{\mu_0 I^2}{\sqrt{2}\pi d}$

Answer: D

View Text Solution

545. Two astronauts are floating in gravitational free space after having lost contanct with their spaceship. The two will:

A. Keep floating at the same distance between them

B. Move towards each other

C. Move away from each other

D. Will become stationary

Answer: B

Watch Video Solution

546. In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms} = 6V/m$. The peak value of the magnetic field is

A. $1.41 \times 10^{-8}T$

B. $2.83 \times 10^{-8}T$

C. 0.70×10^{-8}T

D. $4.23 \times 10^{-8}T$

Answer: B

Watch Video Solution

547. The bulk modulus of a spherical object is B if it is subjected to uniform pressure p, the fractional decrease in radius is:

A. $\frac{p}{B}$

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

C. $\frac{3p}{B}$

D. $\frac{p}{3B}$

Answer: D

Watch Video Solution

548. The ratio of resolving power of an optical microscope for two wavelength $\lambda_1 = 4000\text{Å}$ and $\lambda_2 = 6000\text{Å}$ is:

A. $8:27$

B. $9:4$

C. $3:2$

D. $16:81$

Answer: C

Watch Video Solution

549. Consider a drop of rain water having mass 1 g falling from a height of $1km$. It hits the ground with a speed of $50m/s$ Take g constant with a volume $10m/s^2$. The work done by the

(i) gravitational force and the

(ii) resistive force of air is :

A. (i) -10 J (ii) -8.25

B. (i) 1.25 J (ii) -8.25

C. (i) 100 (ii) J 8.75 J

D. (i) 10 J (ii) -8.75 J

Answer: D

Watch Video Solution

550. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be

A. 225

B. 450

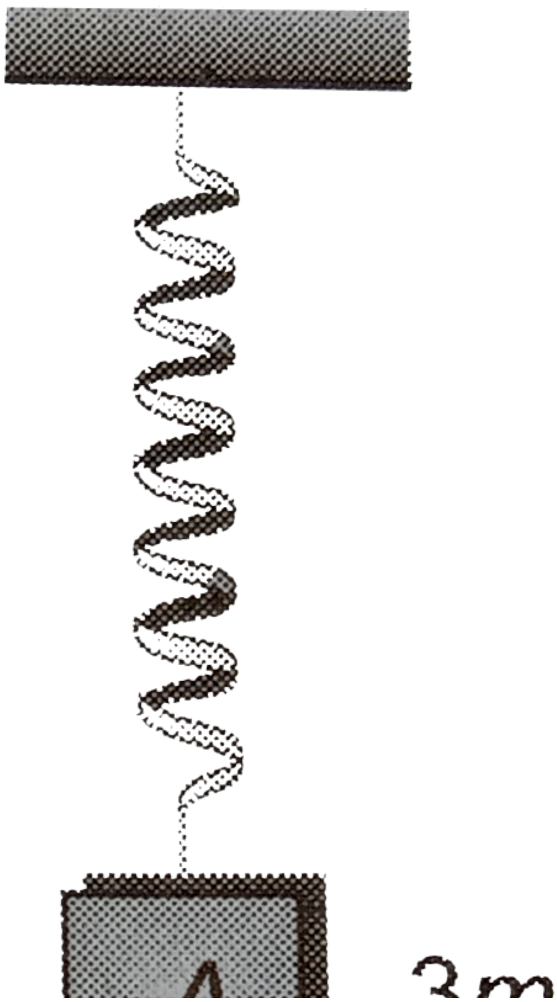
C. 1000

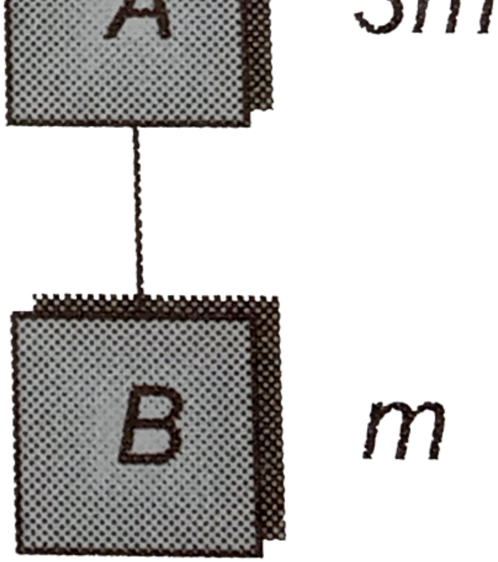
D. 1800

Answer: D

Watch Video Solution

551. Two block A and B of masses $3m$ and m respectively are connected by a massless and nextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are resectively





A. $g, \frac{g}{3}$

B. $\frac{g}{3}, g$

C. g, g

D. $\frac{g}{3}, \frac{g}{3}$

Answer: B

Watch Video Solution

552. Two Polaroids P_1 and P_2 are placed with their axis perpendicular to eachother. Unpolarised light I_0 is nicident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45° with that of P_1. The intensity of transmitted light through P_2 is

A. $\frac{I_0}{2}$

B. $\frac{I_0}{4}$

C. $\frac{I_0}{8}$

D. $\frac{I_0}{16}$

Answer: C

Watch Video Solution

553. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At centre of the solenoid is 100 turns coil of radius 0.01 m placed with its axis coinciding with solenoid axis. The current in the solenoid reduce at a constant rate to 0A from 4 a in 0.05 s . If the resistance of the coil is $10\pi^2\Omega$, the total charge flowing through the coil during this time is

A. $32\pi\mu C$

B. $16\mu C$

C. $32\mu C$

D. $16\pi\mu C$

Answer: C

Watch Video Solution

554. Two discs of same moment of inertia rotating their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2. They are brought into contact face to the face coinciding the axis of rotation. The expression for loss of enregy during this process is :

A. $\frac{1}{2}I\left(\omega_1+\omega_2\right)^2$

B. $\frac{1}{4}I\left(\omega_1-\omega_2\right)^2$

C. $I\left(\omega_1-\omega_2\right)^2$

D. $\frac{1}{8}I\left(\omega_1-\omega_2\right)^2$

Answer: B

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555. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if the remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be :

A. $\frac{t_1 + t_2}{2}$

B. $\frac{t_1 t_2}{t_2 - t_1}$

C. $\frac{t_1 t_2}{t_2 + t_1}$

D. $t_1 - t_2$

Answer: C

Watch Video Solution

556. A rope is wound around a hollow cylinder of mass $3kg$ and radius $40cm$. What is the angular acceleration of the cylinder if the rope is pulled with a force of $30N$?

A. $25m/s^2$

B. $0.25rad/s^2$

C. $25rad/s^2$

D. $5m/s^2$

Answer: C

Watch Video Solution

557. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ the spot of the light is found to move through a distance y on the scale. The angle θ is given by

A. $\frac{y}{2x}$

B. $\frac{y}{x}$

C. $\frac{x}{2y}$

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

Answer: A

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558. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

A. 10 Hz

B. 20 Hz

C. 30Hz

D. 40 Hz

Answer: B

Watch Video Solution

559. A thin prism having refracting angle 10° is made of glass of refracting index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be :

A. 4°

B. 6°

C. 8°

D. 10°

Answer: B

Watch Video Solution

560. The resistance of a wire is 'R' ohm. If it is melted and stretched to n times its origianl length, its new resistance will be

A. nR

B. $\frac{R}{n}$

C. n^2R

D. $\frac{R}{n^2}$

Answer: C

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561. Atomic weight of boron is 10.81 and it has two isotopes $._5B^{10}$ and $._5B^{11}$. Then ratio of $._5B^{10}$ in nature would be.

A. $15:16$

B. $19:81$

C. $81:19$

D. $20:53$

Answer: B

Watch Video Solution

562. A hollow sphere of radius 1m is given a positive charge of 10μC. The electric field at the centre of hollow sphere will be :

A. $60 \times 10^3 Vm^{-1}$

B. $90 \times 10^3 Vm^{-1}$

C. Zero

D. Infinite

Answer: C

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563. Following table is for which logic gate :

A. AND

B. OR

C. NAND

D. NOT

Answer: C

View Text Solution

564. Following logic gate is :

A. AND

B. NAND

C. EX-OR

D. OR

Answer: B

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565. A transverse wave is represented by $y = A\sin(\omega t - kx)$. For what value of the wavelength is the wave velocity equal to the maximum particle velocity?

A. πy_0

B. $2\pi y_0$

C. $\pi y_0 / 2$

D. $4\pi y_0$

Answer: A

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566. Two pendulums suspended from same point having length 2m and 0.5m. If they displaced slightly and released then they will be in same phase, when small pendulum will have completed :

A. 2 oscillation

B. 4 oscillation

C. 3 oscillation

D. 5 oscillation

Answer: A

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567. For protecting a sensitive equipment from the external magnetic field, it should be

A. In iron box

B. In wooden box

C. In metallic box

D. None of these

Answer: A

Watch Video Solution

568. A thin circular ring of mass M and radius R is rotating about its axis with constant angular velocity ω. The objects each of mass m are attached gently to the ring. The wheel now rotates with an angular velocity.

A. $\dfrac{m\omega}{M+2m}$

B. $\dfrac{M\omega}{M-2m}$

C. $\dfrac{M\omega}{M+2m}$

D. $\dfrac{M+2m}{M\omega}$

Answer: C

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569. If $X = 3 - 4t^2 + t^3$, then work done in first 4s. will be (Mass of the particle is 3 gram) :

A. 384 mJ

B. 168 mJ

C. 192 mJ

D. None of these

Answer: A

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570. If force F=500-100t, then function of impulse with time will be,-

A. $500t$ - $50t^2$

B. 50t – 10

C. $50 - t_2$

D. $100t^2$

Answer: A

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571. Half-lives of two radioactive substances A and B are respectively 20 minutes and 40 minutes. Initially, he sample of A and B have equal number of nuclei. After 80 minutes the ratio of the remaining number of A and B nuclei is :

A. $4:1$

B. $1:2$

C. $8:1$

D. $16:1$

Answer: A

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572. A particle of mass m is tied to a string of length L and whirled into a horizontal plan. If tension in the string is T then the speed of the particle will be :

A. $\sqrt{\frac{Tl}{m}}$

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

C. $\sqrt{\frac{3Tl}{m}}$

D. $\sqrt{\frac{T}{ml}}$

Answer: A

Watch Video Solution

573. Radiation of wavelength λ in indent on a photocell . The fastest emitted electron has speed v if the wavelength is changed to $\frac{3\lambda}{4}$, then speed of the fastest emitted electron will be

A. Smaller than $\sqrt{\frac{4V}{3}}$

B. Greater than $\sqrt{\frac{4V}{3}}$

C. 2V

D. Zero

Answer: B

Watch Video Solution

574. A coil one turn is made of a wire of certain lenghth and then from the same length a coil of two turns is made. If the same current is passed both the cases, then the ratio of magnetic induction at there centres will be

A. $1:4$

B. $1:1$

C. $1:8$

D. $4:1$

Answer: A

Watch Video Solution

575. A boat which has a speed of $5 km/hr$ in steel water crosses a river of width $1 km$ along the shortest possible path in $15 \min utes$. The velocity of the river water in km/hr is

A. 3 km/hr

B. 4 km/hr

C. 5 km/hr

D. 2 km/hr

Answer: A

Watch Video Solution

576. Two identical balls A and B having velocity of $0.5 m/s$ and $-0.3 m/s$ respectively collide elastically in one

dimension. The velocities of B and A after the collision respectively will be

A. $-0.3ms^{-1}\&0.5ms^{-1}$

B. $+0.5ms^{-1}\& + 0.3ms^{-1}$

C. $-0.4ms^{-1}\&0.3ms^{-1}$

D. $0.3ms^{-1}\& - 0.4ms^{-1}$

Answer: A

Watch Video Solution

577. A mass 1 kg is suspended by a thread. It is

(i) lifted up with an acceleration $4.9m/s^2$

(ii) lowered with an acceleration $4.9m/s^2$.

The ratio of the tensions is

A. $1:3$

B. $3:1$

C. $1:1$

D. $1:\sqrt{5}$

Answer: B

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578. A device whose one end is connected to -ve terminal and other end connected to $+ve$ terminal. If both ends are interchanged with suppy then current is not flowing then device will be-

A. P–N Junction

B. Transistor

C. Zener diode

D. Triode

Answer: A

Watch Video Solution

579. Light enters at an angle of incidence in a transparent rod of refractive index n. For what value of the refractive index of the material of the rod the light once entered into it will not leave it through its lateral face whatsoever be the value of angle of incidence.

A. $n > \sqrt{2}$

B. 1.0

C. 1.3

D. 1.4

Answer: A

Watch Video Solution

580. 10^5 coloumb charge liberated 1 gm silver (Ag). If now charge is doubled then the amount of liberated Ag will be :

A. 1 gm

B. 2 gm

C. 3 gm

D. 4 gm

Answer: B

Watch Video Solution

581. Work function of a metal surface is $\phi = 1.5 eV$. If a light of wavelength 5000Å falls on it then the maximum K.E. of ejected electron will be-

A. 1.2 eV

B. 0.98 eV

C. 0.45 eV

D. 0 eV

Answer: B

Watch Video Solution

582. If time of mean position from amplitude (extreme) position is 6 s. then the frequency of SHM will be :

A. 0.01 Hz

B. 0.02 Hz

C. 0.03 Hz

D. 0.04 Hz

Answer: D

Watch Video Solution

583. Two coils have the mutual inductance of 0.05 H. The current changes in the first coil as $I = I_0 \sin \omega t$, where $I_0 = 1A$ and $\omega = 100\pi \text{rad/s}$. The maximum emf induced in secondary coil is

A. 4π

B. 3π

C. 2π

D. π

Answer: D

Watch Video Solution

584. Resistance of a Galvanometer coil is 8Ω and 2Ω Shunt resistance is connected with it. If main current is 1 A then the current flow through 2Ω resistance will be :

A. 0.2 A

B. 0.8 A

C. 0.1 A

D. 0.4 A

Answer: B

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585. If a ladder is not in balance against a smooth vertical wall, then it can be made in balance by :-

A. Decreasing the length of ladder

B. Increasing the length of ladder

C. Increasing the angle of inclination

D. Decreasing the angle of inclination

Answer: C

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586. For a Rocket propulsion velocity of exhaust gases relative to rocket is 2km/s. If mass of rocket system is 1000 kg, then the rate of fuel consumption for a rockt to rise up with acceleration $4.9 m / s^2$ will be:-

A. 12.25 kg/s

B. 17.5 kg/s

C. 7.35 kg/s

D. 5.2 kg/s

Answer: C

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587. O is the centre of an equilateral triangle ABC $\vec{F}_1, \vec{F}_2, \vec{F}_3$ are three forces acting along the sides AB, BC and AC as shown in fig. What should be the magnitude of $\vec{F}_3$ so that total torque about O is zero :

A. $\left|\vec{F}_3\right| = \left|\vec{F}_1\right| + \left|\vec{F}_2\right|$

B. $\left|\vec{F}_3\right| = \left|\vec{F}_1\right| - \left|\vec{F}_2\right|$

C. $\left|\vec{F}_3\right| = \vec{F}_1 - 2\vec{F}_2$

D. Not possible

Answer: A

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588. If the ratio of specific heat of a gas of constant pressure to that at constant volume is γ, the change in internal energy of the mass of gas, when the volume changes from V to $2V$ at constant pressure p is

A. PV

B. 3PV

C. $\dfrac{PV}{\gamma - 1}$

D. $\dfrac{RV}{\gamma - 1}$

Answer: C

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589. A gas of volume changes 2 litre to 10 litre at constant temperature 300K, then the change in internal energy will be :

A. 12 J

B. 24 J

C. 36 J

D. 0 J

Answer: D

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590. When three identical bulbs are connected in series. The consumed power is 10W. If they are now connected in pa rallel then the consumed power will be:-

A. 30W

B. 29W

C. 10/3W

D. 270W

Answer: B

Watch Video Solution

591. A ball is dropped from a height of 5 m, if it rebound upto height of 1.8 m, then the ratio of velocities of the ball after and before rebound is :

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

B. $\frac{2}{5}$

C. $\frac{1}{5}$

D. $\frac{4}{5}$

Answer: A

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592. Two long parallel wires are at a distance of 1 m. Both of them carry 1A of current. The force of attraction per unit length between the two wires is

A. $2 \times 10^{-7} N/m$

B. $4 \times 10^{-7} N/m$

C. $8 \times 10^{-7} N/m$

D. $10^{-7} N/m$

Answer: A

Watch Video Solution

593. For the diffraction from a crystal with $\lambda = 1 \text{Å}$ and Bragg's angle $\theta = 60^\circ$, then for the second order diffraction 'd' will be :

A. 1.15 Å

B. 0.75 Å

C. 0.55 Å

D. 2.1 Å

Answer: A

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594. A mass m is vertically suspended from a spring of negligible mass, the system oscillates with a frequency n. what will be the frequency of the system, if a mass $4m$ is suspended from the same spring?

A. 2n

B. n/2

C. n

D. None of the above

Answer: B

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595. A standing wave having 3 nodes and 2 antinodes is formed between two atoms having a distance 1.21Å between them. The wavelength of the standing wave is

A. 1.21 Å

B. 2.42 Å

C. 0.605 Å

D. 4.84 Å

Answer: A

Watch Video Solution

596. A $5^{\circ}C$ rise in the temperature is observed in a conductor by passing some current. When the current is doubled, then rise in temperature will be equal to

A. $15^{\circ} C$

B. $20^{\circ} C$

C. $25^{\circ} C$

D. $30^{\circ} C$

Answer: B

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597. A car is moving with velocity V. If stop after applying break at a distance of 20 m. If velocity of car is doubled, then how much distance it will cover (travel) after applying break :

A. 40 m

B. 80 m

C. 160 m

D. 320 m

Answer: B

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598. A charge q is placed in an uniform electric field E. If it is released, then the K.E of the charge after travelling distance y will be :

A. qEy

B. 2qEy

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

D. $\sqrt{qEy}$

Answer: A

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599. If ε_0 be the permittivity of vacuum and r be the radius of orbit of H- atom in which electron is revolving, then velocity of electron is given by :

A. $\frac{e}{\sqrt{4\pi m\varepsilon_0 r}}$

B. $\frac{2e}{\sqrt{\pi m\varepsilon_0 r}}$

C. $\frac{e}{\sqrt{\pi m\varepsilon_0 r}}$

D. $\frac{e}{\sqrt{4\pi m\varepsilon_0 r}}$

Answer: A

Watch Video Solution

600. Electric field at the equator of a dipole is E. If strength and distance is now doubled then the electric field will be :

A. E/2

B. E/8

C. E/4

D. E

Answer: C

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601. Turn ratio of a step-up transformer is 1 : 25. If current in load coil is 2A, then the current in primary coil will be :

A. 25A

B. 50A

C. 0.25A

D. 0.5A

Answer: B

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602. What physical change occurs when source of sound waves is at rest and the listener moves?

A. 2 n

B. n

C. n/2

D. Zero

Answer: D

Watch Video Solution

603. for nuclear reaction :

$\cdot_{92}U^{235} + \cdot_{0}n^{1} \rightarrow \cdot_{56}Ba^{144} + \ldots\ldots + 3_{0n^{1}}$

A. $\cdot_{26}Kr^{89}$

B. $\cdot_{36}Kr^{89}$

C. $\cdot_{26}Sr^{90}$

D. $\cdot_{38}Sr^{89}$

Answer: B

View Text Solution

604. A rigid rod is placed against the wall as shown in figure. When its velocity of lower end is $10 ms^{-1}$ and its base makes an angle $\alpha = 60°$ with horizontal, then the vertical velocity of its end B will be :

A. $10\sqrt{3}$

B. $10/\sqrt{3}$

C. $5\sqrt{3}$

D. $5/\sqrt{3}$

Answer: B

View Text Solution

605. Radiation energy corresponding to the temperature T of the sun is E. If its temperature is doubled, then its radiation energy will be :

A. 32 E

B. 16 E

C. 8 E

D. 4 E

Answer: B

Watch Video Solution

606. The cause of the potential barrier in a p-n diode is:

A. Concentration of positive and negative ions near the junction

B. Concentration of positive charges near the junction

C. Depletion of negative charges near the junction

D. Increment in concentration of holes and electrons near the junction

Answer: A

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607. A common emitter circuit is used as an amplifier, its current gain is 50. if input resistance is $1k\Omega$ and input voltage is 5 volt then output current will be

A. 250 mA

B. 30 mA

C. 50 mA

D. 100 mA

Answer: A

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608. We consider a thermodynamic system. If ΔU represents the increase in its internal energy and W the work done by the system, which of the following statements is true?

A. ΔU = -W in an isothermal process

B. ΔU = W in an isothermal process

C. ΔU = -W in an adiabatic process

D. ΔU = W in an adiabatic process

Answer: C

Watch Video Solution

609. A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p, If the distance of Q from the dipole is r (much larger than the size of the dipole), then electric field at Q is proportional to

A. p^2 and r^{-3}

B. p and r^{-2}

C. p^{-1} and r^{-2}

D. p and r^{-3}

Answer: D

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610. A particle, with restoring force proportional to displacement and resulting force proportional to velocity is subjected to a force $F \sin \omega t$. If the amplitude of the particle is maximum for $\omega = \omega_1$, and the energy of the particle is maximum for $\omega = \omega_2$, then

A. $\omega_1 \neq \omega_0$ and $\omega_2 = \omega_0$

B. $\omega_1 = \omega_0$ and $\omega_2 = \omega_0$

C. $\omega_1 = \omega_0$ and $\omega_2 \neq \omega_0$

D. $\omega_1 \neq \omega_0$ and $\omega_2 \neq \omega_0$

Answer: B

Watch Video Solution

611. The error in measurement of radius of a sphere is 0.1% then error in its volume is -

A. $0.3\ \%$

B. $0.4\ \%$

C. $0.5\ \%$

D. $0.6\ \%$

Answer: A

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612. A stone falls freely from rest from aheight h and it travels a distance $h/2$ in the last second. The time of journey is

A. $\sqrt{2}$ - 1

B. $2 + \sqrt{2}$

C. $\sqrt{2} + \sqrt{3}$

D. $\sqrt{3} + 2$

Answer: B

Watch Video Solution

613. The K.E. of a person is just half of K.E. of a boy whose mass is just half of that person. If person increases its speed by 1 m/s, then its K.E. equals to that of boy then initial speed of person was -

A. $\left(\sqrt{2} + 1\right)$m/s

B. $\left(2 + \sqrt{2}\right)$ m/s

C. $2\left(\sqrt{2} + 2\right)$ m/s

D. None

Answer: A

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614. Two particles separated at a horizontal distance X as shown in fig. they projected at the same line as shown in fig. with different initial speeds. The time after which the horizontal distance between them become zero -

A. $\frac{x}{u}$

B. $\frac{u}{2x}$

C. $\frac{2u}{x}$

D. None of these

Answer: A

View Text Solution

615. For a particle displacement time relation is $t = \sqrt{x} + 3$. Its displacement when its velocity is zero -

A. 2m

B. 4m

C. 0

D. None of these

Answer: C

Watch Video Solution

616. If 100N force is applied to 10 kg. block as shown in diagram then acceleration produced for slab -

A. 1.65 m/s^2

B. 0.98 m/s^2

C. 1.2 m/s^2

D. 0.25 m/s^2

Answer: B

View Text Solution

617. The current in 8Ω resistance is

A. 0.69 A

B. 0.92 A

C. 1.30 A

D. 1.6 A

Answer: A

View Text Solution

618. The effective capacity of the network between terminals A and B is

A. $6\mu F$

B. $20\mu F$

C. $3\mu F$

D. $10\mu F$

Answer: A

View Text Solution

619. If the power dissipated in 5Ω is 20 W then power dissipated in 4Ω is -

A. 4W

B. 6W

C. 10W

D. 20W

Answer: A

View Text Solution

View Text Solution

620. The value of R for which power in it is maximum-

A. 3Ω

B. 6Ω

C. 12Ω

D. 9Ω

Answer: B

View Text Solution

621. Initially plane of coil is parallel to the uniform magnetic field B. In time Δt it makes to perpendicular to the magnetic field, then charge flows in Δt depends on this time as -

A. $\propto \Delta t$

B. $\propto \frac{1}{\Delta t}$

C. $\propto (\Delta t)^0$

D. $\propto (\Delta t)^2$

Answer: C

View Text Solution

622. A current carrying coil (I = 5A, R = 10 cm.) having 50 number of turns find field at its centre-

A. 1.57 mT

B. 3.14 mT

C. 1 mT

D. 2 mT

Answer: A

Watch Video Solution

623. Eight equals charged tiny drops are combined to form a big drop. If the potential on each drop is 10V then potential of big drop will be -

A. 40V

B. 10V

C. 30V

D. 20V

Answer: A

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624. For a inductor coil L = 0.04 H, then workdone by source to establish a current of 5A in it is -

A. 0.5 J

B. 1.00 J

C. 100 J

D. 20 J

Answer: B

Watch Video Solution

625. What is terminal potential differnce of a cell? Can its value be greater than the emf of a cell? Explian.

A. A battery of less emf is connected in its series

B. A battery of higher emf is connected in its series

C. A battery of higher emf is connected in its parallel

D. A battery of less emf is connected in its parallel

Answer: C

Watch Video Solution

626. In Milikan's oil drop experiment, a charged drop falls with terminal velocity V. If an electric field E is applied in vertically upward direction then it starts moving in upward direction with terminal velocity 2V. If magnitude of electric field is decreased to $\frac{E}{2}$, then terminal velocity will become

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

B. V

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

D. 2V

Answer: A

Watch Video Solution

627. For a vibration magnetometer, the time period of suspended bar magnet can be reduced by -

A. Moving it towards south pole

B. Moving it towards north pole

C. Moving it towards equator

D. Anyone of them

Answer: C

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628. The truth table for the following network is :

A.

B.

C.

D. None of these

Answer: B

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629. Zener diode is used as

A. Half wave rectifier

B. Full wave rectifier

C. A.C. voltage stablizer

D. D.C. voltage stablizer

Answer: D

Watch Video Solution

630. Depletion layer has (for an unbiased PN junction) -

A. Electrons

B. Holes

C. Static ions

D. Neutral atoms

Answer: C

Watch Video Solution

631. A cylindrical tube (L = 125 cm) is resonant with a tuning fork of frequency 330 Hz. If it is filling by water then to get resonance again, minimum length of water column is (V_air = 330 m/s) -

A. 50 cm

B. 60 cm

C. 25 cm

D. 20 cm

Answer: A

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632. Initial pressure and volume of a gas are P and V respectively. First its volume is expanded to 4V by isothermal process and then again its volume makes to be V by adiabatic process then its final pressure is $(\gamma = 1.5)$ -

A. 8P

B. 4P

C. P

D. 2P

Answer: D

Watch Video Solution

633. A sphere at temperature $600K$ is placed in an enviroment to temperature is $200K$. Its cooling rate is H. If its temperature reduced to $400K$ then cooling rate in same enviorment will become

A. $\frac{3}{16}R$

B. $\frac{16}{3}R$

C. $\frac{9}{27}R$

D. None

Answer: A

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634. A particle is projected with velocity 'u' makes an angle θ w.r.t. horizontal. Now it breaks in two identical parts at highest point of trajectory. If one part is retrace its path, then velocity of other part is -

A. 3u cos θ

B. 2u cos θ

C. u cos θ

D. u

Answer: A

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635. The amplitude of a S.H.O. reduces to 1/3 in first 20 secs. then in first 40 sec. its amplitude becomes -

A. $\frac{1}{3}$

B. $\frac{1}{9}$

C. $\frac{1}{27}$

D. $\frac{1}{\sqrt{3}}$

Answer: B

Watch Video Solution

636. Two springs A and B $\left(K_A = 2K_B\right)$ are stretched by same suspended weights then ratio of workdone in stretching is -

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:4$

Answer: A

Watch Video Solution

637. A spring elongated by length 'L' when a mass 'M' is suspended to it. Now a tiny mass 'm' is attached and then released, its time period of oscillation is -

A. $2\pi\sqrt{\frac{(M+m)l}{Mg}}$

B. $2\pi\sqrt{\frac{ml}{Mg}}$

C. $2\pi\sqrt{L/g}$

D. $2\pi\sqrt{\frac{Ml}{(m+M)g}}$

Answer: A

Watch Video Solution

638. Frequency of simple pendulum in a free falling lift is -

A. Zero

B. Infinite

C. Can't be say

D. Finite

Answer: A

Watch Video Solution

639. A parallel capacitor of capacitance C is charged and disconnected from the battery. The energy stored in it is E. If a dielectric slab of dielectric constant 6 is inserted between the plates of the capacitor then energy and capacitance will become.

