

NTSE

NCERT Solutions for Class 10 Science
PHYSICS – Magnetic Effects of Electric Current



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NCERT ANNEXURE

Given below are subjective type questions and answers for your reference:

1. **Why does a compass needle get deflected when brought near a bar magnet?**

Ans. As compass needle itself is also a tiny magnet so, it will get deflected due to the force exerted by bar magnet

2. **Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right-hand rule to find out the direction of the magnetic field inside and outside the loop.**

Ans. As the current passes through the loop in clockwise direction.

Therefore, by applying the right-hand rule, the direction of the magnetic field inside the loop will be pointing downward. The magnetic field will be upward, outside the loop.

3. **Explain different ways to induce current in a coil.**

Ans. Following are the different ways to induce current in a coil:

- There should be relative motion between the coil and a magnet.
- There should be relative motion between the coil and a current carrying conductor.
- There should be a change in current in a conductor kept in the vicinity of the coil.

4. **State the rule to determine the direction of a (i) magnetic field produced around a straight conductor-carrying current, (ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, and (iii) current induced in a coil due to its rotation in a magnetic field.**

Ans. (i) The direction of magnetic field produced around a current – carrying conductor can be determined by right hand thumb rule:

Right hand thumb rule: – According to this rule, imagine a straight current carrying conductor in your right hand such that the thumb points in the direction of current, then the direction in which fingers encircle the wire will give the direction of magnetic field lines.

(ii) The direction of force experienced by a current – carrying straight conductor placed in a magnetic field which is perpendicular to it can be determined by Fleming's left hand rule.

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Fleming's left hand rule: It states that, if we stretch forefinger, middle finger and thumb of our left hand perpendicular to each other in such a way that fore finger points along the direction of magnetic field, central finger points along the direction of current then, thumb will indicate the direction of force or direction of motion of the conductor.

(iii) The direction of current induced in a coil due to its rotation in a magnetic field can be determined by Fleming's right hand rule.

Fleming's right hand rule: If we stretch the forefinger, middle finger and thumb of our right hand in such a way that the forefinger points along the direction of magnetic field, thumb along the direction of motion of conductor then the direction in which the center finger points, gives the direction of induced current.

5. Explain the underlying principle and working of an electric generator by drawing a labeled diagram. What is the function of brushes?

Ans. (a) Principle: When there is a change in magnetic flux linked with a closed coil then an induced current is produced.

(b) Construction: It consists of the following parts.

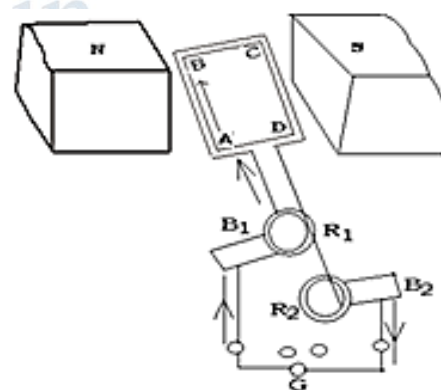
(i) Armature: It is a rectangular coil ABCD which is made-up of a large number of turns of insulated copper wire, wound over a soft iron core. It can rotate between the poles of strong magnets.

(ii) Magnetic field: It is produced by permanent magnet.

(iii) Slip Ring: These are two hollow metallic rings (R1 & R2) which are attached with the armature.

(iv) Brushes : These are flexible metal plates or carbon rods. These are stationary and remain in constant touch with the rings. Externally they are connected with a galvanometer.

(c) Working: An induced current is produced when the magnetic flux linked with the armature changes. Let, armature ABCD is rotating in an anti-clockwise direction between the poles of a strong magnet then the side AB of the coil moves downward while the side CD moves upward. By their movement, they cut magnetic lines of forces, due to which an induced current is developed in the coil. The direction of induced current can be obtained by Fleming's right hand rule. When half rotation gets completed then there is an interchange in the position of ABCD. Now side AB moves up & DC moves down. Due to which direction of induced current is reversed. As a result of which the polarity of the coil changes after every half rotation. In this way during one complete revolution of coil, the direction of current changes twice. Hence, it is also known as Alternating Current.



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I still wonder how one man has such a deep understanding of an examination. It becomes the truth what ever Vipin Sir says about NTSE.

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NCERT EXEMPLAR

1. Choose the incorrect statement from the following regarding magnetic lines of field

- (A) The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points
- (B) Magnetic field lines are closed curves
- (C) If magnetic field lines are parallel and equidistant, they represent zero field strength
- (D) Relative strength of magnetic field is shown by the degree of closeness of the field lines

Ans. (C) If magnetic field lines are parallel and equidistant, they represent zero field strength

2. For a current in a long straight solenoid N- and S-poles are created at the two ends. Among the following statements, the incorrect statement is

- (A) The field lines inside the solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid
- (B) The strong magnetic field produced inside the solenoid can be used to magnetise a piece of magnetic material like soft iron, when placed inside the coil
- (C) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet
- (D) The N- and S-poles exchange position when the direction of current through the solenoid is reversed

Ans. (C) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet

3. Commercial electric motors do not use

- (A) An electromagnet to rotate the armature
- (B) Effectively large number of turns of conducting wire in the current carrying coil
- (C) A permanent magnet to rotate the armature
- (D) A soft iron core on which the coil is wound

Ans. (C) A permanent magnet to rotate the armature

4. A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in Figure. The direction of magnetic field at a point will be North to South

- (A) Directly above the wire
- (B) Directly below the wire
- (C) At a point located in the plane of the paper, on the north side of the wire
- (D) At a point located in the plane of the paper, on the south side of the wire

Ans. (B) Directly below the wire

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5. To convert an AC generator into DC generator

- (A) Split-ring type commutator must be used
- (B) Slip rings and brushes must be used
- (C) A stronger magnetic field has to be used
- (D) A rectangular wire loop has to be used

Ans. (A) Split-ring type commutator must be used

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