PHYSICS

BOOKS - CHHAYA PHYSICS (BENGALI ENGLISH)

QUESTION PAPER OF NEET 2017

Part A

1. Very high or very low resistance cannot be measured correctly by using the Wheatstone

bridge principle. Give reason.

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2. The voltage applied across the cathode and anode of an X-ray generating machine is 50000 V. Determine the shortest wavelength of the X-ray emitted. Given $h = 6.62 \times 10^{-34} \quad J \cdot s.$

Or, Write down the equation of β-decay. Why is the detection of neutrinos difficult?

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3. Define amplitude modulation. The height of a TV tower is 125 m. Find the maximum distance up to which transmitted signal from the tower is available (radius of the earth $= 6.4 \times 10^6$m).

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4. Define surface density of electric charge.

Two large conducting spheres carrying charges Q_1 and Q_2 are brought close to each

other. Is the magnitude of the electrostatice force between them exactly given by $\frac{Q_1 Q_2}{4\pi \in_0 r^2}$, where r is the distance between their centres?

Or, Define dielectric constant . Two charges $\pm 20 \times 10^{-6}$C, placed 2 mm apart from an electric dipole. Determine the electric field at a point 10 cm away from the centre of the dipole on its perpendicular bisector. Given, $\frac{1}{4\pi \in_0} = 9 \times 10^9 \quad N \cdot m^2 \cdot C^{-2}$.

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5. Define dielectric polarisation.

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6. Deduce an expression for the potential energy stored in a paralled plate capacitor

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7. What is cyclotron frequency? Is it possible for a cyclotron to accelerate neutrons?

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8. Write down the mathematical form of Ampere's circuital law related to magnetic field produced by electric current.

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9. A rod of length 'L' is bent in the form a circular loop with a number of turns and is suspended in a magnetic field of intensity B. Find the expression for the maximum torque

produced on the circular loop when a current ' I ' is passed through it.

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10. State one defect of Huygen's wave theory.

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11. Define resolving power of an optical instrument.

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12. The resolving power of a microscope at 6000 Å is 10^4. What is its resolving power at 4000 Å ?

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13. An image of size $\frac{1}{n}$ times the object size is formed in a convex mirror. If r is the radius of corvature of the mirror, what would be the object distance?

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14. In a magnetic field the curvature of the path of a β-particle is greater than that of an α-particle of the same speed. Explain why.

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15. What will be the wavelength of the light emitted due to a transition of electron from n = 3 orbit to n = 2 orbit in hydrogen atom?

Given: the Rydberg constant for hydrogen atom is $R_H = 1.09 \times 10^7 m^{-1}$.

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16. Why is nuclear fusion reaction called a thermonuclear reaction?

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17. In a nuclear decay, a nucleus emits one α-particle and then two β-particles one after

another. Show that the final nucleus is an isotope of the former nucleus.

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18. State one difference between n-type and p-type semiconductors.

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19. In a transistor, emitter-base junction is always forward biased, while the collector-base

junction is reverse biased. Why?

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20. Show that equivalent resistance in parallel combination is always less than each of the individual resistances connected in the combination.

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21. How can the sensitivity of a potentiometer be increased?

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22. A potentiometer has 10 wires each of 1 meter length and the total resistance is 20Ω. Find the resistance to be connected to the driving battery of emf 2 volts to produce a potential drop of $1\mu V$ per millimeter.

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23. Draw a graph representing the change in specific resistance with temperature.

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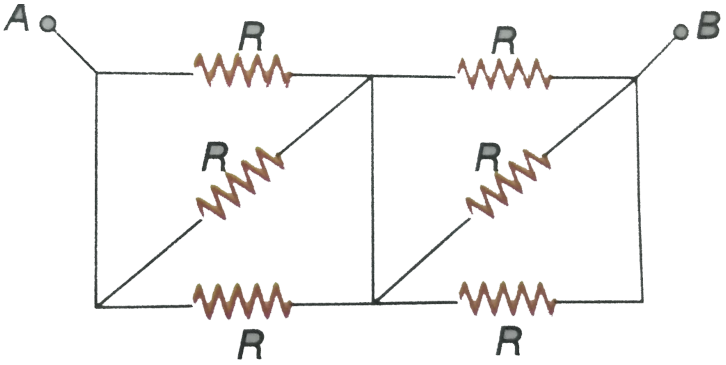
24. Find the equivalent resistance between the two ends A and B of the following circuit:



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25. Define lost volt. state the factors on which the internal resistance of a cell depends.

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26. Define wattless current.

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27. Show that Lenz's law obeys the law of conservation of energy.

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28. Show that in ac circuit the average power dissipated per cycle in a pure inductor is zero.

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29. Compare between inductive reactane and capacitive reactance.

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30. State the factors on which the peak value of alternating emf depends.

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31. In an LCR series combination, R = 400Ω, L = 100 mH and C = $1\mu F$. This combination is connected to a 25 sin 2000 t volt voltage source. Find (i) the impedance of the circuit and (ii) the peak value of the circuit current.

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32. In a certain medium the path difference 5×10^{-5} cm corresponds to a phase

difference π. Estimate the speed of the light waves of frequency 3×10^{14} Hz in the medium.

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33. The optic axes of two polaroids are inclined at an angle of 45° with other, Unpolarised light of intensity I_0 being incident on the first polaroid emerges from the second polaroid. Find the intensity of the emergent light.

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Part B Section I

1. Choose the correct alternative:

Electro-magnetic wave does not carry

A. energy

B. charge

C. information

D. momentum

Answer:

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2. Choose the correct alternative:

When green light is incident on a certain metal surface, electrons are emitted but no electrons are emitted with yellow light. If red light is incident on the same metal surface

A. more energetic electrons will be emitted

B. less energetic electrone will be emitted

C. emission of electrons will depend on the intensity of light

D. no electrons will be emitted

Answer:

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3. Choose the correct alternative:

Two capacitors of capacitances C_1 and C_2 are connected in parallel. If a charge q is given to the assembly, the charge gets shared. The ratio of the charge on the capacitor C_1 to the charge on C_2 is

A. $\frac{C_1}{C_2}$

B. $\frac{C_2}{C_1}$

C. $C_1 C_2$

D. $\frac{1}{C_1 C_2}$

Answer:

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4. Choose the correct alternative:

A parallel beam of white light falls on one face

of a prism. The light emerging from the other face suffers

A. angular deviation, no dispersion

B. dispersion, no angular deviation

C. both dispersion and angular deviation

D. none of these

Answer:

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5. Choose the correct alternative:

For a transistor if $\beta = 100$, then α will be

A. 0.99

B. 1.01

C. 100

D. 0.01

Answer:

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6. Choose the correct alternative:

The lengths, radii and specific resistances of two conducting wires are each in the ratio of 1 : 3 . If the resistance of the thinner wire is 10Ω, then the resistance of the other wire will be

A. 40Ω

B. 20Ω

C. 10Ω

D. 5Ω

Answer:

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7. Choose the correct alternative:

A radioactive element emits 2 α-particles and 3 β- particles. The values of atomic number (Z) and mass number (A) of the new element will be

A. (A + 5),(Z - 1)

B. (A - 5),(Z + 1)

C. (A - 8), (Z - 1)

D. (A - 8),(Z + 1)

Answer:

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8. Choose the correct alternative:

The number of electrons in 2C of charge is

A. 12.5×10^{-18}

B. 12.5×10^{-19}

C. 12.5×10^{18}

D. 12.5×10^{19}

Answer:

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9. Choose the correct alternative:

A luminous object is separated from a screen by a distance D. What is the greatest focal length that a lens should have to focus the image of the object on the screen?