A. 6E, 6C

B. E, C

C. $\frac{E}{6}$,6C

D. E, 6C

Answer: C

Watch Video Solution

640. The current conduction in a discharged tube is due to

A. Electrons only

B. $+Ve$ ions and $-Ve$ ions

C. $-Ve$ ions and electrons

D. $+Ve$ ions, and electrons

Answer: D

Watch Video Solution

641. A light of amplitude A and wavelength λ is incident on a metallic surface, then saturation current flows is proportional to (assume cut off wave length = λ_0) -

A. $A^2, \quad \text{if} \quad \lambda l > \lambda_0$

B. $A^2, \quad \text{if} \quad \lambda l < \lambda_0$

C. $A, \quad \text{if} \quad \lambda > \lambda_0$

D. $A, \quad \text{if} \quad \lambda < \lambda_0$

Answer: B

View Text Solution

642. Light of wavelength 300 Å in Photoelectric effect gives electron of max. K.E. 0.5 eV. If wavelength change to 2000 Å then max. K.E. of emitted electrons will be

A. Less than 0.5 eV

B. 0.5 eV

C. Greater than 0.5 eV

D. PEE does not occurs

Answer: A

Watch Video Solution

643. The K.E. of electron and photon is same then relation between their De-Broglie wavelength :

A. $\lambda_p < \lambda_e$

B. $\lambda_p = \lambda_e$

C. $\lambda_p > \lambda_e$

D. $\lambda_p = 2\lambda_e$

Answer: C

Watch Video Solution

644. The total energy of an electron is 3.555 MeV, then its Kinetic energy is

A. 3.545 MeV

B. 3.045 MeV

C. 3.5 MeV

D. None

Answer: B

Watch Video Solution

645. Two particles X and Y having equal charges, after being accelerated through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2, respectively. The ratio of masses of X and Y is

A. $\left(\frac{r_1}{r_2}\right)^2$

B. $\left(\frac{r_2}{r_1}\right)^2$

C. $\left(\frac{r_1}{r_2}\right)$

D. $\left(\frac{r_2}{r_1}\right)$

Answer: A

Watch Video Solution

646. A radio-active elements emits one α and β particles then mass no. of daughter element is :

A. Decreased by 4

B. Increased by 4

C. Decreased by 2

D. Increased by 2

Answer: A

Watch Video Solution

647. The half life of a radio nuclide is 77 days then its decay constant is

A. 0.003/day

B. 0.006/day

C. 0.009/day

D. 0.012/day

Answer: C

Watch Video Solution

648. The refracting angle of a prism is A and refractive index of the material of prism is $\cot(A/2)$. The angle of minimum deviation will be

A. 180 – A

B. 180 – 2A

C. 90 – A

D. A/2

Answer: B

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649. Two conducting slabs of heat conductivity K_1 and K_2 are joined as shown in fig. The temp. at ends of the slabs are θ_1 and $\theta_2(\theta_1 > \theta_2)$ the, final temp. (θ_m) of junction is :

A. $\dfrac{K_1\theta_1 + K_2\theta_2}{K_1 + K_2}$

B. $\dfrac{K_1\theta_2 + K_2\theta_1}{K_1 + K_2}$

C. $\dfrac{K_1\theta_2 - K_2\theta_1}{K_1 + K_2}$

D. None

Answer: A

View Text Solution

650. A particle starts from rest with constant acceleration. The ratio of space-average velocity to the time average velocity is :-

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

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

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

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

Answer: C

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651. If radius of earth shrinks by 1% then for acceleration due to gravity :

A. No change at poles

B. No change at equator

C. Max. change at equator

D. Equal change at all locations

Answer: D

Watch Video Solution

652. Rohini satellite is at a height of 500 km. and Insat-B is at a height of 3600 km. from surface of earth then relation between their orbital velocity $\left(V_R, V_I\right)$ is :

A. $V_R > V_1$

B. $V_R < V_1$

C. $V_R = V_1$

D. No relation

Answer: A

Watch Video Solution

653. For moon, its mass is 1/81 of earth mass and its diameter is 1/3.7 of earth dia. If acceleration due to gravity at earth surface is 9.8 m/s^2 then at moon its value is :

A. 2.86 m/s^2

B. 1.65 m/s^2

C. 8.65 m/s^2

D. 5.16 m/s^2

Answer: B

Watch Video Solution

654. The length of a spring is α when a force of $4N$ is applied on it and the length is β when $5N$ is applied. Then the leng of spring when $9N$ force is applied is-

A. 4b – 3a

B. 5b – a

C. 5b – 4a

D. 5b – 2a

Answer: C

Watch Video Solution

655. For a body, angular velocity $\vec{\omega} = \hat{i} - 2\hat{j} + 3\hat{k}$ and radius vector $\vec{r} = \hat{i} + \hat{j} + \hat{k}$, then its velocity $\left(\vec{v} = \vec{\omega} \times \vec{r}\right)$ is :

A. $-5\hat{i} + 2\hat{j} + 3\hat{k}$

B. $-5\hat{i} + 2\hat{j} - 3\hat{k}$

C. $-5\hat{i} - 2\hat{j} + 3\hat{k}$

D. $-5\hat{i} - 2\hat{j} - 3\hat{k}$

Answer: A

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656. When a stick is released (as shown in fig.). Its free end velocity when it strikes the ground is

A. 4.2 m/s

B. 1.4 m/s

C. 2.8 m/s

D. $\sqrt{6}$ m/s

Answer: A

View Text Solution

657. Frequency of an E.M. waves is 10 MHz then its wavelength is :

A. 30 m

B. 300 m

C. 3 m

D. None of the above

Answer: A

Watch Video Solution

658. Two particles are projected with same initial velocity one makes angle θ with horizontal while other makes an angle θ with vertical. If their common range is R then product of their time of flight is directly proportional to :

A. R

B. R^2

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

D. R^0

Answer: A

View Text Solution

659. In compound microscope the magnification is 95, and the distance of object from objective lens 1/3.8 cm and focal length of objective is ¼ cm. What is the magnification of eye pieces when final image is formed at least distance of distinct vision :

A. 5

B. 10

C. 100

D. None

Answer: A

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660. In producing chrlorine through electorlysis, 100 kW power at 125 V is being consumed. How much chlorine per minute is liberated ? Electrochemical equivalent for chlorine $= 0.367 \times 10^{-6} kgC^{-1}$

A. 17.6mg

B. 21.3mg

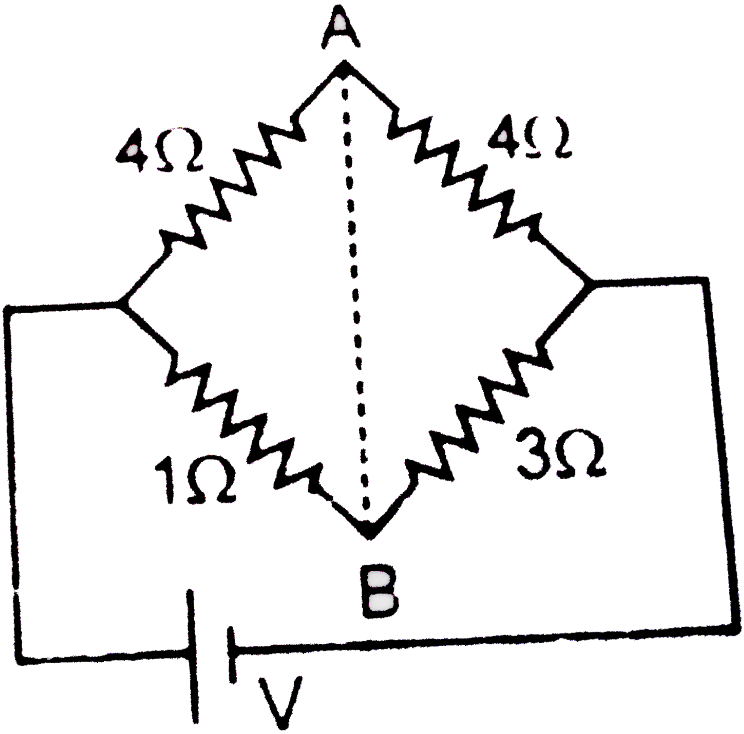
C. 24.3mg

D. 13.6mg

Answer: A

Watch Video Solution

661. In the circuit shown if a conducting wire is connected between points A and B, the current in this wire will :-



A. Flow from A to B

B. Flow in the direction which will be decided by th value of V

C. Be zero

D. Flow from B to A

Answer: D

Watch Video Solution

662. A rectangular block of mass m and area of cross-section A floats in a liquid of density ρ. If it is given a small vertical displacement from equilibrium, it undergoes oscillation with a time period T. Then

A. $T \propto \sqrt{\rho}$

B. $T \propto \frac{1}{\sqrt{A}}$

C. $T \propto \frac{1}{\propto}$

D. $T \propto \frac{1}{\sqrt{m}}$

Answer: B

Watch Video Solution

663. A Carnot engine whose sinl is at $300K$ has an efficiency of 40%. By how much should the temperature of source be increased so as to increase its efficiency by 50% of original efficiency.

A. 275 K

B. 325 K

C. 250 K

D. 380 K

Answer: C

Watch Video Solution

664. When a charged particle moving with velocity $\vec{V}$ is subjected to a magnetic field of induction $\vec{B}$ the force on it is non-zero. This implies that:

A. Angle between $\vec{V}$ and $\vec{B}$ is necessary 90°

B. Angle between $\vec{V}$ and $\vec{B}$ can have at value other than 90°

C. Angle between $\vec{V}$ and $\vec{B}$ can have at value other than zero and 180°

D. Angle between $\vec{V}$ and $\vec{B}$ is either zero or 180°

Answer: C

Watch Video Solution

665. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and $r_2(r_1 > r_2)$ respectively. When the circuit is closed, the potentail difference across the first cell is zero the value of R is

A. $R_1 - R_2$

B. $\dfrac{R_1 + R_2}{2}$

C. $\dfrac{R_1 - R_2}{2}$

D. $R_1 + R_2$

Answer: A

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666. A black body at $1227^{\circ}C$ emits radiations with maximum intensity at a wavelength of 5000Å. If the temperature of the body is increased by 1000°, the maximum intensity will be observed at

A. 4000Å

B. 5000Å

C. 6000Å

D. 3000Å

Answer: D

Watch Video Solution

667. Two circular coil 1 and 2 are made from the same wire but the radius of the 1^{st} coil is twice that of the 2^{nd} coil. What potential difference in volts should be applied across them so that the magnetic field at their centres is the same-

A. 3

B. 4

C. 6

D. 2

Answer: B

View Text Solution

668. A transistor-oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4C, the frequency will be:-

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

B. 8f

C. $\frac{F}{2}\sqrt{2}$

D. f/2

Answer: C

View Text Solution

669. The binding energy of deuteron is 2.2 MeV and that of H${}_2^4He$ is 28MeV. If two deuterons are fused to form one ${}_2^4He$ then the energy released is:-

A. 25.8 MeV

B. 23.6 MeV

C. 19.2 MeV

D. 30.2 MeV

Answer: B

View Text Solution

670. 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. $R_1 = R_2 \quad e^{-\lambda\left(t_1 - t_2\right)}$

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

C. $R_1 = R_2\left(t_2 / t_1\right)$

D. $R_1 = R_2$

Answer: A

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671. Ionization potential of hydrogen atom is 13.6eV. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be:-

A. Two

B. Three

C. Four

D. One

Answer: B

View Text Solution

672. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is:-

A. 4U

B. 8U

C. 16U

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

Answer: C

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673. For angles of projection of a projectile at angles $\left(45^{\circ} - \theta\right)$ and $\left(45^{\circ} + \theta\right)$, the horizontal ranges described by the projectile are in the ratio of:

A. $1:1$

B. $2:3$

C. $1:2$

D. $2:1$

Answer: A

View Text Solution

674. A body of mass 3 kg is under a constant force which causes a displacement s in metres 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. $\frac{5}{19}J$

B. $\frac{3}{8}J$

C. $\frac{8}{3}J$

D. $\frac{19}{5}J$

Answer: C

View Text Solution

675. A particle moves along a straight line AB. At a time t (in seconds) the distance x (in metres) of the particle from O is given by x = 600 + 12t – t^3. How long would the particle travel before coming to rest: -

A. 24m

B. 40m

C. 56m

D. 16m

Answer: D

Watch Video Solution

676. The velocity v of a particle at time t is given by $v = at + \frac{b}{t + c}$, where a, b and c are constants. The dimensions of a, b and c are respectively:-

A. LT^{-2}, L and T

B. L^2 and LT^2

C. LT^2,LT and L

D. L,LT anf T^2

Answer: A

View Text Solution

677. A microscope is focused on a mark on a piece of paper and then a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again:-

A. 1 cm upward

B. 4.5 cm downward

C. 1 cm downward

D. 2 cm upward

Answer: A

View Text Solution

678. 300J of work is done in slinding a 2 kg block up an inclined plane of height 10m. Taking g $=10m/s^2$, work done against friction is

A. 200 J

B. 100 J

C. Zero

D. 1000 J

Answer: B

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679. A transistor is operated in common emitter configuration at constant collector voltage $V_c = 1.5V$ such that a change in the base current from $100\mu A$ to $150\mu A$ produces a change in the collector current from $5mA$ to $10mA$. The current gain (β) is

A. 67

B. 75

C. 100

D. 50

Answer: C

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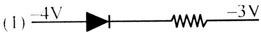
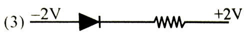
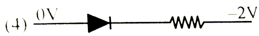
680. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: D

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681. A photocell employs photoelectric effect to convert

A. Change in the frequency of light into a change in electric voltage

B. Change in the intensity of illumination into a change in the work function of the photocathode

C. Change in the frequency of light into a change in the electric current

D. Change in the frequency of light into a change in the electric current

Answer: B

Watch Video Solution

682. The core of a transformer is laminated because:-

A. Energy losses due to eddy currents may be minimised

B. The weight of the transformer may be reduced

C. Rusting of the core may be prevented

D. Ratio of voltage in primary and secondary may be increased

Answer: A

View Text Solution

683. Two coils of self-inductance $2mH$ and $8mH$ are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coil is

A. 10 mH

B. 6mH

C. 4 mH

D. 16 mH

Answer: C

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684. In a discharge tube ionization of enclosed gas is produced due to collisions between

A. Positive ions and neutral atoms/molecules

B. Negative electrons and netural atoms/molecules

C. Photons and neutral atoms/molecules

D. Neutral gas atoms/molecules

Answer: B

Watch Video Solution

685. When photons of energy $h\nu$ fall on an aluminium plate (of work function E_0), photoelectrons of maximum kinetic energy K are ejected . If the frequency of the radiation is doubled , the maximum kinetic energy of the ejected photoelectrons will be

A. K + E_0

B. 2K

C. K

D. K+hv

Answer: D

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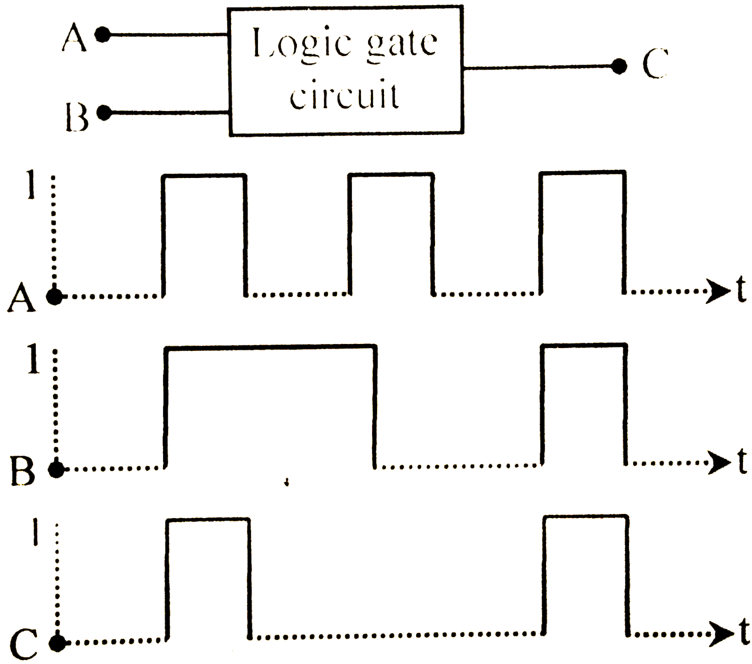
686. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B and C are as shown below-



A. Change in the frequency of light into a change in electric voltage

B. Change in the intensity of illumination into a change in photoelectric current (

C. Change in the intensity of illumination into a change in the work function of the photocathode

D. Change in the frequency of light into a change in the electric current

Answer: A

View Text Solution

687. A coil of inductive reactance 31Ω has a resistance of $8 ohm$. It is placed in series with a condenser of capacitive reactance 25Ω. The combination is connected to an ac source of $110V$. The power factor of the circuit is

A. 0.56

B. 0.64

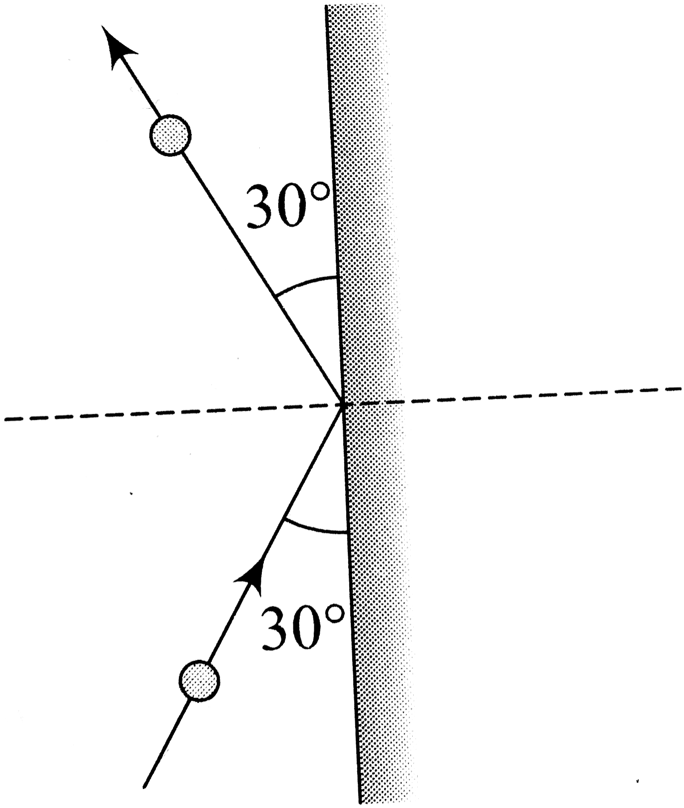
C. 0.8

D. 0.33

Answer: C

Watch Video Solution

688. A $0.5kg$ ball moving with a speed of $12m/s$ strikes a hard wall at an angle of 30° with the wall. It is reflected with the same speed and at the same angle . If the ball is in contact with the wall for $0.25s$, the average force acting on the wall is



A. 48 N

B. 24 N

C. 12 N

D. 96 N

Answer: B

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689. The moment of inertia of a uniform circular disc of radius R and mass M about an axis passing from the edge of the disc and normal to the disc is.

A. MR^2

B. $\frac{2}{5}MR^2$

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

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

Answer: C

Watch Video Solution

690. The momentum of a photon of energy 1 MeV in kg-m/s, will be

A. 0.33×10^{6}

B. 7×10^{-24}

C. 10^{-22}

D. 5×10^{-22}

Answer: D

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691. The radius of germanium (Ge) nuclide is measured to be twice the radius of $._{4}^{9}Be$. The number of nucleons in Ge are

A. 73

B. 74

C. 75

D. 72

Answer: D

Watch Video Solution

692. The molar specific heat at constant pressure of an ideal gas is $(7/2R)$. The ratio of specific heat at constant pressure to that at constant volume is

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

B. $\frac{8}{7}$

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

D. $\frac{9}{7}$

Answer: A

Watch Video Solution

693. The escape velocity of a body from the surface of earth is

A. $\sqrt{2}$

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

C. 1

D. 6

Answer: B

Watch Video Solution

694. Two sound waves with wavelengths $5.0m$ and $5.5m$ respectively, each propagates in a gas with velocity $30m/s$ We expect the following number of beats per second:

A. 12

B. 0

C. 1

D. 6

Answer: D

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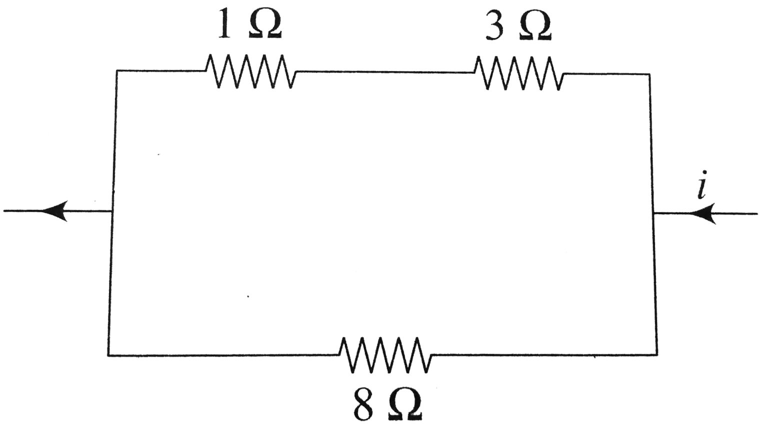
695. Power dissipated across the 8Ω in the circuit shown here is $2W$. The power dissiated in watt units across the 3Ω is



A. 2.0

B. 1.0

C. 0.5

D. 3.0

Answer: D

Watch Video Solution

696. Kirchhoff's first and second laws for electrical circuits are consequences of:-

A. Conservation of energy

B. Conservation of electric charge and energy respectively

C. Conservation of electric charge

D. Conservation of energy and electric charge respectively

Answer: B

View Text Solution

697. A transverse wave propagating along x-axis is represented by: $y(x, t) = 8.0\sin\left(0.5\pi x - 4\pi t - \frac{\pi}{4}\right)$ Where x is in metres and t is in seconds. The speed of the wave is:

A. $4\pi \frac{m}{s}$

B. $0.5\pi \frac{m}{s}$

C. $\frac{\pi}{4} \frac{m}{s}$

D. $8 \frac{m}{s}$

Answer: D

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698. The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of room, having all the dimensions double of those of room A?

A. 2

B. 4

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

D. 1

Answer: A

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699. Which one of the following statements is true

A. Both light and sound waves in air are transverse

B. The sound waves in air are longitudinal while the light waves are transverse

C. Both light and sound waves in air are longitudinal

D. Both light and sound waves can travel in vacuum

Answer: B

View Text Solution

700. Above Curie temperature:-

A.)A ferromagnetic substance becomes paramagnetic

B. A paramagnetic substance becomes diamagnetic

C.) A diamagnetic substance becomes paramagnetic

D. A paramagnetic substance becomes ferromagnetic

Answer: A

View Text Solution

701. A convex lens and a concave lens, each having same focal length of $25cm$, are put in contact to form a combination of lenses. The power in diopters of the combination is

A. 25

B. 50

C. Infinite

D. Zero

Answer: D

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702. An electric dipole of moment $\vec{P}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 90° is:

A. $\sqrt{2}$pE

B. $p\frac{E}{2}$

C. 2pE

D. p E

Answer: D

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703. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates:-

A. Decreases

B. Does not change

C.) Becomes zero

D. Increases

Answer: D

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704. A car runs at a constant speed on a circulat track of radius $100m$. Taking $62.8s$ for every circular lap. The average velocity and average speed for each circular lap respectively are :

A. 0, 0

B. 0, 10 m/s

C. 10 m/s, 10 m/s

D. 10 m/s, 0

Answer: B

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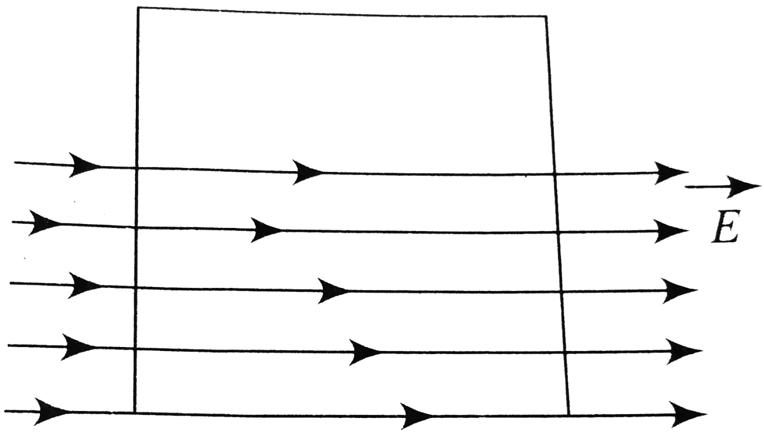
705. A square surface of side Lm is in the plane of the paper. A uniform electric field $\vec{E}(V/m)$, also in the plane of the paper, is limited only to the lower half of the square surface (see figure). The electric flux in SI units associated with the surface is:



A. $EL^2/(2\varepsilon 0)$

B. $E\frac{L^2}{2}$

C. Zero

D. E L^2

Answer: C

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706. A tube of length L is filled completely with an incompressible liquid of mass M and closed at both ends . The tube is then rotated in a horizontal plane about one of its end with a uniform angular velocity ω . Find the force exerted by the liquid at the other end .

A. $\frac{ML\omega^2}{2}$

B. $\frac{ML^2\omega}{2}$

C. $ML\omega^2$

D. $\frac{ML^2\omega^2}{2}$

Answer: A

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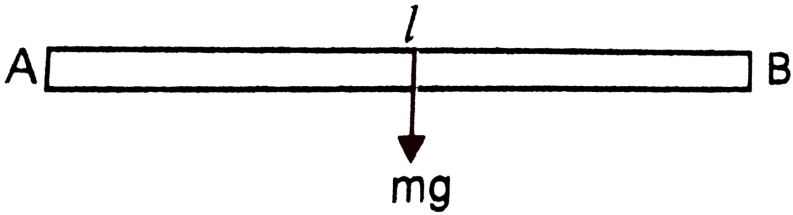
707. A unifrom rod of length l and mass m is free to rotate in a vertical plane about A, Fig. The rod initially in horizontal position is released. The initial angular acceleration of the rod is $\left(MI \text{of rod about} A \text{is} \frac{ml^2}{3}\right)$



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

B. $\frac{2l}{3g}$

C. $\frac{3g}{2l^2}$

D. $mg\frac{l}{2}$

Answer: A

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708. The vectors $\vec{A}$ and $\vec{B}$ uur are such that $|\vec{A} + \vec{B}|$ =$|\vec{A}$ - $\vec{B}|$The angle between the two vectors is

A. 90°

B. 60°

C. 75°

D. 45°

Answer: A

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709. Two bodies A (of mass $1kg$) and B (of mass $3kg$) are dropped from heights of $16m$ and $25m$. Respectively. The ratio of the time taken to reach the ground is :

A. $\frac{5}{4}$

B. $\frac{12}{5}$

C. $\frac{5}{12}$

D. $\frac{4}{5}$

Answer: D

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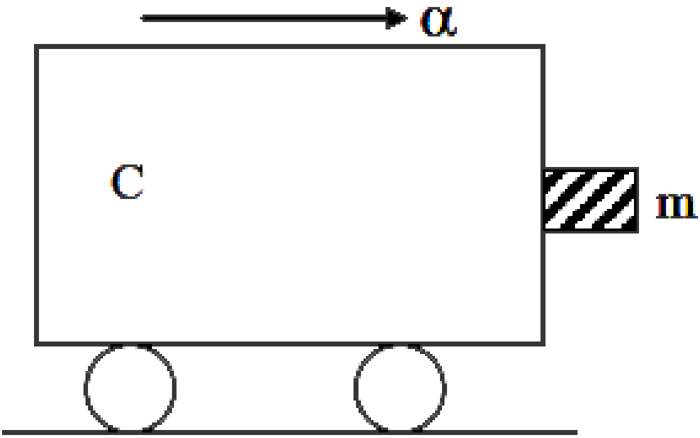
QUESTION

1. A block of mass m is in contact with the cart C as shown in figure -



The coefficient of static friction between the block and the cart is μ , The accelertion α of the cart that will prevent the block from failing satisfies -

A. $\alpha > \frac{mg}{\mu}$

B. $\alpha > \frac{g}{\mu m}$

C. $\alpha \geq \frac{g}{\mu}$

D. $\alpha < \frac{g}{\mu}$

Answer: C

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2. 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 Me V

C. 3.9 MeV

D. 23 MeV

Answer: B

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3. A circular disc of moment of inertia I_t is rotating in a horizontal plane about its symmetry axis with a constant angular velocity ω_i. Another disc of moment of inertia I_b is dropped co-axially onto the rotating disc. Initially, the second disc has zero angular speed. Eventually, both the discs rotate with a constant angular speed ω_f. Calculate the energy lost by the initially rotating disc due to friction.

