



Ministry of Higher Education and
Scientific Research – Iraq
Alfurat Al-Awsat technical university
technical college Al-musaib
Department of Electrical Engineering Techniques



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	ELECTRICAL CIRCUITS ANALYSIS		Module Delivery
Module Type	CORE		✓ Theory Lecture ✓ Lab Tutorial ✓ Practical ✓ Seminar
Module Code	ATU23033		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	٢	Semester of Delivery	1
Administering Department	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES	College	ALFURAT AL-AWSAT TECHNICAL UNIVERSITY technical college Al-musaib
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	None	e-mail	None
Peer Reviewer Name	None	e-mail	None
Review Committee Approval	13/06/2023	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ADVANCED ELECTRICAL CIRCUITS ANALYSIS	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Students will learn the principle of ١-transient AC and DC circuit ٢- design the circuits which used to power electronics, motors, ٣-and delay circuits applications. ٤-Learn how to calculate and analyze voltage and current phasors in AC circuits, including their amplitudes, phases, and frequency relationships. ٥-Explore the behavior and characteristics of AC circuit elements, such as resistors, capacitors, and inductors, and understand their roles in AC circuit analysis. ٦-Investigate the concept of impedance in AC circuits and its relationship to resistance, reactance, and frequency. ٧-Study the principles of AC power and power factor, including real power, reactive power, apparent power, and power factor correction.

	8- Gain a comprehensive understanding of three-phase AC systems, including the generation, transmission, and distribution of power in three-phase circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> ١- Knowledge Acquisition: Students will acquire a comprehensive understanding of the fundamental concepts and principles of Comparison of AC and DC transient circuit ٢- Circuit Design and Analysis: Students will gain the ability to design and analyze Resonance A.c and Dc circuit heir knowledge of impedance, power factor, and component characteristics. They will learn to calculate voltage and current magnitudes, phase differences, and power relationships in AC circuits. ٣- Quality Factor, Bandwidth and Half-Power Frequency in resonance circuits Students will be able to construct and interpret band width to visualize and analyze the behavior of voltages and currents in resonance circuits. ٤- Three-Phase Systems: Students will acquire understanding of three-phase AC systems, including balanced and unbalanced configurations. Laboratory Skills: Students will develop practical skills in using circuit simulation software and laboratory equipment to design, analyze, and verify the performance of TRANSIENT AC and DC circuits.
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following:</p> <ul style="list-style-type: none"> • <u>Part A – Definitions, units, and transient applications</u> General concept of UNITS and some application of transient system [3 hrs] • <u>Part B – Unit step forcing function</u> General concept of applying UNIT step function for the electrical circuit [4 hrs] • <u>Part C Transient analysis in DC circuit.</u> Source free and step response RL and RC circuits in DC system. Comoplet response of a series and a parallel RLC circuits in DC system. [10 hrs] • <u>Part D Single - phase of AC Circuits.</u> AC in resistive circuits, current and voltage in inductive circuits, current and voltage in capacitive circuits. Concept of complex impedance and admittance, AC series and parallel circuits. RL, RC and RLC circuit analysis and phasor representation. [14 hrs] • <u>Part E resonance of AC Circuits</u> Resonance in A.c Series and parallel RLC Circuit ,Quality Factor (Q), Bandwidth and Half-Power Frequency in resonance circuits,Tank circuit and dynamic impedance in RLC circuit [14 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>1-Conceptual Understanding: Explain transient AC and DC circuits, introduce the concept of complete response of RL ,RC circuit, and highlight the significance of RLC series and parallel circuit and phases in AC circuits.</p> <p>2-Mathematical Foundations: Provide a solid mathematical foundation for transient DC and AC circuits. Teach students the use of phasor notation to analyze AC</p>
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	<p>circuits.</p> <p>3-Problem-Solving Skills: Dedicate adequate time to problem-solving exercises and examples.</p> <p>4-Laboratory Experiments: Incorporate laboratory experiments to reinforce theoretical concepts. Allow students to build and analyze AC circuits using oscilloscopes, function generators, and AC power sources.</p> <p>5-Simulation Tools: Introduce simulation MATLAB software tools that allow students to simulate circuits and observe their behavior.</p> <p>6-Review and Assessment: Regularly review key concepts and provide formative assessments to gauge students' understanding. Offer constructive feedback on their performance to help them identify areas for improvement.</p>
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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	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.133
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3-10	LO #3, 2,4 ,5,7 and 10
	Assignments	6	10% (10)	2-12	LO # 3, 4, 6 and 8
	Projects / Lab.	2	10% (10)	3,7	LO # 3-7
	Report	16	10% (10)	continuous	LO # 5, 8 and 11
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-8
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Definitions, units, and transient applications
Week 2	Unit step forcing function.
Week 3,4	Source free series and parallel RLC circuits in DC system.
Week 5	Comoplet response of a series and a parallel RLC circuits in DC system.

