SINGLE PHASE INDUCTION MOTOR
UNIT- V

Vinod Kumar
HOD- ECE
DGI, Greater Noida

CONTENTS

AC Commutator Motors

Universal motor

Single phase a.c. series compensated motor

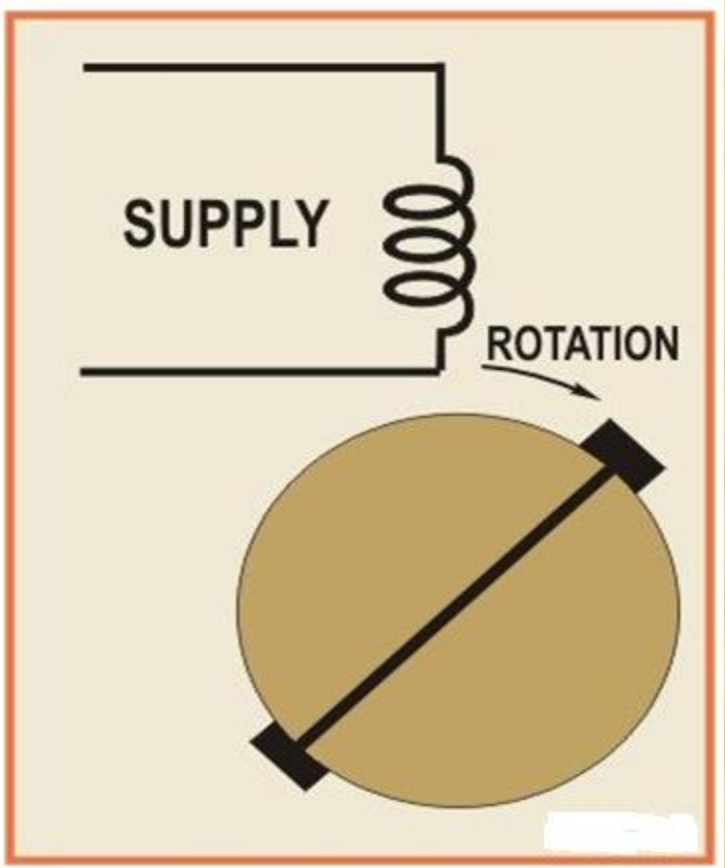
Stepper motors

Lecture No. 8

REPULSION MOTOR

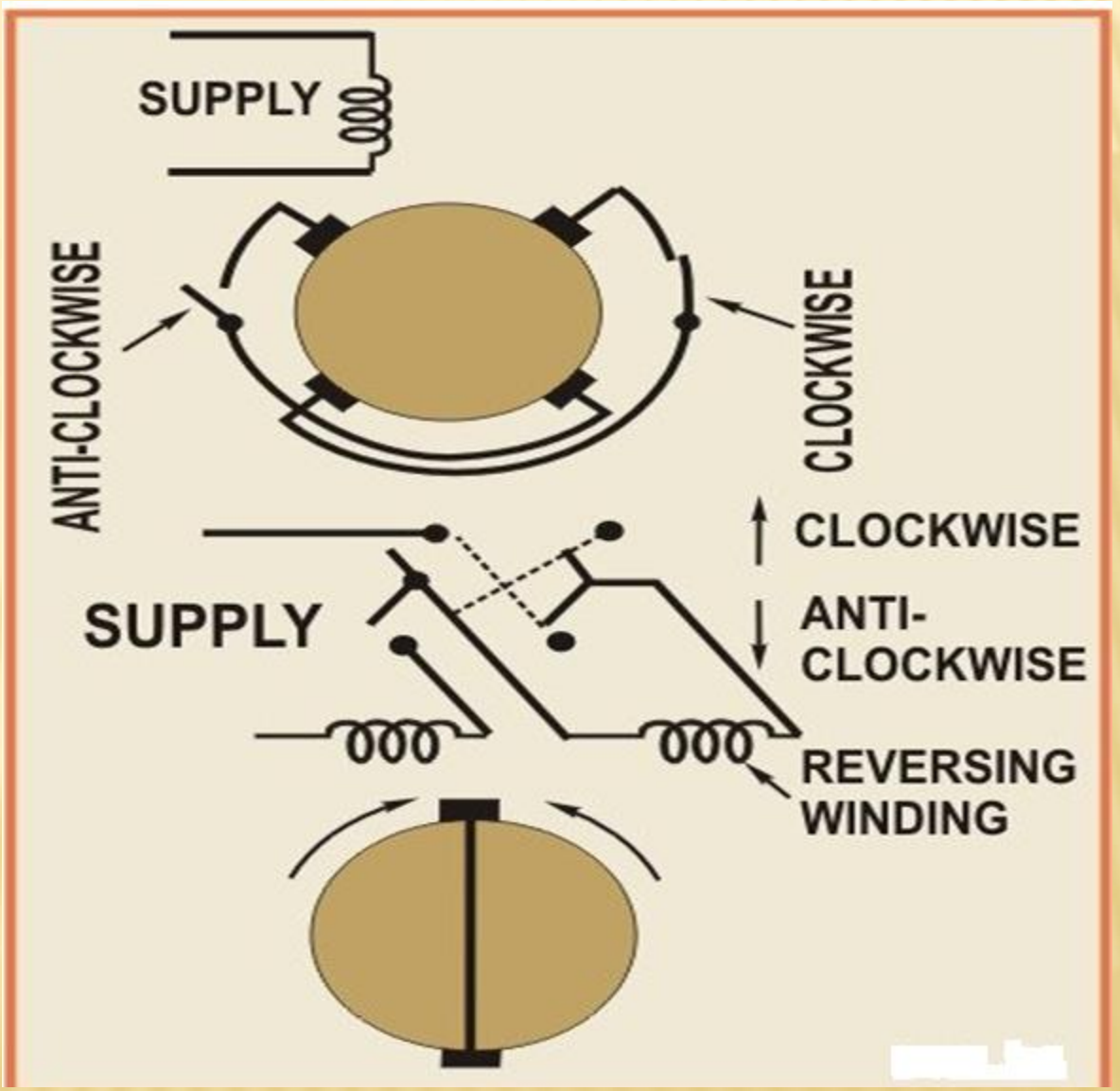
The machine is often converted into an induction motor during the period of running by arranging that all the commutator segments are short-circuited by a centrifugally-operated device when the motor is up to speed. The brushes are also lifted in same cases to reduce wear.

To avoid the complication of the short-circuiting device, the rotor may be arranged with a squirrel-cage winding at the bottom of the slots. This takes over at speed and gives induction-motor characteristics



CONT....

