

Associate Degree Program

Specialization	Common
Course Number	020301121
Course Title	Electrical Machines
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

وصف المادة الدراسية:

This course throws light on all types of electrical machines ,transformers ,motors , generators ,special machines ,These machines which may face a diploma holder in his practical life ,He must be aware of many related things about these machines ,construction ,principles of operation , characteristics , applications , maintenance .

أهداف المادة الدراسية:

بعد دراسة هذه المادة يتوقع من الطالب أن يكون قادراً على تحقيق الأهداف التالية:

1. Explain & describe the operating principles, construction of generators.
2. Explain & describe the operating principles, construction of three phase synchronous generators.
3. Explain & describe the operating principles, construction & excitation of DC & AC motors & generators.

الوصف العام:

رقم الوحدة	اسم الوحدة	محتويات الوحدة	الزمن
1.	Introduction to Magnetic Circuits	<ul style="list-style-type: none"> ▪ I-H relation ▪ B-H relation ▪ Magnetic equivalent circuit ▪ Hysteresis losses ▪ Eddy current losses ▪ Core losses 	1 weeks
2.	Transformers	<ul style="list-style-type: none"> ▪ Construction and principle of operation ▪ EMF Equation ▪ Practical transformer; referred equivalent circuit ▪ Open – circuit test ▪ Short – circuit test ▪ Full – load copper losses. ▪ Efficiency ,all – day efficiency ,maximum efficiency ▪ Voltage regulation ▪ Ideal transformer ▪ Auto transformer ▪ Three – phase transformers 	2 weeks
3.	Direct Current Machines	<ul style="list-style-type: none"> ▪ Construction and principle of operation ▪ Armature windings ▪ Developed torque ▪ DC generators, types; characteristics, interlopes, armature reaction , voltage regulation . ▪ DC Motors, types; mechanical characteristics; losses and efficiency speed control 	3 weeks
4.	Three – Phase Indication Motors	<ul style="list-style-type: none"> ▪ Introduction ▪ Construction and types ▪ Rotating magnetic field ▪ Induced E.M.F ▪ Slip 	3 weeks

		<ul style="list-style-type: none"> ▪ Performance characteristics ▪ No – load test ▪ Blocked – rotor test ▪ Speed control ,pole changing , line voltage control; line frequency ▪ Control , rotor resistance control 	
5.	Single – phase Induction Motors	<ul style="list-style-type: none"> ▪ Double revolving field theory ▪ Types , capacitor – start motor ,split – phase motor ; shade – ▪ Pole motor, capacitor – start and run motor, universal motor. ▪ Characteristics and typical applications ▪ Speed control 	2 weeks
6.	Synchronous Machines	<ul style="list-style-type: none"> ▪ Construction of 3-ph synchronous machine ▪ Synchronous generators , principle of operation , types ▪ characteristics , armature reaction , voltage regulation ▪ Synchronous motors , principle of operation , power and torque ▪ characteristics , P.F control speed control , applications 	2 weeks
7.	Special Machines.	<ul style="list-style-type: none"> ▪ DC servomotor, construction and applications. ▪ AC servomotor, construction and applications. ▪ Stepper motor, types, construction and applications. 	1 week

الكتب و المراجع :

1. Principle of Electric Machines and Power Electronics , P.C. Sen , John Wiley and Sons , Inc , 1997
 2. Small Electric Motors , Helmut Moczala , Jugen Draeger , Hermann Kraub , 1998
 3. Electrical Machines , M.S.Sarma , West Publishing Company , 1994
- Electrical machinery Fundamental, Stephen J. Chap man, Mc GRAW , Hill , 1996 .

Associate Degree Program

Specialization	Common
Course Number	020301122
Course Title	Electrical Machines Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

وصف المادة الدراسية:

This course focus ,on connection of various types of electrical machines , measurement of losses and efficiency ,speed control and mechanical characteristics of types of motors ,external characteristics of generators.

أهداف المادة الدراسية:

Upon the completion of the course, the student will be able to:

1. Make connection of all type of electrical machines , motors , generators and transformers
2. Measure; power ,current, voltage and cosup of electrical machines
3. Measure sped of different types motor
4. Draw the characteristics of transformers ,motors and generators
5. Calculate the parameters of electrical machines

الوصف العام:

رقم الوحدة	اسم الوحدة	محتويات الوحدة	الزمن
1.		Experiments on transformers no- load test, short- circuit test and loading test. Cage type , Capacitor-start motor, shaded- pole type	1 weeks
2.		Experiments on three – phase induction motors; wound rotor type and squirrel	2 weeks
3.		Experiments on single – phase induction motors split phase type ,	3 weeks
4.		Experiments on synchronous machines ; synchronous generator	2 weeks

		(alternator) and synchronous motor	
5.		Experiments on DC motors ;shunt, series, compound	4 weeks
6.		Experiments on DC generators ;shunt, series, compound	4 weeks

الكتب و المراجع :
المراجع:

1. Lab. Sheets Prepared by Instructor
2. Manuals of each type of machines.
3. Electric machinery fundamentals, Stephen J.Chapman, 1996.