Course specification

First Year

First Term

Course Specification

Course Title	**Electrical Circuits(1)**	
Course Code	EPM1101	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohammed Rashad	
Teaching Staff	Dr. Fayza Abd El-Rahman Safan-Dr. Mohamed kamal ElNemr	
Branch / Level	Electrical engineering/ First year	
Semester	First term	
Pre-Requisite	NA	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Help in basic analysis to solve currents and voltages in each branch of dc and ac circuits
- Acquire the relations between currents, voltages, power, and power factor
- Enhance dealing with active, reactive and apparent power in ac circuits
- Enable learning the basic terminology of ac waves

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the main components of dc and ac circuits
A2. Reveal Ohm's and Kirchhoff's laws and their application in series, parallel and series-parallel circuits in both dc and ac circuits
A3. State the method of analysis of the electrical circuits (branch-current analysis and Node and Mesh methods) in both dc and ac circuits
A4. Enumerate the circuit theorems in both dc and ac circuits
A5. Identify the active, reactive and apparent power and the method of power factor improvement
A6. Mention the types of filters
A7. Identify the parameters used in two port networks

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between various connections of circuit elements
B2. Compare between the various methods of circuit analysis
B3. Differentiate between the different circuit theorem and the suitable one for each circuit
B4. Analyze the circuit that contain both ac and dc electrical sources
B5. Link between the absorbed power depending on the load type and the improvement of the overall circuit power factor

B6. Compare between series and parallel resonance
B7. Differentiate between low pass filter, band pass filter, high pass filter and band stop filter

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Solve different circuits including series and parallel forms in the correct form
C2. Derive simplified circuits from the complicated ones
C3. Verify the obtained results using different solving techniques
C4. Derive various parameters for two port networks
C5. Design the different passive filters using resonance circuits

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Familiarize the students with the correct methods of dealing with the equipments
D2. Learn how to carry out different requested tasks in a team group
D3. Learn how to solve any circuit containing electronic devices.

3. Course Contents

Week	Topics
1-2	Principles of ac circuits, RMS value, average value and phasor diagram.
3-4	series, parallel and series-parallel ac circuits
5	Methods of analysis (branch-current analysis, Nodal analysis, and Mesh analysis)
6- 8	Electric circuit theorems (Super-position, Thevenin, Norton, Maximum power transfer Millman, reciprocity, and substitution theorems)
9-10	Power triangle in ac circuits and power factor improvement
11	Series and parallel resonance circuits
12	Filters , their types and principle of operation
13-14	Two port networks

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60 %
Oral Assessment	1	13	10 %
Practical Examination	1	13	10 %
Semester work	2	7, 12	20%

6. List of references

Course notes:

Essential Books:

- *R.L. Boylested "introductory circuit analysis" Prentice Hall; 12 edition (2010).*
- *J. Nilson & Riedel "Electric circuits", Prentice Hall; 9 edition (2010).*
- *W. J. Hayt and J.E. Kemmerly "Engineering Circuit Analysis" Mc Gram Hill Science/Engineering/Math; 7 edition (2007).*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning

- *Electric circuit lab.*
- *Data show and computer*

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ.د.م. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code /Course Title: EPM1101/ Electrical Circuits (1)

Course Contents	Course outcomes ILOs																					
	Knowledge and Understanding							Intellectual							Practical					Transferable		
	A 1	A 2	A 3	A4	A 5	A 6	A 7	B 1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	D1	D2	D3
Ohm's and Kirchhoff's laws, series, parallel and series-parallel dc circuits																						
Principles of ac circuits, RMS value, average value and phasor diagram.	X	X						X							X							
series, parallel and series-parallel ac circuits	X							X														
Methods of analysis (branch-current analysis, Nodal analysis, and Mesh analysis)		X							X	X					X					X		X
Electric circuit theorems (Super-position, Thevenin, Norton, Maximum power transfer Millman, reciprocity, and substitution theorems)			X														X			X		
Power triangle in ac circuits and power factor improvement				X							X					X	X			X	X	X
Series and parallel resonance circuits					X							X								X		X
Filters , their types and principle of operation							X						X						X			
Two port networks						X								X					X			

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy **Head of Department:** Prof. Dr. Essam Eddin Mohammed Rashad

Course Specification

Course Title	**Electrical and Electronic Materials**	
Course Code	EEC/EPM1160	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching staff	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy, Salah Eldeen khamis	
Branch / Level	Electrical engineering/ First year	
Semester	First term	
Pre-Requisite	NA	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 1 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

This course aims at providing the basic knowledge required by practicing engineers for dealing with economics and operation of power systems in order to:

- Improve information about electric and magnetic polarization and dipole moment
- Recognize the characteristics of piezoelectricity and Ferro electricity
- Acquire relations about different polarization types
- Enhance the knowledge about dielectric and magnetic materials
- Enhance the practice about the Dielectric losses and magnetic Dipole moments
- Realize the principles of superconductivity and the Josephson junction.
- Support the learning of types of crystals
- Help to know the semiconductor and transport of carriers
- Improve semiconductor application

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Identify the dielectric constant, the electric dipole moment and the polarization
A2. Mention the conditions and applications of piezoelectricity and Ferro electricity
A3. Identify the frequency dependence of electronic polarizability and ionic polarization as a function of frequency
A4. Outline the types of magnetic materials
A5. State the relations used to calculate the Dielectric losses
A6. Determine the types and applications of superconductivity and Josephson junction.
A7. Classify types of solids and type of crystals
A8. State diffusion and drift current
A9. Match the work phototransistors - solar cells - lasers - leds

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between electric and magnetic dipole moments
B2. Recognize the conditions of occurring the piezoelectricity and Ferro electricity
B3. Predict the frequency dependence of electronic polarizability and ionic polarization
B4. Compare the characteristics of different types of magnetic materials
B5. Develop the relations used to calculate the Dielectric losses
B6. Distinguish the types of superconductors and crystals
B7. Differentiate between different type of semiconductor application

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply the relation between the dielectric constant and frequency
C2. Calculate the polarizability and dipole moment for different types of polarization
C3. Apply the suitable formulas to calculate the Dielectric losses
C4. Solve the relations related to the magnetic circuits
C5. Apply the relations describing the types of superconductors
C6. Utilize operations of semiconductor and transport of carriers
C7. Confirm the relations of semiconductors for certain applications
C8. Apply the most appropriate electronics methodology

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Collect suitable data about selected topics
D2. Corporate to process the collected data
D3. Follow up the team work principles to write technical reports

3. Course Contents

Week	Topics
1	Static dielectric constant and electric dipole moment
2	Polarization and dielectric constant
3	Ferro electricity and Piezoelectricity
4	Frequency Dependence of electronic polarizability and Ionic polarization as a function of frequency
5	Magnetic polarization, Diamagnetism and paramagnetism and Ferromagnetism
6	Dielectric losses and magnetic Dipole moments
7	Thermoelectricity, Thermo-magnetic effects, Superconductivity and the josphson junction.
8	Crystals

9	Semiconductors
10	Applications (phototransistors - solar cells - lasers - leds)
11	Dielectric materials under static fields
12	Dielectrics under alternating fields
13	Thermal effects
14	Magnetic materials

4. Teaching and Learning Methods

4.1- Lectures

4.2-Problems solving

4.3-Web-sites show and demonstration

4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	70%
Oral Assessment	-	-	-
Practical Examination	-	-	-
Semester work	5 (overall)	Weeks: 2, 5, 6, 10, 12, 13	30%

6. List of references

Course notes:

- *Dr. Ahmed Refaat, "Electrical And Electronic Materials", Electrical Power and Machines Department, Faculty of Engineering, Tanta University*