Reversal of Rotation is achieved by switching on rotor windings

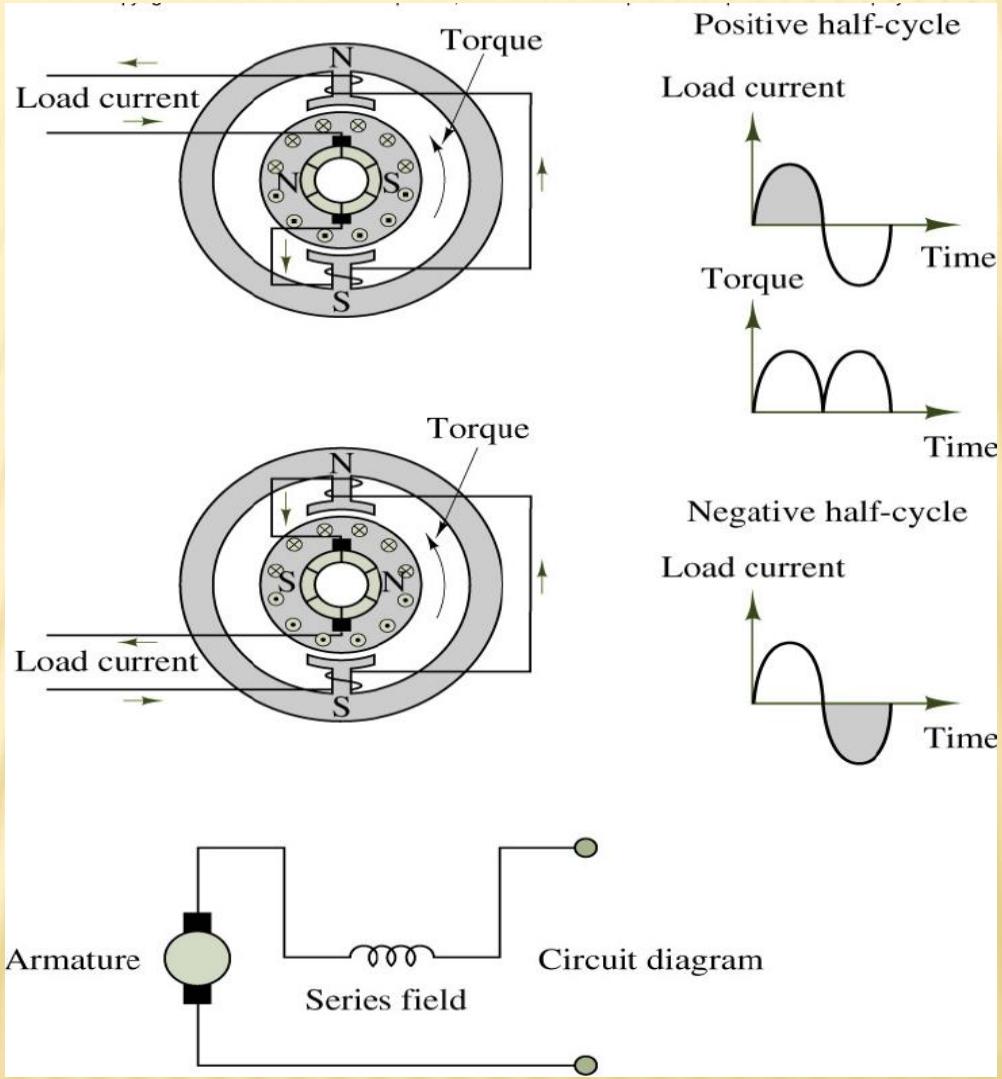


UNIVERSAL MOTOR

The universal motor is a rotating machine similar to a DC motor but designed to operate either from DC or single-phase AC. The stator and rotor windings of the motor are connected in series through the rotor commutator. Therefore the universal motor is also known as an AC series motor or an AC commutator motor. The universal motor can be controlled either as a phase-angle drive or as a chopper drive. The universal motor has a sharply drooping torque-speed characteristics of a DC series motor.

Typical applications in vacuum cleaners, drills, and kitchen appliances.

CONT...


Positive half-cycle
