



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE-35

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 23EET204 -Electrical Machines II

II YEAR / IV SEMESTER

Unit 4 –STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR

Topic 7: Induction generator





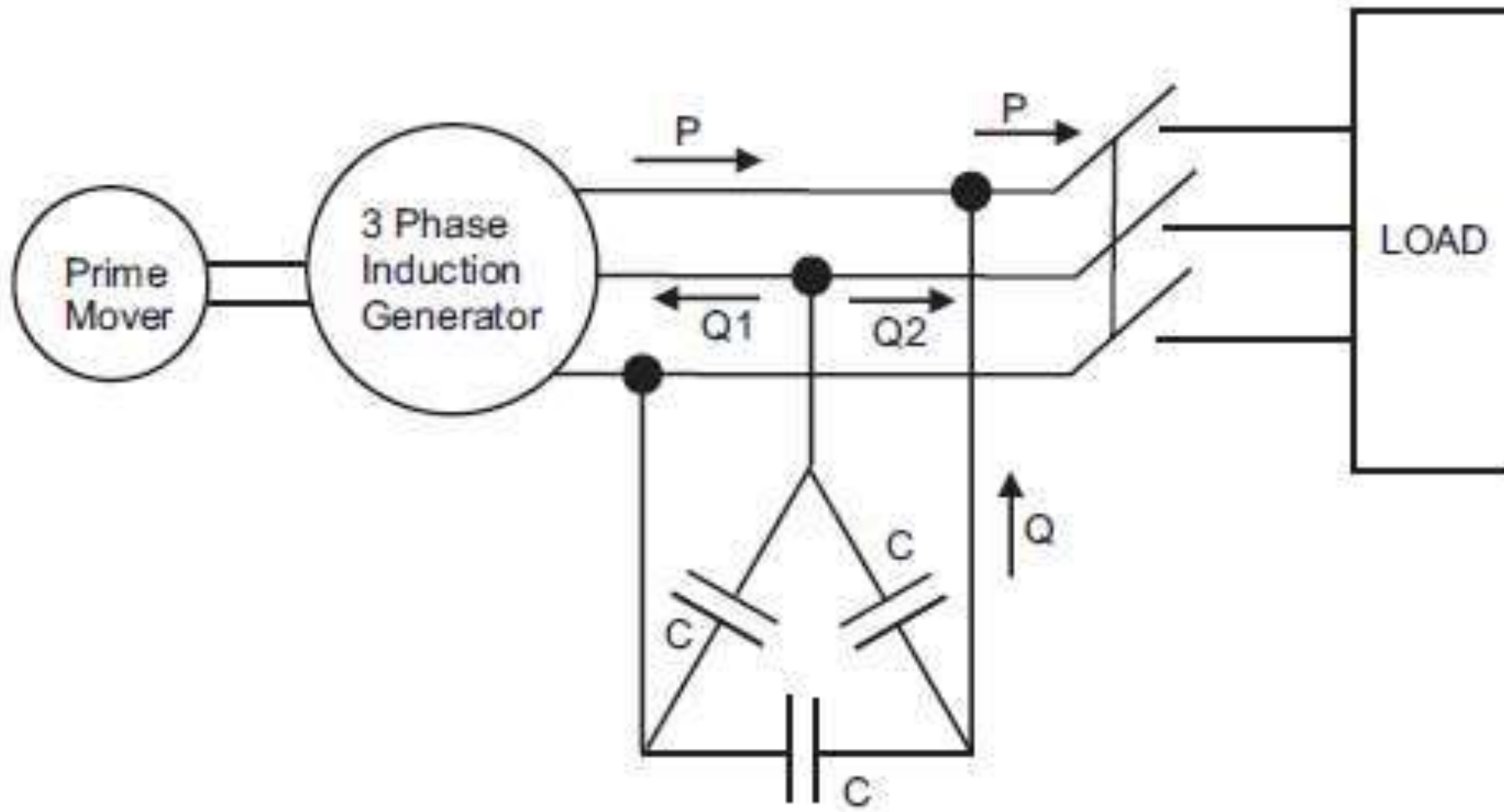
GUESS THE TOPIC NAME...



- Induction generator
- Principle of operation induction generator
- Reactive power requirement, voltage built-up & control.
- Advantages & Disadvantages
- Application



Induction generator



- When the induction motor runs above the synchronous speed then it runs as a generator called induction generator.
- The negative slip indicates that the rotor of induction motor is running faster than the synchronous speed.