***Essential Books**:*

- *Jones ،I. P , " Materials science for electrical and electronic engineers ", Oxford University Press, Oxford, New York, 2001*
- *kasap;s.o, " principles of electrical engineering materials and devices", mcgraw-hill, boston, 2000*
- *Charles A. Harper and Ronald M. Sampson, " Electronic materials and processes handbook", McGraw-Hill Professional Publishing; 2 edition (1993).*
- *W. Tillar Shugg, " Handbook of electrical and electronic insulating materials", IEEE Press; 2 edition (1995)*
- *Zachariason ،Rob, "Electrical materials", Delmar Cengage Learning; 2 edition (2011).*
- *Merrill L. Minges, "Electronic Materials Handbook, Vol. 1", CRC Press; 1st Printing; Volume 1 edition (1989).*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning

- *Electric material lab.*
- *Data show and computer*

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ.د.م. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code /Course Title: **EEC/EPM1160** / Electrical and Electronic Materials

Course Contents	Course outcomes ILOs																										
	Knowledge and Understanding									Intellectual							Practical								Transfer-able		
	A 1	A 2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	C7	C8	D1	D2	D3
Static dielectric constant and electric dipole moment	x									x								x							x	x	
Polarization and dielectric constant	x									x	x								x							x	
Ferro electricity and Piezoelectricity		x										x								x							x
Frequency Dependence of electronic polarizability and Ionic polarization as a function of frequency			x									x	x				x								x		
Magnetic polarization, Diamagnetism and paramagnetism and Ferromagnetism				x									x					x									x
Dielectric losses and magnetic Dipole moments					x									x					x	x							x
Thermoelectricity, Thermo-magnetic effects, Superconductivity and the josphson junction.					x	x									x					x	x				x		
Crystals							x								x							x				x	
Semiconductors								x	X							x						x	x		x		
Applications (phototransistors - solar cells - lasers - leds)								x	X							x						x	x			x	
Dielectric materials under static fields			x		x									x			x		x	x				x			x
Dielectrics under alternating fields			x		x									x			x		x	x				x			x
Thermal effects						x	x								x					x	x					x	
Magnetic materials				x									x					x								x	

Course coordinator:
Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department:
Prof. Dr. Essam Eddin Mohammed Rashad

Course specification

First Year

Second Term

Course Specification

Course Title	**Electrical Measurements**	
Course Code	EPM1202	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Branch / Level	Electrical Engineering /First year	
Semester	Second term	
Pre-Requisite	NA	
Course Delivery	**Lecture 4**	**14 x 4 h lectures**
	Practical 2	**14 x 2 h practical**
Parent Department	**Electrical power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge about basis of electromechanical instruments and their dynamics including the difference between dc and ac instruments.
- Acquire the main principles of moving coil and moving iron instruments and their applications in measuring electrical quantities.
- Help about ac and dc bridges to measure electrical quantities.
- Enhance the principles of different types of transducers and how to use them with electrical measuring instruments to measure non electrical quantities.
- Enable dealing with oscilloscope to measure voltages of electrical signals.
- Encourage defining different types of errors caused by inserting electrical measurement devices into electrical circuits.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the main features and utilizations of different types of electrical measuring instruments.

A2. Identify the principles of operations of moving coil instruments and their applications in dc and ac measurements.

A3. Identify the principles of operations of moving iron instruments and their applications in ac and dc measurements.

A4. State the principles of operations of electro-dynamic and electrostatic instruments and their applications in ac and dc measurements.

A5. Determine the mechanisms of transducers and their applications.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Develop the mathematical formulas used in describing the dynamic response of electromechanical instruments.
B2. Evaluate the advantages and the disadvantages of using moving coil in both ac and dc measurements.
B3. Derive the equivalent electric circuit associated with different electromechanical instruments.
B4. Modify electro-dynamic instruments to measure power and power factor.
B5. Extract the mathematical formulas that used to describe the transducers to measure non-electrical quantities.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Measure electrical quantities in different electrical sketched circuits.
C2. Use minimum number of instruments to measure the required electrical quantities in different electrical circuits
C3. Apply suitable formulas to utilize electrical bridges to measure resistance and inductance.
C4. Measure errors caused by inserting electrical measurement devices into electrical circuits.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Cooperate to collect information about certain topics.
D2. Report a main subject through defined groups.
D3. Build self-confidence.

3. Course Contents

Week	Topics
1-2	Basic Definitions, accuracy, precision, Resolution, Sensitivity, bandwidth, and Types of errors.
3	Analogue Instruments: Control, Damping torques, Dynamic response.
4-6	Direct Current Meters (Moving Coil Instruments), Measuring V, I, and R.
7-9	AC Instruments (Moving Iron Instruments), Electro-dynamic Instrument, PMMC with rectifier, Thermo-couple instrument, Wattmeters, Energy meters (Watt-hour meter), Frequency meter, Power factor meter.
10-11	DC and AC bridges (Wheatstone, Kelvin, Capacitance, Inductance, Maxwell, Hay, Schering Bridges).
12-13	Transducers, Externally Powered (RTD, Thermistors, Strain Gauge, ...) and Self Generating Transducers (Thermocouples, Piezo, Photo voltaic).
14	Oscilloscope, Course Revision

4. Teaching and Learning Methods

4.1 Lectures.
4.2 Problems solving.
4.3 Lab experiments
4.3 Web-sites show and demonstration.

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 h	16	60
Oral Assessment	0.5 h	15	10
Practical Examination	0.5 h	15	10
Semester work	5 h (Overall)	3, 5, 6, 10, 12	20

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- *Sawhney, A.K, "Electrical measurements and measuring Instruments", Dhanpat Rai, New Delhi, 2004.*
- *Gupta, J. B. "ELECTRONIC AND ELECTRICAL MEASUREMENTS AND INSTRUMENTATION", S. K. KATARIA & SONS, India, 2006.*
- *A.K. Sawhney: "Electronic Measurement and Instrumentation", Cambridge University Press, 1996.*

Web sites:

- *To be cited during the course.*

7. Facilities required for teaching and learning

- PC, data show, portable display screen.
- Measurement lab.

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ. د.م. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code /Course Title: EPM1202/Electrical measurements

Course contents	Knowledge and Understanding					Intellectual Skills					Professional and Practical Skills				General and Transferable Skills		
Topic	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3
Basic Definitions, accuracy, precision, Resolution, Sensitivity, bandwidth, and Types of errors.	X																
Analogue Instruments: Control, Damping torques, Dynamic response.		X				X											
Direct Current Meters (Moving Coil Instruments), Measuring V, I, and R.		X					X					X					
AC Instruments (Moving Iron Instruments), Electro-dynamic Instrument, PMMC with rectifier, Thermo-couple instrument, Wattmeters, Energy meters (Watt-hour meter), Frequency meter, Power factor meter.			X					X			X				X		
DC and AC bridges (Wheatstone, Kelvin, Capacitance, Inductance, Maxwell, Hay, Schering Bridges).				X					X				X		X		
Transducers, Externally Powered (RTD, Thermistors, Strain Gauge, …) and Self Generating Transducers (Thermocouples, Piezo, Photo voltaic).					X					X				X		X	
Oscilloscope, Course Revision				X					X					X			X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy **Head of Department:** Prof. Dr. Essam Eddin Mohammed Rashad

Course Specification

Course Title	**Electrical Circuits (2)**	
Course Code	EPM1203	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohammed Rashad	
Teaching Staff	Prof. Dr. Essam Eddin Mohammed Rashad, Dr. Said Mahmoud Allam	
Branch / Level	Electrical Engineering/ First year	
Semester	Second term	
Pre-Requisite	NA	
Course Delivery	**Lecture**	**14 x3 h lectures**
	Practical	**14 x2 h practical**
Parent Department	Electrical power and machines Engineering	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire the basic science that is related to electric circuits under both transient and steady-state conditions
- Enable the implementation of different theories to analyze electric circuits under transient conditions
- Assist dealing with three-phase electric systems

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Describe the transient behavior of electric circuits.
A2. Mention the advantages of three-phase circuits.
A3. Recognize the concept of mutually coupled circuits.
A4. Identify the operational amplifier terminals.
A5. Recognize the circuit characteristics with non-sinusoidal waveforms.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between transient and steady-state responses.
B2. Compare between underdamped, overdamped, and critically damped responses.
B3. Analyze three phase circuits.
B4. Analyze operational-amplifier circuits through terminal behavior.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Verify transient and steady-state responses of RL, RC, and RLC circuits.