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

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

C. D

D. 4D

Answer:

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10. Radio wave of fixed amplitude can be produced by

A. using filter

B. using rectifier

C. using FET

D. using oscillator

Answer:

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11. Choose the correct alternative:

Mutual inductance of two coils can be increased by

A. decreasing the number of turns on the coils

B. increasing the number of turns on the coils

C. winding the coils on the wooden core

D. none of these

Answer:

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12. Choose the correct alternative:

If L and R denote inuctance and resistance respectively, then the dimension of $\frac{L}{R}$ is

A. $M^0L^0T^0$

B. $M^0L^0T^1$

C. $M^2L^0T^2$

D. $M^1L^1T^2$

Answer:

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13. Choose the correct alternative:

A straight conductor of length lm carrying a current IA is bent in the form of a semicircle. The magnetic field (in tesla) at the centre of the semicircle is

A. $\frac{\pi^2 I}{l} \times 10^{-7}$

B. $\frac{\pi I}{l} \times 10^{-7}$

C. $\frac{\pi I}{l^2} \times 10^{-7}$

D. $\frac{\pi I^2}{l} \times 10^{-7}$

Answer:

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Part B Section Ii

1. What will be the change in focal length f of a concave mirror when immersed in a liquid of refractive index n?

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2. Write down the values of $(\overline{X} + X)$ and $(X \cdot \overline{X})$ in Boolean algebra.

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Question Papers Of Jee Main 2017

1. A man grows into a giant such that his linear dimensions increase by a factor of 9. Assuming that his density remains same, the stress in the leg will change by a factor of

A. 9

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

C. 81

D. $\frac{1}{81}$

Answer:

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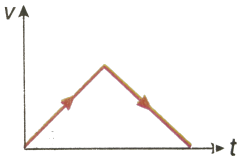
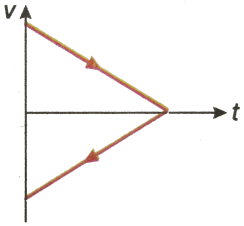
2. A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity vs time?

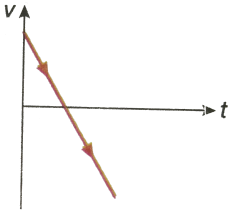
A.



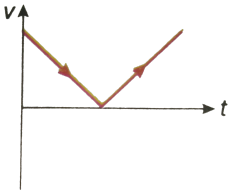
B.



C.



D.



Answer:

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3. A body of mass $m = 10^{-2}$ kg is moving in a medium and experiences a frictional force F = -kv^2. Its initial speed is $v_0 = 10m \cdot s^{-1}$. If after 10 s, its energy is $\frac{1}{8}mv_0^2$the value of k will be

A. $10^{-3}kg \cdot m^{-1}$

B. $10^{-3}kg \cdot s^{-1}$

C. $10^{-4}kg \cdot m^{-1}$

D. $10^{-1}kg \cdot m^{-1} \cdot s^{-1}$

Answer:

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4. A time dependent force F = 6t acts on a particle of mass 1 kg. If the particle starts from rest, the work done by the force during the first 1 s will be

A. 4.5 J

B. 22 J

C. 9 J

D. 18 J

Answer:

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5. The moment of inertia of a uniform cylinder of length l and radius R about its perpendicular bisector is I. What is the ratio $\frac{l}{R}$ such that the moment of inertia is minimum ?

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

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

C. 1

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

Answer:

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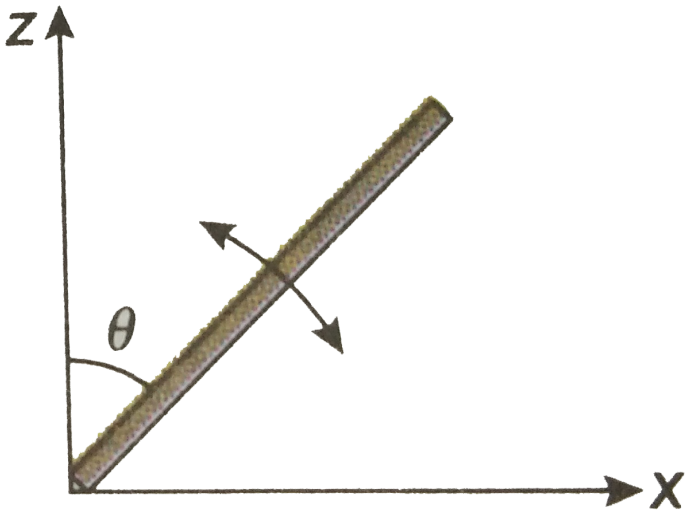
6. A slender uniform rod of mass M and length l is pivoted one end so that it can rotate in a vertical plane (see figure). There is negligible friction at the pivot. The free end is held vertically above the pivot and then released.

The angular acceleration of the rod when it makes an angle θ with the vertical is



A. $\frac{3g}{2l}\sin\theta$

B. $\frac{2g}{3l}\sin\theta$

C. $\frac{3g}{2l}\cos\theta$

D. $\frac{2g}{3l}\cos\theta$

Answer:

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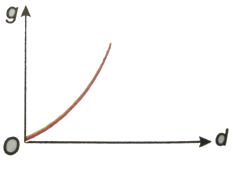
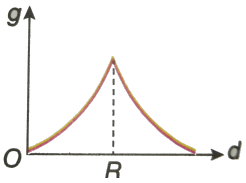
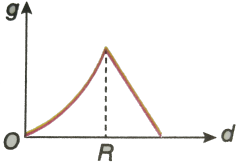
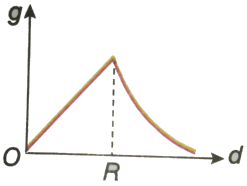
7. The variation of acceleration due to gravity g with distance d from centre of the earth is best represented by (R = earth's radius)

A. 

B. 

C. 

D. 

