

Module Information					
معلومات المادة الدراسية					
Module Title	DC Electrical Circuits		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	HTCMT 107				
ECTS Credits	6				
SWL (hr/sem)	100				
Module Level		UGI			Semester of Delivery
Administering Department		MT	College	HTC	
Module Leader	Zaki M. Abdullah		e-mail	drzaki_hwj@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		01/06/2023	Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of the module are to: <u>Understanding Fundamental Concepts:</u> The course aims to provide students with a solid understanding of fundamental concepts in electrical circuit analysis. This includes voltage, current, resistance, power, etc. <u>Analysis Methodologies:</u> Students will learn a variety of analysis methods to solve DC circuits, including Kirchhoff's laws and series and parallel circuit analysis. They will gain proficiency in nodal and mesh analysis methods, enabling them to analyze complex circuits systematically. <u>Circuit Simplification:</u> This course aims to provide

	students with the skills necessary to use methods like Thevenin's and Norton's theorems to simplify complicated DC circuits and find the equivalent circuits. 4. <u>Problem Solving Skills:</u> The course aims to develop problem-solving skills through hands-on activities and problem-solving exercises. 5. <u>Laboratory Experience:</u> The course aims to provide hands-on laboratory experiences where students can apply theoretical knowledge to practical scenarios. 6. <u>Preparation for Advanced Courses:</u> Prepare students for more advanced courses. A solid understanding of this course is essential in electronics, signal processing, control systems, and other specialized areas. Overall, the Electrical Circuits Analysis I course aims to provide Mechatronics Engineering students with a solid foundation in DC circuit analysis, enabling them to understand, analyze, and design electrical circuits relevant to their field of study.
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	With the successful completion of this Module, students will be able to: 1. Understand the fundamental concepts and principles of electric circuits, including circuit elements, systems of units, and voltage-current relations. 2. Demonstrate knowledge of Ohm's Law and its application in analyzing direct current (DC) networks. 3. Apply Kirchhoff's Laws to analyze and solve DC circuits using nodal and mesh analysis methods. 4. Analyze series and parallel resistor combinations and calculate voltage and current division in these configurations. 5. Perform Star (Wye)-Delta transformations to simplify complex resistor networks. 6. Apply source transformations to simplify circuit analysis and calculations. 7. Understand and apply the linearity and superposition theorems in DC circuit analysis. 8. Apply Thevenin's and Norton's theorems to simplify complex circuits into equivalent circuits. 9. Understand and apply the maximum power transfer theorem to optimize power transfer in DC circuits. 10. Analyze the behavior of capacitors and inductors in DC circuits, including their combinations in series and parallel.
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Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Introduction to DC Circuit Concepts Systems of Units, Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Circuit Diagrams, Nodes, Branches, Loops, and Ohm's Law in the Direct Current (DC) Network. Kirchhoff's laws, Independent and Dependent sources [20 hrs] Revision problem Classes [3] hrs Part B - Introduction to Methods of Analysis. Introduction to DC circuit analysis, Fundamentals Resistive networks, voltage and current sources, Voltage and Current Division, Nodal Analysis, and Super node, Mesh Analysis, and Super mesh. [18 hrs] Part C - Introduction to Circuit Theorems. Linearity Property, Superposition, Source Transformations,

	Thevenin and Norton equivalent circuits, and maximum power transfer, [18 hrs] Part D - Introduction to Capacitors and Inductors. Introduction to Capacitors in Parallel and Series; Capacitor Current and Voltage, Inductors in Parallel and Series; Inductors Current and Voltage [6 hrs]
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their

	critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/Sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/Sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/Sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 3,8,9,10

	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Discuss the Syllabus, Introduction to Systems of Units
Week 2	Circuit Concepts - Passive and Active Elements, Voltage-Current Relations, and Circuit Diagrams
Week 3	Resistance and Resistivity, Ohm's Law

Week 4	Series and Parallel Resistors with Voltage and Current Division
Week 5	Star (Wye)-Delta Transformations
Week 6	Kirchhoff's Laws: KVL and KCL
Week 7	Nodal Analysis, and Super node
Week 8	Mesh Analysis, and Super mesh
Week 9	Linearity and Superposition,
Week 10	Mid-term Exam + Source Transformations + Independent and Dependent sources
Week 11	Thevenin's theorem
Week 12	Norton theorem
Week 13	Maximum Power Transfer Theorem
Week 14	Examples
Week 15	Review, Practice
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Lab instruments, Reports, Safety, and Rules
Week 2	Practical and colored resistance measurements
Week 3	Electrical Measurements, and use of Breadboards
Week 4	Ohm's law

Week 5	Simple DC Circuits: A Series Circuits
Week 6	Simple DC Circuits: A Parallel Circuits
Week 7	Kirchhoff's voltage Laws
Week 8	Mid-term Exam
Week 9	Kirchhoff's current Laws
Week 10	Thevenin's Theorem
Week 11	Norton theorem
Week 12	Superposition Theorem
Week 13	Maximum Power Transfer
Week 14	First-Order Transient Responses
Week 15	Second-Order Transient Responses

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and	Yes

	M.N.O Sadiku, McGraw-Hill Education	
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electricalengineering	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة
الدراسية