C2. Solve steady-state sinusoidal response of balanced three-phase circuits, with star and delta connections, and calculating relevant currents, voltages, power and energy.
C3. Solve circuits with mutually coupled coils.
C4. Apply different theories to periodic (non-sinusoidal) functions on which circuit analysis is based.
C5. Apply Fourier series and Fourier transforms in circuit analysis.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Construct mathematical models of electric systems.
D2. Communicate with electrical and electronics engineers.
D3. Work in groups on design projects of electric networks and systems.

3. Course Contents

Week	Topics
1-4	Transient analysis of RL, RC and RLC circuits
5-6	Three phase circuits
8-7	Magnetically coupled circuits
9-10	Operational amplifier circuits
11-12	Locus of phasor diagrams at variable frequency
13-14	Analysis of electric circuits with non-sinusoidal AC

4. Teaching and Learning Methods

4.1-Lectures
4.2- Problem solving
4.3- Case studies
4.4- Lab

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 hrs	15	68%
Oral Assessment	-	-	0
Practical Examination	-	-	0
Semester work	3hrs	Weeks:3,7,8,12	32%

6. List of references

Course notes:

- *Lectures notes*

Essential Books:

- *J. W. Nilsson, "Electric Circuits", Prentice Hall; 9 edition, 2010.*

- *R. J. Smith and R. C. Dorf, "Circuits, Devices, and Systems", John-Wiley, 1992.*
- *R. L. Boylestad, "Introductory Circuit Analysis", Prentice Hall; 12 edition, 2010.*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning:

- Data Show System
- Electric circuit lab.

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohammed Rashad	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	2015	2015

8. Course contents – Course ILOs Matrix

Course Code /Course Title: EPM1203/ Electrical Circuits(2)

Course Contents	Course outcomes ILOs																
	Knowledge and Understanding					Intellectual				Practical					Transferable		
	A 1	A 2	A 3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3
Transient analysis of RL, RC and RLC circuits	x					x	x			x							x
Three phase circuits		x						x			x						x
Magnetically coupled circuits			x					x				x			x		x
Operational amplifier circuits				x					x				x			x	
Locus of phasor diagrams at variable frequency				x	x			x	x				x	x	x		
Analysis of electric circuits with non-sinusoidal AC					x				x					x	x		

Course coordinator: Prof .Dr. Essam Eddin Mohammed Rashad

Head of Department: Prof. Dr. Essam Eddin Mohammed Rashad

Course specification

Second Year

First Term

Course Specification

Course Title	**Electromagnetic Fields**	
Course Code	EPM2104	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Dr. Ahmed shobear, Dr. Mohamed Elnemr	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	First Term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

This course aims at providing the basic knowledge required by practicing engineers for dealing with electric and magnetic fields and their applications in order to:

- Help to recognize the importance of electromagnetic fields.
- Acquire the different methods of calculating electric field intensity and flux density.
- Enhance the knowledge about main types of conductors, dielectrics, and semiconductors and identifying their properties and boundary conditions.
- Assist dealing with the steady magnetic field and the magnetic forces on different arrangements of charges.
- Enable identifying time varying fields and Maxwell's equations in point form and integral form.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Define Coulomb's law, Gauss's law, and Divergence theorem

A2. Classify the different arrangements of charge such as point charge, line charge, and sheet of charge

A3. Identify the energy and potential concept of a point charge and a system of charges

A4. Enumerate the uses of Poisson's and Laplace's equations

A5. Understand Biot-Savart law and Ampere's Circuital law and non-salient machines

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between dot product and cross product

B2. Distinguish the different methods used to calculate the electric field intensity

B3. Link the different types of materials and their suitability to the different applications

B4. Justify the methods used to determine the capacitance and inductance

B5. Conclude the main features of steady magnetic field and time varying fields to choose the suitable method of solution.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply different coordinate systems to determine the coordinates of any point or vector suitable to deal with charges configurations.

C2. Demonstrate the divergence theorem in calculating electric field intensity

C3. Validate the potential gradient in deriving the boundary conditions between different materials

C4. Put the Laplace's equation and Poisson's equation into practice

C5. Apply Maxwell's equations for steady and time varying fields

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Collect suitable data about different topics

D2. Cooperate in processing collected data

D3. Build self confidence

3. Course Contents

Week	Topics
1	An overview about vector analysis
2,3	Coulomb's law and electric field intensity
4,5	Electric field density, Gauss's law, and Divergence theorem
6	Energy and potential
7,8	Conductors, Dielectrics, and capacitance
9,10	Poisson's and Laplace's equations
11,12	The steady magnetic field and magnetic forces
13,14	Self and mutual Inductance. Time-varying fields and Maxwell's equations

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	70%
Oral Assessment	0	0	0
Practical Examination	0	0	0
Semester work	2	Through Term	30%

6. List of references

Course notes:

Essential Books:

- *William H. Hayt, "Engineering Electromagnetics", McGraw-Hill Science/Engineering/Math; 8 edition, 2011.*

- *Fawwaz T. Ulaby , Eric Michielssen and Umberto Ravaioli ," Fundamentals of Applied Electromagnetics", Prentice Hall; 6 edition, 2010.*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning

- *PC, data show, portable display screen, or*

- *Overhead Projector*

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ. د.عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM2104/ Electromagnetic Fields

Course Contents	Course outcomes ILOs																	
	Knowledge and Understanding					Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
An overview about vector analysis	X					x					x					x		
Coulomb's law and electric field intensity		X					X					x					x	
Electric field density, Gauss's law, and Divergence theorem	X						X					x						x
Energy and potential			x					x					X					x
Conductors, Dielectrics, and capacitance						x		x	x				x				x	
Poisson's and Laplace's equations				x			x							x		x		
The steady magnetic field and magnetic forces					x				x	x					X		x	
Self and mutual Inductance. Time-varying fields and Maxwell's equations		x	x							x					x			x

Course coordinator: Prof. Dr. Essam Eddin Mohamed Rashad **Head of Department:** Prof. Dr. Essam Eddin Mohammed Rashad

Course Specification

Course Title	**Electrical Power Engineering (1)**	
Course Code	EPM2105	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Ayman Hob Allah	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	First	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 3h lectures**
	Practical	**14 x 3 h practical**
Parent Department	**Electrical Power and Machines Engineering.**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance knowledge about main components of electrical power system
- Help to identify the methods used in evaluating transmission line parameters and performance
- Acquire the main types of electrical insulators
- Enable dealing with the mechanical design of overhead lines
- Assist dealing with currents and voltages in DC and Ac distribution networks
- Encourage the use of the equivalent circuit of TL depending on its length.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Outline over head transmission line parameters
A2. Mention methods used in calculating transmission line parameters
A3. Give examples of transmission line physical arrangements such as single-phase, three-phase and three-phase double-circuit lines
A4. Define the mechanical design of transmission lines
A5. Describe electrical power distribution systems
A6. State the fundamental differences between DC and AC distribution

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Estimate the performance of short and medium transmission line**s** under different loading conditions