Answer:

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8. A copper ball of mass 100 g is at a temperature T. it is dropped in a copper calorimeter of mass 100 g, filled with 170 g of water at room temperature. Subsequently, the

temperature of the system is found to be 75° C. T is given by (given: room temperature = 30° C , specific heat of copper = 0.1 cal/g $^\circ C$)

A. $800^\circ C$

B. $885^\circ C$

C. $1250^\circ C$

D. $825^\circ C$

Answer:

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9. An external pressure P is applied on cube at $0 \quad ^{\circ}C$ so that it is equally compressed from all sides. K is the bulk modulus of the material of the cube and α is its coefficient of linear expansion. Suppose we want to bring the cube to its original size by heating. The temperature should be raised by

A. $\frac{P}{3\alpha K}$

B. $\frac{P}{\alpha K}$

C. $\frac{3\alpha}{PK}$

D. $3PK\alpha$

Answer:

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10. C_P and C_v are specific heats at constant pressure and constant volume respectively. It is observed that

$C_p - C_v = a$ for hydrogen gas

$C_p - C_v = b$ for nitrogen gas

The correct relation between a and b is

A. $a = \frac{1}{14}b$

B. a = b

C. a = 14b

D. a = 28b

Answer:

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11. The temperature of an open room of volume $30m^3$ increases from $17^\circ C$ to $27^\circ C$ due to sunshine. The atmospheric pressure in the room remains 1×10^5 Pa. If n_i and n_f are

the number of molecules in the room before and after heating, then $n_f - n_i$ will be

A. -1.61×10^{23}

B. 1.38×10^{23}

C. 2.5×10^{25}

D. -2.5×10^{25}

Answer:

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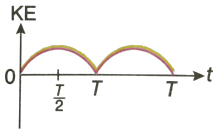
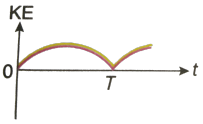
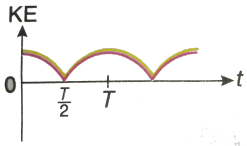
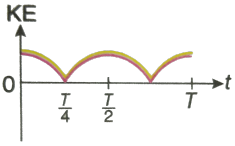
12. A particle is executing simple harmonic motion with a time period T. At time t = 0, it is at its position of equilibrium. The kinetic energy-time graph of the particle will look like

A. 

B. 

C. 

D. 

Answer:

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13. An observer is moving with half the speed of light towards a stationary microwave source emitting waves at frequency 10 GHz. What is the frequency of the microwave measured by the observer? (speed of light = $3 \times 10^8 m \cdot s^{-1}$)

A. 10.1 GHz

B. 12.1 GHz

C. 17.3 GHz

D. 15.3 GHz

Answer:

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14. An electric dipole has fixed dipole moment $\overrightarrow{p}$, which makes angle θ with respect to x- axis. When subjected to an electric field $\overrightarrow{E_1} = E\hat{i}$,it experiences a torque $\overrightarrow{T_1} = \tau\hat{k}$. When

subjected to another electric field $\overrightarrow{E_2} = \sqrt{3}E_1\hat{j}$ it experiences a torque $\overrightarrow{T_2} = -\overrightarrow{T_1}$. The angle θ is

A. 30°

B. 45°

C. 60°

D. 90°

Answer:

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15. A capacitance of $2.0\mu F$ is required in an electrical circuit across a potential difference of 1.0 kV. A large number of 1 muF capacitors are avilable which can withstand a potential difference of not more than 300 V. The minimum number of capacitors required to achieve this is

A. 2

B. 16

C. 24

D. 32

Answer:

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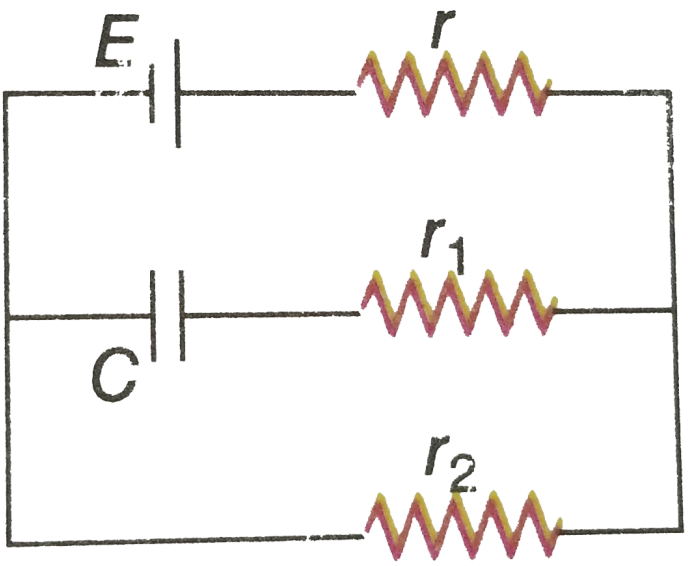
16. In the given circuit diagram when the current reaches steady state in the circuit, the charge on the capacitor of capacitance C will

be



A. CE

B. $\frac{CEr_1}{r_2 + r}$

C. $\frac{CEr_2}{r + r_2}$

D. $\frac{CEr_1}{r_1 + r}$

Answer:

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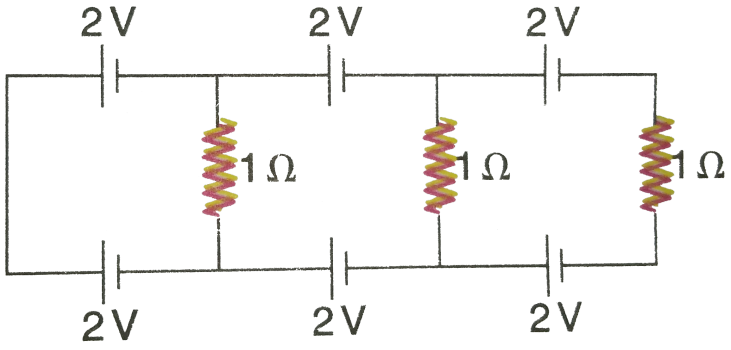
17. In the given circuit the current in each resistance is



A. 1A

B. 0.25 A

C. 0.5 A

D. zero

Answer:

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18. A magnetic needle of magnetic moment $6.7 \times 10^{-2} A \cdot m^2$ and moment of inertia $7.5 \times 10^{-6} kg \cdot m^2$ is performing simple harmonic oscillations in a magnetic field of

0.01 T. Time taken for 10 complete oscillations is

A. 6.65 s

B. 8.89 s

C. 6.98 s

D. 8.76 s

Answer:

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19. When a current of 5mA is passed through a galvanometer having a coil of resistance 15Ω, it shows full scale deflection. The value of the resistance to be put in series with the galvanometer to convert it into a volmeter of range 0 - 10 V is

A. $1.985 \times 10^3\Omega$

B. $2.045 \times 10^3\Omega$

C. $2.535 \times 10^3\Omega$

D. $4.005 \times 10^3\Omega$

Answer:

