Physicsaholics

DPP – 2 (EMI)

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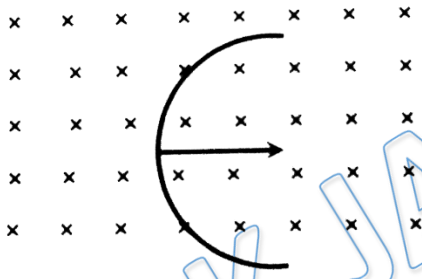
Q 1. A straight wire of length L is bent into a semicircle. It is moved in a uniform magnetic field with speed V with diameter perpendicular to the field. The induced emf between the ends of the wire is



(a) BLV (b) 2BLV
(c) 2πBLV (d) $\frac{2BLV}{\pi}$

Q 2. A straight copper wire of length 2m is perpendicular to a uniform magnetic field of induction 0.7T. It is moved at right angles to its length and magnetic field at a speed of 2m/s. Find the induced emf between the ends of the wire
(a) 2V (b) 2.8V
(c) 1V (d) 1.4V

Q 3. A straight copper wire of length 2m is perpendicular to a uniform magnetic field of induction 0.7T. It is moved at right angles to its length and magnetic field at a speed of 2m/s. If the ends of wire are joined by completing a circuit through a 4-ohm resistor (stationary), at what rate must the work be done to keep the wire moving at the constant speed of 2m/s ?
(a) 1.56 W (b) 3.12 W
(c) 0.49 W (d) 1.96 W

Q 4. A 10 meter wire kept in east-west falling with velocity 5 m/sec perpendicular to the field $0.3 \times 10^{-4}\ Wb/m^2$. The induced e.m.f. across the terminal will be
(a) 0.15 V (b) 1.5 mV
(c) 1.5 V (d) 15.0 V

Q 5. Two rails of a railway track insulated from each other and the ground are connected to a milli voltmeter. What is the reading of voltmeter, when a train travels with a speed of 180 km/hr along the track. Given that the vertical component of earth's magnetic field is $0.2 \times 10^{-4}\ Wb/m^2$ and the rails are separated by 1 metre
(a) 10^{-2} Volt (b) 10^{-4} Volt

(c) 10^{-3} Volt (d) 1 Volt

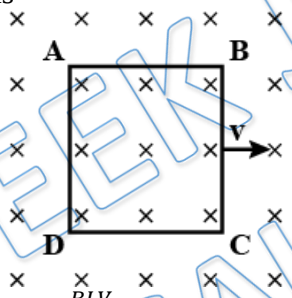
Q 6. A thin wire of length 2m is perpendicular to the x–y plane. It is moved with velocity $\vec{V} = (2\hat{\imath} + 3\hat{\jmath} + \hat{k})\ m/s$ through a region of magnetic induction $\vec{B} = (\hat{\imath} + 2\hat{\jmath})\ Wb/m^2$. Then potential difference induced between the ends of the wire is

(a) 2V (b) 4V
(c) 0V (d) none of these

Q 7. A copper disc of radius 0.1 m is rotated about its centre with 10 revolutions per second in a uniform magnetic field of 0.1 Tesla with its plane perpendicular to the field. The e.m.f. induced across the radius of disc is

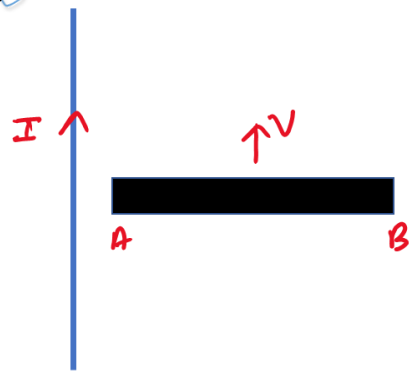
(a) $\frac{\pi}{10}$ V (b) $\frac{2\pi}{10}$ V
(c) $\pi \times 10^{-2}$ V (d) $2\pi \times 10^{-2}$ V

Q 8. A conducting square loop of side L and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane of the loop exists everywhere. The current induced in the loop is



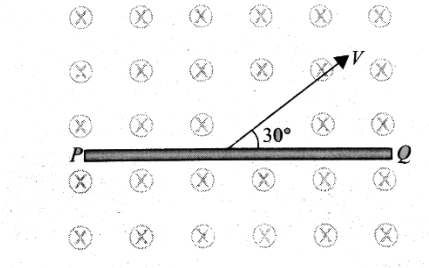
(a) $\frac{BLV}{R}$ clockwise (b) $\frac{BLV}{R}$ anticlockwise
(c) $\frac{2BLV}{R}$ anticlockwise (d) zero

Q 9. The current carrying wire and the rod AB are in same plane. The rod moves parallel to the wire with a velocity v. Which on of the following statement is true about induced emf in the rod?



(a) End A will be at lower potential with respect to B
(b) A and B will be at the same potential
(c) There will be no induced e.m.f. in the rod
(d) Potential at A will be higher than that at B

Q 10. A conducting rod PQ of length l = 2m is moving at a speed of 2 m/s making an angle of $30^0$with its length. A uniform magnetic field B = 2T exists in a direction perpendicular to the plane of motin. Then

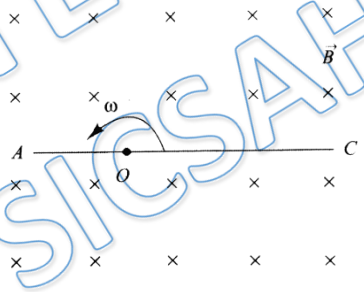


(a) $V_P - V_Q = 8V$
(b) $V_P - V_Q = 4V$
(c) $V_Q - V_P = 8V$
(d) $V_Q - V_P = 4V$

Q 11. A rod of length 20 cm is rotating with angular speed of 100 rps in a magnetic field of strength 0.5 T about its one end. What is the potential difference between two ends of the rod

(a) 2.28 V (b) 4.28 V
(c) 6.28 V (d) 2.5 V

Q 12. A conducting rod AC of length $4l$ is rotated about point O in a uniform magnetic field $\vec{B}$ directed into the plane of the paper. AO = l and OC = $3l$. Find $V_A - V_C$



(a) 4Bωl^2 (b) $\frac{1}{4}B\omega l^2$
(c) zero (d) $2B\omega l^2$

Answer Key

Q.1 d	**Q.2 b**	**Q.3 d**	**Q.4 b**	**Q.5 c**
Q.6 a	**Q.7 c**	**Q.8 d**	**Q.9 d**	**Q.10 b**
Q.11 c	**Q.12 a**			