SNS COLLEGE OF TECHNOLOGY
(Autonomous)
Coimbatore-35
Department of EEE

16EE205 / INDUCTION AND SYNCHRONOUS MACHINES

Unit – IV (B)
Speed control of Three phase Induction motor

Speed Control of Induction Motor

Synchronous speed of the rotating magnetic field produced by the stator, $N_s = 120 f / P$

- 1. By changing the frequency (f)

  The available AC voltage (50 Hz) is rectified and then inverted back to AC of variable frequency/ Variable voltage using inverters.

  Inverter can be Voltage source or current source inverter

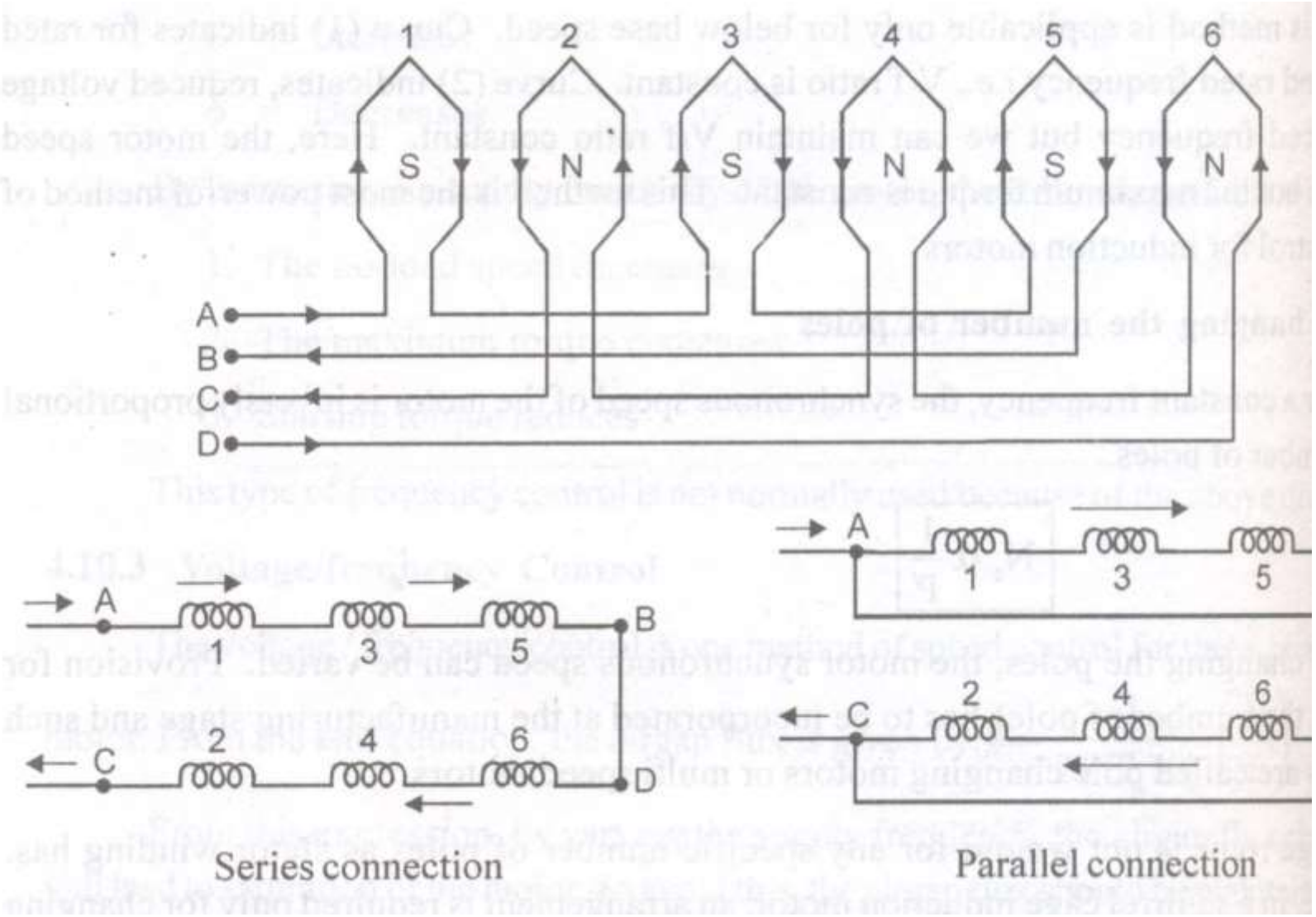
Speed Control of Induction Motors

- 2. Stator voltage control (V)

  The stator voltage is varied – slip and operating speed varies

- 3. By changing the number of poles (P)

  The stator winding is designed for operation for two different pole numbers: 4/6,4/8,6/8 etc. This can be applied only to squirrel cage induction motor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Series connection
Parallel connection

Speed Control of Induction Motors

- 4. Rotor resistance control (R_2)