B2. Differentiate between different line physical arrangements
B3. Distinguish the different types of insulators based on their suitability to different applications
B4. Explain the methods used to improve the voltage distribution over the insulator string
B5. Visualize the main features of distribution systems to be able of choosing the suitable arrangement

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Calculate the efficiency and the voltage regulation for short and medium transmission lines
C2. Demonstrate the performance of transmission lines based on their parameters
C3. Apply the concept of potential distribution over suspension insulator to compute the number of insulator discs required for certain voltage.
C4. Illustrate some examples of the solving DC and AC distribution networks
C5. Compute the copper weight required in DC and AC distribution systems
C6. Compute the mechanical design of transmission line systems.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Get high self-confidence for leadership and motivation capabilities
D2. Become skilled at handling different duties within the required time
D3. Be qualified for self and continuous learning

3. Course Contents

Week	Topics
1	An overview about power system elements
2.3	Transmission line parameters
4,5	Performance of short transmission line
6,7	Performance of medium transmission line
8,9	Mechanical design of transmission lines
10	Insulators in overhead transmission lines
11,12	DC distribution systems
13,14	AC distribution systems

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving and Lab experiments
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60%
Oral Assessment	1	13	10%
Practical Examination	1	13	10%
Semester work	2	Through Term	20%

6. List of references

Course notes:

Essential Books:

- John Grainger and Wolliam D. Stevenson, "Power System Analysis", McGraw-Hill Science/Engineering/Math; 1 edition, 1994.
- Hadi Saadat, "Power System Analysis", PSA Publishing; third edition, 2010.

Web sites: To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr. Essam Eddin Mohammed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM2105/ Electrical Power Engineering (1)

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical						Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	c6	D1	D2	D3
An overview about power system elements	X						X					X						X		
Transmission line parameters	X	X						X					X					X		
Performance of short transmission line		X					X					X	X					X		
Performance of medium transmission line			X				X					X	X					X	X	
Mechanical design of transmission lines			X	X				X						X			X		X	
Insulators in overhead transmission lines					X				X	X				X					X	X
DC distribution systems				X	X						X				X	X				X
AC distribution systems					X	X					X				X	X				X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy **Head of Department:** Prof. Dr. Essam Eddin Mohammed Rashad

Course Specification

Course Title	**Energy conversion**	
Course Code	EPM2106	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Prof. Dr. Essam Eddin Mohamed Rashad & Dr. Abdelwahab Hassan	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	First Term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

This course aims at providing the basic knowledge required by practicing engineers for dealing with principles of electromechanical energy conversion process in order to:

- Help in identifying the different types of energy sources
- Encourage the learning of methods of energy conversion
- Assist knowing the main relations electromagnetic systems
- Enhance the knowledge about the effect of saliencies in rotating machines
- Acquire the main construction of conventional types of rotating machines
- Improve the information about design aspects of AC machines, output coefficient, electric loading and magnetic loading

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Classify the types of energy sources

A2. Define the different components of electromechanical energy converters

A3. Mention the main basis of energy conversion process

A4. List the energy relations in electromagnetic systems

A5. Describe the fundamentals of salient and non-salient machines

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Distinguish between different magnetic circuits

B2. Differentiate between the energy conversion process in motors and generators

B3. Extract the torque equations for motors and generators

B4. Develop the magnetic equivalent circuit for each type of machines

B5. Extract the mathematical formulas for the magnetic equivalent circuit

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply the electromechanical energy conversion concepts

C2. Classify the magnetic circuit depending on flux paths

C3. Solve machine equations to determine the magnetic equivalent circuit

C4. Classify the magnetic materials

C5. Predict the mmf distribution in machines.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Be trained to cooperate in collecting data about certain subjects

D3. Cooperate and work in a teamwork under different stresses

3. Course Contents

Week	Topics
1,2	Types of energy sources and the conversion of electrical energy into mechanical energy and vice versa
3	Energy conversion principle, energy and co-energy
4,5	Mechanical forces and torque in singly excited and multiply excited electromagnetic systems relations
6,7	Transformer emf's, and motional emf's in singly excited and multiply excited electromagnetic systems relations
8,9	Salient and non-salient machines
10	MMF in concentrated and distributed coils
11,12,13	Energy relations in electromagnetic systems with applications to conventional types of rotating machines
14	Design aspects of AC machines, output coefficient, electric loading and magnetic loading

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration
4.4-Lab experiments

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60%
Oral Assessment	1	13	10%
Practical Examination	1	13	10%
Semester work	2	Through Term	20%

6. List of references

Course notes:

Essential Books:

- *·Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *A. E. Fitzgerald , Charles Kingsley Jr. and Stephen Umans, "Electrical machinery" , McGraw-Hill Science/Engineering/Math; 6 edition,2002.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*
- *B. L. Theraja,"Textbook of Electrical Technology", Chand (S.) & Co Ltd ,India, 2008.*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning

- *PC, data show, portable display screen*
- *Overhead Projector*
- *Lab facilities*

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr. Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د.عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM2106/ Energy conversion

Course Contents	Course outcomes ILOs																	
	Knowledge and Understanding					Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Types of energy sources and the conversion of electrical energy into mechanical energy and vice versa	x					x	x					x				x		
Energy conversion principle, energy and co-energy			x			x					x					x		
Mechanical forces and torque in singly excited and multiply excited electromagnetic systems relations				x				x				x	x					x
Transformer emf's, and motional emf's in singly excited and multiply excited electromagnetic systems relations			x					x				x	x					x
Salient and non-salient machines		x			x				x	x	x				x	x		
MMF in concentrated and distributed coils			x				x								x			x
Energy relations in electromagnetic systems with applications to conventional types of rotating machines				x					x	x	x						x	
Design aspects of AC machines, output coefficient, electric loading and magnetic loading					x				x	x				x	x	x	x	

Course coordinator: Prof. Dr.Essam Eddin Mohamed Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course specification

Second Year

Second Term

Course Specification

Course Title	Electrical Power Engineering (2)	
Course Code	EPM2207	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	Second Term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x4 h lectures**
	Practical	**14 x4 h practical**
Parent Department	**Electrical Power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Help in solving electrical networks
- Encourage dealing with different techniques for voltage control
- Acquire the importance of power factor improvement
- Improve the knowledge about the nature of high voltage DC transmission lines
- Assist dealing with types and construction of underground cables

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Itemize the types of power circle diagrams and their steps

A2. State the advantages of representing power systems in single line diagram and dealing with per unit quantities

A3. Enumerate with network equations and methods of solving them

A4. Outline the methods of voltage and reactive power control

A5. List the methods of power factor improvement

A6. Mention the fundamentals of high voltage dc transmission lines and underground cables

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Derive the system variables from power circle diagrams

B2. Extract single line diagrams from actual systems

B3. Analyze the mathematical equations used to represent networks and its solution

B4. Derive the value of capacitance required for improving power factor to a certain value

B5. Differentiate between overhead and underground cables

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply power circle diagram principles to solve power system problems

C2. Apply different methods used for voltage control

C3. Solve problems associated with power factor improvement

C4. Calculate different parameters of underground cables

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Cooperate in a team work

D2. Collect data from different sources.