A. $\frac{1}{2}\frac{I_b^2}{\left(I_t + I_b\right)\omega_i^2}$

B. $\frac{1}{2}\frac{I_t^2}{\left(I_t + I_b\right)\omega_i^2}$

C. $\frac{I_b - I_t}{\left(I_t + L_b\right)}\omega_i^2$

D. $\frac{1}{2}\frac{I_b I_t}{\left(I_t + I_b\right)}\omega_i^2$

Answer: D

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4. Which one of the following statement is false ?

A. Pure SI doped with trivalent impurties gives a p type semiconductor

B. Majority carriers in a n - type semiconductor are holes

C. Minority carriers in a p - type semiconductor are electrons

D. The resistance of intrinsic semiconducotor decreases with increase of temperature

Answer: B

Watch Video Solution

5. The displacement of a particle along the x-axis is given by $x = a\sin^2\omega t$. The motion of the particle corresponds to

A. simple harmonic motion of frequency $\frac{\omega}{\pi}$

B. simple harmonic motion of frequency $3\omega/2\pi$

C. non simple harmonic motion

D. simple harmonic motion of frequency $\omega/2\pi$

Answer: C

Watch Video Solution

6. The radii of circular orbits of two satellite A and B of the earth are $4R$ and R, respectively. If the speed of satellite A is $3v$, then the speed of satellite B will be

A. 3V/4

B. 6V

C. 12V

D. 3V/2

Answer: B

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7. A beam of cathode rays is subjected to crossed electric (E) and magnetic fields (B). The fields are adjusted such that the beam is not deflected. The specific charge of the cathode rays is given by

A. $\frac{B^2}{2VE^2}$

B. $\frac{2VB^2}{E^2}$

C. $\frac{2VE^2}{b^2}$

D. $\frac{E^2}{2VB^2}$

Answer: D

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8. A ball is droped from a high rise platform $t = 0$ starting from rest. After $6s$ another ball is thrown downwards from the same platform with a speed v. The two balls meet at $t = 18s$. What is the value of v ?

A. 75 m/s

B. 55m/s

C. 40 m/s

D. 60 m/s

Answer: A

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9. A ray of light travelling in a transparent medium f refractive index μ, falls on a surface separating the medium from air at an angle of incidence of 45°. For which of the following value of μ the ray can undergo total internal reflection ?

A. $\mu = 1.33$

B. $\mu = 1.40$

C. $\mu = 1.50$

D. $\mu = 1.25$

Answer: C

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10. The period of oscillation of mass M suspended from a spring of negligible mass is T. If along with it another mass M is also suspended, the period of oscillation will now be

A. T

B. $T/\sqrt{2}$

C. $2T$

D. $\sqrt{2}T$

Answer: D

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11. A cylindrical metallic rod in thermal contact with two reservation of heat at its two ends conducts an amount of heat Q in time t. The metallic rod is melted and the material is formed into a rod of half the radius of the original rod. What is the amount of heat conducted by the new rod when placed in thermal contact with the two reservation in time t?

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

B. $\frac{Q}{16}$

C. $2Q$

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

Answer: B

Watch Video Solution

12. A ball moving with velocity $2ms^{-1}$ collides head on with another stationary ball of double the mass. If the coefficient of restitution is 0.5, then their velocities (in ms^{-1}) after collision will be

A. 0,1

B. 1,1

C. 0,0.5

D. 0,2

Answer: A

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13. A transverse wave is represented by $y = A\sin(\omega t - kx)$. For what value of the wavelength is the wave velocity equal to the maximum particle velocity?

A. $\pi A/2$

B. πA

C. $2\pi A$

D. A

Answer: C

Watch Video Solution

14. A particle has an initial velocity of $4\hat{i} + 3\hat{j}$ and an acceleration of $0.4\hat{i} + 0.3\hat{j}$. Its speed after 10s is

A. 7 units

B. $7\sqrt{2}$ units

C. 8.5 units

D. 10 units

Answer: B

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15. An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of $2ms^{1}$. The mass per unit length of water in the pipe is $100kgm^{-1}$. What is the power of the engine?

A. 400 W

B. 200 W

C. 100 W

D. 800W

Answer: D

Watch Video Solution

16. A thin ring of radius R metre has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolution/s. The value of magnetic induction in Wbm^{-2} at the centre of the ring is

A. $\frac{\mu_0 qf}{2\pi R}$

B. $\frac{\mu_0 q}{2\pi R}$

C. $\frac{\mu_0 q}{2fR}$

D. $\frac{\mu_0 qf}{2R}$

Answer: D

Watch Video Solution

17. Which one of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has high melting point?

A. metaallic bonding

B. vander Waal's bonding

C. ionic bonding

D. Covalent bonding

Answer: A

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18. A particle move a distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is alphaortional to.

A. (Velocity $)^{3/2}$

B. (Distance$)^{2}$

C. (Distance $)^{-2}$

D. (Velocity $)^{2/3}$

Answer: A

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19. A conducting circular loop is placed in a uniform magnetic field, $B = 0.025T$ with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of $1mms^{-1}$. The induced emf when the radius is $2cm$ is

A. $2\pi\mu V$

B. $\pi\mu V$

C. $\frac{\pi}{2}\mu V$

D. $2\mu V$

Answer: B

Watch Video Solution

20. The activity of a radioactive sample is measures as N_0 counts per minute at $t = 0$ and N_0/e counts per minute at $t = 5$ min. The time (in minute) at which the activity reduces to half its value is.

A. $\log_e 2/5$

B. $\dfrac{5}{\log_e 2}$

C. $5\log_{10} 2$

D. $5\log_e 2$

Answer: D

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21. Two particle which are initially at rest move towards each other under the action of their internal attraction. If their speeds are v and $2v$ at any instant, then the speed of centre of mass of the system will be

A. 2V

B. zero

C. 1.5V

D. V

Answer: B

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22. A particle of mass M is placed at the centre of a uniform spherical shell of equal mass and radius a. Find the gravitational potential at a point P at a distance $\frac{a}{2}$ from the centre.

A. - $\frac{3GM}{a}$

B. $-\frac{2GM}{a}$

C. $-\frac{GM}{a}$

D. $-\frac{4GM}{a}$

Answer: A

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23. The device that can act as a complete electronic circuit is

A. junction diode

B. integrated circult

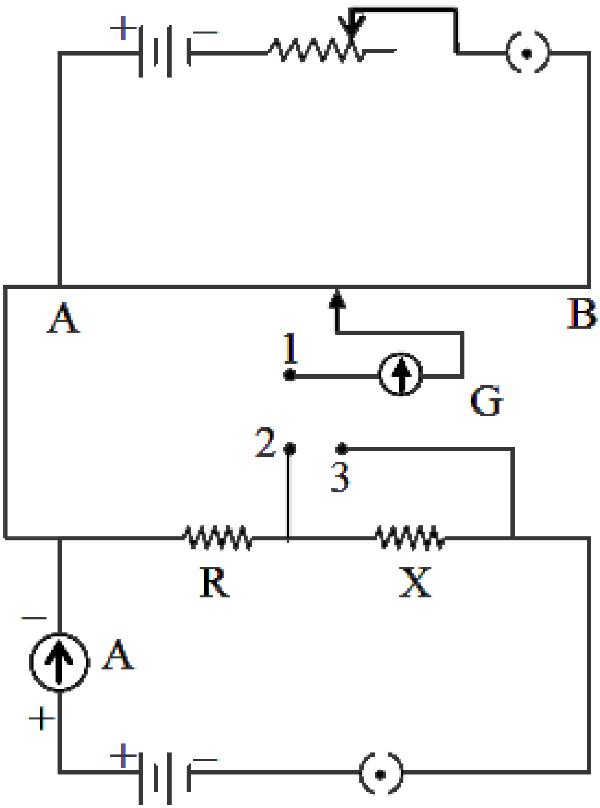
C. junction transistor

D. Zener diode

Answer: B

Watch Video Solution

24. A potentiometer circuit is set up as shown . The potential gradient across the potentiometer wire , Is K volt /cm and the ammeter , present in the circuit , reads 1.0 A when two way key is switched off. The balance point , when the key betwen the terminal (i) 1 and 2 (ii) 1 and 3 , is plugged in , are found to be at lengths l_1 cm and l_2 cm respectively , the j magnitudes , of the resistors R and X, in ohms , are then , equal resectively to -



A. $k\left(l_2 - l_1\right)$ and kl_2

B. kl_1 and $k\left(l_2 - l_1\right)$

C. $K\left(l_2 - l_1\right.$ and kl_1

D. kl_1 and Kl_2

Answer: B

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25. A tuning fork of frequency 512 Hz makes 4 beats//s with the vibrating string of a piano. The beat frequency decreases to 2 beats//s when the tension in the piano string is slightly increased.The frequency of the piano string before increasing the tension was

A. 510 Hz

B. 514 Hz

C. 516 Hz

D. 508 Hz

Answer: D

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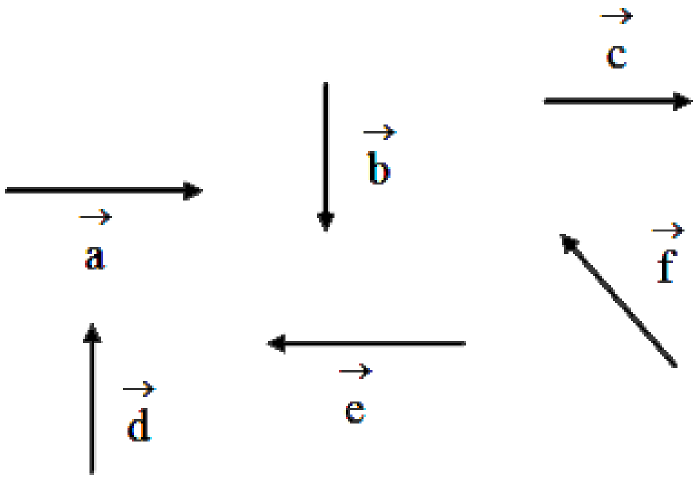
26. Six vectors , $\vec{a}$ through $\vec{f}$ have the magnitudes and directions indicated in the figure , which of the following statements is true ?



A. $\vec{b} + \vec{C} = \vec{f}$

B. $\vec{d} + \vec{C} = \vec{f}$

C. $\vec{d} + \vec{e} = \vec{f}$

D. $\vec{b} + \vec{e} = \vec{f}$

Answer: C

View Text Solution

27. A galvanometer has a coil of resistance 100Ω and gives a full-scale deflection for $30mA$ current. If it is to work as a voltmeter of $30V$ range, the resistance required to be added will be

A. 900Ω

B. 1800Ω

C. 500Ω

D. 1000Ω

Answer: A

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28. A gramphone record is revolving with an angular velocity ω. A coin is placed at a distance R from the centre of the record. The static coefficient of friction is μ. The coin will revolve with the record if

A. $r = \mu g \omega^2$

B. $r < \frac{\omega^2}{\mu g}$

C. $r \leq \frac{\mu g}{\omega^2}$

D. $r \geq \frac{\mu g}{\omega^2}$

Answer: C

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29. Which of the following statement is false for the properties of electromagnetic waves?

A. Both electric and magnetic field vectors attain the maxinima at the same place and same time

B. the energy in eletromagnetic wave is divided equally between electric and magnetic vectors

C. Both electric and magnetic field vectors are parallel to each other and perpendicualar to the direction of propagation of wave

D. These waves do not require any material medium for propagation

Answer: C

Watch Video Solution

30. The energy of a hydrogen atom in the ground state is $-13.6eV$. The eneergy of a He^{+} ion in the first excited state will be

A. $-13.6eV$

B. $-27.2eV$

C. $-54.4eV$

D. $-6.8eV$

Answer: A

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31. The dimensions of $\frac{1}{2} \in_0 E^2$ ($\in_0$: permittivity of free space, E: electric field) is-

A. ML^2T^{-2}

B. $ML^{-1}T^{-2}$

C. $ML^{2}T^{-1}$

D. MLT^{-1}

Answer: B

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32. In producing chrlorine through electorlysis, 100 kW power at 125 V is being consumed. How much chlorine per minute is liberated ? Electrochemical equivalent for chlorine $= 0.367 \times 10^{-6} kgC^{-1}$

A. $1.76 \times 10^{-3} kg$

B. $9.67 \times 10^{-3} kg$

C. $17.6 \times 10^{-3} kg$

D. $3.67 \times 10^{-3} kg$

Answer: C

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33. A man of $50kg$ mass is standing in a gravity free space at a height of $10m$ above the floor. He throws a stone of $0.5kg$ mass downwards with a speed $2m/s$. When the stone reaches the floor, the distance of the man above the floor will be

A. 9.9 m

B. 10.1 m

C. 10 m

D. 20 m

Answer: B

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34. An alpha nucleus of energy $\frac{1}{2}mv^2$ bombards a heavy nucleus of charge Ze . Then the distance of closed approach for the alpha nucleus will be proportional to

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

B. V^2

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

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

Answer: C

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35. A lens having focal length f and aperture of diameter d forms an image of intensity I. Aperture of diameter $d/2$ in central region of lens is covered by a black paper. Focal length of lens and intensity of image now will be respectively

A. f and $\frac{I}{4}$

B. $\frac{3f}{4}$ and $\frac{I}{2}$

C. f and $\frac{3I}{4}$

D. $\frac{f}{4}$ and $\frac{I}{2}$

Answer: C

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36. If ΔU and ΔW represent the increase in internal energy and work done by the system resectively in a thermodynamical process, which of the following is true?

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37. The total radiant energy per unit area, normal to the direction of incidence, received at a distance R from the centre of a star of radius r whose outer surface radiates as a black body at a temperature TK is given by

(where σ is Stefan's constant)

A. $\rho r^2 T^4 / R^2$

B. $\rho R^2 T^4 / 4\pi R^2$

C. $\rho r^2 T^4 / 4\pi r^2$

D. $4\pi\rho r^2 T\&^4 / R^2$

Answer: A

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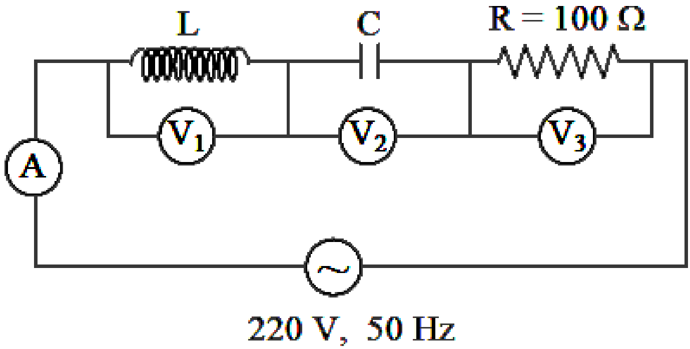
38. In the given circuit the reading of voltmeter V_1 and V_2 are 300 volts each. The reading of the voltmeterV_3 and ammeter A are respectively –



A. 150 V, 2.2 A

B. 220 V, 2.2 A

C. 220 V, 2.0 A

D. 100 V, 2.0 A

Answer: B

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39. A $220V$ input is supplied to a transformer. The output circuit draws a current of $2.0A$ at $440V$. If the efficiency of the transformer is 80%, the current drawn by the primery winding of the transformer is

A. 3.6 ampere

B. 2.8 ampere

C. 2.5 ampere

D. 5.0 ampere

Answer: D

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40. A source S_1 is producing 10^{15} photons/s of wavelength $5000Å$ Another source S_2 is producing 1.02×10^{15} photons per second of wavelength $5100Å$. Then (power ofS_(2))/("power of" S_(1))` is equal to

A. 1

B. 1.02

C. 10.4

D. 0.98

Answer: A

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41. A common emitter amplifier has a voltage gain of 50, an input impedence of 100Ω and an output impedence of 200Ω. The power gain of the of the amplifier is

A. 500

B. 1000

C. 1250

D. 50

Answer: C

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42. A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 microtesla. When a horizontal field of 18 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be

A. 1s

B. 2s

C. 3s

D. 4s

Answer: D

Watch Video Solution

43. Two positive ions , each carrying a charge q , are separated by a distance d.If F is the force of repulsion between the ions , the number of electrons missing from each ion will be (e being the charge on an electron)

A. $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$

B.

C.

D.

Answer: C

Watch Video Solution

44. The potential difference that must be applied to stop the fastest photoelectrons emitted by a nickel surface , having work function $5.01eV$, when ultraviolet light of $200nm$ falls on it , must be

A. 2.4 V

B. – 1.2 V

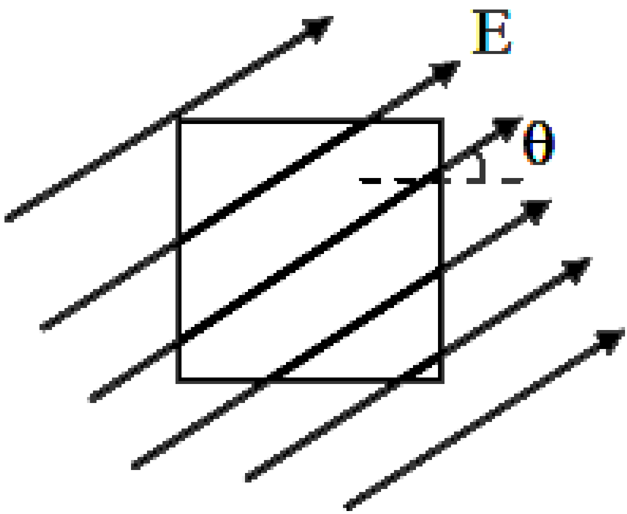
C.) – 2.4 V

D. 1.2 V

Answer: B

Watch Video Solution

45. A square surface of side L meter in the plane of the paper is placed in a uniform electric field E (volt/m) acting along the same plane at an angle θ with the horizontal side of the square as shown in figure. The electric flux linked to the surface, in units of volt-m, is –



A. EL^2

B. $EL^2\cos\theta$

C. $EL^2\sin\theta$

D. zero

Answer: D

View Text Solution

46. A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference $4V$. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has same (total) energy stored in it, as the first combination has. the value of C_2, in terms of C_1, is then

A. $\frac{2C_1}{n_1 n_2}$

B. $16\frac{n_2}{n_1}C_1$

C. $2\frac{n_2}{n_1}C_1$

D. $\frac{16C_1}{n_1 n_2}$

Answer: D

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47. Electromagnets are made of soft iron because soft iron has

A. low retentivity and high coercive force

B. high retentivity and high coercive force

C. low retentivity and low coercive force

D. high retentivity and low coercive force

Answer: C

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48. A square current carrying loop is suspended in a unifrom magnetic field acting in the palne of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is

A. $3\vec{F}$

B. -$\vec{F}$

C. -$3\vec{F}$

D. $\vec{F}$

Answer: B

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49. Consider the following two statements:

(A)Kirchhoff's junction law follows from conservation of charge.

(B)Kirchhoff's loop law follows from conservative nature of electirc field .

A. Both (A) and (B) are wrong

B. (A) is correct and (B) is wrong

C. (A) is wrong and (B) is correct

D. Both (A) and (B) are correct

Answer: D

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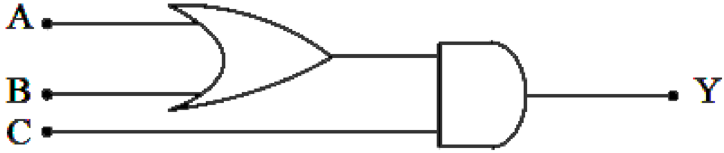
50. To get an output Y = 1 from the circuit shown below, the input must be –



A. A B C (1) 0 1 0

B. 0,0,1

C. 1,0,1

D. 1,0,0

Answer: C

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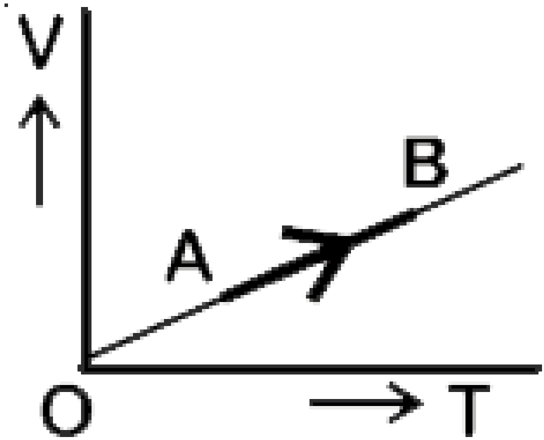
51. The volume (V) of a monatomic gas varies with its temperature (T), as shown in the graph. The ratio of work done by the gas, to the heat absorbed by it, when it undergoes a changes from state A to state B, is



A. $\frac{1}{3}$

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

C. $\frac{2}{5}$

D. $\frac{2}{7}$

Answer: C

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52. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is

A. 12.5 cm

B. 8 cm

C. 13.2 cm

D. 16 cm

Answer: C

Watch Video Solution

53. At what temperature , will the rms speed of oxygen molecules be sufficient for escaping from the earth ? Take $m = 2.76 \times 10^{-26} kg, k = 1.38 \times 10^{-23} J/K$ and $v_e = 11.2 km/s$.

A. 5.016×10^4 K

B. $8.360 \times 10^4 K$

C. 2.508×10^4 K

D. $1.254 \times 10^4 K$

Answer: B

Watch Video Solution

54. The efficiency of an ideal heat engine working between the freezing point and boiling point of water, is

A. $6.25\ \%$

B. $20\ \%$

C. $26.8\ \%$

D. $12.5\ \%$

Answer: C

Watch Video Solution

55. A carbon resistor of $(47 \pm 4.7)k\Omega$ is to be marked with rings of different colours for its identification. The colour code sequence will be

A. Yellow-Green -Violet -Gold

B. Yellow-Violet-Orange-Silver

C. Violet-Yellow-Orange-Silver

D. Green-Orange-Violet-Gold

Answer: B

Watch Video Solution

56. A set of $'n'$ equal resistor, of value of $'R'$ each are connected in series to a battery of emf $'E'$ and internal resistance $'R'$. The current drawn is I. Now, the $'n'$ resistors are connected in parallel to the same battery. Then the current drawn from battery becomes 10.1. The value of $'n'$ is

A. 20

B. 11

C. 10

D. 9

Answer: C

Watch Video Solution

57. A battery consists of a variable number n of identical cells having internal resistance connected in series. The terminals of the battery are short circuited and the current I measured. Which one of the graph below shows the correct relationship between I and n?

A.

B.

C.

D.

Answer: C

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58. Unpolarised light is incident from air on a plane surface of a material of refractive index μ. At a particular angle of incidence i, it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation?

A. $i = \sin^{-1}\left(\frac{1}{\mu}\right)$

B. Reflected light is polarised with its electric vector perpendicular to the plane of incidence

C. Reflected light is polarised with its electric vector parallel to the plane of incidence

D. $i = \tan^{-1}\left(\frac{1}{\mu}\right)$

Answer: B

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59. In young's double slit experiment the separation d between the slits is $2mm$, the wavelength λ of the light used is 5896Å and distance D between the screen and slits is $100cm$. It is found that the angular width of the fringes is 0.20°. To increases the fringe angular width to 0.21° (with same λ and D) the separtion between the slits needs to be changed to

A. 2.1 mm

B. 1.9 mm

C. 1.8 mm

D. 1.7 mm

Answer: B

Watch Video Solution

60. An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of

A. Large focal length and large diameter

B. Large focal length and small diameter

C. small focal length and large diameter

D. Small focal length and small diameter

Answer: A

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61. The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is

A. $2 : -1$

B. $1: -1$

C. $1:1$

D. $1: -2$

Answer: B

Watch Video Solution

62. An electron of mass m with an initial velocity $\vec{v} = v_0 \overset{\wedge}{(i)} \left(v_0 > 0\right)$ enters an electric field $\vec{E} = -E_0\hat{i} \left(E_0 = constant > 0\right)$ at $t = 0$. If λ_0 is its de - Broglie wavelength initially, then its de - Broglie wavelength at time t is

A. $\lambda_0 t$

B. $\lambda_0\left(1 + \left(\frac{eE_0}{mV_0}t\right)\right)$

C. $\dfrac{\lambda_0}{\left(1 + \dfrac{eE_0}{mV_0}t\right)}$

D. λ_0

Answer: C

Watch Video Solution

63. For a radioactive material, half-life is 10 minutes. If initially there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is.