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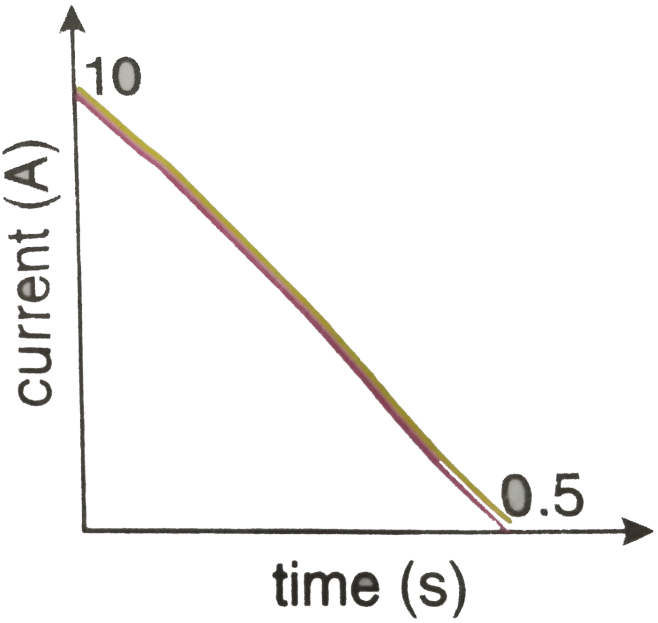
20. In a coil of resistance 100Ω, a current is induced by changing the magentic flux through it as shown in the figure. The magnitude of change in flux through the coil

is



A. 200 Wb

B. 225 Wb

C. 250 Wb

D. 275 Wb

Answer:

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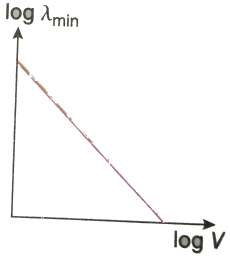
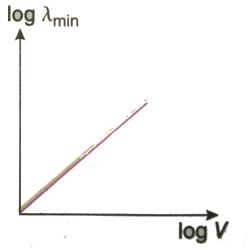
21. An electron beam is accelerated by a potential difference V to hit a metallic target to produce X- rays. It produces continuous as well as characteristic X - ray. If $\lambda_{\min}$ is the smallest possible wavelength of X-ray in the spectrum, the varistion of log $\lambda_{\min}$ with log V is correctly represented in

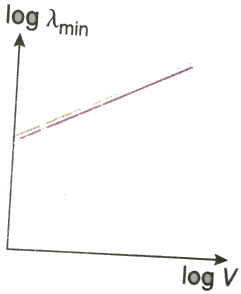
A.


log λ_{min}
log V

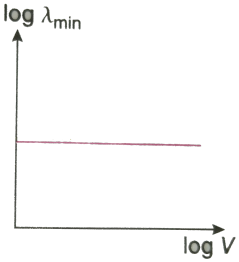
B.


log λ_{min}
log V

C.


log λ_{min}
log V

D.


log λ_{min}
log V

Answer:

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22. A diverging lens with magnitude of focal length 25 cm is placed at a distance of 15 cm from a converging lens of magnitude of focal length 20 cm. A beam of parallel light falls on the diverging lens. The final image formed is

A. real and at a distance of 40 cm from convergent lens

B. virtual and at a distance of 40 cm from the convergent lens

C. real and at a distance of 40 cm from the divergent lens

D. real and at a distance of 6 cm from the convergent lens

Answer:

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23. In a Young's double slit experiment,slits are separated by 0.5 mm, and the screen is placed 150 cm away. A beam of light consisting of two wavelengths, 650 nm and 520 nm is used to obtain interference fringes on the screen. The least distance from the common central maximum to the point where the bright fringes due to both the wavelengths coincide is

A. 1.56 mm

B. 7.8 mm

C. 9.75 mm

D. 15.6 mm

Answer:

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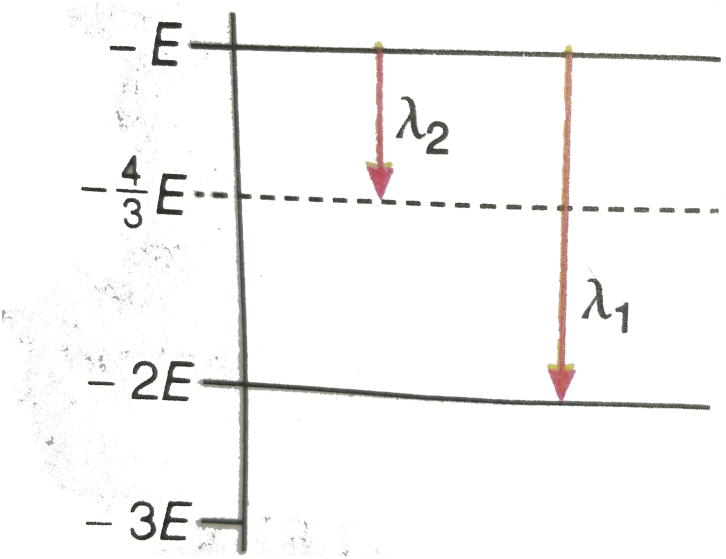
24. A particle A of mass m and initial velocity v collides with a particle B of mass $\frac{m}{2}$ which is at rest. The collision is head-on and elastic. The ratio of the Broglie wavelengths λ_A to λ_B

after collision is



A. $\frac{\lambda_A}{\lambda_B} = \frac{1}{3}$

B. $\frac{\lambda_A}{\lambda_B} = 2$

C. $\frac{\lambda_A}{\lambda_B} = \frac{2}{3}$

D. $\frac{\lambda_A}{\lambda_B} = \frac{1}{2}$

Answer:

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25. A radioactive nucleus A with a half-life, T, decays into a nucleus B. At t = 0, there is no nucleus B. At sometime t, the ratio of the number of B to that of A is 0.3. then , t is given by

A. $t = \frac{T}{2}\frac{\log 2}{\log 1.3}$

B. $t = T\frac{\log 1.3}{\log 2}$

C. $t = T\log(1.3)$

D. $t = \frac{T}{\log(1.3)}$

Answer:

Watch Video Solution

26. In a common-emitter amplifier circuit using an n-p-n transistor, the phase difference between the input and the output voltages will be

A. 45°

B. 90°

C. 135°

D. 180°

Answer:

Watch Video Solution

27. Which of the following statements is false?

A. Wheatstone bridge is the most senitive when all the four resistances are of the

same order of magnitude.

B. In a balanced Wheatstone bridge if the cell and the galvanometer are exchanged, the null point is disturbed.

C. A rheostat can be used as a potential divider.

D. Kirchhoff's second law represents energy conservation.

Answer:

28. The following observations were taken for determining surface tension T of water by capilary method:

diameter of capillary, $D = 1.25 \times 10^{-2}$ m

rise of water, h 1.45×10^{-2} m.