3. Course Contents

Week	Topics
1, 2	Power Circle Diagrams
3, 4	Representation of Power Systems and Per-Unit Quantities
5, 6	Network Equations and Solutions
7, 8	Control of Voltage and Reactive Power
9, 10	Economics of Power Factor
11, 12	High-voltage D.C. Overhead Transmission Lines
13, 14	Introduction to Underground Cables

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Power System Lab
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60 %
Oral Assessment	1	13	10 %
Practical Examination	1	13	10 %
Semester work	2	Through Term	20%

6. List of references

Course notes: A. Azmy, "Electric Power Engineering"

Essential Books:

- Chapman, Stephen, "Electric machinery and power system fundamentals" J. McGraw-Hill, Boston, 2002
- Kothari ،D. P., "Modern power system analysis ", Tata McGraw-Hill Pub, New Delhi, 2003
- Saadat ،Hadi, "Power system analysis", McGraw-Hill, London, 2004
- Schavemaker ،Pieter. "Electrical power system essentials", Wiley, Hoboken, NJ, Chichester, England, 2008
- Singh ،L.P , "Advanced power system analysis and dynamics", New age international (p) limited, New Delhi, 2007

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector
- Power-system lab facilities

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EP2207 / Electrical power engineering (2)

Course Contents	Course outcomes ILOs																
	Knowledge and Understanding						Intellectual					Practical				Transferable	
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2
Power Circle Diagrams	X						X					X				X	
Representation of Power Systems and Per-Unit Quantities	X	X					X	X					X			X	
Network Equations and Solutions			X						X				X			X	
Control of Voltage and Reactive Power			X	X					X				X				X
Economics of Power Factor					X					X				X			X
High-voltage D.C. Overhead Transmission Lines					X	X				X	X			X			X
Introduction to Underground Cables						X					X			X	X		X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Electrical Machines (1)	
Course Code	EPM 2208	
Academic Year	2014/2015	
Coordinator	Dr. Ahmed Ibrahim Shobair	
Teaching Staff	Dr. Mohamed Kamal ElNemr, Dr. Abdelsalam Ahmed	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	Second term	
Pre-Requisite	-	
Course Delivery	**Lecture 4**	**14 x 4 h lectures**
	Practical 4	**14 x 4 h practical**
Parent Department	**Electrical power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance the information about construction and main types of direct-current machines
- Acquire the applications of direct-current machines
- Assist to know the main characteristics of direct-current machines
- Encourage Knowing the design aspects of direct-current machines

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the main features of electro-magnetic energy conversion principles

A2. Describe the construction and the theory of operation of direct-current machines

A3. Outline the equivalent-circuit of different connections of direct-current machines

A4. Enumerate the main features of different types of direct-current machines

A5. Classify the main methods used for controlling the speed of direct-current motors

A6. Outline the design aspects of direct-current machines

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Distinguish the different types of direct-current machines

B2. Justify the advantages and the disadvantages of different methods used to control the speed of direct-current motors

B3. Develop the mathematical formulas for dealing with the different types of direct-current machines

B4. Link the machines' construction with the main dimensions of the machine

B5. Develop an algorithm for the design of the direct-current machine

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Solve the equation of direct-current machines to get their performance

C2. Put into practice the characteristics of the direct-current generators when they are connected in parallel

C3. Validate the different methods of controlling the speed of direct-current motors

C4. Apply the mmf equation to design different types of machines

C5. Validate traditional method of design using computer-aided design method

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	An overview about the electromagnetic energy conversion
2	Construction and theory of operation of direct-current machines
3,4	Magnetic circuit and armature reaction of direct-current machines
5,6	Performance analysis of the different types of direct-current generators.
7,8	Conditions of paralleling two direct-current generators.
9,10	Performance analysis of the different types of direct-current motors
11	Speed control of direct-current motors

12	Principles of design, magnetic, electric and insulating materials
13	Design aspects of direct-current machines
14	An overview about the electromagnetic energy conversion

4. Teaching and Learning Methods

Lectures
Problems solution and lab experiments
Web-sites show and demonstration
General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	14	10
Practical Examination	1	14	10
Semester work	2	Through Term	20

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*

Web sites:

to be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen

  Overhead Projector

	Course Coordinator	Head of Department
Name	Dr. Ahmed Ibrahim Shobair	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	د. أحمد إبراهيم شبير	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM 2208/Electrical Machines (1)

Course contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual Skills					Professional and Practical Skills					General and Transferable Skills		
Topic	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
An overview about the electromagnetic energy conversion	X						X					X							X
Construction and theory of operation of direct-current machines		X					X					X							X
Magnetic circuit and armature reaction of direct-current machines		X	X		X				X				X				X		
Performance analysis of the different types of direct-current generators.				X				X			X		X	X			X	X	
Conditions of paralleling two direct-current generators.					X					X					X			X	
Performance analysis of the different types of direct-current motors				X				X			X			X			X	X	
Speed control of direct-current motors					X				X					X					X
Principles of design, magnetic, electric and insulating materials										X					X		X		
Design aspects of direct-current machines						X					X					X			X

Course coordinator: Dr. Ahmed Ibrahim Shobair

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Power electronics (1)	
Course Code	EPM 2209	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eldeen Rashad	
Teaching Staff	Dr. Abdelwahab Hassan, Dr.Doaa mokhtar	
Branch / Level	Electric Power and Machines Engineering/ Second Year	
Semester	second term	
Pre-Requisite	-	
Course Delivery	**Lecture 3**	**14 x 3 h lectures**
	Practical 2	**14 x 2 h practical**
Parent Department	**Electrical power and machines engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance thought about the principles of power electronic devices such as power diodes, power thyristors, power transistors, GTO, MOSFET ,and IGBT
- Improve knowledge for the different type of electronic circuits
- Acquire information concerning computer simulation of power electronic systems
- Help dealing with rectifier circuits
- Enable Studying different commutation techniques

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Classify the main utilization of different types of power electronic devices

A2. Define the main features of different types of power electronic devices

A3. Describe the mechanisms of rectification process

A4. Realize the different commutation techniques

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between power diode, power thyristors, power transistors, GTO, BJT, MOSFET, and IGBT

B2. Evaluate the advantages and disadvantages of the different methods used for voltage rectification

B3. Develop the mathematical formulas used in measuring rectifier process such as rectifier efficiency and rectifier ripples

B4. Use computer simulation to understand the operation of different power electronic devices

B5. Distinguish between natural and forced commutation

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Demonstrate the conditions of switching ON and switching OFF for different power electronic devices

C2. Use the suitable device for every application depending on the ratings and characteristics

C3. Apply different methods used for protection against dv/dt and di/dt for different types of power electronic devices

C4. Construct suitable circuit for both ac and dc drives to obtain required characteristics

C5. Solve for dynamic and static characteristics for different power electronic devices

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	Power electronic components
2	Characteristics of power semiconductor devices: Diodes, Thyristors, Triac , GTO, BJT, MOSFET, IGBT and MOSIGT
3,4	Types of power electronic circuits
5,6	Computer simulation of power electronic systems
7,8	Single phase half wave rectifiers
9,10	Full wave rectifiers
11,12	Three phase rectifiers
13,14	Commutation techniques.

4. Teaching and Learning Methods

Lectures
Problems solution and Lab experiments
Web-sites show and demonstration
General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	14	10
Practical Examination	1	14	10
Semester work	2	Through Term	20

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- M.H. Rashid, Power Electronics
- Williams, Power Electronics and Drive Applications

Web sites:
to be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen

  Overhead Projector

	Course Coordinator	Head of Department
Name	Prof. Dr.Essam Eddin Mohamed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM 2209/Power electronics (1)

Course content	Course outcomes ILOs																
	Knowledge and Understanding				Knowledge and Understanding					Knowledge and Understanding					Knowledge and Understanding		
	A1	A2	A3	A4	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Power electronic components	X	X			X					X					X		X
Characteristics of power semiconductor devices: Diodes, Thyristors, Triac , GTO, BJT, MOSFET, IGBT and MOSIGT			X			X					X				X		
Types of power electronic circuits			X			X				X						X	X
Computer simulation of power electronic systems			X			X				X						X	
Single phase half wave rectifiers				X			X					X			X		
Full wave rectifiers				X				X					X		X		
Three phase rectifiers				X					X					X		X	
Commutation techniques.				X					X					X		X	

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course specification

Third Year

First Term

Course Specification

Course Title	**Generation and Economy of Electrical Energy**	
Course Code	EPM3110	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 3 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the different load curves and factors used in defining the loading conditions of power system.
- Help dealing with the operating tariffs of electrical energy and selecting the most proper one depending on the load profile.
- Acquire information concerning the economic operation of power systems to achieve the minimum cost operation under different loading conditions.
- Enhance thought about main types of power plants including conventional and renewable types

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Describe the Egyptian electrical network.