A. 30

B. 10

C. 20

D. 15

Answer: C

Watch Video Solution

64. When the light of frequency $2v_0$ (where v_0 is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5v_0$, the maximum velocity of electrons emitted from the same plate is v_2. the ratio of v_1 to v_2 is

A. $4:1$

B. $1:4$

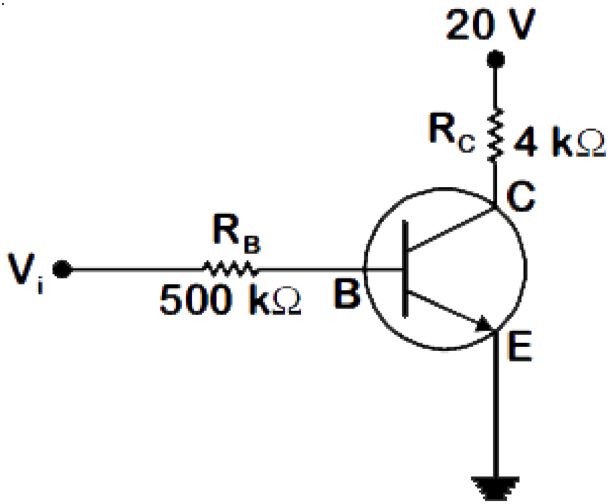
C. $1:2$

D. $2:1$

Answer: C

Watch Video Solution

65. In the circuit shown in the figure, the input voltage V_i is 20 V, $V_{BE} = 0$ and $V_{CE} = 0$. The values of I_B, I_C and β are given by



A. $I_B = 20, \mu A, I_C = 5mA, \beta = 250$

B. $I_B = 25\mu A, I_C = 5mA, \beta = 200$

C. $I_B = 40\mu A, I_C = 10mA, \beta = 250$

D. $I_B = 40\mu A, I_C = 5mA, \beta = 125$

Answer: D

View Text Solution

66. 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

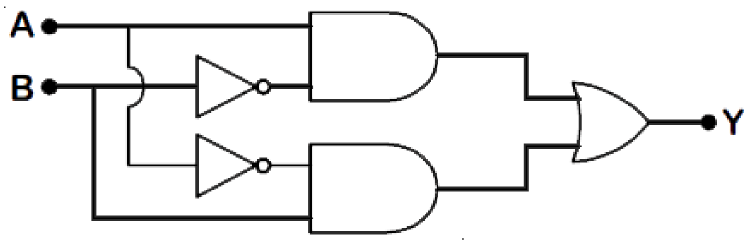
C. Affects only reverse resistance

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

Answer: D

Watch Video Solution

67. In the combination of the following gates the output Y can be written in terms of inputs A and B as



—

A. $A \cdot B + A \cdot B$

B. $A \cdot \bar{B} + \bar{A} \cdot B$

—

C. $A \cdot B$

—

D. $A + B$

Answer: B

View Text Solution

68. An EM wave is propagating in a medium whith a velocity $\vec{v} = v\hat{i}$. The instantaneous oscillating electric field of this of em wave is along $+y$ axis. Then the direction of oscillating magnetic field of the EM wave will be along

A. -y direction

B. $+z$ direction

C. -z direction

D. -x direction

Answer: B

Watch Video Solution

69. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

A. 30°

B. 45°

C. 60°

D. Zero

Answer: B

Watch Video Solution

70. An object is placed at a distance of $40cm$ from a concave mirrorr of focal length $15cm$. If the object is displaced through a distance of $20cm$ towards the mirrorr, the displacement of the image will be

A. 30 cm towards the mirror

B. 36 cm away from the mirror

C. 30 cm away from the mirror

D. 36 cm towards from the mirror .

Answer: B

Watch Video Solution

71. The magnetic potential energy stored in a certain inductor is $25mJ$, when the current in the inductor is $60mA$. This inductor is of inductance

A. 1.389 H

B. 138.88 H

C. 0.138 H

D. 13.89 H

Answer: D

Watch Video Solution

72. An electron falls from rest through a vertical distance h in a uniform and vertically upwards directed electric field E. The direction of electric field is now reversed , keeping its magnitude the same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall proton is

A. 10 times greater

B. 5 times greater

C. Smaller

D. Equal

Answer: C

Watch Video Solution

73. The electrostatic force between the metal plate of an isolated parallel plate capacitro C having charge Q and area A, is

A. Proportional to the square root of the distance between the plates

B. Linearly proportional to the distance between the plates

C. Independent of the distance between the plates

D. Inversely proportional to the distance between the plates.

Answer: C

Watch Video Solution

74. A tuning fork is used to produce resonance in glass tuve. The length of the air column in the tube can be adjusted by a variable piston. At room temperature of $27^{\circ} C$ two succesive resonance are produced at 20 cm and 73 cm column length. If the frequency of the tuning fork is 320 Hz. the velocity of sound is air at $27^{\circ} C$ is

A. 350 m/s

B. 339 m/s

C. 330 m/s

D. 300 m/s

Answer: B

Watch Video Solution

75. A pendulum is hung the roof of a sufficiently high huilding and is moving freely to and fro like a simple harmonic oscillator .The acceleration of the bob of the pendulum is $20m/s^2$ at a distance of $5m$ from the meanposition .The time period of oscillation is

A. 2 s

B. π s

C. 2π s

D. 1s

Answer: B

Watch Video Solution

76. A metallic rod of mass per unit length $0.5kgm^{-1}$ is lying horizontally on a straght inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current throguh it when a magnetic field of induction $0.25T$ is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is

A. 14.76 A

B. 5.98 A

C. 7.14 A

D. 11.32 A

Answer: D

Watch Video Solution

77. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnetic is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains horizontal potential energy. the work required to do this comes from

A. The lattice structure of the material of the rod

B. The magnetic field

C. The current source

D. The induced electric field due to the changing magnetic field

Answer: C

Watch Video Solution

78. An inductor $20mH$, a capacitor $100\mu F$ and a resistor 50Ω are connected in series across a source of emf, $V = 10\sin 314t$. The power loss in the circuit is

A. 2.74 W

B. 0.43 W

C. 0.79 W

D. 1.13 W

Answer: C

Watch Video Solution

79. Current senstivity of moving coil galvanometer is $5\text{div}/mA$ and its voltage senstivity (angular deflection per unit voltage applied) is $20\text{div}/V$. The resistance of the galvanometer is

A. 250Ω

B. 25Ω

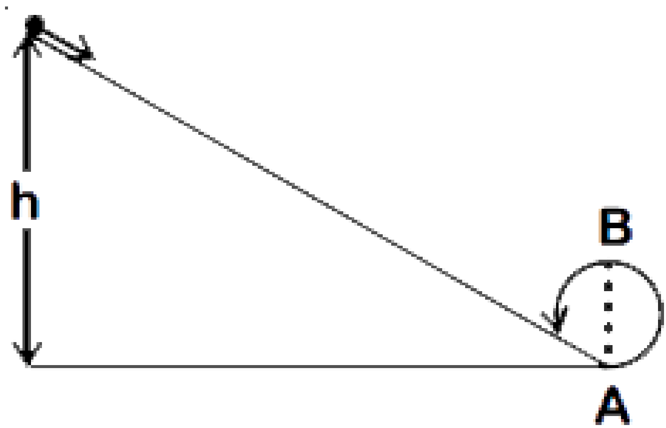
C. 40Ω

D. 500Ω

Answer: A

Watch Video Solution

80. A body initially at rest and sliding along a frictionaless track from a height h (as shown in the figure) just completes a vertical circle of diameter AB=D. The height h is equal to



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

B. D

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

D. $\frac{5}{4}$ D

Answer: D

View Text Solution

81. There object, A : (a solid sphere), B : (a thin circular disk) and C : (a circular ring), each have the same mass M and radius R. They all spin with the same angular speed ω about their own symmetry axes. The amount of work (W) required ot bring them to rest, would satisfy the relation

A. $W_B > W_A > W_C$

B. $W_A > W_B > W_C$

C. $W_C > W_B > W_A$

D. $W_A > W_C > W_B$

Answer: C

Watch Video Solution

82. A moving block having mass m , collides with another stationary block having mass $4m$. The lighter block comes to rest after collision. When the initial velocity of the block is v, then the value of coefficient of restitution (e) will be

A. 0.8

B. 0.25

C. 0.5

D. 0.4

Answer: B

Watch Video Solution

83. Which one of the following statements is incorrect ?

A. Frictional force opposes the relative motion.

B. Limiting value of static friction is directly proportional to normal reaction.

C. Rolling friction is smaller than sliding friction

D. Coefficient of sliding friction has dimensions of length.

Answer: D

Watch Video Solution

84. A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\vec{E}$. Due to the force $q\vec{E}$, its velocity increases from 0 to $6 m/s$ in one second duration. At that instant the direction of field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively.

A. 1 m/s, 3.5 m/s

B. 1 m/s, 3 m/s

C. 2 m/s, 4 m/s

D. 1.5 m/s , 4 m/s

Answer: B

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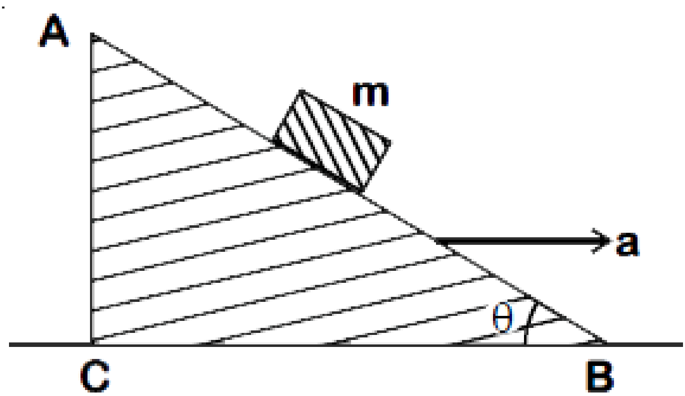
85. A block of mass m is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acccelertion 'a' towards the right . The relation between a and θ

for the block to remain stationary on the wedge is



A. $a = g\cos\theta$

B. $a = \dfrac{g}{\sin\theta}$

C. $a = \dfrac{g}{\mathrm{cosec}\theta}$

D. $a = g\tan\theta$

Answer: D

View Text Solution

86. The moment of the force, $\vec{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$ at $(2, 0, -3)$. About the point $(2, -2, -2)$ is given by

A. $-7\hat{i} - 8\hat{j} - 4\hat{k}$

B. $-6\hat{i} - \hat{j} - 8\hat{k}$

C. $-8\hat{i} - 4\hat{j} - 7\hat{k}$

D. $-7\hat{i} - 4\hat{j} - 8\hat{k}$

Answer: D

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87. A student measued the diameter of a small steel ball using a screw gauge of least count $1.001cm$. The main scale reading is $5mm$ and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero erroof $-0.004cm$, the correct diameter of the ball is

A. 0.053 cm

B. 0.525 cm

C. 0.521 cm

D. 0.529 cm

Answer: D

Watch Video Solution

88. A solid sphere is rotating in free space. If the radius of the sphere is increased keeping mass same which one of the following wil not be affected?

A. Rotational kinetic energy

B. Moment of inertia

C. Angular velocity

D. Angular momentum

Answer: D

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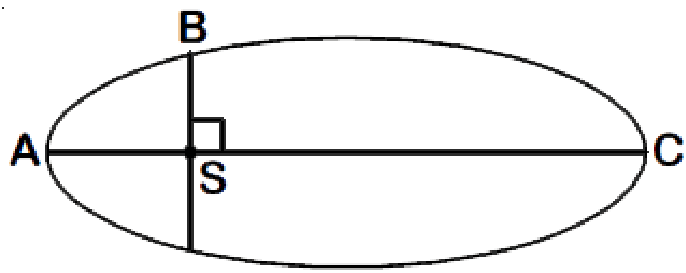
89. The kinetic energies of a planet in an elliptical orbit about the sun, at positions, A,B and C are K_A, K_B and K_C, respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as the shown in the figure. Then



A. $K_B < K_A < K_C$

B. $K_A > K_B > K_C$

C. $K_A < K_B < K_C$

D. $K_B > K_A > K_C$

Answer: B

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90. If the mass of the sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is not correct?

A. Time period of a simple pendulum on the Earth would decrease

B. Walking on the ground would become more difficult

C. Raindrops will fall faster

D. g' on the Earth will not change

Answer: D

Watch Video Solution

91. A solid sphere is in rolling motion. In rolling motion a body prosseses translational kinetic energy $\left(K_t\right)$ as well as rotational kinetic energy $\left(K_r\right)$ simutaneously. The ratio $K_t : \left(K_t + K_r\right)$ for the sphere is

A. $10 : 7$

B. $5 : 7$

C. $7 : 10$

D. $2 : 5$

Answer: B

Watch Video Solution

92. A small sphere falls from rest in a viscous liquid. Due to frication, heat is produced. Find the relation between the rate of production of heat and the radius of the sphere at terminal velocity.

A. r^5

B. r^2

C. r^3

D. r^4

Answer: A

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93. The power radiated by a black body is P, and it radiates maximum energy around the wavelength λ_0. If the temperature of the black body is now changed so that it radiates maximum energy around a wavelength $3\lambda_0/4$, the power radiated by it will increase by a factor of

A. $\frac{256}{81}$

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

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

D. $\frac{81}{256}$

Answer: A

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94. Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area 3A. If the length of wire 1 increases by Δx on applying force F, how much force is needed to stretch wire 2 by the same amount?

A. 4 F

B. 6F

C. 9F

D. F

Answer: C

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95. A sample of $0.1g$ of water of $100\,^{\circ}C$ and normal pressure $\left(1.013\times10^{5}Nm^{-2}\right)$ requires 54 cal of heat energy to convert to steam at $100\,^{\circ}C$. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample is

A. 42.2 J

B. 208.7 J

C. 104.3 J

D. 84.5 J

Answer: B

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96. A series LCR circuit containing 5.0 H inductor, $80\mu F$ capacitor and 40Ω resistor is connected to 230 V variable frequency ac source. The angular frequencies of the source at which power transfered to circuit is half the power at resonant angular frequency are likely to be.

A. 46 rad/s and 54 rad/s

B. 42 rad/s and 58 rad/s

C. 25 rad/s and 75 rad/s

D. 50 rad/s and 25 rad/s

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97. A uniform conducting wire of length 12a and resistance 'R' is wound up as a current carrying coil in the shape of

1. an equilateral triangle of side 'a'

2. a square of side 'a'

The magnetic dipole moments of the coil in each case resp. are.

A. $3Ia^2$ and $4Ia^2$

B. $4Ia^2$ and $3Ia^2$

C. $\sqrt{3}Ia^2$ and $3Ia^2$

D. $3Ia^2$ and Ia^2

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98. A ball of mass 0.15kg is dropped from a height 10m strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is $(g = 10\frac{m}{s^2})$ nearly:

A. 2.1 kg m/s

B. 1.4 kg m/s

C. 0 kg m/s

D. 4.2 kg m/s

Answer: D

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99. A step down transformer connected to an ac mains supply of 220V is made to operate at 11V, 44W lamp. Ignoring power losses in the transformer what is the current in primary circuit.

A. 2A

B. 4A

C. 0.2A

D. 0.4A

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100. From a circular ring of mass M and radius R, an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is k times MR^2. Then the value of k is

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

B. $\frac{1}{8}$

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

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

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101. A particle moving in a circle of radius R with a uniform speed takes a time T to complete one revolution. If this particle were projected with the same speed at an angle θ to the horizontal, the maximum height attained by it equals 4R. The angle of projection θ is then given by

A. $\theta = \sin^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{\frac{1}{2}}$

B. $\theta = \sin^{-1}\left(\frac{2gT^2}{\pi^2 R}\right)^{\frac{1}{2}}$

C. $\theta = \cos^{-1}\left(\frac{2gT^2}{\pi^2 R}\right)^{\frac{1}{2}}$

D. $\theta = \cos^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{\frac{1}{2}}$

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102. Twenty seven drops of same size are charged at 220V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

A. 4520 V

B. 1980 V

C. 660 V

D. 1320 V

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103. A particle of mass 'm' is projected with a velocity $v = kV_e(k < 1)$ from the surface of the earth.(Ve = escape velocity)The maximum height above the surface reached by the particle is:

A. $\dfrac{R^2k}{1+k}$

B. $\dfrac{Rk^2}{1-k^2}$

C. $R\left(\dfrac{k}{1-k}\right)^2$

D. $R\left(\dfrac{k}{1+k}\right)^2$

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104. A car starts from rest and accelerates at $5\dfrac{m}{s^2}$. At t = 4s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at t = 6s?

A. $20\sqrt{2}\dfrac{m}{s}$, 0

B. $20\sqrt{2}\dfrac{m}{s}, 10\dfrac{m}{s^2}$

C. $20\sqrt{2}\dfrac{m}{s}, 5\dfrac{m}{s^2}$

D. $20\frac{m}{s}, 0$

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105. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$ the mutual inductance M between them will be directly proportional to

A. $\frac{(R_1)^2}{R_2}$

B. $\frac{(R_2)^2}{R_1}$

C. $\frac{R_1}{R_2}$

D. $\frac{R_2}{R_1}$

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106. A radioactive nucleus X undergoes spontaneous decay in the sequence

z X to z-1 B to z-3 C to z-2 D, where Z is the atomic number of element Z. The possible decay particles in the sequence are:

A. $\beta^{+}, \alpha, \beta^{-}$

B. $\beta^{-}, \alpha, \beta^{+}$

C. $\alpha, \beta^{-}, \beta^{+}$

D. $\alpha, \beta^{+}, \beta^{-}$

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107. In a potentiometer circuit a cell of EMF 1.5V gives balance point at 36 cm length of wire. If another cell of EMF 2.5V replaces the first cell., then at what length of the wire, the balance point occurs?

A. 64 cm

B. 62 cm

C. 60 cm

D. 21.6 cm

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108. A small block slides without friction down an iclined plane starting form rest. Let S_n be the distance traveled from time

$t = n - 1$ to $t = n$. Then $\frac{S_n}{S_{n+1}}$ is:

A. $\frac{2n+1}{2n-1}$

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

C. $\frac{2n-1}{2n}$

D. $\frac{2n-1}{2n+1}$

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109. Consider the following statements A and B and identify the correct answer

(A) A Zener diode is always connected in reverse bias to use it as voltage regulator.

(B) The potential barrier of a $p - n$ junction lies between 0.1 to $0.3V$, approximately.

A. A is correct and B is incorrect

B. A is incorrect and B is correct

C. (A) and (B) both are correct

D. (A) and (B) both are incorrect

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110. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field is applied across each of them. Compare the currents in them.

A. current in n-type gt current in p-type

B. no current will flow in p-type, current will only flow in n-type

C. current in n-type = current in p-type

D. current in p-type gt current in n-type

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111. A capacitor of capacitance C is connected across an ac source of volatge V given by, $V = V_0 \sin(wt)$. The displacement current between the plates of the capacitor would then be given by

A. $I_d = \dfrac{V_0 \sin(wt)}{wC}$

B. $I_d = \left(V_0 wC \sin(wt)\right)$

C. $I_d = \left(V_0 wC \cos(wt)\right)$

D. $I_d = \dfrac{V_0 \cos(wt)}{wC}$

Watch Video Solution

112. A particle is released from height S from the surface of the earth. At a certain height its KE is three times its PE. The height from the surface of earth and the speed of the particle at that instant are resp.

A. $\frac{S}{2}, \frac{\sqrt{3gS}}{2}$

B. $\frac{S}{4}, \sqrt{\frac{3gS}{2}}$

C. $\frac{S}{4}, \frac{3gS}{2}$

D. $\frac{S}{4}, \frac{\sqrt{3gS}}{2}$

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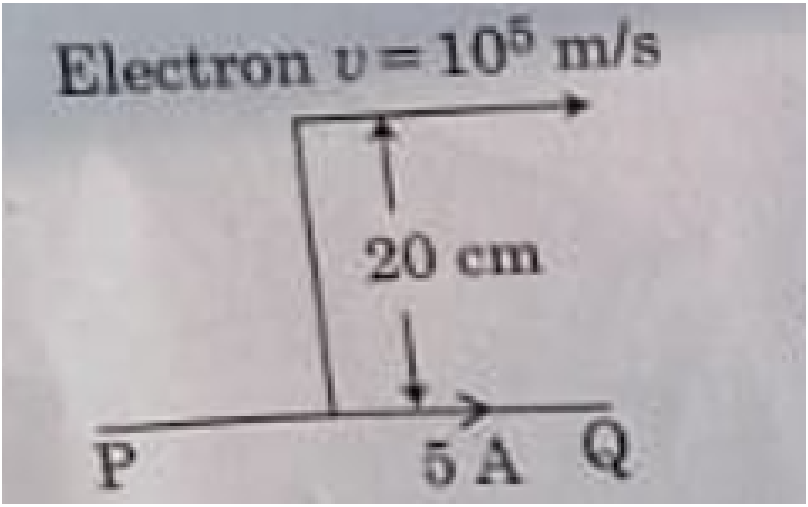
113. An infinitely long straight consuctor carries a current of 5A as shown. An electron is moving with a speed of $10^5 \frac{m}{s}$ parallel to the conductor. The perpendicular distance between the electron and the conductor is 20cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant. 

A. $4\pi x 10^{-20} N$

B. $8x10^{-20} N$

C. $4x10^{-20} N$

D. $8\pi x 10^{-20} N$

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114. A screw gauge gives the following readings when used to measure the diameter of a wire.

Main Scale Reading: 0mm

Circular scale reading: 52 divisions

Given that 1mm on main scale corresponds to 100 divisons on the circular scale. The diameter of the wire from the above data is

A. 6.26 cm

B. 0.052 cm

C. 0.52 cm

D. 0.026 cm

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115. If force [F] acceleration [A] time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

A. $[F][A]\left[T^{-1}\right]$

B. $[F]\left[A^{-1}\right][T]$

C. $[F][A][T]$

D. $[F][A]\left[T^{2}\right]$

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116. A lens of large focal length and large aperture is best suited as an objective of an astronomical telescope since:

A. a large aperture contributes to the quality and visiblity of the images.

B. a large area of the objective ensures better light gathering power

C. a large aperture provides a better resolution

D. all of the above

Answer: D

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117. An EM wave of waalength λ is incident on a photosensitive surface of negligible work function. If m mass is of photo electron emitted from the surface has de-broglie wavelength λ_d then,

A. $\lambda = \dfrac{2mc(\lambda_d)^2}{h}$

B. $\lambda = \dfrac{2h(\lambda_d)^2}{mc}$

C. $\lambda = \dfrac{2m(\lambda_d)^2}{hc}$

D. $\lambda_d = \dfrac{2mc\lambda^2}{h}$

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118. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres $\dfrac{\sigma_1}{\sigma_2}$ is

A. $\sqrt{\dfrac{R_1}{R_2}}$

B. $\dfrac{R_1^2}{R_2^2}$

C. $\dfrac{R_1}{R_2}$

D. $\dfrac{R_2}{R_1}$

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119. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the binding energy in the process is:

A. 804 MeV

B. 216 MeV

C. 0.9 MeV

D. 9.4 MeV

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120. Water falls from a height of 60m at the rate of 15 kg/s to operate a turbine. The losses due to frictional force are 10% of the input energy. How much power is generated by the turbine?

A. 12.3 kW

B. 7.0 kW

C. 10.2 kW

D. 8.1 kW

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121. If E and G resp. denote energy and gravitational constant then E/G has the dimensions of

A. $[M]\left[L^{0}\right]\left[T^{0}\right]$

B. $\left[M^{2}\right]\left[L^{-2}\right]\left[T^{-1}\right]$

C. $\left[M^{2}\right]\left[L^{-1}\right]\left[T^{0}\right]$

D. $[M]\left[L^{-1}\right]\left[T^{-1}\right]$

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122. The effective resistance of a parallel connection that consists of four wires of equal length equal area of cross section and same material is 0.25 omega. What will be the effective resistance if they are connected in series?

A. 1Ω

B. 4Ω

C. 0.25Ω

D. 0.5Ω

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123. The half life of a radioactive nuclide is 100 hours. The fraction of original activity that will remain after 150 hours would be:

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

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

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

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

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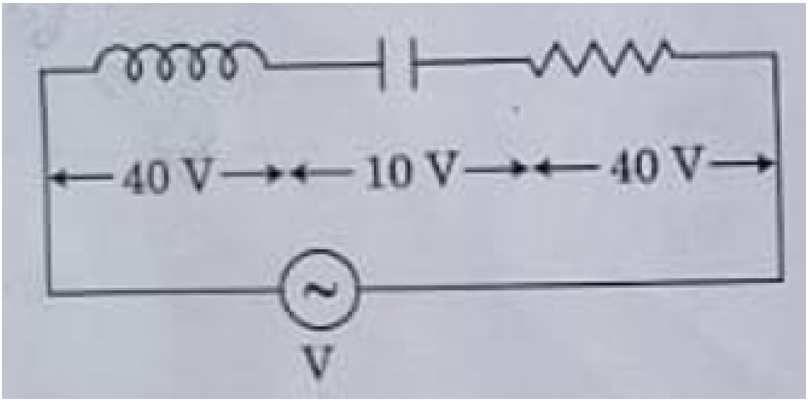
124. An inductor of inductance L, a capacitor of capacitance C and a resistor of resistance 'R' are connected in series to an ac source of potential difference 'V' volts as shown in figure. Potential difference across L, C, R is 40V, 10 V, 40 V resp. The amplitude of current flowing through LCR series circuit is $10\sqrt{2}$ A. The impedance of the circuit is:



A. 4Ω

B. 5Ω

C. $4\sqrt{2}\Omega$

D. $5\sqrt{2}\Omega$

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125. Column I- gives certain physical terms associated with flow of current through a metallic conductor

Column II- gives some mathematical relations involving electrical quantities. Match column I and column II with appropriate relations.

(A)	Drift Velocity	(P)	$\frac{m}{ne^2\rho}$
(B)	Electrical Resistivity	(Q)	nev_d
(C)	Relaxation Period	(R)	$\frac{eE}{m}\tau$
(D)	Current Density	(S)	$\frac{E}{J}$

A. (A)-(R), (B)-(P), (C)-(S), (D)-(Q)

B. (A)-(R), (B)-(Q), (C)-(S), (D)-(P)

C. (A)-(R), (B)-(S), (C)-(P), (D)-(Q)

D. (A)-(R), (B)-(S), (C)-(Q), (D)-(P)

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126. Polar molecules are the molecules:

A. acquire a dipole moment only when magnetic field is absent

B. having a permanent electric dipole moment

C. having zero dipole moment

D. acquire a dipole moment only in the presence of electric field due to displacement of charges

Answer: B

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127. Match column 1 and column 2 and choose correct match from the given choices.

(A)	Root mean square speed of gas molecules	(P)	$\frac{1}{3}nm\bar{v}^2$
(B)	Pressure exerted by ideal gas	(Q)	$\sqrt{\frac{3RT}{M}}$
(C)	Average kinetic energy of a molecule	(R)	$\frac{5}{2}RT$
(D)	Total internal energy of 1 mole of a diatomic gas	(S)	$\frac{3}{2}k_BT$

A. (A)-(Q),(B)-(P),(C)-(S),(D)-(R)

B. (A)-(R),(B)-(Q),(C)-(P),(D)-(S)

C. (A)-(R),(B)-(P),(C)-(S),(D)-(Q)

D. (A)-(Q),(B)-(R),(C)-(S),(D)-(P)

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128. A convex lens A of focal length 20cm and a concave lens G of focal length 5cm are kept along the same axis with the distance d between them. If a parallel beam of light falling on A leaves B as a parallel beam, then distance d in cm will be

A. 50

B. 80

C. 25

D. 15

Answer: D

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129. A cup of coffee cools from 90^0C to 80^0C in t minutes when the room temperature is 20^0C. The time taken by a similar cup of coffee to cool from 80^0C to 60^0C at a room temperature same at 20^0C is

A. $\frac{10t}{13}$

B. $\frac{5t}{13}$

C. $\frac{13t}{10}$

D. $\frac{13t}{5}$

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130. The escape velocity from the earth's surface is v. The escape velocity from the surface of another planet having a radius, four times that of earth and same mass density is

A. 3v

B. 4v

C. v

D. 2v

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131. A body is executing simple harmonic motion with frequency 'n' the frequency of its potential energy is

A. 3n

B. 4n

C. n

D. 2n

Answer: D

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132. The number of photons per second on an average emitted by the souce of monochromatic light of wavelength 600 nm when it delivers the power ofd 3.3 x 10^-3` watt will be

A. 10^{16}

B. 10^{15}

C. 10^{18}

D. 10^{17}

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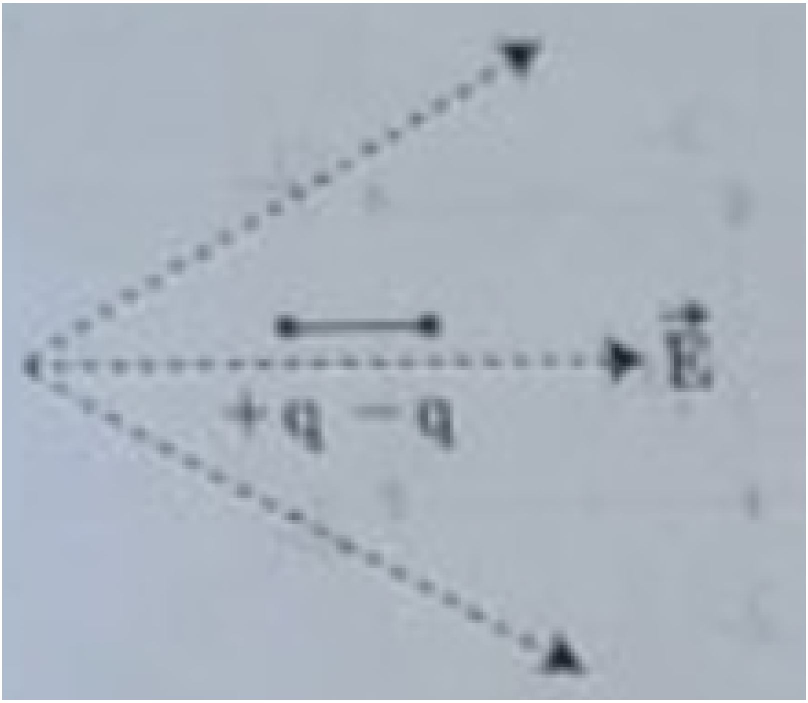
133. A dipole is placed in an electric field as shown. In which directions will it move?