Using $g = 9.80 m/s^2$ and the simplified relation $T = \frac{rhg}{2} \times 10^3$N/m, the possible error in surface tension is closest to

A. $0.15\ \%$

B. $1.5\ \%$

C. $2.4\ \%$

D. $10\ \%$

Answer:

Watch Video Solution

Question Papers Of Neet 2017

1. A molecule of a substance has permanent dipole moment p. A mole of this substance is polarised by applying a strong electrostatic

field E. The direction of the field is suddenly changed by an angle of 60°. If N is the Avogadro's number the amount of work done by the field is

A. 2 NpE

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

C. NpE

D. $\frac{3}{2}$NpE

Answer:

Watch Video Solution

2. If the angle of a prism is 60° and angle of minimum deviation is 40°, then the angle of refraction will be

A. 4°

B. 30°

C. 20°

D. 3°

Answer:

Watch Video Solution

3. A student performs an experiment of measuring the thickness of a slab with a vernier calliper whose 50 divisions of the vernier scale are equal to 49 divisions of the main scale. He noted that zero of the vernier scale is between 7.00 cm and 7.05 cm mark of the main scale and 23rd division of the vernier scale exactly coninides with the scale. the measured value of the thickness of the given slab using the calliper will be

A. 7.73 cm

B. 7.23 cm

C. 7.023 cm

D. 7.073 cm

Answer:

Watch Video Solution

4. If the longest wavelength in the ultraviolet region of hydrogen spectrum is λ_0 then the shortest wavelength in its infrared region is

A. $\frac{46}{7}\lambda_0$

B. $\frac{20}{3}\lambda_0$

C. $\frac{36}{5}\lambda_0$

D. $\frac{27}{4}\lambda_0$

Answer:

Watch Video Solution

5. A circular coil of radius 10 cm, 500 turns and resistance 2Ω is placed with its plane, perpendicular to the horizontal component of

the earth's magnetic field. It is rotated about its vertical diameter through 180° in 0.25s. The induced emf in the coil is (take $H_E = 3.0 \times 10^{-5} T$)

A. 6.6×10^{-4}V

B. $1.4 \times 10^{-2} V$

C. 2.6×10^{-2} V

D. 3.8×10^{-3} V

Answer:

Watch Video Solution

6. Two reasons for using soft iron as the material for electromagnets.

A. low permeability and high retentivity

B. high permeability and low retentivity

C. low permeability and low retentivity

D. high permeability and high retentivity

Answer:

Watch Video Solution

7. A person has near point at 60 cm. The focal length of spectacles lenses to red at 22 cm having glasses separated 2 cm from the eyes is

A. 40 cm

B. 10 cm

C. 20 cm

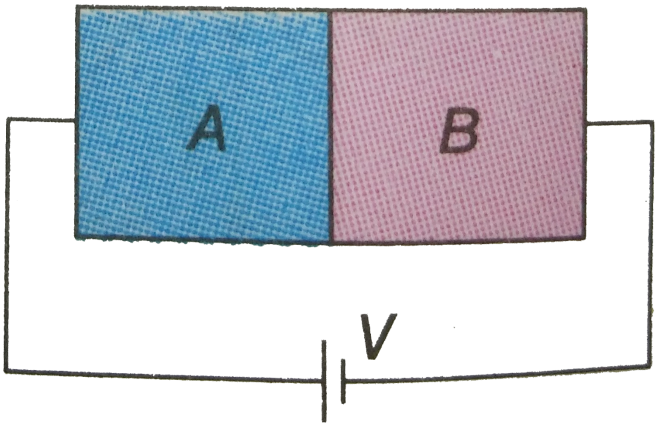
D. 30 cm

Answer:

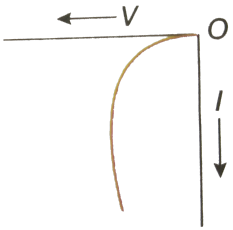
Watch Video Solution

8. Two sides of a semiconductor germanuim crystal A and B are doped with arsenic and indium, respectively, They are connected to a battery as shown in figure.

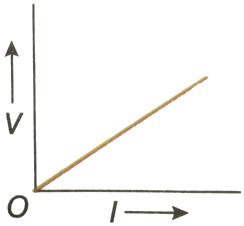
The correct graph between current and voltage for the arrangement is



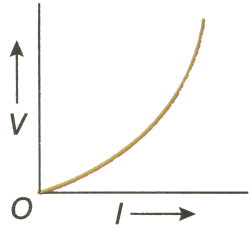
A.



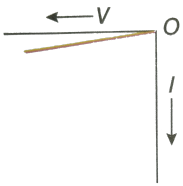
B.



C.



D.



Answer:

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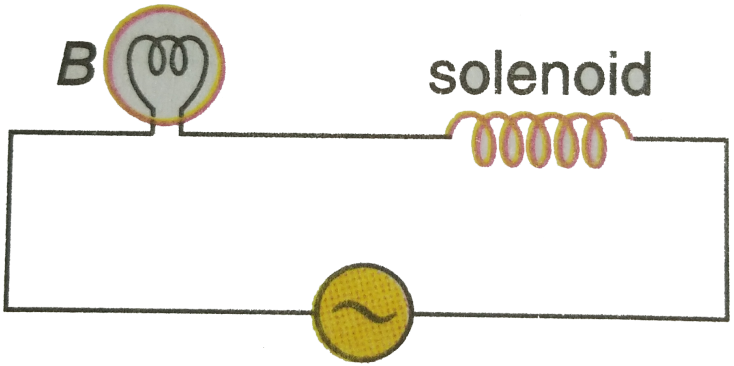
9. A bulb connected in series with an air-cored solenoid is lit by an ac source. If a soft iron core is introduced in the solenoid



A. the bulb stops glowing

B. the bulb will glow brighter

C. there is no change in glow of bulb

D. the bulb will become dimmer

Answer:

Watch Video Solution

10. Due to Doppler effect, the shift in wavelength observed is 0.1 Å, for a star producing a wavelength 6000 Å. The velocity of recession of the star will be

A. 20 $km \cdot s^{-1}$

B. 2.5 $km \cdot s^{-1}$

C. 10 km $\cdot s^{-1}$

D. 5 km $\cdot s^{-1}$

Answer:

Watch Video Solution

11. The angular momentum of a rigid body of mass m about an axis is n times the linear momentum (P) of the body. Total kinetic energy of the rigid body is:

A. $\frac{n^2P^2}{2}$

B. $\frac{P^2\left[1+n^2\right]}{2m}$

C. $\frac{n^2P^2}{2m}$

D. $n^2P^2 \times 2m$

Answer:

Watch Video Solution

12. A parallel plate capacitor is to be designed, using a dielectric of dielectric constant 5, so as to have a dielectric strength of $10^9 V \cdot m^{-1}$. If

the votage rating of the capacitor is 12 kV, the minimum area of each plate required to have a capacitance of 80 pF is

A. $10.5 \times 10^{-6} m^2$

B. $21.7 \times 10^{-6} m^2$

C. $25.0 \times 10^{-5} m^2$

D. $12.5 \times 10^{-5} m^2$

Answer:

Watch Video Solution

13. A cyclist on a level road takes a sharp circular turn of radius 3 m (g = $10ms^{-2}$). If the coefficient of static friction between the cycle tyres and the road is 0.2, at which of the following speeds will the cyclist not skid while taking the turn?