Induction generator



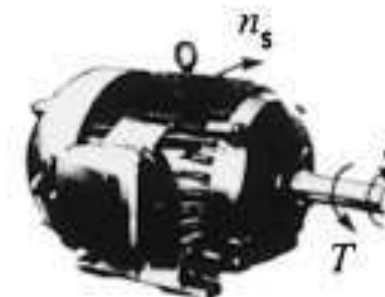
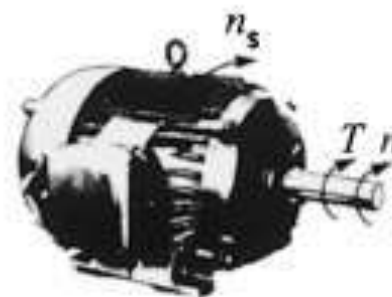
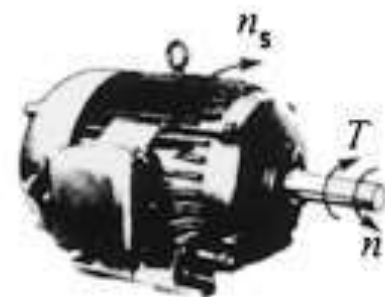
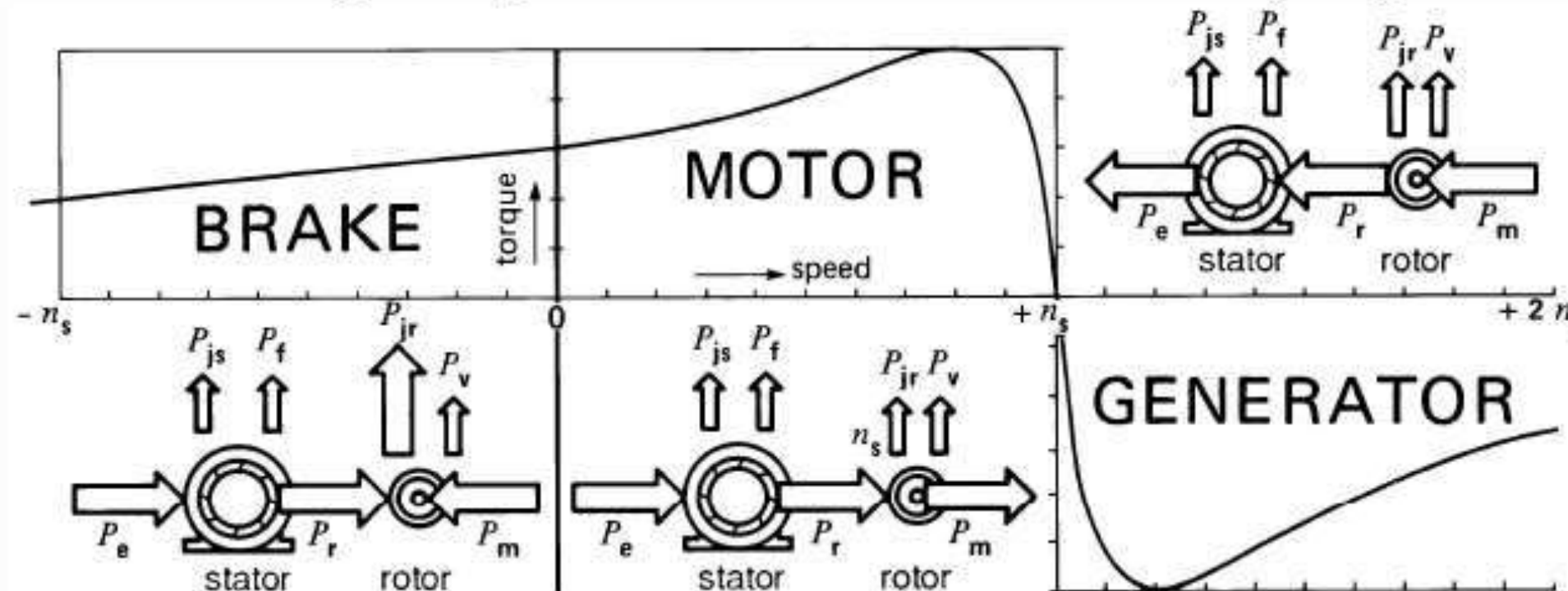
- The induction generator which is driven by the prime mover such as a wind turbine is connected to a load.
- When the speed of induction generator above synchronous speed the active power delivered by the 3-phase load.
- The corresponding mode of operation of induction machine is called generating mode & the slip of induction machine will be negative.
- The construction of induction generator is the same as that of induction motor.



Induction generator

Complete Torque-speed Characteristics

- An induction machine
 - can function as a motor, a brake, and an asynchronous motor
 - all three operating modes can be seen from the torque-speed curve





Principle of operation



- When the 3-phase induction motor is driven at a speed greater than synchronous speed(-ve slip) by an external prime mover with exciting current provided either from 3-phase line or capacitor bank.
- The emf and current of slip frequency will appear in the rotor winding.
- In generating mode of operation, an external prime mover drives the rotor above the synchronous speed.
- The stator flux induces currents in the rotor, but since the opposing rotor flux is now cutting the stator coils & the motor operates as a generator.



Reactive power requirement, voltage built-up & control



- The induction generator is not self excited machine, therefore develop rotating magnetic field.
- The reactive power is also required for the connected inductive load to improve the power factor on the load.
- The induction generator using the delta connected capacitor bank for the supply of reactive power is called self excited or isolated induction generator
- The reactive power required by the generator and for the connected inductive load is supplied by the capacitor bank.
- To achieve a given voltage level in an induction generator, the capacitor bank must supply the magnetizing or exciting current corresponding to that level.
- For a particular value of capacitance, the curve between the voltage and magnetizing or capacitive current will be linear.



Advantages

- Mechanically & electrically simpler than other types of generator.
- Construction: simple, robust & rugged.
- Relatively cheaper.
- Requires no brushes & commutator.
- easy in maintenance.
- They do not have to be synchronized to the supply lines as does a synchronous generator.

Applications :

- Induction generator are often used in wind turbines and small station due to their ability to produce useful power at varying rotor speed.
- Particularly suitable for wind generating stations as in this speed is always a variable factor.
- They are also very useful automatic dynamic braking such as for braking purpose in case of railways.
- Induction generator for a fixed wind turbine system.



KEEP
LEARNING..
Thank u

SEE YOU IN NEXT CLASS