A. towards the left as its PE will decrease

B. towards the right as its PE will increase

C. towards the left as its PE will increase

D. towards the right as its PE will decrease

134. For a plane EM wave propagating in x-direction which one of the following combination gives the correct possible direction for electric field E and magnetic field B resp.?

A. $\hat{j}+\hat{k}$, $-\hat{j}-\hat{k}$

B. $-\hat{j}+\hat{k}$, $-\hat{j}+\hat{k}$

C. $\hat{j}+\hat{k}$, $\hat{j}+\hat{k}$

D. $-\hat{j}+\hat{k}$, $-\hat{j}-\hat{k}$

135. The velocity of a small ball of mass M and density d when dropped in a container filled with glycerine becomes constant after sometime. If the density of glycerine is 'd/2' then the viscous force acting on the ball will be

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

B. $2Mg$

C. $M\frac{g}{2}$

D. Mg

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136. A parallel plate capacitor has a uniform electric field $\vec{E}$ in the space between the plates. If the distance between the plates is 'd' and the area of each plate is 'A' the energy stored in the capacitor is

A. $\frac{\varepsilon_0 E^2 Ad}{2}$

B. $\frac{E^2 Ad}{\varepsilon_0}$

C. $\frac{\varepsilon_0 E^2}{2}$

D. $\left(\varepsilon_0 EAd\right)$

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137. A spring is stretched by 5cm by a force 10N. The time period of the oscillations when a mass of 2Kg is suspended by it is

A. 3.14s

B. 0.628s

C. 0.0628s

D. 6.28s

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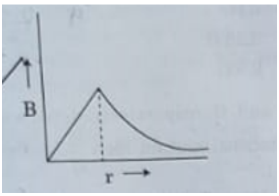
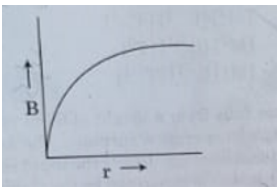
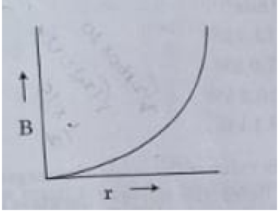
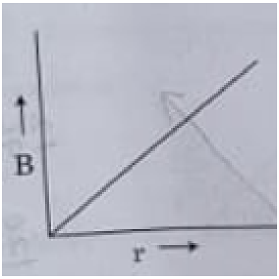
138. A thick current carrying cable of radius 'R' carries current 'I' uniformly distributed across its crosssection. The variation of magnetic field B(r) due to cable with distance 'r' from the axis of the cable is represented by.

A. 

B. 

C. 

D. 

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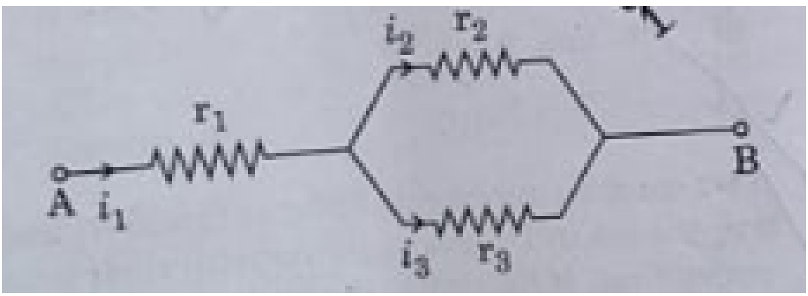
139. Three resistors having resistance r_1, r_2, r_3 are connected as shown. The ratio $\frac{i_3}{i_1}$ of current in terms of resistance used in circuit is 

A. $\dfrac{r_1}{r_1 + r_2}$

B. $\dfrac{r_2}{r_1 + r_3}$

C. $\dfrac{r_1}{r_2 + r_3}$

D. $\dfrac{r_2}{r_2 + r_3}$

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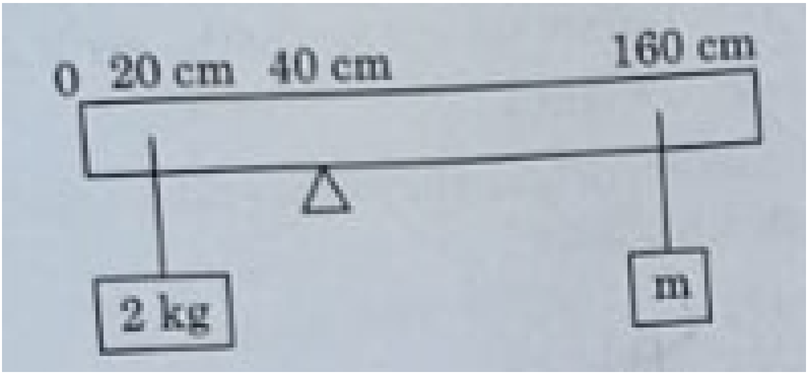
140. A uniform rod of length 200cm and mass 500g is balanced on a wedge placed at 40 cm mark. A mass of 2Kg is suspended from the rod at 20cm and another unknown mass m is suspended from the rod at 160cm mark as shown in figure. Find value of m such that the rod is in equilibrium.



A. $\frac{1}{6}kg$

B. $\frac{1}{12}kg$

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

D. $\frac{1}{3}kg$

Answer: B

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141. In the product

$$\vec{F} = q\left(\vec{v} \times \vec{B}\right) = q\vec{v} \times \left(B\hat{i} + B\hat{j} + B_0\hat{k}\right)$$

For q = 1 and $\vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and $\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$. What will be the complete expression for $\vec{B}$?

A. $8\hat{i} + 8\hat{j} - 6\hat{k}$

B. $-6\hat{i} - 6\hat{j} - 8\hat{k}$

C. $-8\hat{i} + 8\hat{j} - 6\hat{k}$

D. $6\hat{i} - 6\hat{j} - 8\hat{k}$

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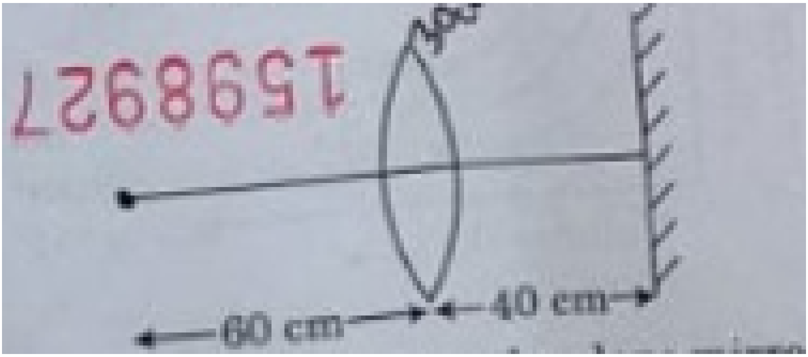
142. A point object is placed at distance 60cm from a convex lens of focal length 30 cm. If a plane mirror were put perpendicular to principal axis of lens and at distance 40cm from it the final image would be formed at distance of:



A. 30cm from plane mirror it would be a virtual image

B. 20cm from plane mirror it would be a virtual image

C. 20cm from lens it would be a real image

D. 30cm from lens it would be a real image

Answer: C

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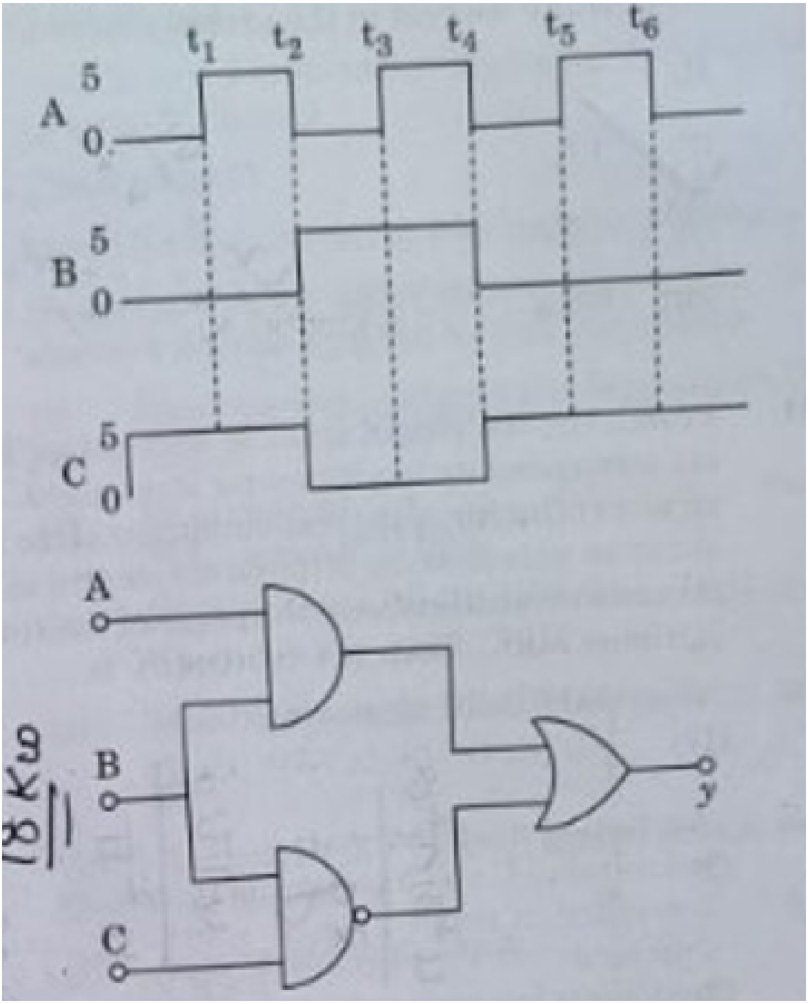
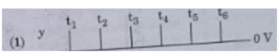
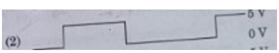
143. For given circuit the input digital signals are applied at terminal A,B, C. What would be output at terminals?



A. 

B. 

C. 

D. 

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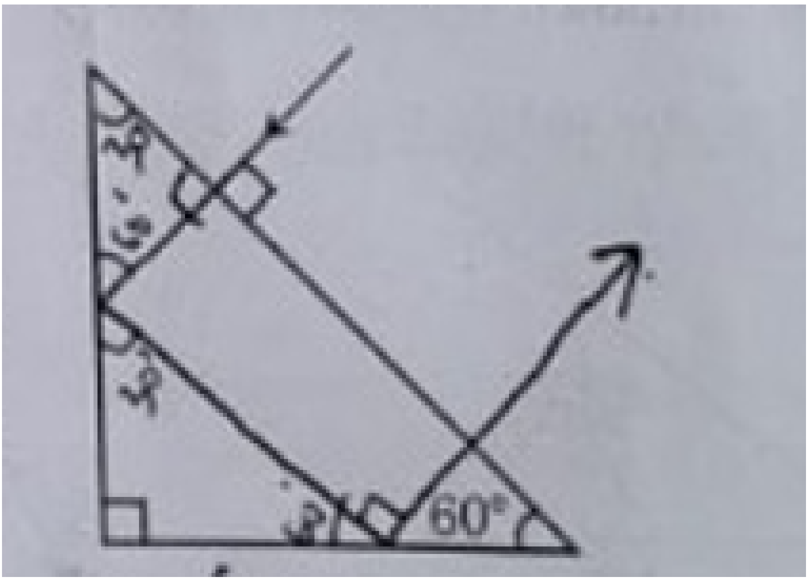
144. Find the value of angle of emergence from the prism. Refractive index of the glass $\sqrt{3}$



A. 45

B. 90

C. 60

D. 30

Answer: B

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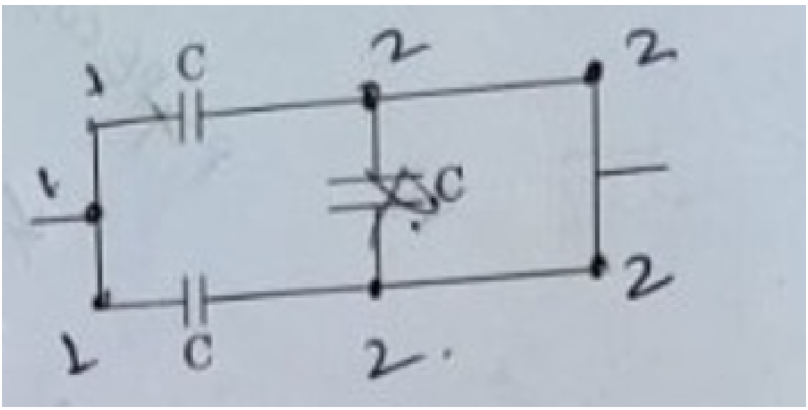
145. The equivalent capacitance of combination shown in figure is



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

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

C. $3C$

D. $2C$

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146. Two resistors of resistance, 100Ω and 200Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100Ω to that in 200Ω in a given time is

A. $4:1$

B. $1:2$

C. $2:1$

D. $1:4$

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147. A body of mass 60g experiences a gravitational force of 3.0N when placed at a particular point. The magnitude of the gravitational field intensity at that point is:

A. $180\frac{N}{k}g$

B. $0.05\frac{N}{k}g$

C. $50\frac{N}{k}g$

D. $20\frac{N}{k}g$

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148. A light ray falls on a glass surface of refractive index $\sqrt{3}$ at an angle 60^0. The angle between the refracted and reflected rays would be

A. 120^0

B. 30^0

C. 60^0

D. 90^0

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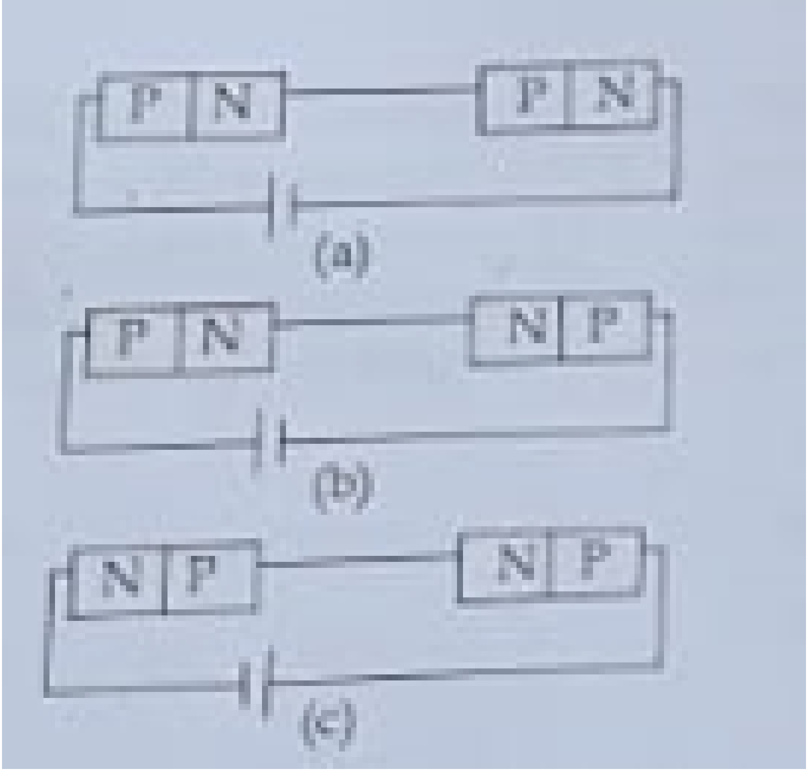
149. In the given circuits (a),(b) and (c) the potential drop across the two pn junctions are equal in



A. Both circuits (a) and (c)

B. Circuit (a) only

C. Circuit (b) only

D. Circuit (c) only

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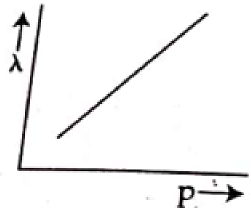
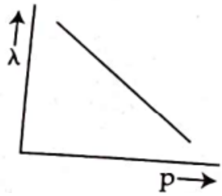
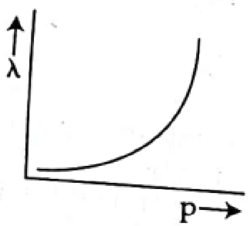
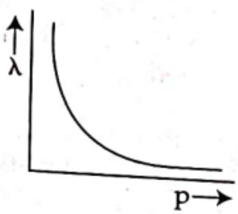
150. The graph which shows the variation of the de broglie wavelength (λ) of a particle and its associated momentum (p) is:

A. 

B. 

C. 

D. 

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151. As the temperature increases, the electrical resistance:

A. increases for both conductors and semiconductors

B. decreases for both conductors and semiconductors

C. increases for conductors but decrreases for semiconductors

D. decreases for conductors but increases for semiconductors

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152. Let T_1 and T_2 be the energy of an electron in the first and second excited states of hydrogen atom respectively. According to bohr's model of an atom, the ratio $T_1 : T_2$ is:

A. $9:4$

B. $1:4$

C. $4:1$

D. $4:9$

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153. Two objects of mass 10kg and 20 kg respectively are connected to the two ends of a rigid rod of length 10m with negligible mass. The distance of the centre of mass of the system from the 10kg mass is:

A. 10/3 m

B. 20/3 m

C. 10 m

D. 5 m

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154. Find the ratio of the distances travelled by a freely falling body in first, second and third second of its fall.

A. 1:2:3:4

B. 1:4:9:16

C. 1:3:5:7

D. 1:1:1:1

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155. The ratio of the radius of gyration of a thin uniform disc about an axis passing through its centre and normal to its plane to the radius of gyration of the disc about its diameter is:

A. $2:1$

B. $\sqrt{2}:1$

C. $4:1$

D. $1:\sqrt{2}$

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156. The angular speed of fly wheel moving with uniform angular acceleration changes from 1200rpm to 3120rpm in 16s.The angular acceleration in $\frac{rad}{s^2}$ is:

A. 2π

B. 4π

C. 12π

D. 104π

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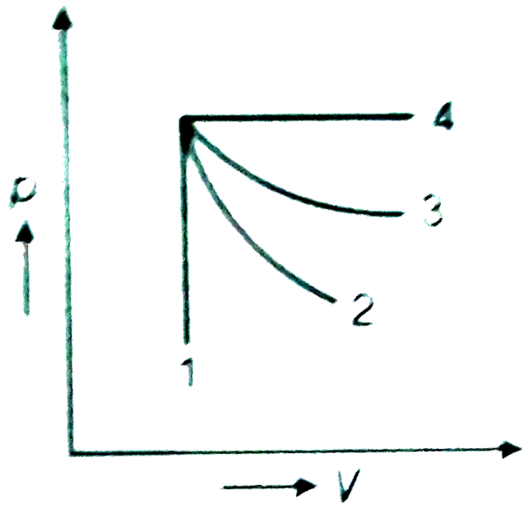
157. An ideal gas undergoes for different processes from the same initial state (figure). Four processes are adiabatic, isothermal, isobaric and isochoric. Out of 1, 2, 3 and 4 which one is adiabatic ?



A. 1

B. 2

C. 3

D. 4

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158. Two hollow conducting spheres of radii R_1 and R_2 $\left(R_1 \; R_2\right)$ have equal charges. The potential would be:

A. more on bigger sphere

B. more on smaller sphere

C. equal on both the spheres

D. dependent on the material property of the sphere

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159. When light propagates through a material medium of relative permittivity ε_r and relative permeability μ_r, the velocity of light, v is given by:

A. $v = c$

B. $v = \sqrt{\frac{\mu_r}{\varepsilon_r}}$

C. $v = \sqrt{\frac{\varepsilon_r}{\mu_r}}$

D. $v = \frac{c}{\sqrt{\varepsilon_r \mu_r}}$

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160. A long solenoid of radius 1mm has 100 turns per mm. If 1A current flows in the solenoid, the magnetic field strength at the centre of solenoid is

A. $6.28x10^{-2}$ T

B. $12.56x10^{-2}$ T

C. $12.56x10^{-4}$ T

D. $6.28x10^{-4}$ T

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161. The peak voltage of the ac source is equal to:

A. the value of voltage supplied to the circuit

B. the rms value of the ac source

C. $\sqrt{2}$ times the rms value of the ac source

D. $\frac{1}{\sqrt{2}}$ times the rms value of the ac source

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162. An electric lift with a maximum load of 2000kg (lift+passengers) is moving up with a constant speed of 1.5 m/s. The frictional force opposing the motion is 3000N. The minimum power delivered by the motor to the lift in watt is: $\left(g = 10\frac{m}{s^2}\right)$

A. 23000

B. 20000

C. 34500

D. 23500

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163. In a young's double slit experiment, a student observes 8 fringes in a certain segment of screen when a monochromatic light of 600 nm wavelength is used. If the wavelength of light is changed to 400nm, then the number of fringes he would observe in the same region of the screen is:

A. 6

B. 8

C. 9

D. 12

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164. A copper wire of length 10m and radius $\left(\frac{10^{-2}}{\sqrt{\pi}}\right)$m has electrical resistance of 10Ω. The current density in the wire for an electric field strength of 10(V/m):

A. $10^4 \frac{A}{m^2}$

B. $10^6 \frac{A}{m^2}$

C. $10^{-5} \frac{A}{m^2}$

D. $10^5 \frac{A}{m^2}$

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165. The dimensions $\left[MLT^{-2}A^{-2}\right]$ belong to the:

A. magnetic flux

B. self inductance

C. magnetic permeability

D. electric permittivity

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166. If the initial tension on a stretched string is doubled, then the ratio of initial and final speeds of a transverse wave along the string is:

A. $1:1$

B. $\sqrt{2}:1$

C. $1:\sqrt{2}$

D. $1:2$

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167. In half wave rectification, if the input frequency is 60Hz, then the output frequency would be:

A. zero

B. 30Hz

C. 60Hz

D. 120Hz

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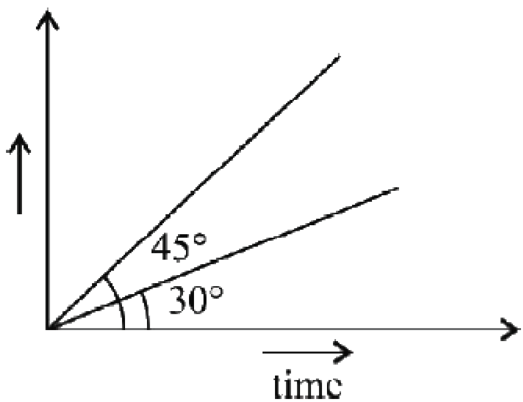
168. The displacemenet time graph of two moving particles make agnes of 30° and 45° with the x-axis. The ratio of the two velocities V_A and V_B is



A. $\sqrt{3}:1$

B. $1:1$

C. $1:2$

D. $1:\sqrt{3}$

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169. A square loop of side 1m and resistance 1Ω is placed in a magnetic field of 0.5T. If the plane of loop is perpendicular to the direction of magnetic field, the magnetic flux through the loop is:

A. 2 weber

B. 0.5 weber

C. 1 weber

D. 0 weber

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170. The energy that will be ideally radiated by a 100kW transmitter in 1 hour is

A. $36 \times 10^{7} J$

B. $36 \times 10^{4} J$

C. $36 \times 10^{5} J$

D. $1 \times 10^{5} J$

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171. Match List-1 with List-2

List - I (Electromagnetic waves)		List - II (Wavelength)	
(a)	AM radio waves	(i)	10^{-10} m
(b)	Microwaves	(ii)	10^{2} m
(c)	Infrared radiations	(iii)	10^{-2} m
(d)	X-rays	(iv)	10^{-4} m

A. a-iv,b-iii,c-ii,d-i

B. a-iii,b-ii,c-i,d-iv

C. a-iii,b-iv,c-ii,d-i

D. a-ii,b-iii,c-iv,d-i

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172. A shell of mass m is at rest initially. It explodes into three fragments having mass in the ratio $2:2:1$. If the fragments having equal mass fly off along mutually perpendicular directions with speed v the speed of the third (lighter) fragments is:

A. v

B. $\sqrt{2}v$

C. $2\sqrt{2}v$

D. $3\sqrt{2}v$

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173. A biconvex lens has radii of curvature, 20cm each. If the refractive index of the material of the lens is 1.5, the power of the lens is:

A. $+2D$

B. $+20D$

C. $+5D$

D. infinity

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174. Given below are two statements:

Statement I :
Biot-Savart's law gives us the expression for the magnetic field strength of an infinitesimal current element (Idl) of a current carrying conductor only.
Statement II :
Biot-Savart's law is analogous to Coulomb's inverse square law of charge q, with the former being related to the field produced by a scalar source, Idl while the latter being produced by a vector source, q.
In light of above statements choose the most appropriate answer from the options given below :

A. Both statement I and statement II are correct

B. Both Statement I and Statement II are incorrect

C. Statement I is correct and Statement II is incorrect

D. Statement I is incorrect and Statement II is correct

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175. In the given nuclear reaction, the element X is

$$\left(Na_{11}\right)^{22} \rightarrow X + e^{+} + v$$

A. $\left(Na_{11}\right)^{23}$

B. $\left(Ne_{10}\right)^{23}$

C. $\left(Ne_{10}\right)^{22}$

D. $\left(Mg_{12}\right)^{22}$

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176. Plane angle and solid angle have:

A. units but no dimensions

B. dimensions but no units

C. no units and no dimensions

D. both units and dimensions

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177. The angle between the electric lines of force and the equipotential surface is:

A. 0^0

B. 45^{0}

C. 90^{0}

D. 180^{0}

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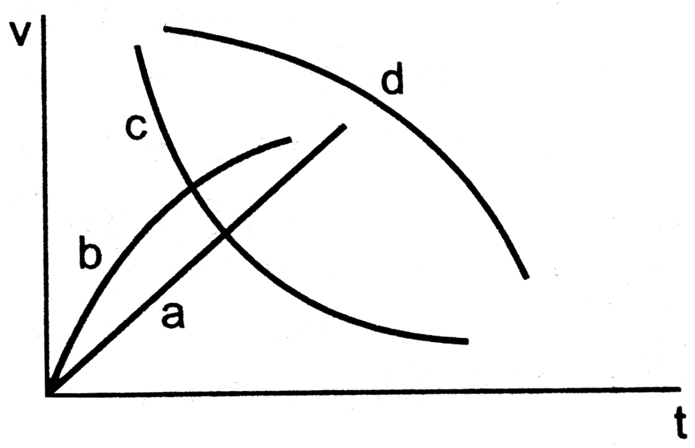
178. A spherical bal is dropped in a long column of a viscous liquid. The speed of the ball as a function of time may be best represented by the graph



A. A

B. B

C. C

D. D

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179. When two monochromatic lights of frequency, v and v/2 are incident on a photoelectric metal, their stopping potential becomes $\frac{v_s}{2}$ and v_s respectively. The threshold frequency for this metal is:

A. 2v

B. 3v

C. 2v/3

D. 3v/2

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180. If a soap bubble expands, the pressure inside the bubble:

A. decreases

B. increases

C. remains the same

D. is equal to the atomspheric pressure

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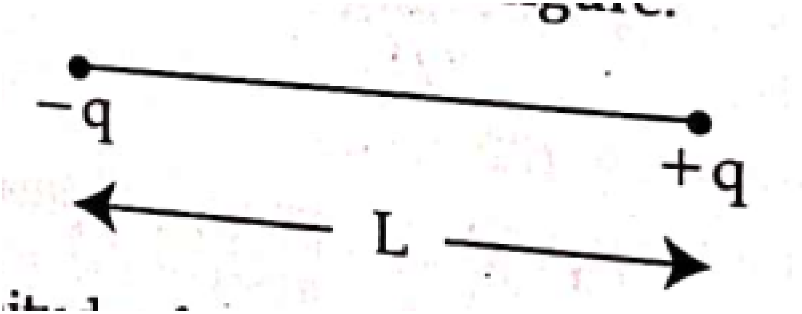
181. Two point charges -q and +q are placed at a distance of L as shown in the figure. The magnitude of electric field intensity at a distance R (R>>L) varies as:



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

B. $\frac{1}{R^3}$

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

D. $\frac{1}{R^6}$

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182. The area of a rectanglular field (in m^2) of length 55.3m and breadth 25m after rounding off the value for correct significant digits is:

A. 138×10^1

B. 1382

C. 1382.5

D. 14×10^2

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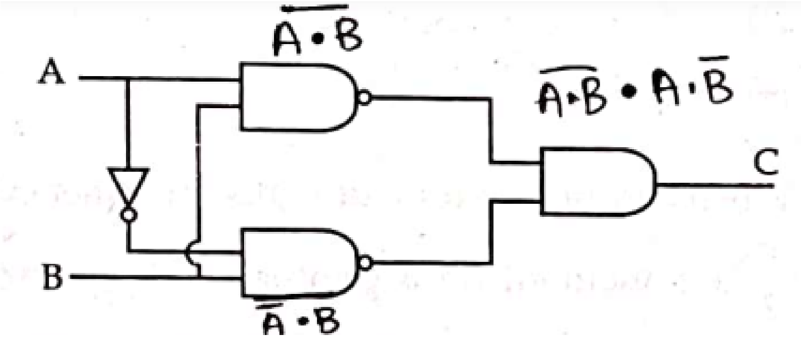
183. The truth table for the given logic circuit is:



A.