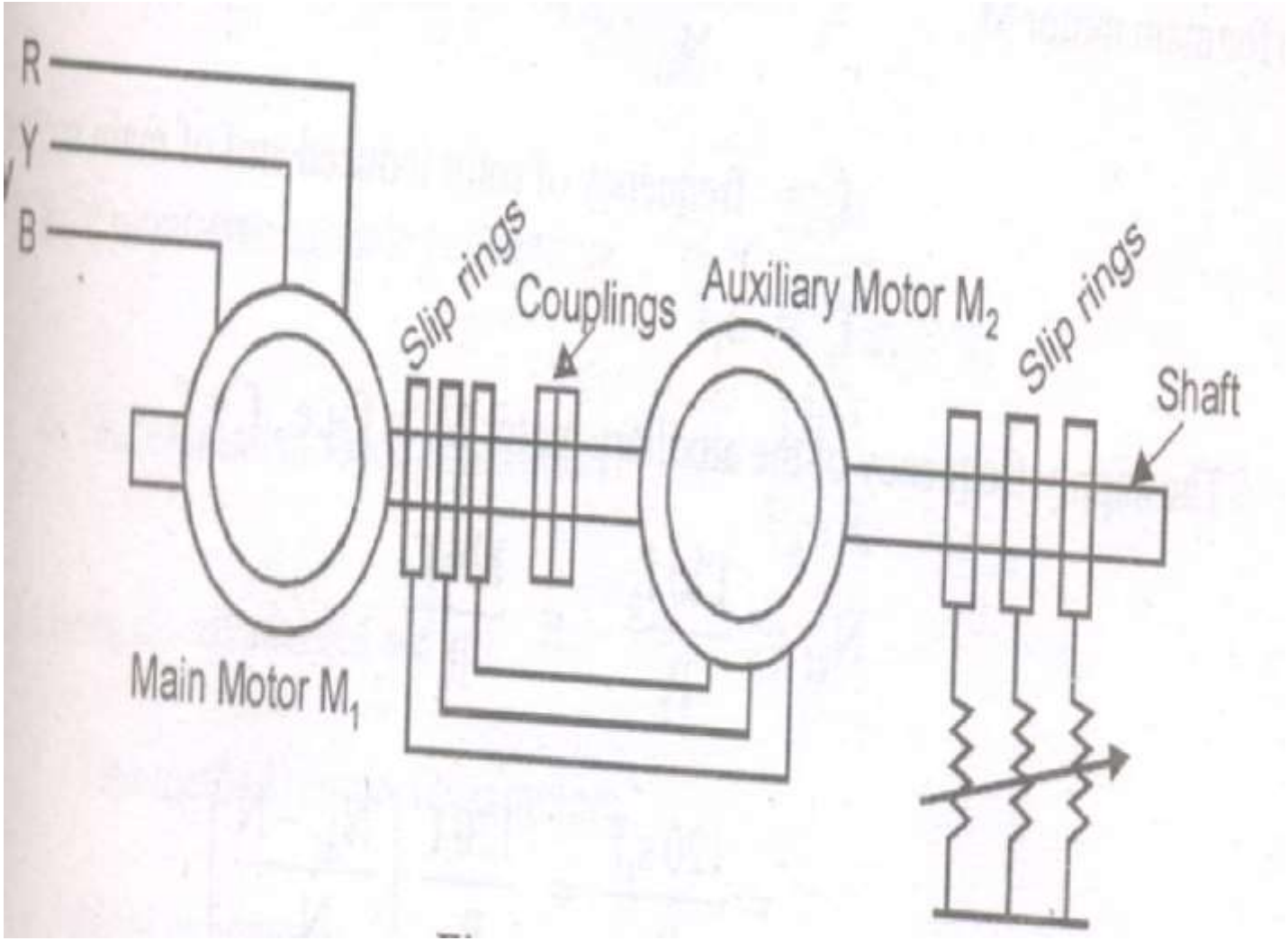
This method is applied to slip ring induction motor – rotor is connected to variable resistance through slip rings – resistance varied – slip and hence the operating speed varies – this method results in power loss in the resistor

Speed Control of Induction Motors

- 5.Using cascade connection (Two motors)

Three phase voltage applied to the stator of a slip ring induction motor(P1 – poles) – slip ring voltage applied to the stator of squirrel cage induction motor (P2 – poles)– two rotors are coupled.

$$Ns = 120\ f\ /\ (P1 \pm P2)$$


R
Y
B
Slip rings
Couplings
Auxiliary Motor M_2
Slip rings
Shaft
Main Motor M_1

6. Slip Power Recovery Schemes

This scheme applied to slip ring induction motor:

Rated voltage applied to the stator – the rotor voltage is rectified using a diode bridge rectifier – the resulting DC voltage is inverted using line commutated inverter and the AC voltage is fed back to the supply through appropriate transformer – slip power is thus recovered from the motor and the speed reduced