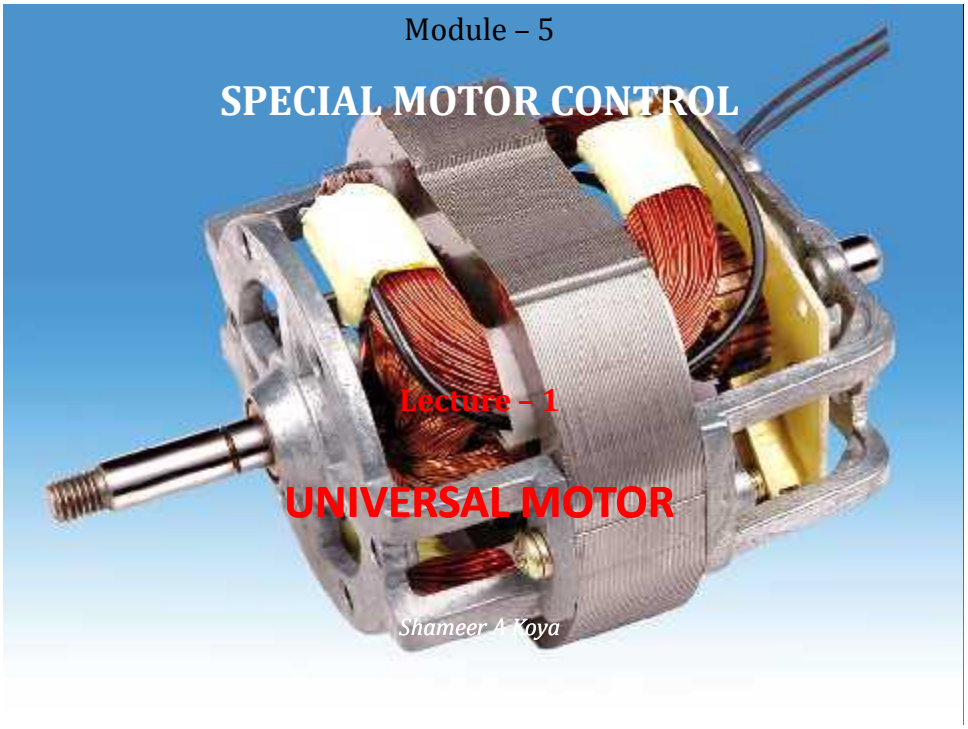
Module – 5

SPECIAL MOTOR CONTROL



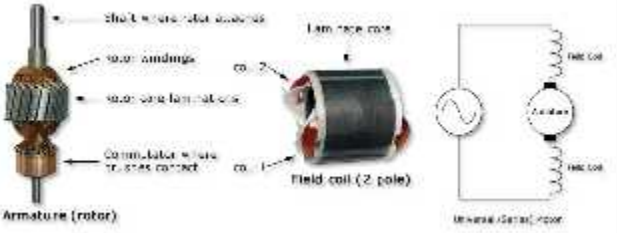
Lecture – 1

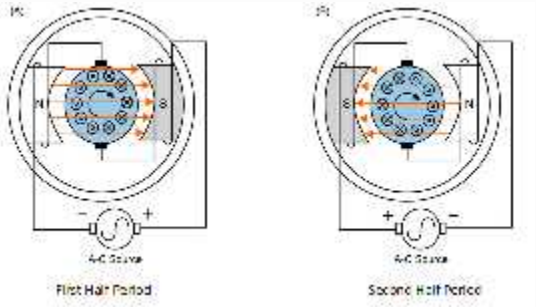
UNIVERSAL MOTOR

Shameer A Koya

Universal Motor

- The universal motor is a type of electric motor that can operate on both AC and DC power.
- They are commutated series or shunt wound motors, where the stator field coils are connected in series or parallel with the rotor windings through a commutator.