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

B.

A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

C.

A	B	C
0	0	0
0	1	1
1	0	0
1	1	1

D.

A	B	C
0	0	0
0	1	1
1	0	0
1	1	1

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184. Given below are two statements: One is labelled as assertion A and the other is labelled as reason R.

assertion A : The stretching of a spring is determined by the shear modulus of The material of the spring.

Reason R : A coil spring of copper has more tensile strength than a Steel Spring of a same dimensions.

in the light of the above statement choose the most appropriate answer from the options given below

A. both A and R are true and R is correct explanation of A

B. both A and R are true and R is not correct explanation of A

C. A is true and R is false

D. A is false but R is true

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185. From Ampere's circuital law for a long straight wire of circular cross section carrying a steady current the variation of magnetic field in the inside and outside region of the wire is:

A. uniform and remains constant for both the regions

B. a linearly increasing function of distance upto the boundary of the wire and then linearly decreasing for the outside region

C. a linearly increasing function of distance r upto the boundary of the wire and then decreasing one with 1/r dependence for the outside region

D. a linearly decreasing function of distance upto the boundary of the wire and then a linearly increasing one for the outside region

Watch Video Solution

186. A series LCR circuit with inductance 10H, capacitance $10\mu F$, resistance 50Ω is connected to an ac source of voltage $V = 200\sin(100t)$ volt. If the resonant frequency of the LCR circuit is v_0 and the frequency of the ac source is v then,

A. $v_0 = v = 50Hz$

B. $v_0 = v = \frac{50}{\pi}Hz$

C. $v_0 = \frac{50}{\pi}Hz, v = 50Hz$

D. $v = 100Hz, v_0 = \frac{100}{\pi}Hz$

187. Match List-1 with List-2

	List - I		List - II
(a)	Gravitational constant (G)	(i)	$[L^2T^{-2}]$
(b)	Gravitational potential energy	(ii)	$[M^{-1}L^3T^{-2}]$
(c)	Gravitational potential	(iii)	$[LT^{-2}]$
(d)	Gravitational intensity	(iv)	$[ML^2T^{-2}]$

A. a-ii,b-i,c-iv,d-iii

B. a-ii,b-iv,c-i,d-iii

C. a-ii,b-iv,c-iii,d-i

D. a-iv,b-ii,c-i,d-iii

Watch Video Solution

188. Two pendulum of length 121cm and 100cm start vibrating in phase. At some instant, the two are at their mean position in the same phase. The minimum number of vibrations of the shorter pendulum after which the two are again in phase at the mean position is:

A. 11

B. 9

C. 10

D. 8

Watch Video Solution

189. A big circular coil of 1000 turns and average radius 10m is rotating about its horizontal diameter at $2\frac{rad}{s}$. If the vertical component of earth's magnetic field at that place is $2 \times 10^{-5} T$ and electrical resistance of the coil is 12.56Ω then the maximum induced current in the coil will be:

A. 0.25A

B. 1.5A

C. 1A

D. 2A

Watch Video Solution

190. A capacitor of capacitance $C = 900pF$ is charged fully by 100V battery B as shown in figure (a). Then it is disconnected from the battery and connected to another uncharged capacitor of capacitance $C = 900pF$ as shown in figure(b). The electrostatic energy stored by the system (b) is:

A. $4.5x10^{-6}J$

B. $3.25x10^{-6}J$

C. $2.25x10^{-6}J$

D. $1.5x10^{-6}J$

Watch Video Solution

191. A nucleus of mass number 189 splits into two nuclei having mass number 125 and 64. The ratio of radius of two daughter nuclei respectively is:

A. 4:5

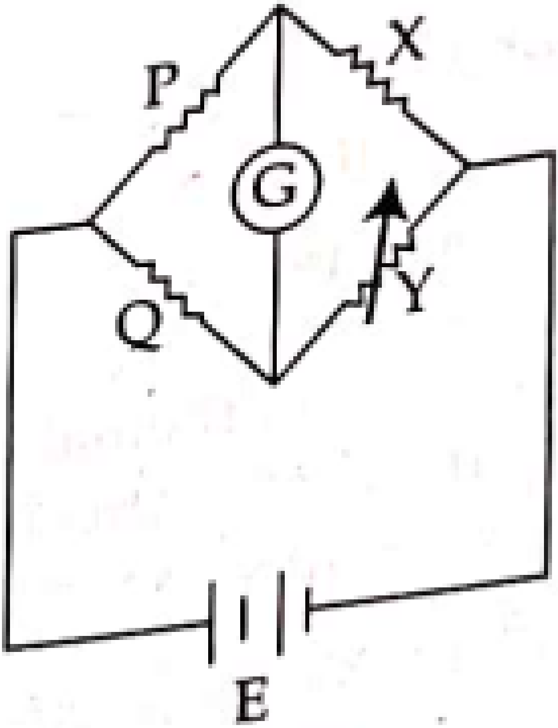
B. 5:4

C. 25:16

D. 1:1

Watch Video Solution

192. A wheatstone bridge is used to determine the value of unknown resistance X by adjusting the variable resistance Y as shown in the figure. For the most precise measurement of X the resistance P and Q:



A. should be approximately equal to 2X

B. should be approximately equal and are small

C. should be very large and unequal

D. do not play any significant role

Watch Video Solution

193. If the intermolecular forces vanish away the volume occupied by the molecules contained in $4.5kg$ water at STP will be .

A. $5.6 \times 10^{6}m^{3}$

B. $5.6 \times 10^{3}m^{3}$

C. $5.6 \times 10^{-3}m^{3}$

D. $5.6m^{3}$

Watch Video Solution

194. A ball is projected with a velocity 10 m/s at an angle of 60^{0} with the vertical direction. Its speed at the highest point of its trajectory will be:

A. zero

B. $5\sqrt{3}\frac{m}{s}$

C. $5\frac{m}{s}$

D. $10\frac{m}{s}$

Watch Video Solution

195. Two transparent media A and B are separated by a plane boundary. The speed of light in those media are $1.5 \times 10^8\frac{m}{s}$ and $2.0 \times 10^8\frac{m}{s}$ respectively. The critically angle for a ray of light for these two media.

A. $\sin^{-1}(0.500)$

B. $\sin^{-1}(0.750)$

C. $\tan^{-1}(0.500)$

D. $\tan^{-1}(0.750)$

Watch Video Solution

196. In a series LCR circuit, the inductance L is 10 mH, capacitance C is $1\mu F$ and resistance R is 100Ω. The frequency at which resonance occurs is:

A. 15.9 kHz

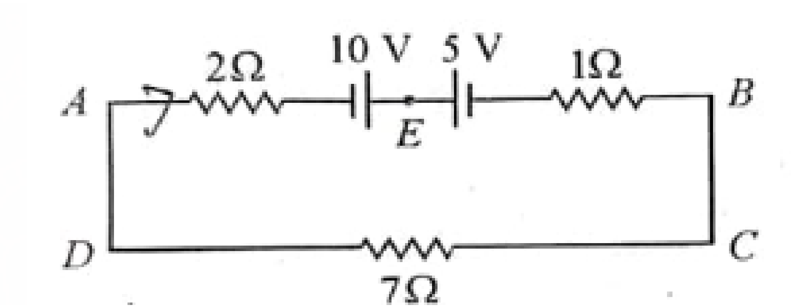
B. 1.59 rad/s

C. 1.59 kHz

D. 15.9 rad/s

Watch Video Solution

197. The magnitude and direction of the current in the following circuit is



A. 0.5 A from A to B through E

B. $\frac{5}{9}$ A from A to B through E

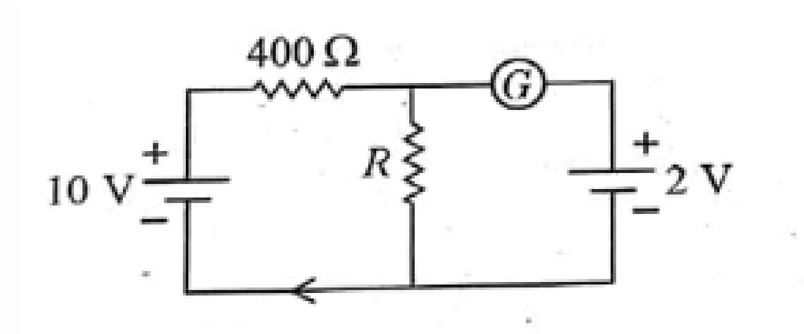
C. 1.5 A from B to A through E

D. 0.2 A from B to A through E

Watch Video Solution

Watch Video Solution

198. If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



A. 50Ω

B. 100Ω

C. 400Ω

D. 200Ω

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199. The temperature of a gas is -$50\,^{\circ}C$. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

A. $3295\,^{\circ}C$

B. $3097K$

C. $223K$

D. $669\,^{\circ}C$

Watch Video Solution

200. The ratio of radius of gyration of a solid sphere of mass M and radius r about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is :

A. $5:3$

B. $2:5$

C. $5:2$

D. $3:5$

Watch Video Solution

201. A Carnot engine has an efficiency of 50% when its source is at a temperature $327^{\circ}C$. The temperature of the sink is :

A. $15^{\circ}C$

B. $100^{\circ}C$

C. $200^{\circ}C$

D. $27^{\circ}C$

Watch Video Solution

202. A bullet is fired from a gun at the speed of $280ms^{-1}$ in the direction 30° above the horizontal. The maximum height attained by the bullet is ($g = 9.8ms^{-2}$, $\sin 30^{\circ} = 0.5$)

A. 2000 m

B. 1000 m

C. 3000 m

D. 2800 m

Watch Video Solution

203. An electric dipole is placed at an angle of 30° with an electric field of intensity $2 \times 10^{5} NC^{-1}$. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm.

A. 6 mC

B. 4 mC

C. 2 mC

D. 8 mC

Watch Video Solution

204. Given below are two statements:

Statement I : Photovoltaic devices can convert optical radiation into electricity.

Statement II : Zener diode is designed to operate under reverse bias is breakdown region.

In the light of the above statements, choose the most appropriate answer from the options given below:

A. Both Statement I and Statement II are incorrect.

B. Statement I is correct but Statement II is incorrect.

C. Statement I is incorrect but Statement II is correct.

D. Both Statement I and Statement II are correct.

Watch Video Solution

205. The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are :

A. Personal errors

B. Least count errors

C. Random errors

D. Instrumental errors

Watch Video Solution

206. The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is :

A. $2:1$

B. $1:3$

C. $3:1$

D. $1:2$

Watch Video Solution

207. The net magnetic flux through any closed surface is :

A. Positive

B. Infinity

C. Negative

D. Zero

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208. The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these photosensitive surfaces may emit photoelectrons?

A. Both Na and K

B. K only

C. Na only

D. Cs only

Watch Video Solution

209. The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to :

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

B. $\frac{1}{\sqrt{V}}$

C. V^2

D. $\sqrt{V}$

Watch Video Solution

210. A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

A. 2.7 a

B. 3.7 A

C. 0.37 A

D. 0.27 A

Watch Video Solution

211. Light travels a distance x in time t_1 in air and 10x in time t_2 in another denser medium. What is the critical angle for this medium ?

A. $\sin^{-1}\left(\frac{10t_2}{t_1}\right)$

B. $\sin^{-1}\left(\frac{t_1}{10t_2}\right)$

C. $\sin^{-1}\left(\frac{10t_1}{t_2}\right)$

D. $\sin^{-1}\left(\frac{t_2}{t_1}\right)$

Watch Video Solution

212. A metal wire has mass (0.4 ± 0.002)g, radius (0.3 ± 0.001)mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:

A. 1.3%

B. 1.6%

C. 1.4%

D. 1.2%

Watch Video Solution

213. For Young's double slit experiment, two statements are given below:

Statement I : If screen is moved away from the plane of slits, angular separation of the fringesremains constant.

Statement II :If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.

If the light of the above statements, choose the correct answer from the options given below:

A. Both Statement I and Statement II are false.

B. Statement I is true but Statement II is false.

C. Statement I is false but Statement II is true.

D. Both Statement I and Statement II are true.

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214. The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $\left(\frac{1}{16}\right)^{th}$ of its initial value?

A. 40 minutes

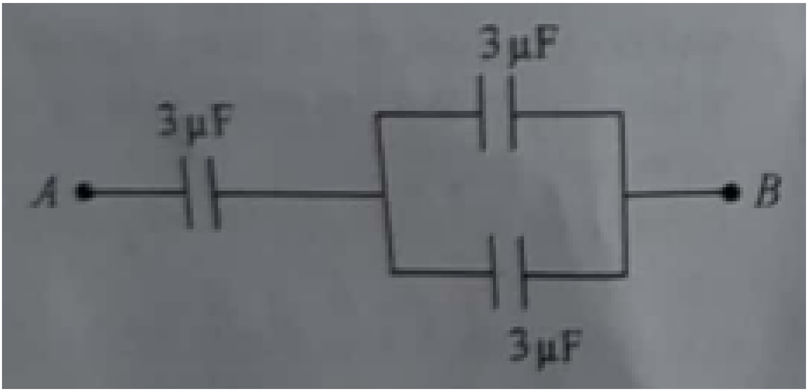
B. 60 minutes

C. 80 minutes

D. 20 minutes

Watch Video Solution

215. The equivalent capacitance of the system shown in the following circuit is:



A. $3\mu F$

B. $6\mu F$

C. $9\mu F$

D. $2\mu F$

Watch Video Solution

216. Resistance of a carbon resistor determined from colour codes is $(22000 \pm 5\%)\Omega$. The colour of third band must be :

A. Green

B. Orange

C. Yellow

D. Red

Watch Video Solution

217. An ac source is connected to a capacitor C. Due to decrease in its operating frequency:

A. Displacement current increases.

B. Displacement current decreases.

C. Capacitive reactance remains constant.

D. Capacitive reactance decreases.

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218. A vehicle travels half the distance with speed v and the remaining distance with speed $2v$. Its average speed is:

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

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

C. $\frac{3v}{4}$

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

Watch Video Solution

219. The amount of energy required to form a soap bubble of radius 2cm from a soap solution is nearly : (surface tension of soap solution $=0.03 Nm^{-1}$)

A. $5.06 \times 10^{-4} J$

B. $3.01 \times 10^{-4} J$

C. $50.1 \times 10^{-4} J$

D. $30.16 \times 10^{-4} J$

Watch Video Solution

220. The venturi-meter works on :

A. Bernoulli's principle

B. The principle of parallel axes

C. The principle of perpendicular axes

D. Huygen's principle

Watch Video Solution

221. In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is:

A. 4λ

B. 9λ

C. 16λ

D. 2λ

Watch Video Solution

222. The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be:

A. $4U$

B. $8U$

C. $16U$

D. $2U$

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223. A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance, Which of these components remove the ac ripple from the rectified output?

A. p-n junction diodes

B. Capacitor

C. Load resistance

D. A centre-tapped transformer

Watch Video Solution

224. The magnetic energy stored in an inductor of inductance $4\mu H$ carrying a current of 2 A is:

A. $4mJ$

B. $8mJ$

C. $8\mu J$

D. $4\mu J$

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225. If oint_s vecE.vec(ds)=0` over a surface, then :

A. the magnitude of electric field on the surface is constant.

B. all the charges must necessarily be inside the surface.

C. the electric field inside the surface is necessarily uniform.

D. the number of flux lines entering the surface must be equal to the number of flux leaving it.

Watch Video Solution

226. A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is:

A. along northward

B. along north-east

C. along south-west

D. along eastward

Watch Video Solution

227. Let a wire be suspended from the ceiling(rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

A. $\frac{W}{A}$

B. $W(2A)$

C. Zero

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

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228. The angular acceleration of a body, moving along the circumference of a circle, is :

A. along the radius towards the centre

B. along the tangent to its position

C. along the axis of rotation

D. along the radius, away from centre

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229. In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of $2.0 \times 10^{10} Hz$ and amplitude $48 Vm^{-1}$. then the amplitude of oscillating magnetic field is : (Speed of light in free space $= 3 \times 10^{8} ms^{-1}$)

A. $1.6 \times 10^{-8} T$

B. $1.6 \times 10^{-7} T$

C. $1.6 \times 10^{-6} T$

D. $1.6 \times 10^{-9} T$

Watch Video Solution

230. Two bodies of mass m anf 9m are placed at a distance R. the gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G=gravitational constant) :

A. $\frac{-12Gm}{R}$

B. $\frac{-16Gm}{R}$

C. $\frac{-20Gm}{R}$

D. $\frac{-8Gm}{R}$

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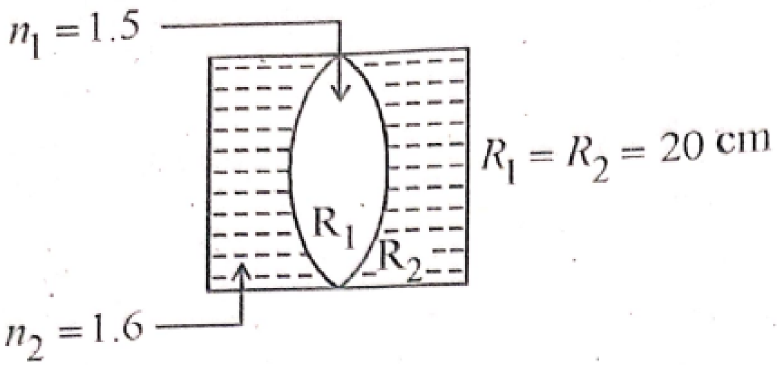
231. In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin)?



A. -40 cm

B. -100 cm

C. -50 cm

D. 40 cm

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232. Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is 0.15($g=10ms^{-2}$)

A. $150ms^{-2}$

B. $1.5ms^{-2}$

C. $50ms^{-2}$

D. $1.2ms^{-2}$

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233. A satellite is orbiting just above the surface of the earth with period T.If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

A. T^2

B. T^3

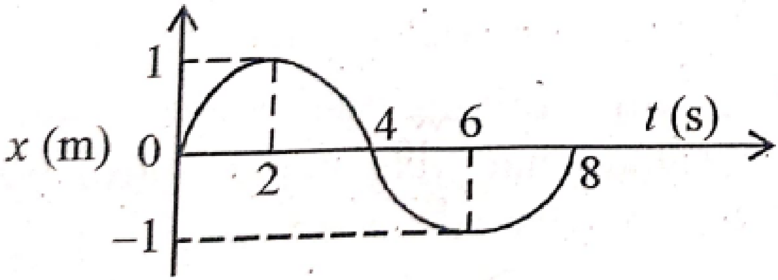
C. $\sqrt{T}$

D. T

Watch Video Solution

234. The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at

$t = 2s$ is :



A. $\frac{-\pi^2}{8} ms^{-2}$

B. $\frac{\pi^2}{16} ms^{-2}$

C. $\frac{-\pi^2}{16} ms^{-2}$

D. $\frac{\pi^2}{8} ms^{-2}$

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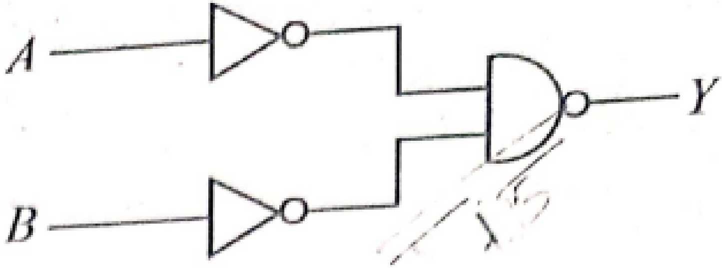
235. For the following logic circuit, the truth table is:



A.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

B.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

C.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

D.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

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236. Ahorizonatal bridge is built across a river. A student standing on the bridge throws a small ball vercally upwards with a velocty $4ms^{-1}$. The ball strikes the water surface after $4s$. The height of bridgeabove water surface is (Take $g = 10ms^{-2}$:

A. $60m$

B. $64m$

C. $68m$

D. $56m$

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237. Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave . When they are placed in contact with each other , the equivalent focal length og the combination will be :

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

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

C. infinite

D. Zero

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238. A wire carrying a current I along the positive X-axis has lenght L . It is kept in a magnetic field $\vec{B} = \left(2\hat{i} + 3\hat{j}_4\hat{k}\right)$ T . The magnitude of the mannetic fotce acting on the wire is :

A. $\sqrt{5}IL$

B. $5IL$

C. $\sqrt{3}IL$

D. $3IL$

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239. A bullet from a gun is fired on a rectangular wooden block with velocity u . When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it same direction before coming to rest exactly at the other end of the block . The total length of the block is :

A. $24cm$

B. $28cm$

C. $30cm$

D. $27cm$

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240. The resistance of platinum wire at $0 \circ C$ is 2Ω and 6.8Ω at $80 \circ C$ .The temperature coefficient of resistance of the wire is :

A. $3 \times 10^{-3} {}^{\circ}C^{-1}$

B. $3 \times 10^{-2} {}^{\circ}C^{-1}$

C. $3 \times 10^{-1} {}^{\circ}C^{-1}$

D. $3 \times 10^{-4} {}^{\circ}C^{-1}$

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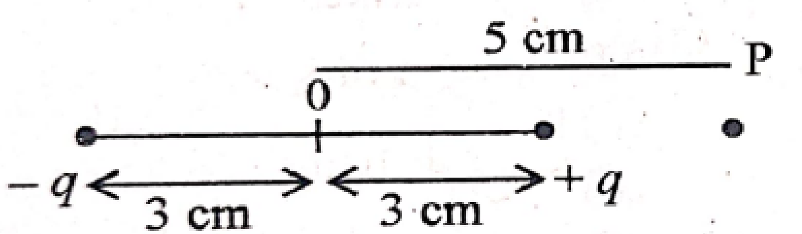
241. An electric dipole is placed as shown in the figure.



The electric

potential (in 10^2V) at point P due to the dipole is $\left(\in_0 = \right.$ permittivity of free shape and $\frac{1}{4\pi \in_0} = K$):

A. $\left(\frac{5}{8}\right)qK$

B. $\left(\frac{8}{5}\right)qK$

C. $\left(\frac{8}{3}\right)qK$

D. $\left(\frac{3}{8}\right)qK$

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242. 10 resistors, each of resistance R are connected in series to a battery of emf E and negligiblle internal resistance . Then those are negliggible internal resistance . Then those are connected in parallel to the same battery ,the current is increased n times . The value of n is :

A. 100

B. 1

C. 1000

D. 10

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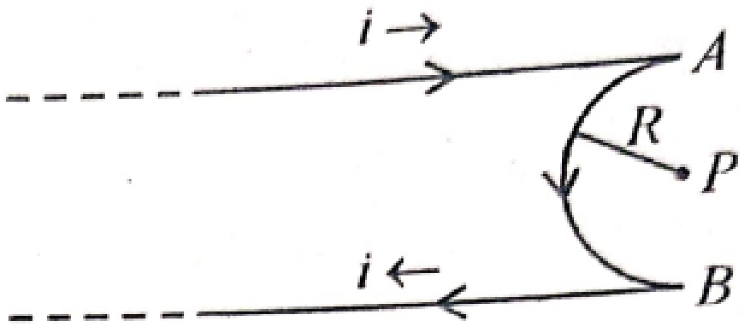
243. A very long conducting wire is bent in a semi-circular shape from A to B as show in figure . The magneticfield at point P for steady current confiuration is given by : < br>



A. $\frac{\mu_0 i}{4R}$ pointed away fron the page

B. $\frac{\mu_0 i}{4R}\left[1 - \frac{2}{\pi}\right]$ pointed away from page

C. $\frac{\mu_0 i}{4R}\left[1 - \frac{2}{\pi}\right]$ pointed into the page

D. $\frac{\mu_0 i}{4R}$ pointed into the page

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244. The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m .What is the radius of third allowed orbit of hydrogen atom ?

A. 1.06Å

B. 1.59Å

C. 4.77Å

D. 0.53Å

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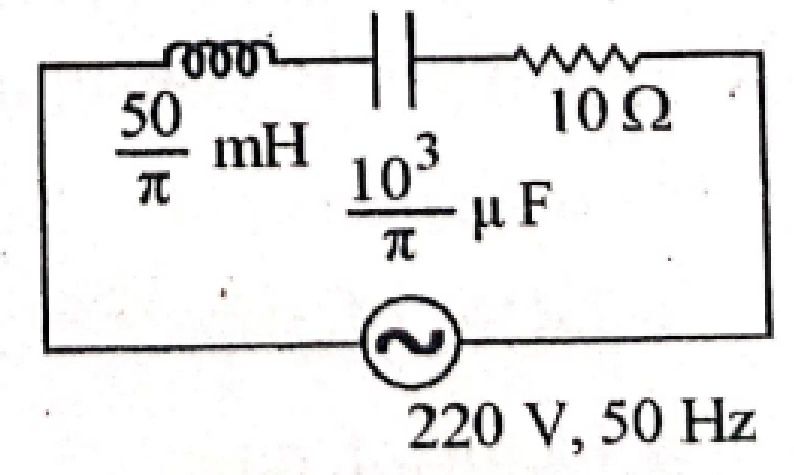
245. The net impedance of cricuit (as shown in figure) will be :



A. 15Ω

B. $5\sqrt{5}\Omega$

C. 25Ω

D. $10\sqrt{2}\Omega$

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MCQ

1. The damping force on an oscillator is directly proportional to the velocity. The units of the constant to proportionality are

A. kgs^{-1}

B. kgs

C. $kgms^{-1}$

D. $kgms^{-2}$

Answer: A

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2. The motion of a particle along a straight line is described by equation : $x = 8 + 12t - t^3$ where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is.

A. $6ms^{-2}$

B. $12ms^{-2}$

C. $24ms^{-2}$

D. zero

Answer: B

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3. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is

A. $\theta = \tan - 1(2)$

B. $\theta = 45^{\circ}$

C. $\theta = \tan^{-1}\left(\frac{1}{4}\right)$

D. $\theta = \tan^{-1}(4)$

Answer: D

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4. A particle has initial velocity $\left(2\vec{i} + 3\vec{j}\right)$ and acceleration $\left(0.3\vec{i} + 0.2\vec{j}\right)$. The magnitude of velocity after 10 seconds will be

A. 5 units

B. 9 units

C. $9\sqrt{2}$ units

D. $5\sqrt{2}$ units

Answer: D

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5. A car of mass $1000kg$ negotiates a banked curve of radius $90m$ on a fictionless road. If the banking angle is 45° the speed of the car is:

A. $5ms^{-1}$

B. $10ms^{-1}$

C. $20ms^{-1}$

D. $30ms^{-1}$

Answer: D

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6. A solid cylinder of mass $3kg$ is rolling on a horizontal surface with velocity $4ms^{-1}$. It collides with a horizontal spring of force constant $200Nm^{-1}$. The maximum compression produced in the spring will be :

A. 0.7 m

B. 0.2 m

C. 0.5 m

D. 0.6 m

Answer: D

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7. The potential energy of a particle in a force field is:

$U = \frac{A}{r^2} - \frac{B}{r}$,. Where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium the distance of the particle is

A. A/B

B. B/A

C. $B/2A$

D. $2A/B$

Answer: D

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8. Two sphere A and B of masses m_1 and m_2 respectivelly colides. A is at rest initally and B is moving with velocity v along x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction.

