PHYSICS

161. Bohr magneton is

(1) $\frac{eh}{2\pi m}$ (2) $\frac{e^2h}{4\pi m}$

(3) $\frac{e^2h}{2\pi m}$ (4) $\frac{eh}{4\pi m}$

162. A current I flows along the length of an infinitely long straight thin wall pipe, then

(1) Magnetic field at any point inside the pipe is zero

(2) Magnetic field is zero only on axis of pipe

(3) Magnetic field inside the pipe is non-zero

(4) Magnetic field outside the pipe is zero

163. A circular coil having N turns and radius r carries a current I. It is held in the XZ-plane in a magnetic field $B\hat{i}$. The torque on the coil due to the magnetic field (in N-m) is

(1) $\frac{Br^2I}{\pi N}$ (2) $B\pi r^2 IN$

(3) $\frac{B\pi r^2 I}{N}$ (4) Zero

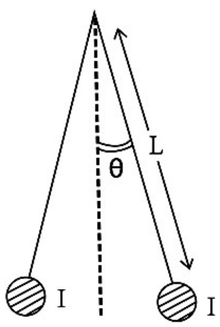
164. Two long current carrying thin wires, both with current I, are held by insulating threads of length L and are in equilibrium as shown in the figure, with threads making an angle θ with the vertical. If wires have mass λ per unit length then, the value of I is (g = gravitational acceleration)

(1) $2\sin\theta\sqrt{\frac{\pi\lambda gL}{\mu_0\cos\theta}}$

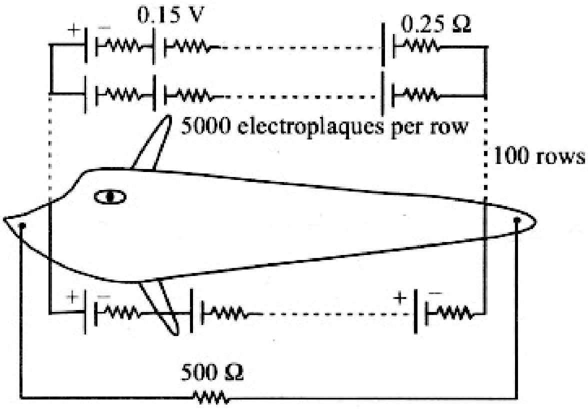
(2) $\sin\theta\sqrt{\frac{\pi\lambda gL}{\mu_0\cos\theta}}$

(3) $2\sqrt{\frac{\pi gL}{\mu_0}\tan\theta}$

(4) $\sqrt{\frac{\pi\lambda gL}{\mu_0}\tan\theta}$



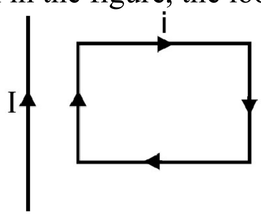
165. Eels are able to generate current with biological cells called electroplaques. The electroplaques in an eel are arranged in 100 rows, each row stretching horizontally along the body of the fish Containing 5000 electroplaques. The arrangement is suggestively shown here. Each electroplaques has an emf of 0.15 V and internal resistance of 0.25 Ω. The water surrounding the eel completes a circuit between the head and its tail. If the water surrounding it has a resistance of 500 Ω, the current an eel can produce in water is about



(1) 1.5 A (2) 3.0 A

(3) 15 A (4) 30 A

166. A rectangular loop carrying a current i is situated near along straight wire such that the wire is parallel to one of the sides of the loop and is in the plane of the loop. If steady current I is established in the wire as shown in the figure, the loop will



(1) rotate about an axis parallel to the wire

(2) move away from the wire

(3) move towards the wire

(4) remain stationary

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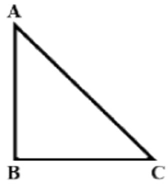
167. A current carrying closed loop in the form of a right angle isosceles triangle ABC is placed in a uniform magnetic field acting along AB. If the magnetic force on the arm BC is $\vec{F}$, the force on the arm AC is

(1) $\sqrt{2}\vec{F}$

(2) $-\sqrt{2}\vec{F}$

(3) $-\vec{F}$

(4) $\vec{F}$

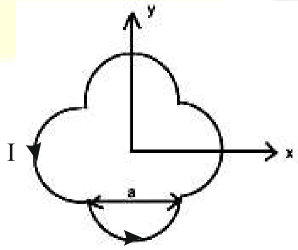


168. A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by

(1) qvR   (2) $\frac{qvR}{2}$

(3) qvR^2 (4) $\frac{qvR^2}{2}$

169. A loop carrying current I lies in the x-y plane as shown in the figure. The unit vector $\hat{k}$ is coming out of the plane of the paper. The magnetic moment of the current loop is



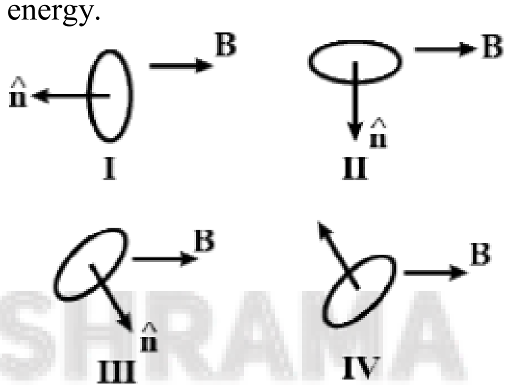
(1) $a^2I\hat{k}$

(2) $\left(\frac{\pi}{2}+1\right)a^2I\hat{k}$

(3) $-\left(\frac{\pi}{2}+1\right)a^2I\hat{k}$

(4) $(2\pi+1)a^2I\hat{k}$

170. A current carrying loop is placed in a uniform magnetic field in four different orientations, I, II, III and IV. Arrange them in the decreasing order of potential energy.



(1) I > III > II > IV

(2) I > II > III > IV

(3) I > IV > II > III

(4) III > IV > I > II

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