



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Delivery	ADVANCED ELECTRICAL CIRCUITS ANALYSIS			Module Title
Theory ✓ Lecture Lab ✓ Tutorial Practical ✓ Seminar ✓	CORE			Module Type
	EET209			Module Code
	6			ECTS Credits
	150			SWL (hr/sem)
2	Semester of Delivery	U		Module Level
AL-FURAT AL-AWSAT TECHNICAL UNIVERSITY AL-MUSAIB TECHNICAL COLLEGE		College	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES	Administering Department
		e-mail		Module Leader
master	Module Leader's Qualification		ASS.Prof	Module Leader's Acad. Title
None		e-mail	None	Module Tutor
None		e-mail	None	Peer Reviewer Name
1.0	Version Number		13/06/2023	Review Committee Approval

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Students will learn the principle of ; Write circuit first order and second order equations for coupled system .1 Analyze circuits containing ideal transformers .2 Derive two port parameter descriptions for circuits. .3				Module Objectives أهداف المادة الدراسية
1-Knowledge Acquisition: Students will acquire a comprehensive understanding of the fundamental concepts and principles of Write circuit first order and second order equations circuit 2-Circuit Design and Analysis: Students will gain the ability to design and analyze Resonance A.c and Dc circuit heir knowledge of impedance, power				Module Learning Outcomes مخرجات التعلم للمادة الدراسية

factor, and component characteristics. They will learn to calculate voltage and current magnitudes, phase differences, and power relationships in AC circuits. 3-Analyze circuits containing ideal transformers(Laplas transformation and Fourier transformation) 4-Hybird Systems: Students will acquire understanding of hybrid tow port net work 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 different circuits.	
Indicative content includes the following: Part A – Application of laplace transform to circuit analysis. • Solve the second order differential equation using laplas transformation and Application of Laplace transform to circuit analysis. [6 hrs] Part B – Frequency selective circuits • Design the passive and active filter select the correct frequency for design [4 hrs] Part C Transient analysis in DC circuit. • 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] Part D Sinusoidal frequency analysis. • 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] Part E Two-port networks and Hybrid parameter • Two-port networks: (impedance, admittance, transmissions parameters, relationships between parameters, interconnection between networks). [14 hrs]	Indicative Contents المحتويات الإرشادية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
1-Conceptual Understanding: Explain transient AC and DC circuits, introduce the concept of complete response of RLC circuit, and highlight the significance of RLC series and parallel circuit and phases in AC circuits. 2-Mathematical Foundations: Provide a solid mathematical foundation for transient DC and AC circuits. Teach students the use of LAPLAS Transformation to analyze circuits. 3-Problem-Solving Skills: Dedicate adequate time to problem-solving exercises and examples. 5-Simulation Tools: Introduce simulation MATLAB software tools that allow students to simulate circuits and observe their behavior. 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.	Strategies

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Student Workload (SWL) الحمل الدراسي للطالب			
4.2	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	63	Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل
5.8	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	87	Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل
		150	Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Sinusoidal steady- state analysis (Kirchhoff's laws, Mesh analysis, Nodal analysis, Superposition's theorem, Thevenin's theorem, Norton's theorem, source transformations).	Week1
Balanced three-phase circuits: (wye -wye, delta-delta, connections).	Week 2
Balanced three-phase circuits: (wye-delta, delta-wye connections).	Week 3,4
Unbalanced three phase system	Week 5
Frequency selective circuits: Passive filters • Active filters •	Week 6,7
Advanced circuit analysis using Laplace transform.	Week 8
Application of Laplace transform to circuit analysis.	Week 9,10

Two-port networks: (impedance, admittance, transmissions parameters, relationships between parameters, interconnection between networks).	Week 11,12
Hybrid parameter of two port(H-parameters), Inverse hybrid parameters	Week 11
Final Examination	Week 12

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Material Covered	
Lab 1: simulation of the sinusoidal steady state system	Week 1
Lab 2: simulation The sinusoidal transient analysis	Week 2
Lab 3:simulation of three phase star to star connection	Week 3
Lab 4: simulation of three phase delta to delta connection	Week 4
Lab 5: simulation of three phase star to delta connection	Week 5
Lab 6: simulation of three phase delta to star connection	Week 6
Lab 7: simulation of Unbalanced three phase system in different phase voltage	Week 7
Lab 8: simulation of Unbalanced three phase system in different phase frequency	Week 8
Lab 9: design passive filter in MATLAB program	Week 9
Lab 10: design active filter in MATLAB program	Week 10
Lab 11: design Two-port networks impedance in MATLAB program	Week 11,12
Lab 12: design hybrid of Two-port networks in MATLAB program	Week 13
Lab 14: Review	Week 14

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

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Definition	Marks (%)	التقدير	Grade	Group

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

NB 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.