COURSE SEMESTER PLAN

PART I: COURSE INFORMATION			
Semester:	381	**Academic Year:**	2026-2027
Department:	EE	**Program(s):**	BSc. Electrical Engineering
Course Code:	EEN 315	**Course Title:**	Electric Machines
Credit Hours:	3	**Pre/Co-requisite:**	EEN 221 Electromagnetism
Weekly Contact Hours	**Theory (Hrs):**	**Practical (Hrs):**	**Total (Hrs):**
	3	0	3

PART II: TEXTBOOKS/TEACHING MATERIALS	
1.	Electric Machinery Fundamentals, 5th edition, Stephen J. Chapman
2.	Electrical Machines, S. K. Sahdev
3.	Hand out

PART III: COURSE DESCRIPTION

This course covers a wide range of topics including single-phase and three-phase transformer, autotransformer, instrument transformer, DC machines, AC single phase & three-phase induction machines and synchronous machines. This includes the principles of operation, construction and applications of different electrical machines. The torque-speed characteristic, power flow, efficiency and speed control techniques for DC & AC motors are also covered. The course also includes solving analytical and design problems of single-phase & three-phase transformer, autotransformer and induction & synchronous machines.

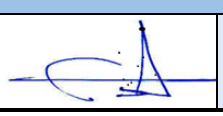
PART IV: COURSE LEARNING OUTCOMES (CLOS) Upon completion of the course, the student should be able to:	
1.	Identify the techniques for torque production as well as AC voltage generation and DC conversion.
2.	Describe the construction and operation principles of DC machines, AC machines and transformers.
3.	Analyze the operation of DC motors, AC induction motors and Synchronous generator.
4.	Calculate the electrical quantities for different types of electrical machines.
5.	Design a model of an electric machine using appropriate software tools.
6.	Act effectively as a team player in solving an engineering problem or research work.

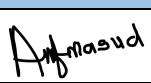
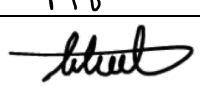
PART V (a): WEEKLY PACING SCHEDULE - THEORY	
Week No.	**Topic and Sub-Topic**
1.	Introduction to magnetic circuits.
2.	Single-phase Transformer: Construction Theory of Operation and Equivalent Circuit
3.	Autotransformer, Conversion of Two-Winding Transformer into Autotransformer, voltage and current relation, apparent power rating advantage.
4.	Three-Phase Transformer Construction, Three-Phase Transformer Connection. Three Phase Transformation using two transformers-Power Transformers – Distribution Transformers.
5.	Three-Phase Transformer Connection problems, Instrument Transformer (Current / Potential Transformer)
6.	Generation Principles: Introduction to electric machines. Construction of AC Machines: AC machinery fundamentals.
7.	Construction of DC Generators and Armature Winding: DC machinery fundamentals.
8.	Midterm Exams
9.	DC Motors & Generators: DC Shunt, Series and Compound.
10.	DC Motor Principles, Speed Control of DC Motor, Speed Characteristics: DC Separately Excited, Series and Compound
11.	Synchronous generator & motors, Basic construction & principles
12.	Synchronous generators working alone & Synchronous generators working in parallel operation/solving examples
13.	Classification of AC Motors, Induction Motor Principles Construction (Squirrel Cage/Wound-Rotor)
14.	Induction Motor Equivalent circuit, Power, Torque-speed characteristics and speed control.
15.	Determining the induction motor parameters. Single Phase Motors
16.	Review
17.	Final Exams

PART V (b): WEEKLY PACING SCHEDULE - PRACTICAL	
Week No.	**Title of Experiment / Activity**
1.	
2.	

3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

PART VI: EVALUATION / ASSESSMENT					
Assessment (Theory)	**Week No.**	**Marks (%)**	**Assessment (Practical)**	**Week No.**	**Marks (%)**
Quiz 1	4/6	15%			
Quiz 1	12/15	15%			
Assignments	3-15	10%			
Midterm Exam	8	25%			
Final Exam	16-17	35%			
	Total (Theory):	100%		**Total (Practical):**	
Grand Total (Theory & Practical) = 100%					

PART VII: PREPARED BY					
Instructor/ Course Coordinator:	Shaaban M. Elfarawi	**Signature:**		**Date:**	3-Sep-2026

PART VIII: APPROVED BY					
Program (Course) Director:	Dr. Abdullahi Masoud	**Signature:**		**Date:**	3-Sep-2026
Head of Department:	Dr. Faris Al-Harbi	**Signature:**		**Date:**	3-Apr-2026