PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER -10 (SOLVED)

Part I

1. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work

done in moving 50 electrons from A to B is

A. $8.80 \times 10^{-17} J$

B. $-8.80 \times 10^{-17} J$

C. $4.40 \times 10^{-17} J$

D. $5.80 \times 10^{-17} J$

Answer: A

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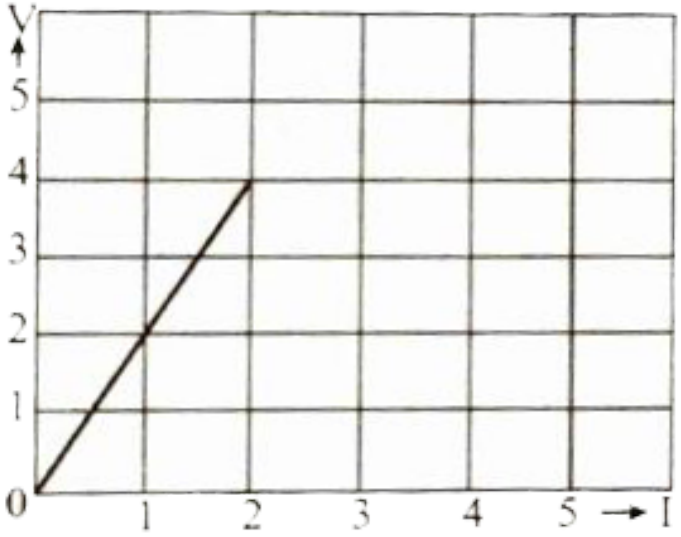
2. The following graph shows current versus voltage values of some unknown conductor. What is the resistance of this conductor?



A. 2 ohm

B. 4 ohm

C. 8 ohm

D. 1 ohm

Answer: A

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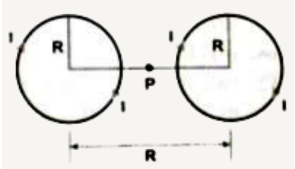
3. Two identical coils, each with N turns and radius R are Placed coaxially at a distance R as shown in the figure. If I is the current passing through the loops in the same direction,

then the magnetic field at a point P which is at exactly at $\frac{R}{2}$ distance between two coils is

..... .



A. $\frac{8N\mu_0 I}{\sqrt{5}R}$

B. $\frac{8N\mu_0 I}{5^{3/2}R}$

C. $\frac{8N\mu_0 I}{5R}$

D. $\frac{4N\mu_0 I}{\sqrt{5}R}$

Answer: B

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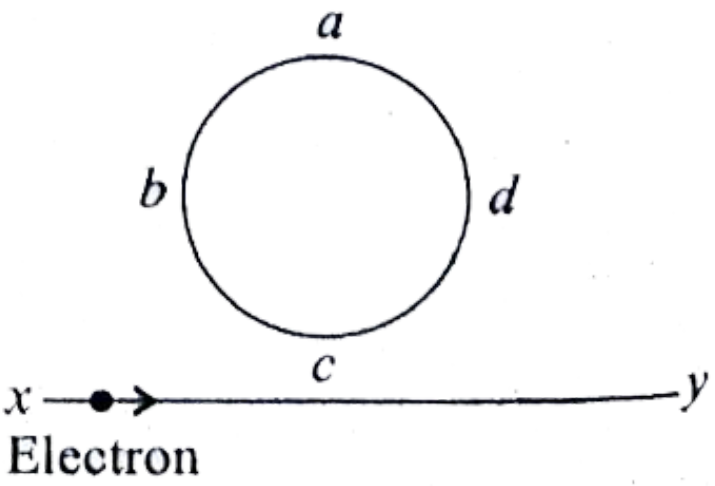
4. An electron moves on a straight line path XY as shown in the figure. The coil abed is adjacent to the path of the electron. What will be the direction of current, if any, induced in the coil?



A. The current will reverse its direction as the electron goes past the coil

B. No current will be induced

C. abcd

D. adcb

Answer: A

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5. The resistance of an ideal ammeter is _____

.

A. zero

B. small

C. high

D. infinite

Answer: A

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6. In a step-down transformer the input voltage is 22 kV and the output voltage is 550 V. The ratio of the number of turns in the secondary to that in the primary is

A. $1:20$

B. $20:1$

C. $1:40$

D. $40:1$

Answer: C

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7. If the magnetic monopole exists , then which of the Maxwell's equation to be modified ?

