

EE 521 – Special Electrical Machines

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr Noha El Amary

TEXT BOOK:

A. F. Fitzgerald, "Electric Machinery", McGraw-Hill Publishing company.

COURSE DESCRIPTION:

Two-phase induction motor. Single phase induction motor. Starting of single phase induction motor. Single-phase commutator series motor. Energy conversion in doubly salient machines. Three-phase conventional reluctance machines. Salient pole synchronous reluctance machine. Stepper motor operation principles. Permanent magnet stepper motor. Variable reluctance stepper motors. Switched reluctance motors. Linear induction motors. Induction generators. Permanent magnet DC motor. Brushless DC motors.

PREREQUISITE:

EE 422

RELATION OF COURSE TO PROGRAM:

Elective

COURSE INSTRUCTION OUTCOMES:

The student gains detailed skills related to the subject of special type of electrical machines.

TOPICS COVERED:

- AC Motors (Two-phase and Single-phase)
- Starting of single phase AC motor
- Single phase commutator series motor
- Energy conversion in doubly salient machines
- Three phase conventional reluctance machines
- Salient pole synchronous reluctance motor
- Operation principles of stepper motors and their classifications (Permanent magnet stepper motors and Variable reluctance stepper motors)

- Switched reluctance motors
- Linear induction motor
- Induction generator
- Operation and performance of permanent magnet DC motors
- Uni- and bi-directional Brushless DC motors

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

| Professional Component Content | | | |
|---------------------------------------|---------------------------|--------------------------|---------------------------|
| Math and Basic Sciences | Engineering Topics | General Education | Engineering Design |
| | ✓ | ✓ | ✓ |

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

| Student Outcomes | | Course Outcomes |
|-------------------------|--|------------------------|
| a. | An ability to apply knowledge of mathematics, science, and engineering. | |
| b. | An ability to design and conduct experiments, analyze and interpret data. | |
| c. | An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. | ✓ |
| d. | An ability to function on multi-disciplinary teams. | |
| e. | An ability to identify, formulate, and solve engineering problems. | |
| f. | An understanding of professional and ethical responsibility. | |
| g. | An ability to communicate effectively. | |
| h. | The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content | |
| i. | A recognition of the need for, and an ability to engage in life-long learning. | |
| j. | A knowledge of contemporary issues within and outside the electrical engineering profession. | |
| k. | An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice. | ✓ |