A2. Tell the development stages of energy utilization in recent decades.

A3. Identify the characteristics of different loads.

A4. Outline the concepts of investment and depreciation in power system.

A5. Mention the benefits of economic operation of power systems.

A6. State the main differences between electrical power plants.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between various curves and factors describing different types of loads.

B2. Distinguish the methods used to define the operating tariffs of electrical energy.

B3. Predict the situations where the transmission losses have to be considered and where they have to be neglected.

B4. Develop the mathematical model of the optimization problem and analyze the problem to find the economical generation.

B5. Choose the suitable type of power plants depending on their features, technical and economical conditions

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Use Load curves to extract important load features

C2. Calculate the operating factors.

C3. Apply different electricity tariffs in an economic manner.

C4. Solve economic dispatch problems.

C5. Calculate the fixed costs as well as running costs of major types of power plants.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn how to collect suitable data

D2. Cooperating to process the collected data.

D3. Follow up the new technology related to the topic

3. Course Contents

Week	Topics
1	An overview about the Egyptian network
2	Electrical Load curves
3, 4	Different types of electrical power station
5	Economics of electrical power stations
6	Tariffs
7	Optimal operation of electrical power stations
8, 9	Economic operation of electrical power stations
10	Division of loads between generators

11, 12	Renewable energy sources
13	Safety systems in power stations
14	Power stations and the environment

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3- PC lab facilities
4.4-Web-sites show and demonstration
4.5-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 h	15	60 %
Oral Assessment	0.5 h	13	15 %
Practical Examination	0.5 h	13	5 %
Semester work	5 h (Overall)	4, 6, 10, 12	20%

6. List of references

Course notes:

Essential Books:

- William D. Stevenson, "Elements of power system analysis", McGraw-Hill, Inc, New York, 1994
- Bhattacharyya, Subhes C., "Energy Economics", Concepts, Issues, Markets and Governance, 1st Edition., 2011
- Marija D. Ilic, Francisco Galiana, Lester Fink, "Power Systems Restructuring: Engineering and Economics (Power Electronics and Power Systems)", Kluwer Academic Publishers, Boston/Dordrecht/ London, 1998
- Steven Stoft,"Power System Economics: Designing Markets for Electricity", IEEE press, Wiley-Interscience, 2002

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- Specialist software (i.e. ETAP, EMTP/ATP … etc.)
- PC, data show, portable display screen

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3110 / Generation and economy of electrical energy

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
An overview about the Egyptian network	X	X																	
Electrical Load curves			X				X					X	X						
Different types of electrical power station						X					X		X			X			X
Economics of electrical power stations					X					X					X		X	X	
Tariffs				X				X						X					
Optimal operation of electrical power stations								X						X					
Economic operation of electrical power stations					X				X	X					X		X	X	
Division of loads between generators											X					X			X
Renewable energy sources		X				X										X			X
Safety systems in power stations						X					X					X	X		
Power stations and the environment		X				X					X						X		X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy **Head of Department:** Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Electrical Machines (٢)	
Course Code	EPM3111	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohammed Rashad	
Teaching Staff	Dr. Abdelsalam Ahmed Abdelsalam	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 4 h practical**
Parent Department	**Electrical power and machines department**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire information concerning the main type of transformers.
- Help dealing with the applications of transformers.
- Enhance thought about main methods of deriving the equivalent circuit of transformers.
- Enable Studying the main characteristics of transformers and their type and routine tests
- Assist the knowledge about the concept of instrument transformers.
- Improve knowledge for the requirements of transformers designing.
- Acquire information related to the concept of optimal design of electrical transformers.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the main features of electromagnetic energy conversion principles.

A2. Describe the construction and the theory of operation of transformers.

A3. Outline the equivalent circuit of ideal and practical transformers.

A4. Classify the main methods used for three-phase transformer connection.

A5. Identify the mmf equations for transformer designing.

A6. Name the procedures of main dimension design.

A7. Specify the type and routine tests required for power transformers.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between dealing with power transformer and measuring transformer.

B2. Develop the mathematical formulas used in calculating the voltage ratio, voltage regulation and efficiency of transformers.

B3. Extract the charts, tables and curves used for the design process.

B4. Summarize the final design results.

B5. Differentiate among type, routine and special tests for power transformers.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Illustrate the main difference between ideal and practical transformers.

C2. Apply the characteristics of the transformers for the parallel operation.

C3. Apply the mmf equation to design transformers.

C4. Validate traditional method of design using computer-aided design method.

C5. Use the results to obtain primal design and final design results.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	Transformer types
2	Construction and theory of operation of transformers
3,4	Equivalent-circuit and the characteristics of ideal and practical transformer
5,6	Calculating the voltage regulation and the efficiency of transformers
7,8	Determination of transformer's parameters from open circuit test and short circuit test data

9,10	Cooling methods of power transformer
11	Autotransformer (step-up and step-down)
12	Three-phase transformers
13	Instrument transformers.
14	Design aspects of transformers: main dimensions, magnetic cores, windings and insulation grades

4. Teaching and Learning Methods

4.1-Lectures
4.2-Problems solving and Lab experiments
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 hours	15	60 %
Oral Assessment	1 hours	13	10 %
Practical Examination	1 hours	13	10 %
Semester work	2 hours	Trough Term	20 %

6. List of references

Course notes:

Notes provided by the lecturer

Essential Books:

- *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*
- Theodore Wildi, "Electrical Machines, Drives and Power Systems", Prentice Hall; 6 edition, 2005.

Web sites:

To be cited during the course.

7. Facilities required for teaching and learning

- PC, data show, portable display screen

  Overhead Projector

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohammed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3111/Electrical Machines (2)

Course Contents	Course outcomes ILOs																			
	Knowledge and Understanding							Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Transformer types	X							X					X						X	
Construction and theory of operation of transformers		X						X	X					X	X			X		
Equivalent-circuit and the characteristics of ideal and practical transformer			X	X						X			X					X		
Calculating the voltage regulation and the efficiency of transformers				X	X				X	X					X					X
Determination of transformer's parameters from open circuit test and short circuit test data			X							X				X	X					X
Cooling methods of power transformer					X					X	X					X				X
Autotransformer (step-up and step-down)					X						X					X		X		
Three-phase transformers				X					X		X				X				X	
Instrument transformers.					.	X					X						X		X	
Design aspects of transformers: main dimensions, magnetic cores, windings and insulation grades						X	X				X	X			X				X	

Course coordinator: Prof. Dr. Essam Eddin Mohamed Rashad **Head of Department:** Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	High voltage engineering	
Course Code	EPM3112	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Diaa Mansour	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture 3**	**14 x 3 h lectures**
	Practical 1	**14 x 1 h practical**
Parent Department	**Electrical power and machines engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire information concerning the main characteristics of high voltages.
- Help dealing with the principles of breakdown mechanisms in different dielectrics.
- Enable studying the main methods of generating high voltage signals.
- Enhance thought about main methods of measuring the different types of high voltage signals.
- Assist knowing the basics of over voltages phenomenon in power systems and their protection
- Assist knowing the basics of travelling waves over power lines and equipments.
- Improve knowledge for the different computational methods electric fields.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the main features of different types of dielectrics

A2. Mention the main utilizations of different types of dielectrics.