A. $\oint \vec{E} \cdot d\vec{A} = \frac{Q_{\text{enclosed}}}{e_0}$

B. $\oint \vec{E} \cdot d\vec{A} = 0$

C.

$$\oint \vec{E} \cdot d\vec{A} = \mu_0 I_{\text{enclosed}} + \mu_0 e_0 \frac{d}{dt} \int \vec{E} \cdot d\vec{A}$$

D. $\oint \vec{E} \cdot d\vec{l} = -\frac{d}{dt}\phi_B$

Answer: B

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8. An air bubble in glass slab of refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness of the slab is,

A. 8 cm

B. 10 cm

C. 12 cm

D. 16 cm

Answer: C

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9. When a ray of light enters a glass slab from air

A. its wavelength decreases

B. its wavelength increases

C. its frequency increases

D. neither its wavelength nor its frequency changes

Answer: A

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

A. $1.82 \times 10^{-18} m/s$

B. $1.82 \times 10^{-18} m/s$

C. $9 \times 10^{-2} m/s$

D. $3 \times 10^{-31} m/s$

Answer: D

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11. If the nuclear radius of ^{27}Al is 3.6 fermi, the approximate nuclear radius of ^{64}Cu is

A. 2.4

B. 1.2

C. 4.8

D. 3.6

Answer: C

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12. Energy of characteristic X-ray is a consequence of

A. energy of projectile electron

B. thermal energy of target

C. transition in target atoms

D. none of the above

Answer: C

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13. The specific characteristic of a common emitter amplifier is

A. High input resistance

B. Low power gain

C. Signal phase reversal

D. Low current gain

Answer: C

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14. The variation of frequency of carrier wave with respect to the amplitude of the modulating signal is called_____

A. Amplitude modulation

B. Frequency modulation

C. Phase modulation

D. Pulse width modulation

Answer: B

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15. The particle of ZnO material is 30 nm. Based on the dimension it is classified as

A. Bulk material

B. Nanomaterial

C. Soft material

D. Magnetic material

Answer: B

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Part Ii

1. Write a short note on superposition principle.

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2. If a electric field of magnitude 570 N C^{-1}, is applied in the copper wire. find the acceleration experienced by the electron.

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3. State Ampere's circuital law.

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4. Write down the equation for a sinusoidal voltage of 50 Hz and its peak value is 20 V. Draw the corresponding voltage versus time graph.

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5. What is displacement current?

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6. Why do clouds appear white?

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7. How many photons per second emanate from a 50 mW laser of 640 nm ?

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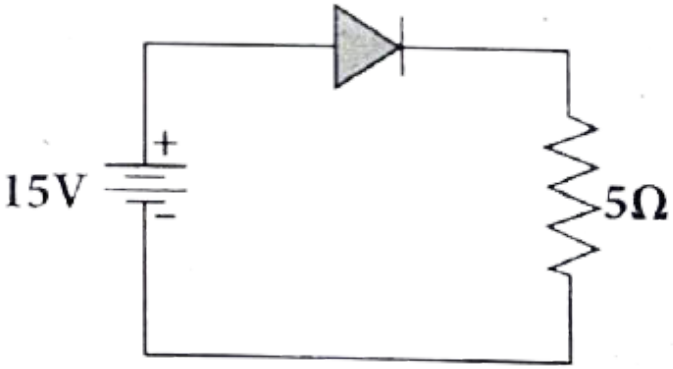
8. An ideal diode and a 5 fl resistor are connected in series with a 15 V power supply

as shown in figure below. Calculate the current that flows through the diode.



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9. Whatdo you mean by Internet of Things?

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Part Iii

1. Define electrostatic potential energy.

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2. If the resistance of coil is 3Ω at $20^{\circ}C$ and $\alpha = 0.004/^{\circ}C$ then determine its resistance t $100^{\circ}C$.

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3. What is tangent law ? Discuss in detail.

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4. What are step-up and step-down transformers ?

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5. One type of transparent glass has refractive index 1.5. What is the speed of light through

thi glass?

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6. What is a photo cell ? Mention the different types of photocells.

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7. Half lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially, the samples have equal number of

nuclei. Calculate the ratio of decayed numbers of A and B nuclei after 80 minutes.

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8. Distinguish between intrinsic and extrinsic semiconductors.

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9. Distinguish between Nanoscience and Nanotechnology.

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Part Iv

1. Obtain the expression for electric field due to an uniformly charge spherical shell.

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2. Obtain the condition for bridge balance in Wheatstone's bridge.

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3. What is the magnetic field along the axis and equatorial line of a bar magnet ?

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4. Give the advantage of AC in long distance power transmission w ith an example.

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5. What is emission spectra? Give their types

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6. Obtain the equation for radius of illumination (or) Snell's window.

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7. Explain why photoelectric effect cannot be explained on the basis of wave nature of light.

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8. Obtain the law of radioactivity. Law of radioactive decay

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9. Explain the construction and working of a full wave rectifier.

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10. Explain the three modes of propagation of electromagnetic waves through space.

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