A. 14.4 km $\cdot h^{-1}$

B. $7.2km \cdot h^{-1}$

C. 9 km $\cdot h^{-1}$

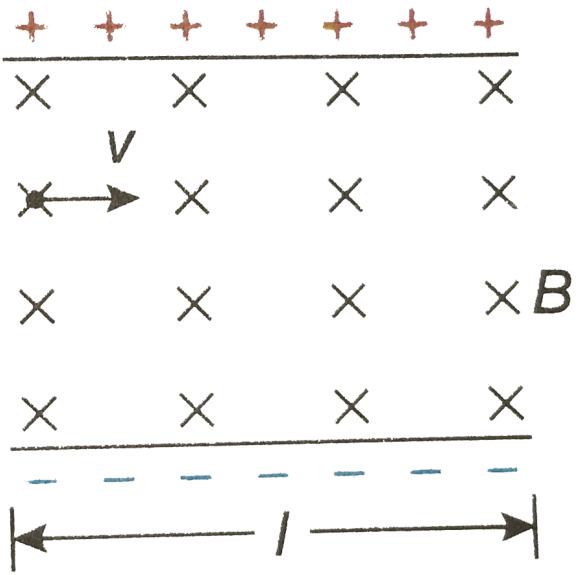
D. 10.8 km $\cdot h^{-1}$

Answer:

Watch Video Solution

14. An electron moves straight inside a charged parallel plate capacitor of uniform charge density σ. The space between the plates is filled with uniform magnetic field of intensity B, as shown in the figure. Neglecting effect of gravity, the time of straight line

motion of the electron in the capacitor is



A. $\frac{\varepsilon_0 lB}{\sigma}$

B. $\frac{\sigma}{\varepsilon_0 lB}$

C. $\frac{\varepsilon_0 B}{\sigma}$

D. $\frac{\sigma}{\varepsilon_0 B}$

Answer:

Watch Video Solution

15. The volume of 1 mole of an ideal gas with the adiabatic exponent λ is changed according to the relation $V = \frac{b}{T}$ where b = constant. The amount of heat absorbed by the gas in the process if the temperature is increased by ΔT will be

A. $\left(\frac{1-\lambda}{\lambda+1}\right)R\Delta T$

B. $\frac{R}{\lambda - 1}\Delta T$

C. $\left(\frac{2 - \lambda}{\lambda - 1}\right) R\Delta T$

D. $\frac{R\Delta T}{\lambda - 1}$

Answer:

Watch Video Solution

16. Two coherent sources of intensity ratio α interfere. The value of $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$ is

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

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

C. $\frac{1+\alpha}{2\sqrt{\alpha}}$

D. $\frac{1-\alpha}{1+\alpha}$

Answer:

Watch Video Solution

17. When the temperature of a gas is raised from 30° C to 90° C, the percentage increase in the rms velocity of the molecules will be

A. $60\ \%$

B. $10\ \%$

C. $15\ \%$

D. $30\ \%$

Answer:

Watch Video Solution

18. A parallel beam of light of wavelength λ is incident normally on a single slit of width d. Diffraction bands are obtained on a screen

placed at a distance D from the slit. The second dark band from the central bright band will be at a distance given by

A. $\frac{2\lambda D}{d}$

B. λdD

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

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

Answer:

Watch Video Solution

19. A thin uniform rod of mass M and length L is rotating about a perpendicular axis passing through its centre with a constant angular velocity ω. Two objects each of mass $\frac{M}{3}$ are attached gently to the two end of the rod. The rod will now rotate with an angular velocity of

A. $\frac{1}{3}\omega$

B. $\frac{1}{7}\omega$

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

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

Answer:

Watch Video Solution

20. Two open organ pipes of fundamental frequencies n_1 and n_2 are joined in series. The fundamental frequency of the new pipe so obtained will be

A. $(n_1 + n_2)$

B. $\frac{n_1 + n_2}{2}$

C. $\sqrt{n_1^2 + n_2^2}$

D. $\frac{n_1 n_2}{n_1 + n_2}$

Answer:

Watch Video Solution

21. The density of a metal at normal pressure is ρ. Its density when it is subjected to an excess pressure p is ρ'. If B is bulk modulus of the metal, the ratio of $\frac{\rho'}{\rho}$ is

A. $1 + \frac{B}{p}$

B. $\frac{1}{1-\frac{p}{B}}$

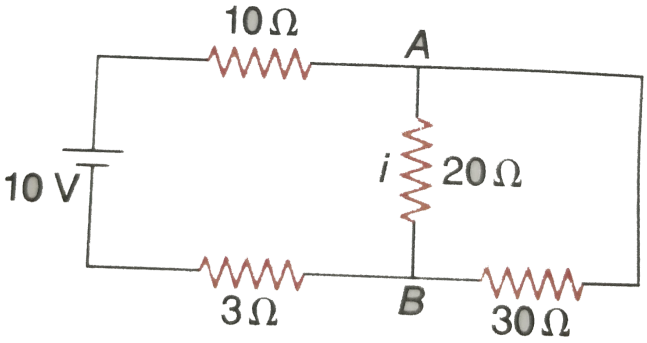
C. $1+\frac{p}{B}$

D. $\frac{1}{1+\frac{p}{B}}$

Answer:

Watch Video Solution

22. In the electrical circuit shown in the figure, the current I through the side AB is



A. $\frac{6}{25}$ A

B. $\frac{10}{33}$ A

C. $\frac{1}{5}$ A

D. $\frac{10}{63}$ A

Answer:

Watch Video Solution

23. If the mass of neutron is 1.7×10^{-27} kg, then the de Broglie wavelength of neutron of energy 3 eV is

$\left(h = 6.6 \times 10^{-34} J \cdot s\right)$

A. 1.4×10^{-11}m

B. 1.6×10^{-10}m

C. 1.65×10^{-11}m

D. 1.4×10^{-10}m

Answer:

Watch Video Solution

24. Imagine earth to be a solid sphere of mass M and radius R. If the value of acceleration due to gravity at a depth d below earth's surface is same as its value at a height h above its surface and equal to $\frac{g}{4}$ (where g is the value of acceleration due to gravity on the surface of earth), the ratio of $\frac{h}{d}$ will be

