The University of Jordan
School of Engineering
Department of Electrical Engineering
second Semester – 2023/2024

Course: Electric Circuits and Machines Lab – 0953374 (1 Cr. – Core Course)

Instructor: Eng. Enaam Al-khatib
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Course Website: N/A

Catalog Data: DC circuits. KVL. Network theorems. and RL, RC, circuits.(Impedance concept. Power and P.F.. Power measurement).

Prerequisites by Course: EE 0903203 – Electric engineering 0903373– Electric machines

Prerequisites By Topic: Students are assumed to have sufficient knowledge pertaining to the following:
DC and AC Electric Circuit Analysisand DC and AC Electric Machines Analysis

Textbook: **Lab Manual .**

References:

- *Engineering Circuits Analysis* by Kemmerly Hayt and Durbin. 7th Edition. McGraw-Hill.
- *Shaum's outline of Electrical Circuits,* Research & Education Association, 1st Edition, 1998.
- *Electric Circuits Problem Solver (Problem Solved Solution Guides),* by Nilsson Riedel, McGraw-Hill, 5th Edition, 2011
- *Fundamentals of Electric Circuits, by Charles Alexander and Matthew Sadiku, McGraw-Hill, 3rd Edition, 2012.*
- *Electric Machinery Fundamentals. S. J. Chapman, 4th Edition, 2005, McGraw Hill.*
- *Principles of Electric Machines and Power Electronics. P.C. Sen, John Wiley & Sons.*

Schedule & Duration: 16 Weeks, 10 Labs (3 hours each) plus exams.

Minimum Student Material: Experiments Manual, class handouts, scientific calculator, and access to a personal computer.

Minimum College Facilities: Lab with proper equipment and measuring instrumentation facilities.

Course Objectives: The main objective of this lab is to allow the student to perform a set of experiments needed to validate different circuit theorems and to utilize some basic measurement instruments such as mustimeters and the oscilloscope.

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

1. Perform fundamental measurements on electrical circuits. [b,d,g,k]
2. Use basic electrical laboratory instrumentation. [b,d,g,k]
3. Write complete technical reports. [b,d,g,k]
4. Know basics of electronic circuit instrumentation, including multimeters, power supplies, function generators and oscilloscopes. [b,d,g,k]
5. Know basics of electrical machnes, including multimeters, power supplies, transformer , DC machines , and AC motors [b,d,g,k]
6. Know format and content requirements for complete technical reporting. [b,d,g,k]

	Course Topics:		
		Topic Description	**Hr**
Part 1	1.	**Measurement Devices and Resistors**: Introduction to lab kits and equipment the student will use thoughout the Lab, including: breadboards, DC power supplies, multimeters, and Identification of resistors and capacitors values by color coding.	**3**
	2.	**DC Circuits and Network Theorems**: Verify Mesh Analysis and superposition theorem. Investigate the conditions for maximum power transfer in dc circuits.	**3**
	3.	**AC circuit Measurement Devices :** Introduction to function generator and oscellscope	
	5.	**Capacitive Reactance**: Investigate capacitive reactance relationship to AC source frequency. In addition, AC power and power factor calculations are conducted.	**3**
	6.	**Inductive Reactance**: Investigate inductive reactance relationship to AC source frequency. In addition, AC power and power factor calculations are introduced, along with the difference between peak-to-peak and rms values.	**3**
Part 2	7.	Single-Phase Transformers: DC test, No-load test and Short-circuit test , Equivalent circuit parameters evaluation ,Load test, Voltage regulation and efficiency curves.	**3**
	8.	DC Motors: Starting of DC Motors , Torque-Speed Characteristics Shunt DC Motors , Speed control of DC Motors	**3**
	9.	Three-Phase Induction (Asynchronous) Motors: Starting of 3-phase induction motors ,No-load test , Equivalent circuit parameters evaluation , Torque-Speed characteristics of 3-phase induction motors	**3**
	10	Synchronous motors: Starting of synchronous motors , Load test and torque-power angle characteristics , V-curve and power factor correction	**3**

Ground Rules: **Attendance is required** and highly encouraged. To that end, attendance will be taken every lecture. All exams (including the final exam) should be considered **cumulative**. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Assessments: Exams, Quizzes, Reports, Projects, and Assignments.

Grading policy:

Pre-Lab Reports	**0 %**
Lab Reports part1	**10 %**
Quizzes part 1	**10 %**
Midterm Exam	**20 %**
Lab Reports part2	**10 %**
Quizzes part 2	**10 %**
Final Exam	**40 %**
Total	**100%**

Last Updated: April 2024