Torque
Load current
N
S
N
S
Load current
Time
Torque
Time
Torque
N
S
N
S
Load current
Negative half-cycle
Load current
Time
Armature
Series field
Circuit diagram

STEPPER MOTORS

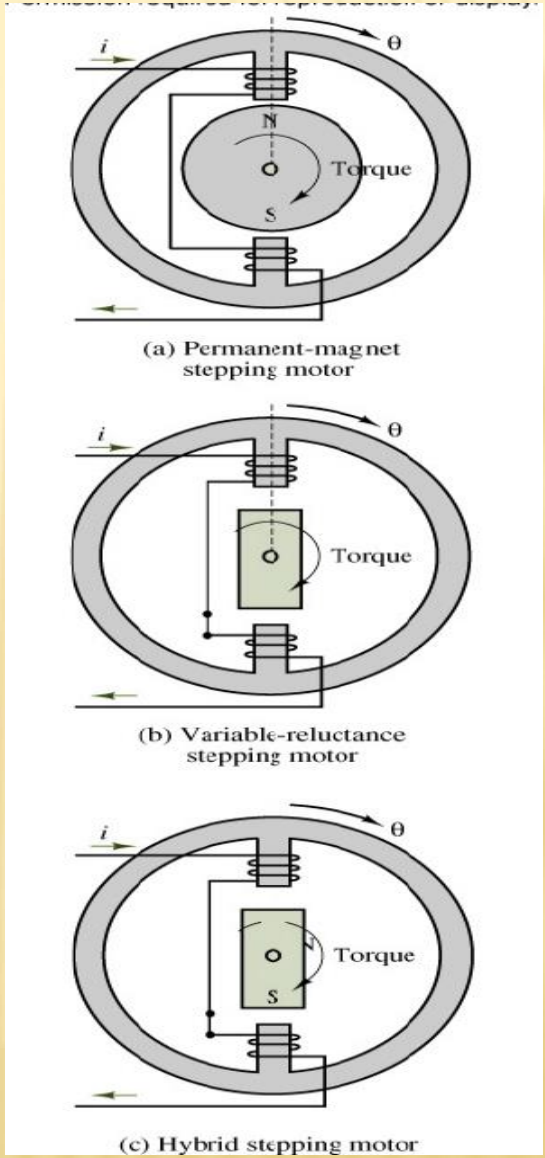
A special type of synchronous motor which is designed to rotate a specific number of degrees for every electric pulse received by its control unit. Typical steps are 7.5° or 15° per pulse. It is a motor that can rotate in both directions, move in precise angular increments, sustain a holding torque at zero speed, and be controlled with digital circuits. It moves in accurate angular increments known as steps, in response to the application of digital pulses to the electric drive circuit.