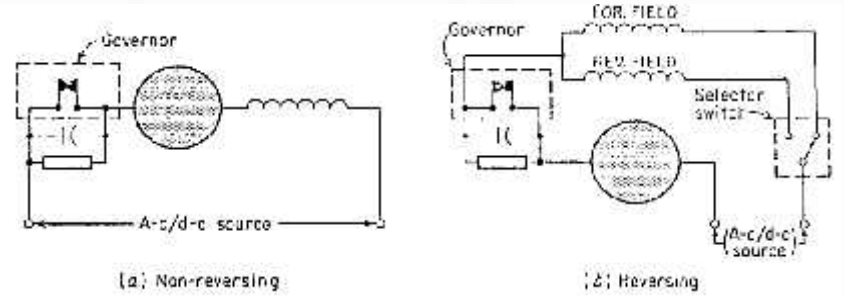




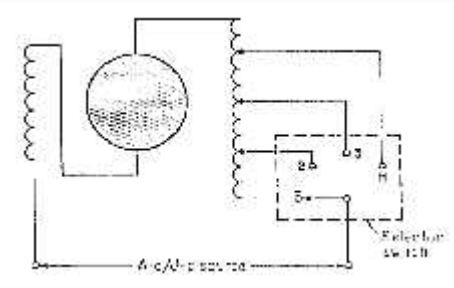
Speed Control of Universal Motor

- Methods
  - Rheostat method
  - Brush shifting mechanism
  - Specially constructed governor
  - Tapped field
    - number of turns on the two poles need not be the same
    - field coil that has the larger number of turns is tapped at three points, so that four operating speeds are possible

- specially constructed governor
  - Consists of a disc upon which is fastened a pair of spring-loaded contacts
  - the entire assembly mounted on the rotating shaft
  - During operation, the governor contacts open and close very rapidly
  - For a given spring-tension setting, the contact attempts to vibrate at a certain rate.
  - Then if the speed rises above the particular value set by the spring tension, the centrifugal force hold the contact open a relatively longer period of time than it is closed;
  - this keeps a line resistance in the circuit a little longer than required and acts to reduce the speed.
  - The reverse is true if the motor speed should drop below the adjusted value.

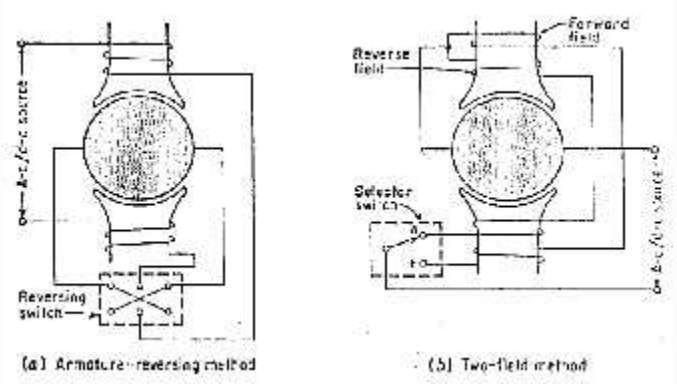


- Tapped field
  - number of turns on the two poles need not be the same
  - field coil that has the larger number of turns is tapped at three points, so that four operating speeds are possible
  - minimum speed will be obtained when the entire winding is used – maximum flux.
  - maximum speed will result on point H - minimum mmf and flux

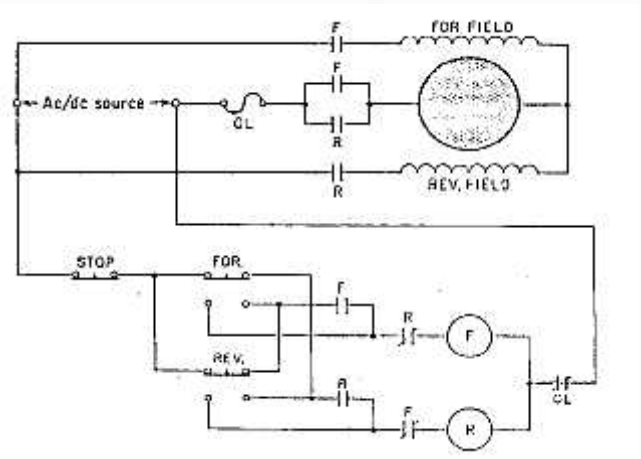


Reversing Of UniversalMotors

1. by interchanging the field terminals with respect to those of the armature
2. by using two field windings
   - two field windings, wound on the core in opposite directions
   - one of them connected to the armature gives clockwise rotation
   - the other in series with the armature gives counterclockwise rotation.



- Control circuit to reverse universal motor



Thank You

Next Lecture:
Single phase Induction Motor