

**Faculty of Engineering & Technology**

**Electrical Machines**

**Information :**

**Course Code :** EPR 340

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Mechanical Engineering

**Instructor Information :**

Title	Name	Office hours
Professor	Mousa Awadallah Abdallah Mousa	4
Lecturer	MARIAM AHMED SAMEH MOHAMAD AHMED ABBADI	1
Teaching Assistant	Abeer Tharwat Said Awad	
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**Area Of Study :**

By the end of the course the students will be able to:

- 1) Understand the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of DC Machines.
- 2) Understand the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 1-ph Transformers.
- 3) Understand the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 3-ph Induction Motors.
- 4) Understand the construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 3-ph Synchronous Machines.
- 5) To perform the required experiments to get the load characteristics of each of the previous machines.

**Description :**

Theory, basic concepts and operating characteristics, and applications of AC and DC machinery, Transformers and control devices, Generators and motors, Induction motor theory, Synchronous machine theory, Fractional HP motor theory, Steady-state analysis of AC machines: synchronous, induction, reluctance, and single phase, including permanent magnet machines, Development of models for steady state, starting, speed control, Linear and nonlinear analysis of synchronous machines.

**Course outcomes :**

**a. Knowledge and Understanding: :**

1 -	Identify basic applied and engineering science.
2 -	Identify principles in the design of mechanical components, different materials, and manufacturing technologies in the field of mechanical power engineering and some other engineering disciplines.
3 -	Identify principles in the field of design of fluid flow, thermodynamics, gas dynamics, turbo-machinery, heat transfer engineering and fundamentals of thermal and fluid processes
4 -	Develop conceptual and detailed design of construction projects and fluid power systems..

**b. Intellectual Skills: :**

1 -	Define the mechanical power engineering problems and evaluate designs, processes, and performance and propose improvements.
2 -	Derive different solution alternatives for the engineering problems, analyze, interpret data and design experiments to obtain new data, and evaluate the power losses in the fluid transmission lines and networks
3 -	Analyze the performance of the basic types of internal combustion engines, hydraulic machines, fluid power systems, subsystems and various control valves and actuators.

**c. Professional and Practical Skills: :**

1 -	Use laboratory, workshop equipment and field devices competently and safely.
2 -	Analyze the record data in the laboratory.
3 -	Prepare engineering drawings, computer graphics, and write specialized technical reports.

**d. General and Transferable Skills: :**

1 -	Collaborate effectively within multidisciplinary team.
2 -	Share ideas, communicate effectively and work in stressful environment and within constraints.
3 -	Lead and motivate individuals and work with others according to the rules of the professional Ethics.
4 -	Use digital libraries and/or Learning systems and demonstrate efficient IT capabilities

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Revision of 3-ph circuits and magnetic circuits.			
Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of DC Machines.			
Starting and speed control of DC motors.			
Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 1-ph Transformers.			
Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 3-ph Induction Motors			
Starting and speed control of Induction Motors.			
Construction, theory of operation, equivalent circuit, (voltage, current, power and torque) equations, and basic characteristics of each of 3-ph Synchronous Machines.			

**Teaching And Learning Methodologies :**

Lectures
Tutorial
Class discussions and activities
Homework and self-study

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Attendance	10.00	15	
Final Exam	40.00	16	
Lab	10.00	16	
Mid-Term Exam 1	15.00	6	
Mid-Term Exam 2	15.00	11	
Reports and quizzes	10.00	4	

**Recommended books :**

- 1) Basic Engineering Circuit Analysis - J. D. Irwin, Fourth edition, Macmillan, most recent edition.
- 2) Electric Circuits - James W. Nilsson and Susan A. Riedel, Addison Wesley, most recent edition.