A. $\theta = \tan^{-1}(1/2)$ to the x-axis

B. $\theta = \tan^{-1}(-1/2)$ to the x-axis

C. same as that of B

D. opposite to the of B

Answer: B

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9. Two persons of masses $55kg$ and $65kg$ respectively are at the opposite ends of a boat. The length of the boat is $3.0m$ and weights $100kg$. The $55kg$ man walks up to the $65kg$ man and sits with him. If the boat is in still water the centre of mass of the system shifts by.

A. zero

B. 0.75 m

C. 3.0 m

D. 2.3 m

Answer: A

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10. ABC is an equilateral triangle with O as its centre $\vec{F}_1, \vec{F}_2$ and $\vec{F}_3$ represent three forces acting along the sides AB, BC and AC respectively. If the torque about O is zero then the magnitude of $\vec{F}_3$ is

A. $\dfrac{F_1 + F_2}{2}$

B. $2\left(F_1 + F_2\right)$

C. $F_1 + F_2$

D. $F_1 - F_2$

Answer: C

View Text Solution

11. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along.

A. the radius

B. the tangent to the orbit

C. a line perpendicular to the plane of rotation

D. the line making an angle of 45° to the plane

Answer: C

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12. A spherical planet far out in space has a mass M_0 and diameter D_0. A particle of mass m falling freely near the surface of this planet will experience an accelertion due to gravity which is equal to

A. GM_P/D_P^2

B. $4GM_Pm/D_P^2$

C. $4GM_P/D_P^2$

D. GM_Pm/D_P^2

Answer: C

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13. A geostationary satellite is orbiting the earth at a height of $5R$ above the surface of the earth, $2R$ being the radius of the earth. The time period of another satellite in hours at a height of $2R$ form the surface of the earth is

A. $6\sqrt{2}$

B. $\frac{6}{\sqrt{2}}$

C. 5

D. 10

Answer: A

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14. The height a which the weight of a body becomes $1/16th$ its weight on the surface of earth (radius R) is

A. 3R

B. 4R

C. 5R

D. 15R

Answer: A

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15. Two sources of sound placed close to each other are wmitting progressive waves given by $y_1 = 4\sin 600\pi t$ and $y_2 = 5\sin 608\pi t$. An observer located near these two sources of sound will hear:

A. 8 beats per second with intensity ratio 81 : 1 between waxing and waning

B. 4 beats per second with intensity ratio 81 : 1 between waxing and waning

C. 4 beats per second with intensity ratio 25 : 16 between waxing and waning

D. 8 beats per second with intensity ratio 25 : 16 between waxing and waning

Answer: B

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16. When a string is divided into three segments of length l_1, l_2 and l_3 the fundamental frequencies of these three segments are f_1, f_2 and f_3 respectively. The original fundamental frequency f of the string is

A. $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2} + \frac{1}{v_3}$

B. $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v_1}} + \frac{1}{\sqrt{v_2}} + \frac{1}{\sqrt{v_3}}$

C. $\sqrt{v} = \sqrt{v_1} + \sqrt{v_2} + \sqrt{v_3}$

D. $v = v_1 + v_2 + v_3$

Answer: A

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17. One mole of an ideal gas goes from an initial state A to final state B via two processs : It first undergoes isothermal expansion from volume V to $3V$ and then its volume is reduced from $3V$ to V at constant pressure. The correct P - V diagram representing the two process in (figure)

A.

B.

C.

D.

Answer: B

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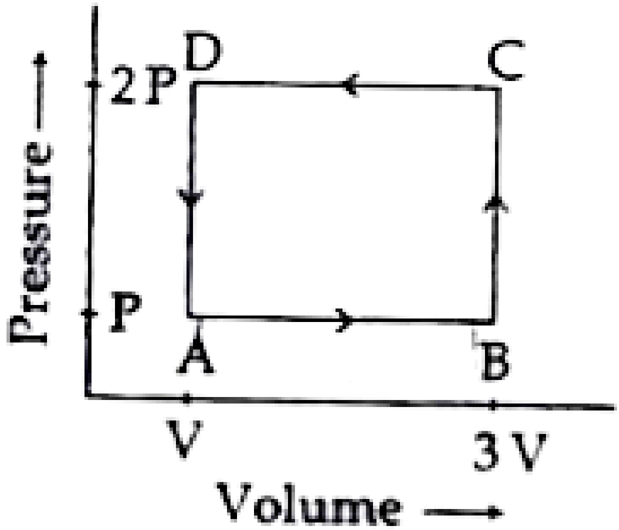
18. A thermodynamics system is taken trough the cycle ABCD as shown in figure. Heat rejected by the gas during the cycle is:



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

B. PV

C. $2PV$

D. $4PV$

Answer: C

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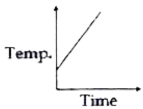
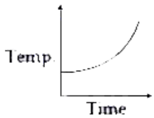
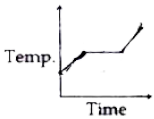
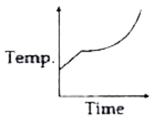
19. Liquid oxygen at $50K$ is heated to $300K$ at constant pressure of $1atm$. The rate of heating is constant. Which of the following graphs represents the variation of temperature with time?

A. (1) 

B. (2) 

C. (3) 

D. (4) 

Answer: C

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20. If the radius of a star is R and it acts as a black body, what would b the temperature of the star, in which the rate of energy production is Q?

A. $\left(4\pi R^2 Q/\sigma\right)^{1/4}$

B. $\left(Q/4\pi R^2\sigma\right)^{1/4}$

C. $Q/4\pi R^2\sigma$

D. $\left(Q/4\pi R^2\sigma\right)^{-1/2}$

Answer: B

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21. A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux ϕ (wb) linked with the coil varies with time t (sec) as $f = 50t^2 + 4$, the current in the coil at $t = 2$ sec is

A. 2A

B. 1A

C. 0.5 A

D. 0.1 A

Answer: C

22. The current (I) in the inductance is varying with time according to the plot shown in figure.

Which one of the following is the correct variation of voltage with time in the coil ?

A. 

B.

C.

D.

Answer: B

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23. In an electrical circuit R, L, C and an AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\pi/3$. If instead, C is removed from the circuit, difference the phase difference is again $\pi/3$. The power factor of the circuit is

A. 1

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

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

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

Answer: A

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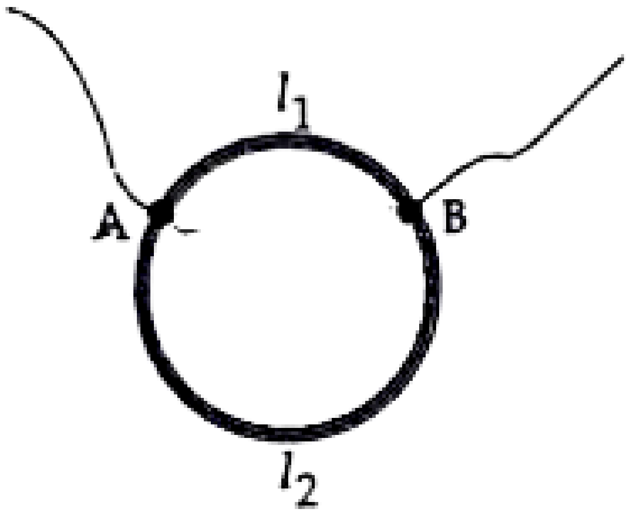
24. A ring is made of a wire having a resistance $R_0 = 12\Omega$. Find the points A and B, as shown in the figure, at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$:



A. $\frac{l_1}{l_2} = \frac{3}{8}$

B. $\frac{l_1}{l_2} = \frac{1}{2}$

C. $\frac{l_1}{l_2} = \frac{5}{8}$

D. $\frac{l_1}{l_2} = \frac{1}{3}$

Answer: B

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25. If voltage across a bulb rated 220 volt-100 watt drops by 2.5% of its value, the percentage of the rated value by which the power would decrease is

A. 0.05

B. 0.1

C. 0.2

D. 2.5%

Answer: A

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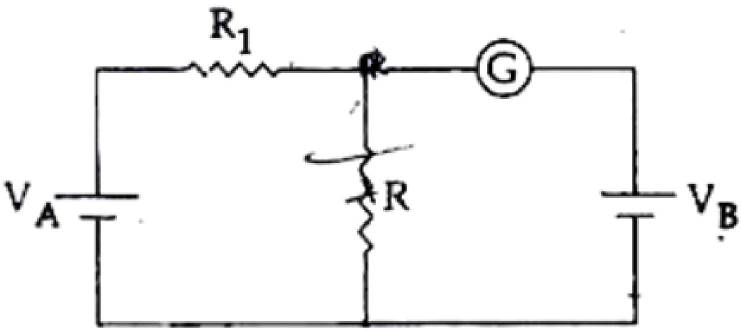
26. In the circuit shown the cells A and B have negligible resistance. For $V_A = 12V, R_1 = 500\Omega$ and $R = 100\Omega$ the galvanometer (G) shows no deflection. The value of VB is



A. 12V

B. 6V

C. 4V

D. 2V

Answer: D

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27. The electric field associated with an electromagnetic wave in vacuum is given by $\vec{E} = \hat{i}40\cos\left(kz = 6 \times 10^{8}t\right)$, when E, z and t are in volt/m metre and second respectively

find the wave vector.

A. $6m^{-1}$

B. $3m^{-1}$

C. $2m^{-1}$

D. $0.5m^{-1}$

Answer: C

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28. What is the flux through a cube of side $'a'$ if a point charge of q is at one of its corner :

A. $\frac{q}{\in_0}$

B. $\frac{q}{2 \in_0} 6a^2$

C. $\frac{2q}{\in_0}$

D. $\frac{q}{8 \in_0}$

Answer: D

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29. An electric dipole moment p is placed in an electric field of intensity $'E'$. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when $\theta = 90^\circ$, the torque and the potential energy of the dipole will respectively be

A. $pE\sin\theta, 2pE\cos\theta$

B. $pE\cos\theta, -pE\sin\theta$

C. $pE\sin\theta, -pE\cos\theta$

D. $pE\sin\theta, -2pE\cos\theta$

Answer: C

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30. Four point charges $-Q, -q, 2q$ and $2Q$ are placed, one at each corner of the square. The relation between Q and q for which the potential at the centre of the square is zero is

A. Q=q

B. $Q = \frac{1}{q}$

C. Q=-q

D. $Q = -\frac{1}{q}$

Answer: C

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31. A compose needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It

A. Will staty in north-south direction only

B. Will stay in east-west direction only

C. Will becomes rigid showing no movement

D. Will stay in any position

Answer: D

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32. A milli-voltmeter of 25 milli-volt range is to be converted into an ammeter of 25 ampere range. The value (in ohm) of necessary shunt will be:

A. 1

B. 0.05

C. 0.001

D. 0.01

Answer: C

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33. Two similar coils of radius R are lying concentriclaly with their planes at right angels to each other. The currents flowing in them are I and $2I$ respectively. The resulant magntic field induction at the centre will be

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

B. $\frac{\mu_0 I}{R}$

C. $\frac{\sqrt{5}\mu_0 I}{2R}$

D. $\frac{3\mu_0 I}{2R}$

Answer: C

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34. An alternating electric field, of frequency v, is applied across the dees (radius=R) of a cyclotron that is being used to accelerate protons (mass=m) the operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by:

A. $B = \dfrac{2\pi m v}{e}$ and $K = 2m\pi^2 v^2 R^2$

B. $B = \dfrac{mv}{e}$ and $K = m^2 \pi v R^2$

C. $B = \dfrac{mv}{e}$ and $K = 2m\pi^2 v^2 R$

D. $B = \dfrac{2\pi m v}{e}$ and $K = m^2 \pi v R^2$

Answer: A

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35. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is $20 cm$. The focal lengths of lenses are

A. 18 cm, 2 cm

B. 11 cm, 9 cm

C. 10 cm, 10 cm

D. 15 cm, 5 cm

Answer: A

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36. A ray of light is incident at small angle I on the surface of prism of small angle A and emerges normally from the oppsite surface. If the refractive index of the material of the prism is mu, the angle of incidence is nearly equal to

A. A/μ

B. $A/2\mu$

C. μA

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

Answer: C

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37. A concave mirrorr of focal length f_1 is placed at a distance of d from a convex lens of focal length f_2. A beam of light coming from infinity and falling on this convex lens-concave mirrorr combination returns to infinity. The distance d must equal.

A. $2f_1 + f_2$

B. $-2f_1 + f_2$

C. $f_1 + f_2$

D. $-f_1 + f_2$

Answer: A

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38. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index.

A. greater than that of glass

B. less than that of glass

C. equal to that of glass

D. less than one

Answer: C

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39. A α -parhticle moves in a circular path of radius $0.83cm$ in the presence of a magnetic field of $0.25Wb/m^2$. The de-Broglie wavelength assocaiated with the particle will be

A. 10 Å

B. 0.01 Å

C. 1 Å

D. 0.1 Å

Answer: B

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40. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be $3.57V$. The threshold frequency of the material is

A. $1.6 \times 10^{15} Hz$

B. $2.5 \times 10^{15} Hz$

C. $4 \times 10^{15} Hz$

D. $5 \times 10^{15} Hz$

Answer: A

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41. A modern 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

A. 62×10^{20}

B. 3×10^{19}

C. 1.5×10^{20}

D. 6×10^{18}

Answer: C

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42. Electron in hydrogen atom first jumps from third excited state to second excited state and then form second excited state to first excited state. The ratio of wavelength $\lambda_1 : \lambda_2$ emitted in two cases is

A. $27/5$

B. $20/7$

C. $7/5$

D. $27/20$

Answer: B

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43. An electrons of a stationary hydrogen aton passes form the fifth enegry level to the ground level. The velocity that the atom acquired as a result of photon emission will be

(m is the mass of the electron, R, Rydberg constanrt and h, Planck's constant)

A. $\frac{25m}{24hR}$

B. $\frac{24m}{24hR}$

C. $\frac{24m}{25hR}$

D. $\frac{25m}{24hR}$

Answer: C

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44. If the nuclear radius of $.^{27}A1$ is 3.6 Fermi, the approximate nuclear radius of $64Cu$ in Fermi is :

A. 4.8

B. 3.6

C. 2.4

D. 1.2

Answer: A

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45. A mixture consists of two radioactive materials A_1 and A_2 with half-lives of $20s$ and $10s$ respectively. Initially the mixture has $40g$ of A_1 and $160g$ of a_2. The amount the two in the mixture will become equal after

A. 20 s

B. 40 s

C. 60 s

D. 80 s

Answer: B

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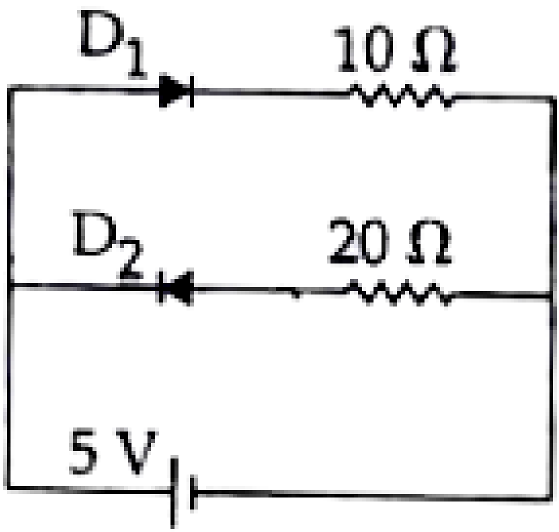
46. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is



A. 0.25 A

B. 0.5 A

C. 0.75 A

D. zero

Answer: B

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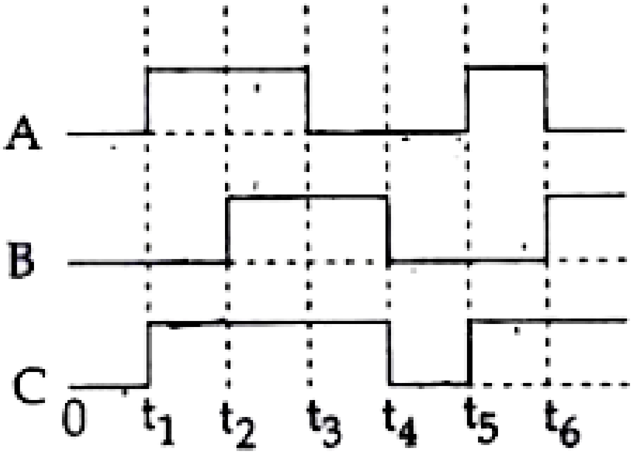
47. The figure shown a logic circuit with two inputs A and B and the output C. The voltage wave farms across A, B and C are given. The logic circuit gate is



A. AND gate

B. NAND gate

C. OR gate

D. NOR gate

Answer: C

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48. In a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is $2V$. If the base resistance is $1k\Omega$ and the current amplification of the transistor is 100, the input signal voltage is:

A. 1 m V

B. 10 m V

C. 0.1 V

D. 1.0 V

Answer: B

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49. C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator whereas Si is intrinsic semiconductor. This is because

A. The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third

B. The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

C. In case of C the valence band is not completely filled at absolute zero temperature

D. In case of C the conduction bans is partly filled even at absolute zero temperature

Answer: A

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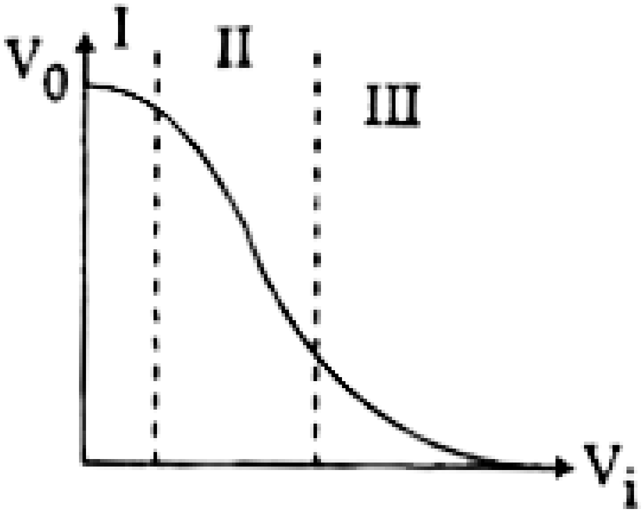
50. Transfer characteristics [output voltage $\left(V_0\right)$ vs input voltage $\left(V_i\right)$] for a base biased transistor in CE configuration is as show in the figure. For using transistor as a switch, it is used.



A. in region II

B. in region I

C. in region III

D. both in region (I) and (III)

Answer: D

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51. In an experiment four quantities a,b,c and d are measure with percentage error 1% , 2% , 3% ,and 4% respectively quantity is P is calculate as follow

$P = \dfrac{a^3 b^2}{cd}$ % error in P is

A. 14%

B. 10%

C. 7%

D. 4%

Answer: A

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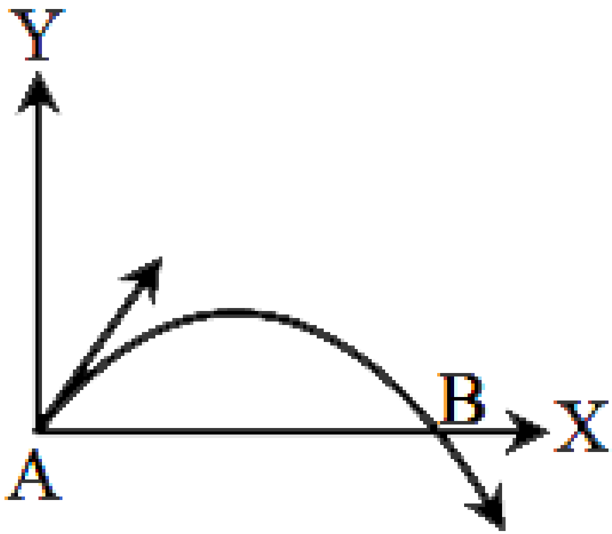
52. The velocity of a projectile at the initial point A is $\left(2\hat{i} + 3\hat{j}\right)\frac{m}{s}$.

It's velocity (in m/s) at point B is -



A. $-2\hat{i} - 3\hat{j}$

B. $-2\hat{i} + 3\hat{j}$

C. $2\hat{i} - 3\hat{j}$

D. $2\hat{i} + 3\hat{j}$

Answer: C

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53. A stone falls freely under gravity. It covered distances h_1, h_2 and h_3 in the first 5 seconds. The next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is :

A. $h_1 = 2h_2 = 3h_3$

B. $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

C. $h_2 = 3h_1$ and $h_3 = 3h_2$

D. $h_1 = h_2 = h_3$

Answer: B

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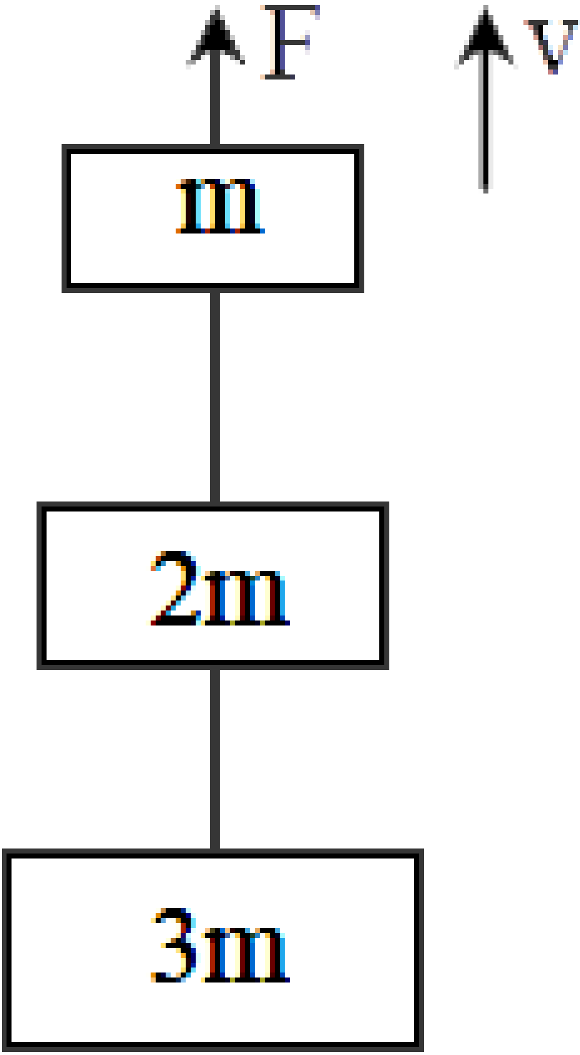
54. Three blocks with masses m, 2m and 3m are connected by strings, as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m ? (g is the acceleration due to gravity)



A. zero

B. 2 mg

C. 3 mg

D. 6 mg

Answer: A

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55. The upper half of an inclined plane with inclination ϕ is perfectly smooth while the lower half is rough. A body starting from rest at the top will again come to rest at the bottom if the coefficient of friction for the lower half is given by

A. $\mu = \frac{1}{\tan\theta}$

B. $\mu = \frac{2}{\tan\theta}$

C. $\mu = 2\tan\theta$

D. $\mu = \tan\theta$

Answer: C

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56. A uniform force of $\left(3\hat{i} + \hat{j}\right)$ N acts on a particle of mass 2kg. Hence, the particle is displaced from position $\left(2\hat{i} + \hat{k}\right)$m to position $\left(4\hat{i} + 3\hat{j} - \hat{k}\right)$m. The work done by the force on the particle is

A. 9 J

B. 6 J

C. 13 J

D. 15 J

Answer: A

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57. An explosion blows a rock into three parts. Two parts go off at right angles to each other . These two are $1kg$ first part moving with a velocity of $12ms^{-1}$ and $2kg$ second part moving with a velocity of $8ms^{-1}$. If the third part flies off with a velocity of $4ms^{-1}$. Its mass would be

A. 3 kg

B. 5 kg

C. 7 kg

D. 17 kg

Answer: B

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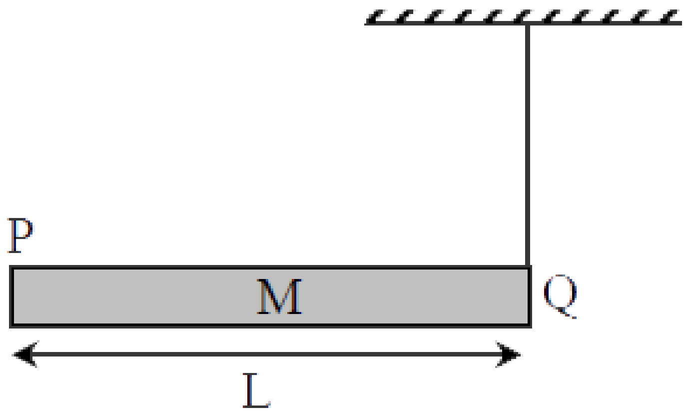
58. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in figure. When string is cut, the initial angular acceleration of the rod is -



A. $\dfrac{3g}{2L}$

B. $\dfrac{g}{L}$

C. $\dfrac{2g}{L}$

D. $\dfrac{2g}{3L}$

Answer: A

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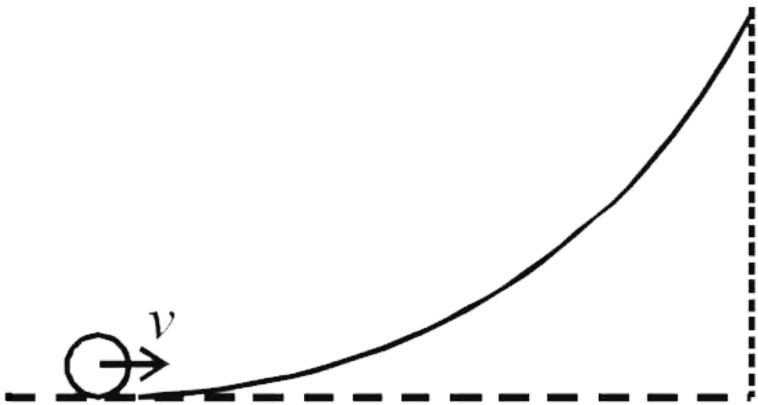
59. A small object of uniform density rolls up a curved surface with an initial velocity v. it reaches up to a maximum height of `(3v^2)/(4g)



with respect to the initial position. The object is

A. Ring

B. Solid sphere

C. Hollow sphere

D. Disc

Answer: D

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60. A body of mass m taken form the earth's surface to the height is equal to twice the radius (R) of the earth. The change in potential energy of body will be

A. mg 2R

B. $\frac{2}{3}$ mgR

C. 3 mgR

D. $\frac{1}{3}$ mgR

Answer: B

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61. Infinite number of bodies, each of mass 2kg are situated on X-axis at distance $1m, 2m, 4m, 8m,$ respectively from the origin, What is the resulting gravitational potential due to this system at the origin ?

A. $-G$

B. $-\frac{8}{3}G$

C. $-\frac{4}{3}$

D. $-4G$

Answer: D

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62. The following four wires are made of the same material which of these will have the largest extension when the same tension is applied

A. length = 50 cm, diameter = 0.5 mm

B. length = 100 cm, diameter = 1 mm

C. length = 200 cm, diameter = 2 mm

D. length = 300 cm, diameter = 3 mm

Answer: A

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63. The wattability of a surface by a liquid depends primarily on

A. viscosity

B. surface tension

C. density

D. angle of contact between the surface and the liquid

Answer: D

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64. The molar specific heats of an ideal gas at constant pressure and volume are denotes by C_P and C_υ respectively. If $\gamma = \frac{C_P}{C_\upsilon}$ and R is the universal gas constant, then C_υ is equal to

A. $\frac{1+\gamma}{1-\gamma}$

B. $\frac{R}{(\gamma - 1)}$

C. $\frac{(\gamma - 1)}{R}$

D. γR

Answer: B

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65. A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using.