Generally, such motors are manufactured with steps per revolution. Step motors are either bipolar, requiring two power sources or unipolar requiring only one power source.

CONT...

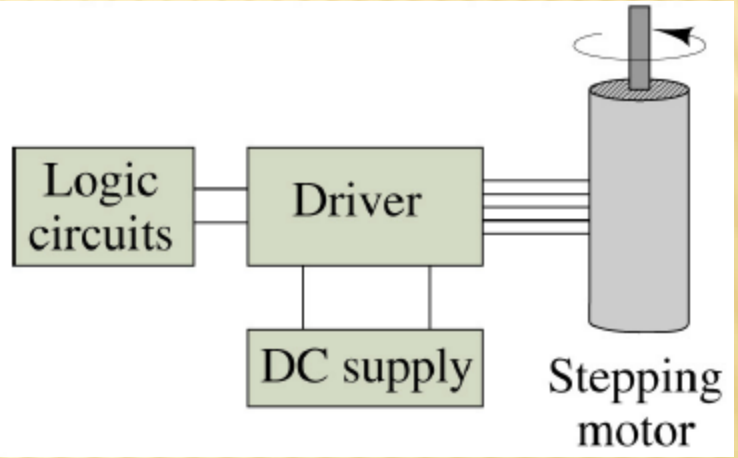
$$\theta_m = \frac{2}{p}\theta_e$$

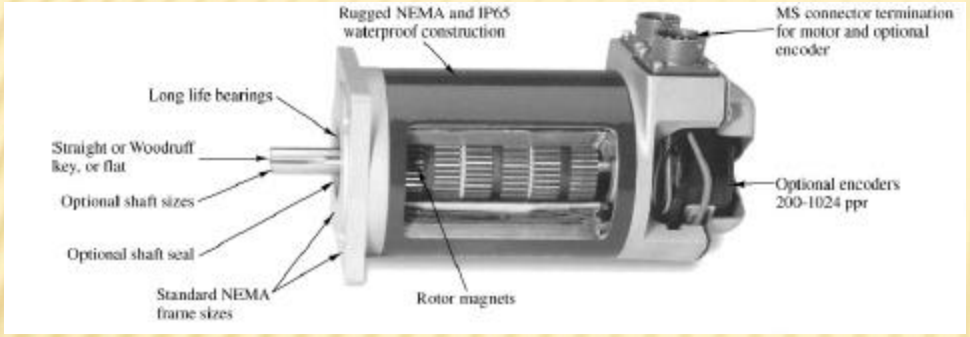
$$\omega_m = \frac{2}{p}\omega_e$$



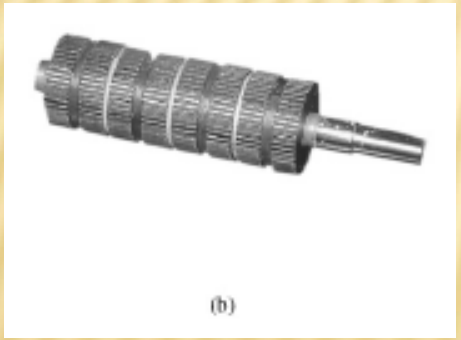
CONT....

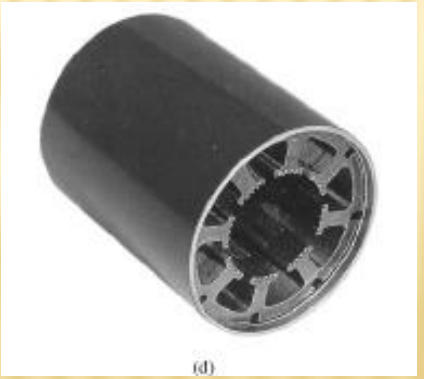
Variable Reactance (VR) Stepper Motor (a) Complete Motor Assembly; (b) PM Rotor; (c) Stator Cross Section; (d) Fully Assembled Stator; (e) Stator with Windings.






(c)


(b)


(d)


(e)

THANK YOU