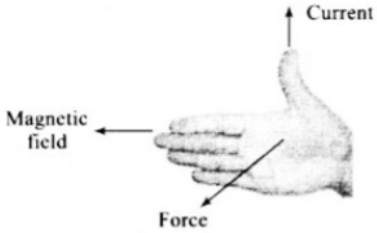
QUES 01:-

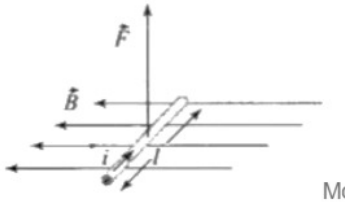
Consider a wire carrying a steady current, I placed in a uniform magnetic field B perpendicular to its length. Consider the charges inside the wire. It is known that magnetic forces do no work. This implies that,

a. the motion of charges inside the conductor is unaffected by B since they do not absorb energy.
b. some charges inside the wire move to the surface as a result of B.
c. if the wire moves under the influence of B, no work is done by the force.
d. if the wire moves under the influence of B, no work is done by the magnetic force on the ions, assumed fixed within the wire.

Sol. (b, d). Key concept: If a current-carrying straight conductor (the length l) is placed in a uniform magnetic field (B) such that it makes an angle θ with the direction of field then force experienced by it is $F_{max} = \vec{B}\vec{i}\vec{l} \sin\theta$. Direction of this force is obtained by right hand palm rule.
Right-hand palm rule: Stretch the fingers and thumb of the right hand at right angles to each other. Then if the fingers point in the direction of field B and thumb in the direction of current z, then normal to the palm will point in the direction of the force.



If the conductor is placed perpendicular to the magnetic field, then $\theta = 90°$, $F_{max} = \vec{B}\vec{I}\vec{l}$



Motion of charges inside the conductor is affected by magnetic field$\vec{B}$, due to magnetic force $\vec{F}$, given by =q x($\vec{v}$x$\vec{B}$).discard option (a).