

## **EE 322 – Electrical Machines (2)**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2; Lab: 2

### **COURSE COORDINATOR**

Dr Noha El Amary

### **TEXT BOOK:**

B. S. Guru, "Electric Machinery and Transformers", Oxford Uni. Press, 2001

### **COURSE DESCRIPTION:**

Single phase transformer, construction, principle of operation. No load conditions, leakage reactance and equivalent circuit, voltage regulation, losses and efficiency, impedance. Auto transformer. Principle of three phase machines, Construction of 3-phase stator, and general layout of three phase two pole full and short pitched winding, distribution and pitch factor. MMF of one-phase and three-phase windings. Synchronous and rotor speed theory of action of three phase induction motor. Three phase induction motors power flow, EMF and equivalent circuit. Torque speed characteristics and starting. Effect of slip and stator voltage on the performance.

### **PREREQUISITE:**

EE 321

### **RELATION OF COURSE TO PROGRAM:**

Required

### **COURSE INSTRUCTION OUTCOMES:**

The student gains detailed skills related to the subject of single phase transformers and induction motors

### **TOPICS COVERED:**

- Single phase transformer
- Auto transformer
- Principle of three phase machines
- Three phase induction motors

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional Component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Engineering Design</b>
	✓		

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

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