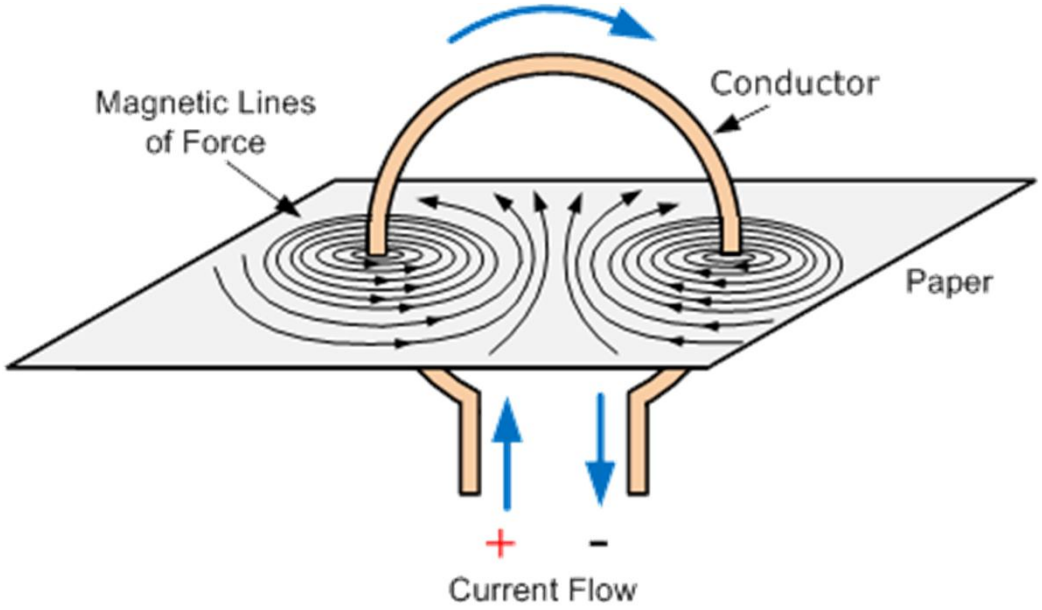
CASE STUDY QUESTION 43

Read the following and answer any four questions from (i) to (v)

When a current is passed through the circular loop of wire, a magnetic field lines near the coil are nearly circular and concentric. At the centre of the circular loop, the magnetic field lines are straight. The strength of the magnetic field produced by a current-carrying circular coil (or circular wire) depends on (i) current flowing through the coil. (ii) radius of the circular coil. (iii) number of turns of wire in the circular coil. The direction of the field lines can be found by applying right-hand thumb rule.



(i) A long horizontal power line is carrying a current of 100 A in the east-west direction. What is the direction of magnetic field at a point 1.0 m below it?
(a) North-South (b) East-West (c) South-East (d) North-West

The current flows in the east-west direction. From right hand thumb rule, we get the direction of magnetic field as from north to south. The direction of magnetic field will be same at every point below the power line.

Ans: (a) North-South

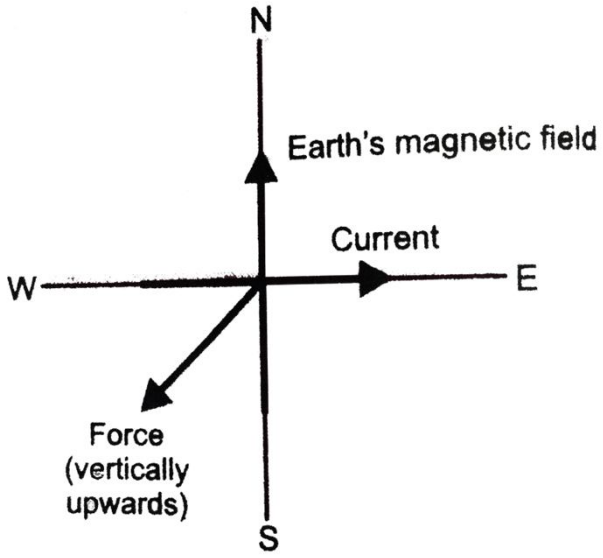
(ii) State the pattern of magnetic field lines for current carrying circular conductor.
(a) Magnetic field lines will be concentric circles to any point of the circular loop
(b) At centre, the field lines appear straight
(c) Both of these
(d) None of these

Ans: (c) Both of these

(iii) If a current carrying straight conductor is placed in east-west direction, then find the direction of the force experienced by the conductor due to earth's magnetic field.
(a) Upward (b) Downward (c) Can't determined (d) Same as of current

Ans: (a) Upward

The direction of the Earth's magnetic field is from geographic south to north. Let the direction of current in the conductor be from west to east. Applying Fleming's left-hand rule, we find, that the direction of the force acting on the conductor will be vertically upwards,



(iv) According to right-hand thumb rule direction of the curl of fingers of the right hand gives the

(a) electric field lines (b) magnetic field lines

(c) direction of magnetic field (d) direction of current

The direction of curl of fingers of the right hand gives the direction of magnetic field lines.

Ans: (b) magnetic field lines

(v) In case of circular loop carrying current, the strength of magnetic field is

(a) constant everywhere

(b) stronger inside the loop than outside the loop

(c) weaker inside the loop than outside the loop

(d) none of these

Magnetic field is strongest near the centre of the loop.

Ans: (b) stronger inside the loop than outside the loop