A. 1

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

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

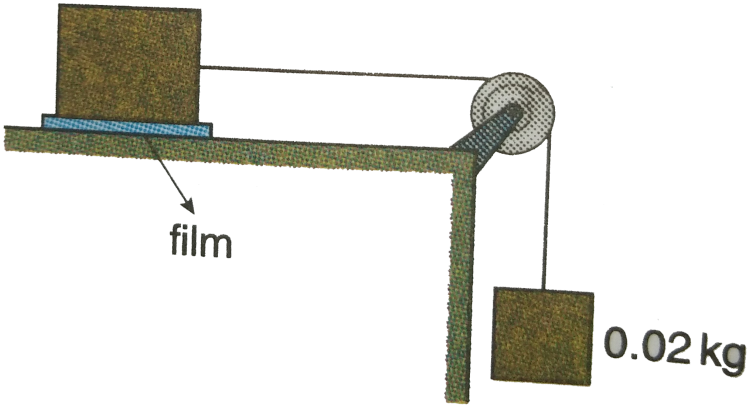
D. $\frac{2}{3}$

Answer:

Watch Video Solution

25. A metal block of base area 0.2 m^2 is connected to a 0.02 kg mass via a string that passes over an ideal pulley as shown in figure. A liquid film of thickness 0.6 mm is placed between the block and the table. When

released the block moves to the right with a constant speed of 0.17 m/s. The co-efficient of viscosity of the liquid is



A. 3.45×10^{3} Pa.s

B. 3.45×10^{-2} Pa.s

C. 3.45×10^{-3} Pa.s

D. 3.45×10^{2} Pa.s

Answer:

Watch Video Solution

26. The energy liberated per nuclear fission is 200 MeV. If 10^{20} fission occur per second the amount of power produced will be

A. 2×10^{22} W

B. 32×10^{8}W

C. 16×10^{8}W

D. 5×10^{11}W

Answer:

Watch Video Solution

27. A ball of mass 1 kg is thrown vertically upward and returns to the ground after 3 second. Another ball, thrown at 60° with vertical also stays in air for the same time before it touches the ground. The ratio of the two heights are

A. $1:3$

B. $1:2$

C. $1:1$

D. $2:1$

Answer:

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28. A body initially at rest, breaks up into two pieces of masses 2M and 3M respectively, together having a total kinetic energy E. The

piece of mass 2M, after breaking up, has a kinetic energy

A. $\frac{2E}{5}$

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

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

D. $\frac{3E}{5}$

Answer:

Watch Video Solution

29. A light beam is incident on a denser medium whose refractive index is 1.414 at an angle of incidence 45^0. Find the ratio of width of refracted beam in medium to the width of the incident beam in air.

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

B. $1:\sqrt{2}$

C. $\sqrt{2}:1$

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

Answer:

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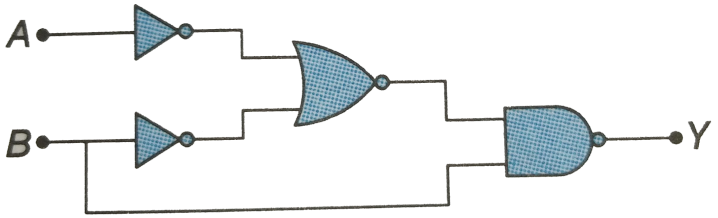
30. From the circuit of the following logic gates, the basic logic gate obtained is



A. NAND gate

B. AND gate

C. OR gate

D. NOT gate

Answer:

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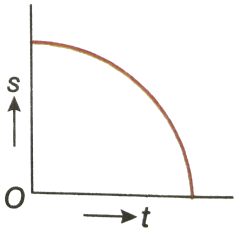
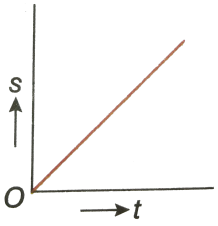
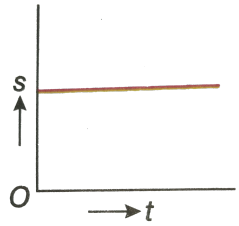
31. A body starts moving unidirectionally under the influence of a source of constant power . Which one of the graph corectly shows the variation of displacement (s) with time (t)?

A. 

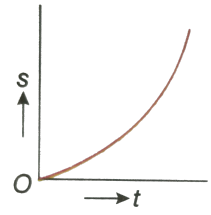
B.



C.



D.



Answer:

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32. In an experiment of photoelectric effect the stopping potential was measured to be V_1 and V_2 with incident light of wavelength λ and $\frac{\lambda}{2}$, respectively. The relation between V_1 and V_2 is

A. $V_2 > 2V_1$

B. $V_2 < V_1$

C. $V_1 < V_2 < 2V_1$

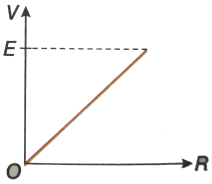
D. $V_2 = 2V_1$

Answer:

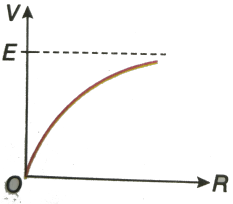
Watch Video Solution

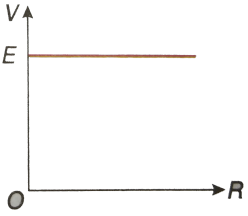
33. A cell of emf E and internal resistance r is connected to a variable external resistor R. The graph which gives the terminal voltage of cell V with respect to R is

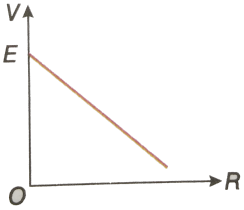
A.



B.



C. 

D. 

Answer:

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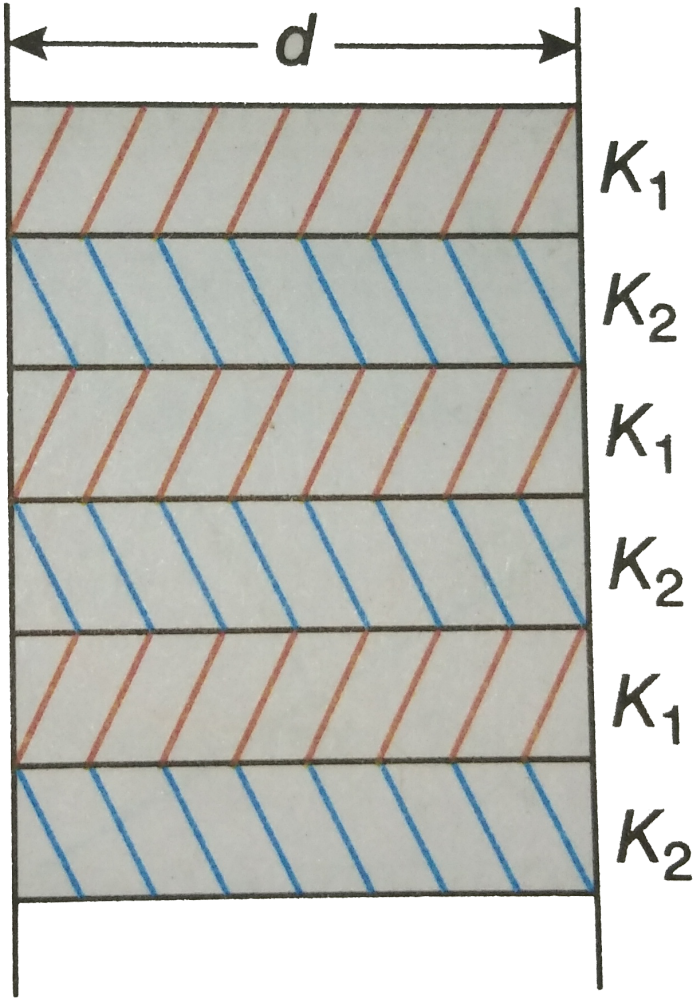
34. A wall consists of alternating blocks of length d and coefficient of thermal conducitivitly K_1 and K_2 respectively as

