



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	ELECTRIC MACHINE DRIVES			Module Delivery	
Module Type	CORE			✓ Theory Lecture ✓ Lab Tutorial ✓ Practical ✓ Seminar	
Module Code	EET401				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	4		Semester of Delivery	1	
Administering Department	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES		College	AL-FURAT AL-AWSAT TECHNICAL UNIVERSITY AL-MUSAIB TECHNICAL COLLEGE	
Module Leader			e-mail		
Module Leader's Acad. Title	ASS. Prof		Module Leader's Qualification	PhD	
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	NONE	Semester	
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 ; 1. Comparison of AC and DC Drives 2. AC-DC converter DC Motor Drives 3. DC-DC chopper DC Motor Drive 4. AC Motor Drives
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Knowledge Acquisition: Students will acquire a comprehensive understanding of the fundamental concepts and principles of AC and DC Electrical Drive Circuit . 2-AC To DC DC motor drive circuit: Students have the ability to design a controlled rectifier dc motor drive , derive the equation of power electronics circuit, harmonics, power quality, voltage and current rating, and four quadrant drive. 3-Analyze power electronics of chopper dc to dc drive: four-quadrant, mode operation power quality and duty cycle variation. 4-AC drive Systems: Students will acquire an understanding of power electronic circuit fed ac motor drive with stator voltage speed control. 6- Analyze the drive power electronic circuit for speed control using rotor voltage

	control. 7- understanding the speed control using frequency control. 8. analyze the current control induction motor drive with the current source inverter. 9-Laboratory Skills: Students will develop practical skills in using circuit simulation software and laboratory equipment to design, analyze, and verify the performance of different AC and DC drive circuits
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • <u>Part A – Application controlled rectifier DC motor drive</u> analyze one, two, and Four quadrant power electronic dc motor drive. [10 hrs] • <u>Part B – application of chopper dc motor :</u> Design and analyze one-quadrant and four-quadrant dc motor drives. [10 hrs] • <u>Part C Mode of operation of dc motor drive</u> . motoring and regenerative operation of dc motor drive for chopper drive and controlled rectifier drive[10 hrs] • <u>Part D Ac motor drive mode of operation.</u> Ac motor drive induction and synchronous drive for motoring and regenerative and plugging mode operation. [10 hrs] • <u>Part E stator voltage, frequency and current control of induction motor</u> ac voltage controller fed induction motor drive(speed control, power factor calculation of the drive, harmonics determination. [16 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1-Conceptual Understanding: the comparison of ac and dc drives. 2-Mathematical Foundations: Provide a solid mathematical foundation for DC and AC Drive circuits. Teach students the use of Matlab program 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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.13
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, 5,7,10	LO #1, 2, 5 and 8
	Assignments	7	10% (10)	2- 12	LO # 3, 4, 6 and 8
	Projects / Lab.	9	10% (10)	Continuous	All
	Report	6	10% (10)	2,4,6,8,10,12	LO # 5, 8 and 9
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-9
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	AC and DC Drives, compassion, applications
Week 2	Load Toque Requirement, types Load Torque
Week 3	Single Phase AC to DC converter DC Motor Drives, Semiconverter drive
Week 4	Single Phase AC to DC full Converter Drive, Dual Converter
Week 5	Three-Phase AC to DC converter DC Motor Drives, Semiconverter drive, full Converter Drive, Dual Converter
Week 6	DC -DC chopper DC Motor Drives, one Quadrant Drive
Week 7	Two Quadrant Drive, Four Quadrant Drive
Week 8	AC Drives , Induction Motor Drive, Stability of induction motor
Week 9	Stator voltage speed control of induction Motor
Week 10	Rotor voltage control of induction Motor
Week 11	Frequency speed control of induction motor, voltage to frequency speed control of induction motor
Week 12	Current control of AC Motor Drive
Week 13	Synchronous Motor Drive
Week 14	Direct Torque Control of AC Motor Drive
Week 15	Final Examination

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Matlab Model Power Electronics circuit design
Week 2	Lab 2: AC -Dc semi converter separately excited, Series dc motor Drive
Week 3	Lab 3:AC -Dc Full separately excited, Series dc motor Drive
Week 4	Lab 4:DC-DC ONE- Quadrant DC Motor Drive

Week 5	Lab 5:DC-DC Two Quadrant DC Motor Drive.
Week 6	Lab 6:Stator Voltage Control of Induction Motor.
Week 7	Lab 7:Rotor Voltage Control of Induction Motor
Week 8	Lab 8:Frequency Control of Induction Motor
Week 9	Lab 9: Voltage to frequency Control of Induction Motor
Week 10	Lab 10: slip power control by dc converter of Induction Motor
Week 11,12	Lab 11:Single phase DC-AC converter Motor Drive
Week 13	Lab 12: Three- phase DC-AC converter Motor Drive
Week 14	Review

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Gopal K. Dubey “ power semiconductor controlled Drives” 1st edition, 1989	Yes
Recommended Texts	Mohammed Rashid” Power electronics circuits, Devices and application” 4th edition, 2014	No
Websites	https://www.amazon.com/Power-Electronics-Circuits-Devices-Applications/dp/0133125904	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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.