

SEMESTER <i>Sixth</i>	DEPARTMENT <i>Control Engineering</i>	COURSE TITLE <i>AC Machines</i>
COURSE CODE <i>EP601</i>	HOURS: 3 UNITS: 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>
<p>1. Know the Construction and Operation of 3-Phase Squirrel-Cage and Slip-Ring Motors.</p> <ul style="list-style-type: none"> ➤ Explain the three phase induction motor: Internal construction. Types of rotors. Production of rotating magnetic field. Synchronous, speed and slip. ➤ Understand the difference between a Squirrel Cage and a Wound rotor. 		
<p>2. Examining the Relationship between Torque and Speed.</p> <ul style="list-style-type: none"> ➤ Understand the difference winding methods of the two types of rotors. Protection of wires. ➤ Alignment and bearing testing methods. ➤ Measurement aspects of Torque and Speed parameters and instruments used for the purpose. 		
<p>3. Conduct Tests to Determine the Equivalent Circuit Constants and Efficiency.</p> <ul style="list-style-type: none"> ➤ Derive the equivalent circuit of the machine. ➤ Define the parameters of the circuit and know how to do the open circuit and short circuit tests. ➤ Do tutorial exercises on the subject. 		
<p>4. Conduct Tests of Different Methods of Starting 3-Phase Motors.</p> <ul style="list-style-type: none"> ➤ Understand the different starting methods used in small and large size motors ➤ Star-delta and autotransformer methods & requirements. 		
<p>5. Understand the Construction of Operation for Synchronous Generators. Ability to Control the Generated Voltage and Frequency. Understanding the Parallel Operation.</p> <ul style="list-style-type: none"> ➤ Explains the synchronous generators: 		

Internal construction. Theory of operation. Armature windings and generated voltage.

- Variation of voltage and frequency.
- Open- circuited test and short-circuited test. Synchronous reactance and equivalent circuit.
- Phasor-diagram and power-angle characteristics.
- Voltage regulation.
- Parallel operation.

6. *Understands the Construction and Theory of Operation of Single-Phase Induction Motors and Stepper Motors.*

Describe the:

- Single-phase induction motors and stepper motors. Internal construction.
- Defines types of single phase induction motors.
- Starting methods. Forward and backward fields.
- Principles of operation.

References:

1- *Elements of power system*, by W. Stevenson.

2- *Power System Analysis*, John Grainger and William D. Stevenson JR. 1994