A3. Outline the mechanisms of breakdown in different dielectrics.

A4. Name the technical and practical bases of generating high voltage signals.

A5. Give examples of measuring method of high voltage signals.

A6. Identify the fundamentals of transient phenomena in power systems.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between high voltage fields and fields at low and medium voltages.

B2. Explain the breakdown mechanisms in different types of dielectrics.

B3. Critic the different methods used to generate high-voltage waves.

B4. Develop the mathematical formulas used in measuring the high-voltage signals.

B5. Analyze transients occurring in power systems due to traveling waves and lightening.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Realize the conditions of breakdown in gas, liquid and solid dielectrics.

C2. Solve for the transient of currents and voltages for the different stages of breakdown in gaseous dielectrics.

C3. Illustrate the characteristics of different high-voltage waves.

C4. Demonstrate the different methods used for protection against lightning strokes.

C5. Solve the traveling waves problem to get current and voltage waves.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	Applications of high voltages in electrical power systems
2,3	Breakdown in gaseous dielectrics
4,5	Breakdown in liquid dielectrics
6,7	Breakdown in solid dielectric
8,9	Generation of high voltage and high current
10	Measurement of high voltage
11	Overvoltage phenomena
12,13	Travelling wave in power systems
14	High voltage fields computational methods

4. Teaching and Learning Methods

Lectures
Problems solution
Web-sites show and demonstration
General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	70
Oral Assessment	-	-	-
Practical Examination	-	-	-
Semester work	2	Trough Term	30

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- H. Prinz, Lightning in history
- L.V. Bewley, "Traveling waves on transmission systems", Dover; 2nd edition, 1963.
- CIGRE technical Bulletin 63, Guide to procedures for estimating the lightening performance on transmission lines
- M.S. Naidu, "High voltage Engineering", McGraw-Hill Professional; 1st edition, 1999.
- Andrew R. Hileman, "Insulation coordination for power systems", CRC Press; Har/Dskt edition, 1999.

Web sites:

- to be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3112/High voltage engineering

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Applications of high voltages in electrical power systems	X	X					X					X					X		X
Breakdown in gaseous dielectrics			X					X					X				X		X
Breakdown in liquid dielectrics			X					X				X						X	
Breakdown in solid dielectric			X					X				X						X	
Generation of high voltage and high current				X					X					X			X		X
Measurement of high voltage					X					X					X		X		X
Overvoltage phenomena						X					X					X		X	
Travelling wave in power systems						X					X					X		X	
High voltage fields computational methods							X						X		X		X		

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy **Head of Department:** Prof. Dr.Essam Eddin Mohamed Rashad

Course specification

Third Year

Second Term

Course Specification

Course Title	Power electronics (2)	
Course Code	EPM3213	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Fayza Saafan-Dr. AbdElwahab Hasan	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	Second term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x2 h lectures**
	Practical	**14 x2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire information concerning the different types of power converters
- Enhance thought about the main methods of AC regulators
- Improve knowledge for the main difference between different types of dc chopper circuits
- Help dealing with the different types of inverter circuits and their applications

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Classify the main utilization of different types of power converters and regulators.
A2. Define the main features of different types of power converters and regulators.
A3. Describe the mechanisms of conversion and operation of converters.
A4. Enumerate and classify the different types of three phase inverters.
A5. Describe the mechanisms of firing circuits and control units.
A6. Describe the protection, heat sinks and isolations of a firing circuits and control units.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between AC to DC converters, AC regulators and cycloconverter.
B2. Evaluate the advantages and disadvantages of the different regulators of chopper circuits.
B3. Develop the mathematical formulas used in measuring the regulated voltages on chopper circuits.
B4. Extract the mathematical formulas for dealing with three phase inverters.
B5. Distinguish between stepped inverters, six step inverter, PWM inverters, current source, and voltage source inverters

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Demonstrate the conditions of switching ON and switching OFF for different power converters and regulators.
C2. Use different types of regulators depending on the investigated application.
C3. Apply the different methods used for protection for control units.
C4. Create suitable firing circuits for power converters and inverters.
C5. Solve for the performance of the firing and control circuits under loading.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn how to deal with power converters and regulators.
D2. Become skilled at reporting some collected data.
D3. Cooperate and work in a teamwork under different stresses.

3. Course Contents

Week	Topics
1	AC to DC converters - AC regulators – Cycloconverters
2,3	Chopper circuits: Buck regulator, Boost regulator, Buk-Boost regulators, and cuk regulators
4	Converter operation - Pulse circuits
5-7	Three phase voltage source inverter - Stepped inverters – six step inverter - PWM inverters
8,9	Current source inverters
10,11	Voltage source inverters

12	Firing circuits
13	Control units – Protection
14	Heat sinks – Isolation

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solution and Lab experiments
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	12	10
Practical Examination	1	12	10
Semester work	2	Trough Term	20

6. List of references

Course notes: Presentation slides is submitted to student every lecture.

Essential Books:

- M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", Prentice Hall; 3 edition, 2003.
- Ned Mohan, Tore M. Undeland and William P. Robbins , "Power Electronics: Converters, Applications, and Design", Wiley; 3rd edition, 2003.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen.
- Overhead Projector

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3213/Power Electronics (2)

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
AC to DC converters - AC regulators – Cycloconverters	X	X					X					X					X		
Chopper circuits: Buck regulator, Boost regulator, Buk-Boost regulators, and cuk regulators			X					X	X			X	X				X		
Converter operation - Pulse circuits	X	X	X						X				X				X		
Three phase voltage source inverter - Stepped inverters – six step inverter - PWM inverters				X						X	X				X			X	
Current source inverters	X			X							X	X			X			X	
Voltage source inverters					X					X					X			X	
Firing circuits					X					X						X			X
Control units – Protection						X					X					X		X	
Heat sinks – Isolation						X					X					X	X		

Course coordinator: Dr. Fayza Abd El-Rahman Safan

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Power System Analysis	
Course Code	EPM3214	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Diaa Mansour	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	Second	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x4 h lectures**
	Practical	**14 x3 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

This course aims to present methods of power system analysis and design in sufficient depth to give the student a thorough understanding of the analysis of electrical power systems at the undergraduate level in order to:

- Acquire information concerning the network model formulation through Y_{BUS} by singular transformation
- Help dealing with the load flow problem and its importance
- Enable understanding the importance of fault analysis
- Enhance thought about the stability problem in electrical power systems
- Improve knowledge for the basics of on line control of electrical power system

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Classify the main methods of solving the power flow problem
A2. Identify the main types of faults in electrical power systems
A3. List the methods of voltage control
A4. Outline the representation of electrical power system components
A5. Name the main types of stability
A6. Enumerate the main methods of active and reactive power control for generators

B. Intellectual skills:

By the end of this course, the students should be able to:

B1.Correlate the system active and reactive power with voltage magnitudes and phase angles
B2. Differentiate the states of the system from constraints and objective variables
B3. Extract the mathematical formulas relating the stability limit of electrical power system with the voltages, reactances and system power angles
B4. Develop the mathematical formulas used to estimate the system fault current in different cases according to the type of the fault
B5. Explain the transient and dynamic stability of electrical power systems

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Compute the stability limits of a certain power system
C2. Use the features of circuit breakers of the system
C3. Modify load flow program according to the system operating variables
C4. Illustrate the critical operating conditions of the system
C5. Put into practice the methods of transient and dynamic stability of electrical power systems.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Become skilled at dealing with multiple data from different resources.
D2 .Cooperate in a teamwork
D3. Become skilled to work under different stresses.