shown in figure. The cross sectional area of the blocks are the same. The equivalent coefficient of thermal conductivity of the wall

between left and right is



A. $\frac{K_1 + K_2}{2}$

B. $\frac{2K_1K_2}{K_1+K_2}$

C. $\frac{K_1K_2}{3}$

D. $\frac{3K_1K_2}{K_1+K_2}$

Answer:

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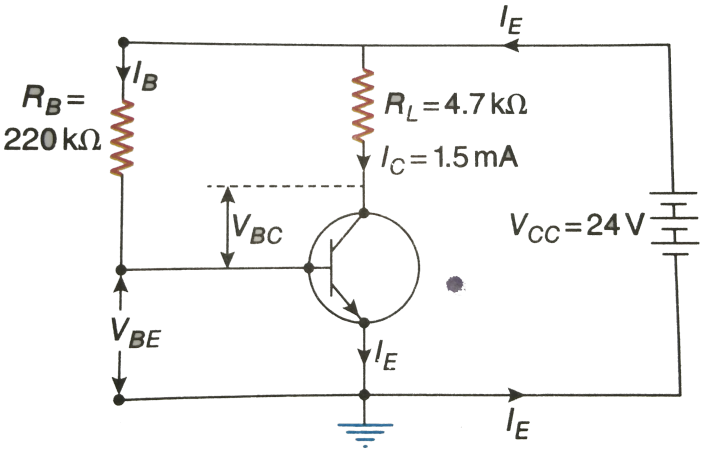
35. A common-emitter amplifier circuit is shown in the figure below. For the transistor used in the circuit the current amplification factor, β_{dc} = 100. other parameters are

mentioned in the figure.

We find that



A. $V_{BE} = +18.2 \quad V, \quad V_{BC} = -3.45V$

and amplifier is working

B. $V_{BE} = +18.5 \quad V, \quad V_{BC} = +2.85V$

and amplifier is not working

C. $V_{BE} = +20.7 \quad V, \quad V_{BC} = +3.75V$

and amplifier is not working

D. $V_{BE} = +21.5V, \quad V_{BC} = -2.75V$

and amplifier is working

Answer:

Watch Video Solution

36. The angle between $\vec{A} - \vec{B}$ and $\vec{A} \times \vec{B}$ is $\left(\vec{A} \neq \vec{B}\right)$

A. 60°

B. 90°

C. 120°

D. 45°

Answer:

Watch Video Solution

37. A satellite of mass m is in circular orbit of radius $3R_E$ about earth (mass of earth M_E, radius or earth R_E). How much additional

energy is required to transfer the satellite to an orbit of radius $9R_E$?

A. $\frac{GM_{E^m}}{3R_E}$

B. $\frac{GM_{E^m}}{18R_E}$

C. $\frac{3GM_{E^m}}{2R_E}$

D. $\frac{GM_{E^m}}{9R_E}$

Answer:

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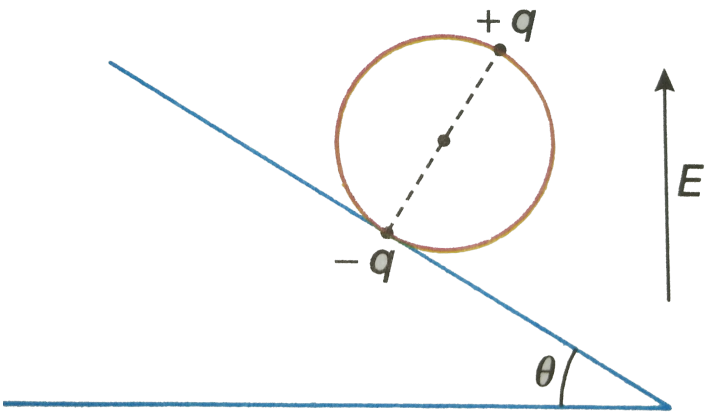
38. A wheel having mass m has charges +q and -q on diametrically opposite points. It remains in equilibrium on a rough inclined plane in the presence of a vertical electric field E. Then value of E is



A. $\frac{mg\tan\theta}{q}$

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

C. $\frac{mg}{2q}$

D. $\frac{m > an\theta}{2q}$

Answer:

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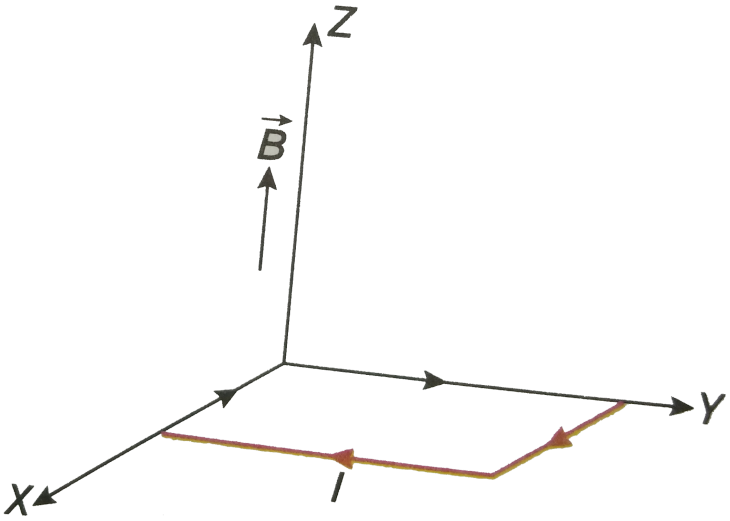
39. A uniform magnetic field of 0.3 T is established along the positive Z-direction. A rectangular loop in XY- plane of sides 10 cm and 5 cm carries a current of I = 12A as shown.

The torque on the loop is



A. $+1.8 \times 10^{-2} \hat{i} N \cdot m$

B. $-1.8 \times 10^{-2} \hat{j} N \cdot m$

C. zero

D. $-1.8 \times 10^{-2} \hat{i} N \cdot m$

Answer:

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