Week 6	Resonance in A.c Series and parallel RLC Circuit
Week 7	Quality Factor (Q), Bandwidth and Half-Power Frequency in resonance circuits
Week 8	Tank circuit and dynamic impedance in RLC circuit
Week 9,10	Sinusoids, phasors diagram for circuit elements.
Week 11	Balanced three-phase circuits: (wye –wye, delta-delta, connections).
Week 12	Balanced three-phase circuits: (wye-delta, delta-wye connections).
Week 13,14	Unbalanced three phase system
Week 15	Final Examination

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Matlab Model Power circuit design
Week 2	Lab 2: unit step forcing function
Week 3	Lab 3: Simulation of free source series RLC (over ,critical, under damped)
Week 4	Lab 4: Simulation of free source parallel RLC (over ,critical, under damped)
Week 5	Lab 5: Simulation of complete response of series and parallel RLC (over, critical, under damped)
Week 6	Lab 6: simulation of the Resonance in series RLC Circuit
Week 7	Lab 7: simulation of the Resonance in parallel RLC Circuit
Week 8	Lab 8: simulation of the sinusoidal steady state system
Week 9	Lab 9: simulation The sinusoidal transient analysis
Week 10	Lab 10:simulation of three phase wye to wye connection
Week 11	Lab 11:simulation of three phase delta to delta connection
Week 12	Lab 12:simulation of three phase wye to delta connection
Week 13	Lab 13:simulation of three phase unbalanced wye to wye connection
Week 14	Lab 14: Review

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Charles K. Alexander, Matthew N.O. Sdiku Fundamentals of Electrical Engineering, 4th Edition, 2009	Yes
Recommended Texts	Tony R. Kuphaldt, Lessons In Electric Circuits, Volume II - AC 5th edition, 2002	No
Websites	AC circuits https://byjus.com/physics/ac-circuit/	

APPENDIX:

GRADING SCHEME				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (٥٠ - ١٠٠)	A - Excellent	امتياز	٩٠ - ١٠٠	Outstanding Performance
	B - Very Good	جيد جدا	٨٠ - ٨٩	Above average with some errors
	C - Good	جيد	٧٠ - ٧٩	Sound work with notable errors
	D - Satisfactory	متوسط	٦٠ - ٦٩	Fair but with major shortcomings
	E - Sufficient	مقبول	٥٠ - ٥٩	Work meets minimum criteria
Fail Group (٠ - ٤٩)	FX – Fail	مقبول بقرار	(٤٥-٤٩)	More work required but credit awarded
	F – Fail	راسب	(٠-٤٤)	Considerable amount of work required
Note:				
NB Decimal places above or below ٠,٥ will be rounded to the higher or lower full mark (for example a mark of ٥٤,٥ will be rounded to ٥٥, whereas a mark of ٥٤,٤ will be rounded to ٥٤. 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.				