Lecture 6 : The Electric Motor (DC Motor)

An electric motor is a machine for converting electrical energy into mechanical energy. Motors can be designed to run on direct (DC) or alternating current (AC). The motor shown in Figure is a DC motor. It‟s most important parts are the rotor, the stator and the brushes.

The rotor is the moving part. It contains an armature, which is a set of wire loops wound on a steel core. When current is fed to the armature, these windings produce a magnetic field. The armature and core are mounted on a shaft which runs on bearings. It provides a means of transmitting power from the motor

The rotor also contains a commutator. This consists of a number of copper segments insulated from one another. The armature windings are connected to these segments. Carbon brushes are held in contact with the commutator by springs. These brushes allow current to pass to the armature windings. As the rotor turns, the commutator acts as a switch making the current in the armature alternate.

The stator does not move. It consists of magnetic

Armature

Commutator

Stator magnet

Terminals

Windings

Bruches

and electrical conductors. The magnetic circuit is made up of the frame and the poles. Wound round the poles are the field coils. These form the stator‟s electrical circuit. When current is fed to them, a magnetic field is set up in the stator.

The motor operates on the principle that when a current-carrying conductor is placed in a magnetic field, a force is produced on the conductor. The interaction of the forces produced by the magnetic field of the rotor and the stator makes the rotor spin.

# TERMINOLOGY:

**Armature Winding**-It is the current carrying winding which rotates on interaction with the magnetic field. It is the load carrying member which is mounted on the rotor.

**Field Winding**-It is the excitation system, which generates the magnetic field. Excitation system may consist of a magnet or electromagnet.

**Commutator**-The electrical power is fed to rotor through commutator. It rotates along with the rotor to make sure current is in correct direction in armature coil.

**Brushes**- are used to send current into the armature winding.

**Poles-Field** is divided into sets; each set represents the north and south pole of a magnet. The number of poles determines the rating of motor.

**READING:** Read the text

1. What does an electric motor do?
2. Select the word from the three alternatives given which is the most similar in meaning the underlined word as it is used in the passage.

|  |  |
| --- | --- |
| **Provides:** produces - supplies - allows**Alternate:** reverse- change- flow in one direction then in another | **Segments:** sections - pieces - wires**Interaction:** action together- operation - result |

1. Complete the text by using the following words:

made up of - composed - placed on - is mounted on- consists

A

|  |  |  |
| --- | --- | --- |
| A | Consists ofComprises Composed ofMade up of | X and Y |

y

x

A

|  |  |  |
| --- | --- | --- |
| A | Containsincludes | C and D |

|  |  |
| --- | --- |
| c | D |
|  |

A simple transformer of two coils, a primary and a secondary, wound on a former which

is …………… a core. The coils are …………… a number of loops of wire. The core is

………………of thin pieces of soft iron. The Former is the center limb of the E or T.

**VOCABULARY :**

 **1.** Match the physical quantities with their characteristics

|  |  |
| --- | --- |
| Current | * the measure of the energy carried by the charge („energy per unit charge‟), potential difference
* supplied by the battery (or power supply)
* the property of a component which restricts the flow of electric current
* the rate of using or supplying energy
* measured in watts, W
* the rate of charge flow
* measured with an ammeter, connected in series
* depends on the power and the time for which it is used (Power × Time)
* the standard unit for it is the joule (J)
* it is often measured in kilowatt-hours, kWh
* the measure of a capacitor‟s ability to store a charge
* measured in farads, F
 |
| Resistance |
| Voltage |
| Capacitance |
| Power |
| Energy |

**2.** Choose the right words to fill in the gaps.

commutator - poles - direct - direction - rotates - alternating – circuit - coil -field

In the simplest form of generator the conductor is an open **(1)** of wire rotating between the **(2)** of a permanent magnet. During a single rotation, one side of the coil passes through the magnetic **(3)** first in one direction and then in the other, so that the induced current is **(4)** current (AC), moving first in one direction, then in the other. Each end of the coil is attached to a separate metal slip ring that **(5)** with the coil. Brushes that rest on the slip rings are attached to the external **(6)** Thus the current flows from the coil to

the slip rings, then through the brushes to the external circuit. In order to obtain **(7)** current (DC), i.e. current that flows in only one direction, a commutator is used in place of slip rings. The **(8)** is a single slip ring split into left and right halves that are insulated from each other and are attached to opposite ends of the coil. It allows current to leave the generator through the brushes in only one **(9)** This current pulsates, going from no flow to maximum flow

and back again to no flow.

**3-** Summarise the text using your own words .

# REFERENCES

Eric H Glendinning, Norman K Glendenning,” English for electrical and mechanical engineering”, Oxford University Press (2008).

Eric H Glendinning, “English in Electrical Engineering and Electronics”, Teacher‟s Edition, Oxford University Press (2009).