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MAGNETIC EFFECTS OF ELECTRIC CURRENT

Defination

Electric current through a metallic conductor produces a magnetic field around it.

Electromagnetic induction

- **Defination**: Phenomenon of induction of EMF in a coil when there is a change in magnetic flux linked with the coil.
- **Application**: Electric generator
  - Mechanical energy is converted into electrical energy.
- **Direction of induced current**: Fleming's right hand rule

Application

Electric motor

- **Defination**: Electrical energy is converted into mechanical energy.
- **Uses**:
  - Electric fans
  - Refrigerators
  - Washing machines
  - Computers

Magnetic field

- **Defination**:
  - Space surrounding a magnet within which a magnetic force is experienced.
  - Has both direction and magnitude.
  - SI unit is tesla
- **Magnetic field lines**:
  - Continuous curve in a magnetic field such that the tangent at any point on it gives the direction of magnetic field at that point.
  - If field lines are close, field is stronger.
  - If field lines are far apart, field is weak.
  - Field lines around a bar magnet
- **Force on a current-carrying conductor**:
  - **Definition**: Force acting on the conductor is perpendicular to the direction of magnetic field.
  - **Direction of force**: Fleming's left hand rule

Field patterns produced in different shapes of current carrying conductor

- **Straight conductor**
  - **Defination**: Magnetic field is represented by concentric circles which become larger and larger as the distance increases.
  - **Direction of magnetic field lines**: Right hand thumb rule
- **Circular loop**
  - **Defination**: Magnetic field lines represented by concentric circles that appear as straight lines near the centre of loop.
  - **Diagram**
- **Solenoid**
  - **Defination**: Magnetic field produced is similar to that produced by a bar magnet.
  - **Diagram**
  - **Electromagnet**: A temporary magnet of soft iron which retains magnetism only when current passes round it.
    - **Uses**
      - Electric bell
      - Telephone
      - Electric motor
  - **Direction of magnetic field**
    - Clockwise current shows South polarity
    - Anti-clockwise current shows North polarity