A. Stefan's law

B. Wien's displacement law

C. Kirchoff's law

D. Newton's law of cooling

Answer: B

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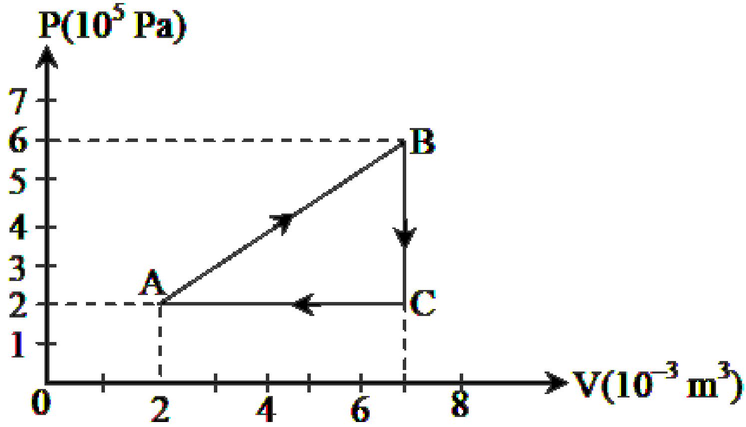
66. A gas is taken through the cycle $A \rightarrow B \rightarrow C \rightarrow A$, as shown.

What is the net work done by the gas ?



A. 2000 J

B. 1000 J

C. zero

D. -2000 J

Answer: B

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67. During an adiabatic process, the pressure of gas is found to be proportional to the cube of its absolute temperature. The ratio of $\left(C_{p,m}/C_{v,m}\right)$ for gas is :

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

B. 2

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

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

Answer: D

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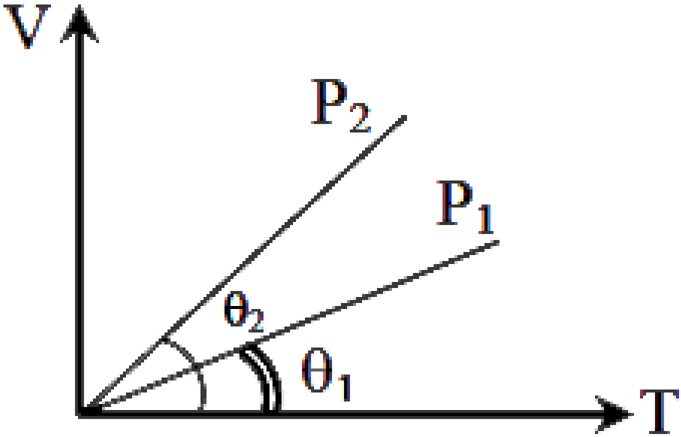
68. In the given $(V - T)$ diagram, what is the relation between pressures P_1 and P_2 ?



A. $P_2 = P_1$

B. $P_2 > P_1$

C. $P_2 < P_1$

D. cannot be predicted

Answer: C

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69. The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from T_1 K to T_2 K is :

A. $\frac{3}{8}N_a k_B(T_2 - T_1)$

B. $\frac{3}{2}N_a k_B(T_2 - T_1)$

C. $\frac{3}{4}N_a k_B(T_2 - T_1)$

D. $\frac{3}{4}N_a k_B\left(\frac{T_2}{T_1}\right)$

Answer: A

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70. A wave travelling in the $+ve$ x-direction having displacement along y-direction as 1m, wavelength 2π m and frequency of $1/\pi$ Hz is represented by

A. $y = \sin(x - 2t)$

B. $y = \sin(2\pi x - 2\pi t)$

C. $y = \sin(10\pi x - 20\pi t)$

D. $y = \sin(2\pi x + 2\pi t)$

Answer: A

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71. If we study the vibration of a pipe open at both ends, then the following statements is not true

A. Open end will be antinode

B. Odd harmonics of the fundamental frequency will be generated

C. All harmonics of the fundamental frequency will be generated

D. Pressure change will be maximum at both ends.

Answer: D

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72. A source of unknown frequency gives 4 beats//s, when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 The unknown frequency is

A. 254 Hz

B. 246 Hz

C. 240 Hz

D. 260 Hz

Answer: A

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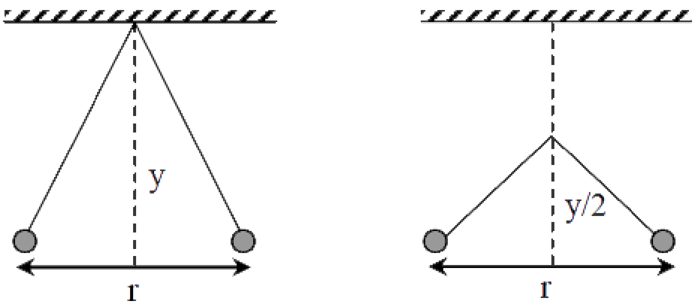
73. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become -



A. $\left(\frac{1}{\sqrt{2}}\right)^{2}$

B. $\left(\frac{r}{\sqrt[3]{2}}\right)$

C. $\left(\frac{2r}{\sqrt{3}}\right)$

D. $\left(\frac{2r}{3}\right)$

Answer: B

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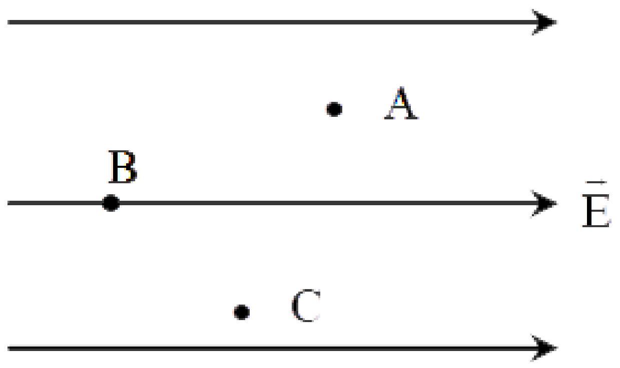
74. A, B and C are three points in a uniform electric field. The electric potential is -



A. maximum at A

B. maximum at B

C. maximum at C

D. same at all the three points A, B and C

Answer: B

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75. A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be

A. 2Ω

B. 4Ω

C. 8Ω

D. 16Ω

Answer: D

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76. The internal resistance of a $2.1V$ cell which gives a current $0.2A$ through a resistance of 10Ω

A. 0.2Ω

B. 0.5Ω

C. 0.8Ω

D. 1.0Ω

Answer: B

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77. The resistance of the four arms P, Q, R and S in a Wheatstone's bridge are $10ohm30ohm$ and $90ohm$ rerspectively. The e.m.f. and internal resistance of the cell are $7vo <$ and $5ohm$ respectively. If the galvanometer resistance is $50ohm$, the current drawn for the cell will be

A. 1.0 A

B. 0.2 A

C. 0.1 A

D. 2.0 A

Answer: B

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78. When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial accelaration $3a_0$ towards west. The electric and the maximum possible magnetic field in the room

(i) $\frac{ma_0}{e}$, towards west

(ii) $\frac{2ma_0}{ev_0}$, downward

(iii) $\frac{ma_0}{e}$, towards east

(iv) $\frac{2ma_0}{ev_0}$, upward

A. $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ up

B. $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ down

C. $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ up

D. $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ down

Answer: B

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79. A current loop in a magnetic field

A. experiences a torque whether the field is uniform or non-uniform in all orientations

B. can be in equilibrium in one orientation

C. can be in equilibrium in two orientations, both the equilibrium states are unstable

D. can be in equilibrium in two orientations, one stable while the other is unstable

Answer: D

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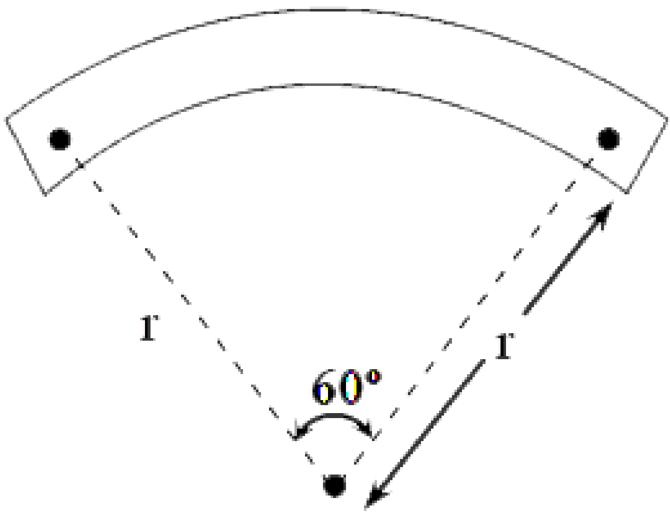
80. A bar magnet of length $'l'$ and magnetic dipole moment 'M' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be –



A. M

B. $\frac{3}{\pi}M$

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

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

Answer: B

View Text Solution

81. A wire loop is rotated in magneitc field. The frequency of change of direction of the induced e.m.f. is.

A. once per revolution

B. twice per revolution

C. four times per revolution

D. six times per revolution

Answer: B

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82. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when

A. frequency of the AC source is decreased

B. number of turns in the coil is reduced

C. a capacitance of reactance $X_C = X_L$ is included in the same circuit

D. an iron rod is inserted in the coil

Answer: D

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83. The condition under which a microwave oven heats up a food item containing water molecules most efficiently is:

A. The frequency of the microwaves must match the resonant frequency of water molecules

B. The frequency of the microwaves has no relation with natural frequency of water molecules

C. Microwaves are heat waves, so always produce heating

D. Infra-red waves produce heating in a microwave oven

Answer: A

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84. In the spectrum of hydrogen atom, the ratio of the longest wavelength in Lyman series to the longest wavelangth in the Balmer series is:

A. $\frac{5}{27}$

B. $\frac{3}{23}$

C. $\frac{7}{29}$

D. $\frac{9}{31}$

Answer: A

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85. The half-life of a radioactive isotope X is 20 years. It decays to another element Y which is stable. The two elements X and Y

were found to be in the ratio of $1:7$ in a sample of a given rock. The age of the rock was estimated to be.

A. 40 years

B. 60 years

C. 80 years

D. 100 years

Answer: B

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86. A certain mass of hydrogen is changed to helium by the process of fusion. The mass defect in fusion reaction is $0.02866u$. The energy liberated per u is

(given $1u = 931MeV$)

A. 2.67 MeV

B. 26.7 MeV

C. 6.675 MeV

D. 13.35 MeV

Answer: C

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87. For photoelectric emission from certain metal the cut - off frequency is v. If radiation of frequency $2v$ incident on the metal plate , the maximum possible velocity of the emitted electron will be (m is the electron mass).

A. $\sqrt{hv/(2m)}$

B. $\sqrt{hv/m}$

C. $\sqrt{2hv/m}$

D. $2\sqrt{hv/m}$

Answer: C

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88. The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by

A. $\lambda_p \propto \lambda_e^2$

B. $\lambda_p \propto \lambda_e$

C. $\lambda_p \propto \sqrt{\lambda_e}$

D. $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$

Answer: A

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89. A plano convex lens fits exactly into a plano concave lens. Their plane surfaces are parallel to each other. If the lenses are made of different materials refractive indices μ_1 and μ_2 and R is the radius curvature of the curved surface of the lenses, the focal length of the combination is

A. $\dfrac{R}{2\left(\mu_1+\mu_2\right)}$

B. $\dfrac{R}{2\left(\mu_1-\mu_2\right)}$

C. $\dfrac{R}{\left(\mu_1-\mu_2\right)}$

D. $\dfrac{2R}{\left(\mu_2-\mu_1\right)}$

Answer: C

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90. For a normal eye, the cornea of eye provides a converging power of $40D$ and the least converging power of the eye lens behind the cornea is $20D$. Using this information, the distance between the retina and the cornea eye lens can be estimated to be

A. 5 cm

B. 2.5 cm

C. 1.67 cm

D. 1.5 cm

Answer: C

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91. In Young's double-slit experiment, the slits are $2mm$ apart and are illuminated by photons of two wavelengths $\lambda_1 = 12000\text{Å}$ and $\lambda_2 = 10000\text{Å}$. At what minimum distance from the common central bright fringe on the screen $2m$ from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?

A. 8 mm

B. 6 mm

C. 4 mm

D. 3 mm

Answer: B

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92. A parallel beam of fast moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct?

A. Diffraction pattern is not observed on the screen in the case of electrons

B. The angular width of the central maximum of the diffraction pattern will increase

C. The angular width of the central maximum will decrease

D. The angular width of the central maximum will be unaffected

Answer: C

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93. In a n-type semiconductor, which of the following statement is true?

A. Electrons are majority carriers and trivalent atoms are dopants

B. Electrons are minority carriers and pentavalent atoms are dopants

C. Holes are minority carriers and pentavalent atoms are dopants

D. Holes are majority carriers and trivalent atoms are dopants

Answer: C

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94. In a common emitter (CE) amplifier having a voltage gain G, the transistor used has transconductor 0.03 mho and current gain 25. If the above transistor is replaced with another one with transconductance 0.02 mho and current gain 20, the voltage gain will

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

B. 1.5 G

C. $\frac{1}{3}G$

D. $\frac{5}{4}G$

Answer: A

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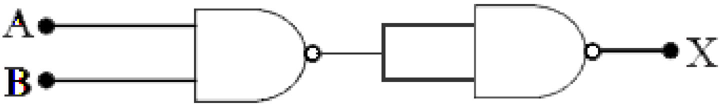
95. The output (X) of the logic circuit shown in figure will be -



A. $X = \bar{A}.\bar{B}$

B. $X = \overline{A.B}$

C. $X = A.B$

D. $X = \overline{A + B}$

Answer: C

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Others

1. Light with an average flux of $20\frac{W}{c}m^2$ falls on a non-reflecting surface at normal incidence having surface area $20cm^2$. The energy received by the surface during time span of 1 minute is:

A. $10x10^3J$

B. $12x10^3J$

C. $24x10^3J$

D. $48x10^3J$

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2. For transistor action, which of the following statements are correct ?

A. base, emitter and collector regions should have same doping concentrations

B. base, emitter and collector regions should have same size

C. both emitter junction as well as collector junction are forward biased

D. the base region must be very thin and lightly doped

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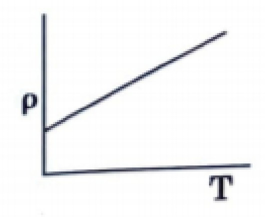
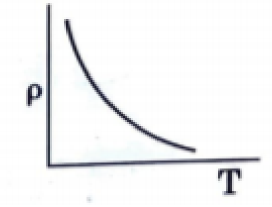
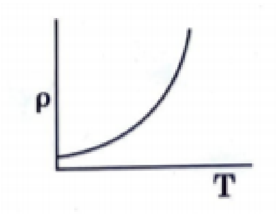
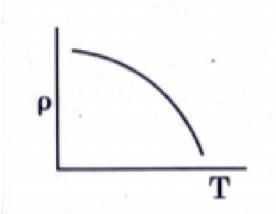
3. which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper?

A. 

B. 

C. 

D. 

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4. In certain region of space with volume 0.2 m^3 the electric potential is found to be 5V throughout. The magnitude of electric field is this region is

A. zero

B. 0.5 N/C

C. 1 N/C

D. 5 N/C

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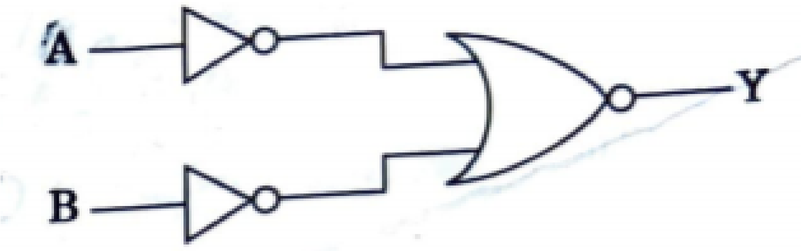
5. For the logic circuit shown the truth table is



A.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

B.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

C.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

D.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

6. A $40 microF$ capacitor is connected to a 200V, 50 Hz ac supply. Rms value of current in circuit is nearly

A. 1.7A

B. 2.05A

C. 2.5A

D. 25.1A

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7. A cylinder contains hydrogen gas at pressure of $249 kPa$ and temperature $27 degree C$. Its density is $(R = 8.3 J mol^{-1} K^{-1})$

A. $0.5k\frac{g}{m^3}$

B. $0.2k\frac{g}{m^3}$

C. $0.1k\frac{g}{m^3}$

D. $0.02k\frac{g}{m^3}$

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8. Taking into account of significant figures what is value of 9.99m - 0.0099m?

A. 9.9801 m

B. 9.98 m

C. 9.980 m

D. 9.9 m

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9. The mean free path for gas with molecular diameter d and number density n can be expressed as:

A. $\frac{1}{\sqrt{2}n\pi d}$

B. $\frac{1}{\sqrt{2}n\pi d^2}$

C. $\frac{1}{\sqrt{2}n^2\pi d^2}$

D. $\frac{1}{\sqrt{2}n^2\pi^2 d^2}$

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10. An iron rod of susceptiblity 599 is subjected to a magnetising field of 1200 A/m . The permeability of material of rod is: (`mu_0 = 4 pi x 10^(-7) Tm A ^-1)

A. $2.4\pi x 10^{-4} TmA^{-1}$

B. $8.0x10^{-5} TmA^{-1}$

C. $2.4\pi x 10^{-5} TmA^{-1}$

D. $2.4\pi x 10^{-7} TmA^{-1}$

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11. A short electric dipole has dipole moment of 16 x 10^-9 C m. The electric potential due to dipole at a point at a distance of 0.6m from centre of dipole situated on aline making an angle of 60 degrees with dipole axis:

A. 50V

B. 200V

C. 400V

D. zero

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12. A body weighs 72N on surface of earth what is gravitational force on it at a height equal to half radius of earth

A. 48N

B. 32N

C. 30N

D. 24N

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13. The solids which have negative temperature coefficient of resistance are:

A. metals

B. insulators only

C. semiconductors only

D. insulators and semiconductors

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14. Light of frequency 1.5 times the threshold frequency is incident on a photodsensitive material . What will be the photoelectric current if frequency is halved and intensity is doubled

A. doubled

B. four times

C. one-fourth

D. zero

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15. A seriesLCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit phase difference is agin $\frac{\pi}{3}$ between current and voltage. Power factor of circuit is:

A. zero

B. 0.5

C. 1

D. -1

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16. A spherical conductor of radius 10 cm has a charge of 3.2 x 10^-7 C distributed uniformly. What is magnitude of electric field at point 15 cm from centre of sphere?

A. $1.28x10^4 \frac{N}{C}$

B. $1.28x10^5 \frac{N}{C}$

C. $1.28x10^6 \frac{N}{C}$

D. $1.28x10^7 \frac{N}{C}$

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17. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m

A. $6\hat{i}\frac{N}{m}$

B. $6\hat{j}\frac{N}{m}$

C. $-6\hat{i}\frac{N}{m}$

D. $6\hat{k}\frac{N}{m}$

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18. A charged particle having drift velocity of $7.5x10^{-4}\frac{m}{s}$ in an electric gffield of $3x10^{-10}\frac{V}{m}hasamobility \in$ m^2 V^-1 s^-1`

A. $2.25x10^{15}$

B. $2.5x10^{6}$

C. $2.5x10^{-6}$

D. $2.25x10^{-15}$

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19. A ray is incident at an angle of incidence i on one surfcae of a small angle prism (with angle of prism A) and emerges normally from opposite surface. If refractive index of material of prism is μ then the angle of incidence is nearly equal to

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

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

C. μA

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

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20. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 $\left(r_1 = 1.5r_2\right)$ through 1K are in ratio

A. 27/8

B. 44078

C. 43892

D. 43954

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21. When a uranium isotope U is bombarded with a neutron, it generates kr three neutrons

A. Ba

B. Zr

C. Kr

D. Kr

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22. The phase difference between displacement and acceleration of particle in a simple harmonic motion is

A. πrad

B. $3\frac{\pi}{2}rad$

C. $\frac{\pi}{2} rad$

D. zero

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23. A resistance wire connected in left gap of a metre bridge balances a 10 ohm resistance in right gap at point which divides bridge wire in ratio 3:2. if length of resistance wire is 1.5 m then length of 1 ohm of resistance wire is

A. $1x10^{-2}m$

B. $1x10^{-1}m$

C. $1.5x10^{-1}m$

D. $1.5x10^{-2}m$

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24. A capillary tube of radius r is immersed in water and water rises in to a height h. The mass of water in the capillary tube is 5g. Another capillary tube of radius 2 r is immersed in water. The mass of water that will rise in this tube is

A. 2.5g

B. 5.0 g

C. 10.0g

D. 20.0g

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25. The ratio of contributions made by electric field and magnetic field components to intensity of em wave is

A. c:1

B. 0.0423611111111

C. 1:c

D. $1 : c^2$

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26. In young's double slit experiment if the seperation between coherent sources is halved and the distance of the screen from coherent sources is doubled, then the fringe width becomes:

A. doubled

B. half

C. four times

D. one-fourth

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27. A long solenoid of 50 cm length having 100 turns carries a current of 2.5A. The magnetic field at centre of solenoid is:

A. $6.28x10^{-4}T$

B. $3.14x10^{-4}T$

C. $6.28x10^{-5}T$

D. $3.14x10^{-5}T$

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28. A ball is thrown vertically downward with velocity of 20 m/s from top of tower. It hits ground after some time with a velocity of 80 m /s . Height of tower is

A. 360 m

B. 340 m

C. 320 m

D. 300 m

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29. For which one one of the following bohr model is not valid

A. hydrogen atom

B. single ionised helium atom (He^{+})

C. deuteron atom

D. single ionised neon atom (Ne^{+})

Answer: D

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30. The average thermal energy for a mono-atomic gas is: (k_B is Boltzmann constant and T, absolute temperature)

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

B. $\frac{3}{2}k_BT$

C. $\frac{5}{2}k_BT$

D. $\frac{7}{2}k_BT$

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31. The increase in the width of the depletion region in a p-n junction diode is due to:

A. forward bias only

B. reverse bias only

C. both forward bias and reverse bias

D. increase in forward current

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32. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass. the centre of mass of the system from the 5 kg particle is nearly at a distance of :

A. 33 cm

B. 50 cm

C. 67 cm

D. 80 cm

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33. In a guitar , two strings A and b made of same material are slightly out of tune and produce beats of frequency 6 Hz. when tension in B is slightly decreased, the beat frequency increases to

7 Hz. If the frequency of A is 530 hz, the original frequency of B will be

A. 523 hz

B. 524 Hz

C. 536 Hz

D. 537 Hz

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34. Two cylinders A and B of equal capacity are connected to each other vis a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The sto cock is suddenly opened. The process is:

A. isothermal

B. adiabatic

C. isochoric

D. isobaric

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35. The capacitance of a parallel plate capacitor with air as Medium is $6\mu F$. With the introduction of a dielectric medium,the capacitance becomes $30\mu F$. The permittivity of the medium is:

A. $0.44 \times 10^{-13} C^2 N^{-1} m^{-2}$

B. $1.77 \times 10^{-12} C^2 N^{-1} m^{-2}$

C. $0.44 \times 10^{-10} C^2 N^{-1} m^{-2}$

D. $5.00 C^2 N^{-1} m^{-2}$

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36. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is:

A. 10V

B. $10^2 V$

C. $10^3 V$

D. $10^4 V$

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37. A wire of length L,area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is:

A. $\left(\frac{MgL}{AL}\right)$

B. $\left(\frac{Mg\left(L_1 - L\right)}{AL}\right)$

C. $\left(\frac{MgL}{AL_1}\right)$

D. $\left(\frac{MgL}{A\left(L_1 - L\right)}\right)$

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38. The Brewsters angle i_b for an interface should be:

A. $0^{\circ} < i_b < 30^{\circ}$

B. $30^{\circ} < i_b < 45^{\circ}$

C. $45^{\circ} < i_b < 90^{\circ}$

D. $i_b = 90^{\circ}$

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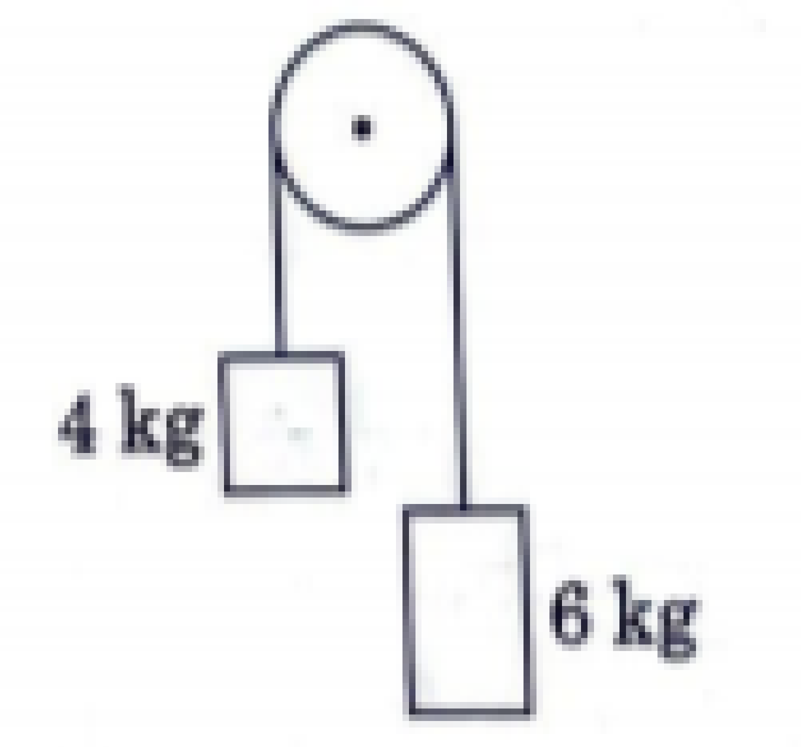
39. Two bodies of mass 4 kg and tied to the ends of a massless string. the string passes over a pully which is frictionless (see figure). the acceleration of the system in terms of acceleration due to gravity (g) is:



A. g

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

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

D. $\frac{g}{10}$

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40. Dimensions of stress are:

A. $\left[MLT^{-2}\right]$

B. $\left[ML^{2}T^{-2}\right]$

C. $\left[ML^{0}T^{-2}\right]$

D. $\left[ML^{-1}T^{-2}\right]$

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41. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale:

The pitch of the screw gauge is:

A. 0.01 mm

B. 0.25 mm

C. 0.5 mm

D. 1.0 mm

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42. The energy required to break one bond in DNA is $10^{-20}J$. This value in eV is nearly:

A. 6

B. 0.6

C. 0.06

D. 0.006

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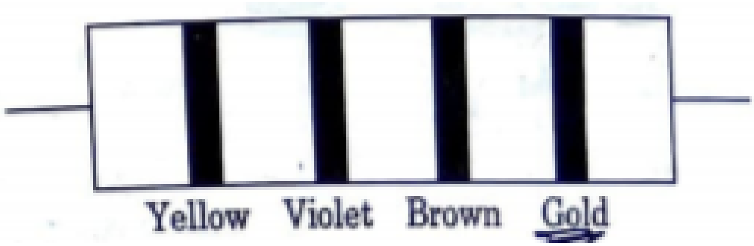
43. The color code of a resistance is given below:



The value of resistance and tolerance , respectively are

A. $470 Kohm, 5\%$

B. $47 kohm, 10\%$

C. $4.7 kohm, 5\%$

D. $470 ohm, 5\%$

44. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2m is:

A. $3.66 \times 10^{-7} rad$

B. $1.83 \times 10^{-7} rad$

C. $7.32 \times 10^{-7} rad$

D. $6.00 \times 10^{-7} rad$

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45. The energy equivalent to 0.5 g of a substance is

A. $4.5 \times 10^{16} J$

B. $4.5 \times 10^{13} J$

C. $1.5 \times 10^{13} J$

D. $0.5 \times 10^{13} J$

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