3. Course Contents

Week	Topics
1	Symmetrical components
2	Symmetrical three phase faults
3,4	Unsymmetrical faults
5	Network matrices
7,8	Load flow solutions and control
9,10	Transient phenomena in electrical power systems
11,12	Simplified criteria of transient stability
13,14	Dynamic stability of electrical power systems

4. Teaching and Learning Methods

4.1- Lectures
4.2- Problems solving and Lab Experiments
4.3- Web-sites show and demonstration
4.4- General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	71.43%
Oral Assessment	1	13	0
Practical Examination	1	13	0
Semester work	2	Through Term	28.57%

6. List of references

Course notes:

Dr. Ibrahim Bedir, "Power System Analysis", Electrical Power and Machines Department, Faculty of Engineering, Tanta University

Essential Books:

- W. D. Stevenson, "Power system analysis", McGraw-Hill Science/Engineering/Math; 1st edition, 2004.
- Mohamed E. El-Hawary, "Electrical Power System Design and Analysis", Wiley-IEEE Press; 1st edition, 2005.
- D. P. Kothari, "Modern Power System Analysis", McGraw-Hill Science/Engineering/Math; 1st edition, 2006.
- V. K. Mehta, Rohit Mehta, "Principles of Power System", S Chand & Co Ltd; 3rd edition, 2005.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning:

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: **EPM3214/ Power System Analysis**

Course Contents	Course outcomes ILOs																	
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Symmetrical components				X			X			X					X		X		
Symmetrical three phase faults		X								X			X					X	
Unsymmetrical faults		X								X			X					X	
Network matrices	X									X				X			X		
Load flow solutions and control	X		X				X	X						X			X		
Transient phenomena in electrical power systems				X	X	X			X			X			X				X
Simplified criteria of transient stability					X				X							X			X
Dynamic stability of electrical power systems					X				X		X					X			X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Electrical machines (3)	
Course Code	EPM3215	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Dr. Said Mahmoud Allam	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	Second	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 4 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the construction and the principle of operation of the three phase induction motor
- Acquire information concerning the equivalent circuit and different experimental tests of a three phase induction motor
- Help dealing with the power relation and characteristic curves of the three phase induction motor
- Enable Studying the methods of speed control and starting of this motor
- Enhance thought about the equivalent circuit, starting methods of a single phase induction motor
- Assist knowing the design aspects of the three phase induction motor.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the construction and principle of operation the three phase induction motor
A2. Identify the equivalent circuit parameters
A3. Mention the power relation and torque/ speed characteristics curves
A4. List the methods of speed control and starting of a 3 phase induction motor
A5. Describe the construction and principle of operation of a single phase induction motor
A6. Mention the design aspect of the induction machines

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Estimate the parameters of a three phase induction motor using the experimental tests
B2. Explain the different methods of operation of the three phase induction motor
B3. Differentiate between the different methods used to control the speed and starting this motor type
B4. Differentiate between different starting methods of the single phase induction motor
B5. Explain the design aspects of a three phase induction motor

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply different experimental tests of a three phase induction motor
C2. Calculate the machine parameters based on the measurement tests
C3. Illustrate the speed control and starting methods of a three phase induction motor
C4. Illustrate the starting methods of a single phase induction motor
C5. Demonstrate the electrical loading and magnetic loading of a three phase induction motor and their effect on machine design

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics
D2. Perform tasks in a teamwork
D3. Deal with manuals and catalogues

3. Course Contents

Week	Topics
1	AC armature windings
2,3	Three phase induction motor types, construction, principles of operation and modes of operation
4,5	Equivalent circuit and measurement tests of a three phase induction motor
6,7	Power balance equations, torque/speed curves of a three phase induction motor
8,9	Speed control methods of a three phase induction motor
10,11	Starting methods of a three phase induction motor
12	Single phase induction motor
13,14	Design aspects of a three phase induction motor

4. Teaching and Learning Methods

4.1-Lectures
4.2-Problems solving and Lab Experiments
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60 %
Oral Assessment	1	13	10 %
Practical Examination	1	13	10 %
Semester work	2	Through Term	20 %

6. List of references

Course notes:

Presentation slides is submitted to student every lecture.

Essential Books:

- *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*
- Theodore Wildi, "Electrical Machines, Drives and Power Systems", Prentice Hall; 6 edition, 2005.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3215/ Electrical machines (3)

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
AC armature windings	X						X					X							X
Three phase induction motor types, construction, principles of operation and modes of operation		X	X				X			X		X	X						X
Equivalent circuit and measurement tests of a three phase induction motor		X		X				X	X					X		X		X	
Power balance equations, torque/speed curves of a three phase induction motor				X		X			X		X		X			X		X	
Speed control methods of a three phase induction motor				X		X		X			X		X	X			X		
Starting methods of a three phase induction motor		X							X						X		X		
Single phase induction motor						X				X				X		X		X	
Design aspects of a three phase induction motor					X			X							X				X

Course coordinator: Prof. Dr. Essam Eddin Mohamed Rashad **Head of Department:** Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Control of electrical power system (1)	
Course Code	EPM3216	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Wael Elawady	
Branch / Level	Electric Power and Machines Engineering/ Third Year	
Semester	second term	
Pre-Requisite	-	
Course Delivery	**Lecture 3**	**14 x 3 h lectures**
	Practical 2	**14 x 2 h practical**
Parent Department	**Electrical power and machines engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance thought about the main bases of operation of electrical power systems
- Acquire information concerning the different methods used in controlling electrical power systems
- Help dealing with the effect of each control method on the performance of power systems
- Improve knowledge for the transient operation of electrical power systems with and without control action
- Enable Studying the main types of control used in electrical power systems

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the main definitions of controllability and observability

A2. State the parameter estimation and parametric identification of the network

A3. List the different types of control of electrical power systems

A4. Identify the types of sampled data transformation

A5. Describe the closed loop performance and stability of electrical power system

A6. Say the applications in electrical power systems

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Estimate the parameters of electrical network and parametric model identification

B2. Explain the non-linear control and the describing function

B3. Choose the different methods used to control the performance of electric power systems

B4. Select the appropriate controller parameters

B5. Integrate the technical issues with the economical topics when controlling the performance of electric power systems

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply different load curves to controlled electrical power systems

C2. Calculate the operating variables based on the operating factors and the network parameters

C3. Classify the controllers based on the control action quality and its stability

C4. Solve the electrical system equations to predict the optimal control method

C5. Use the controller parameters to improve its performance

D. General and transferable skills:

By the end of this course, the students should be able to:

D1.Learn reporting methods about defined topics

D2.Become skilled at Information Technology to show suitable IT capabilities

D3.Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	Controllability and observability – Performance measures
2	Nonlinear control and the describing function
3,4	Parameter estimation and linear parametric model identification by least squares
5,6	Multivariable control –Robust control – Intelligent control – Control integration
7,8	Sampled data systems – Z-Transform and its properties –Inverse of Z-Transform
9,10	Closed loop performance and stability
11,12	Digital PID control design – Pole placement digital control
13,14	Applications in electrical power system

4. Teaching and Learning Methods

Lectures
Problems solution
Laboratory experiments
Web-sites show and demonstration
General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	14	10
Practical Examination	1	14	10
Semester work	2	Through Term	20

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- A. Fouad, Anderson, "Stability and Control of Power System", Wiley-IEEE Press; 2 edition, 2002.
- Richard Dorf , "Modern control systems", Prentice Hall; 12 edition, 2010.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector
- Laboratory facilities

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM3216/Control of electrical Power system (1)

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Controllability and observability – Performance measures	X						X								X		X		X
Nonlinear control and the describing function		X	X					X								X			X
Parameter estimation and linear parametric model identification by least squares		X					X						X					X	
Multivariable control –Robust control – Intelligent control – Control integration			X					X		X	X	X		X			X		
Sampled data systems – Z-Transform and its properties –Inverse of Z-Transform				X						X					X		X		X
Closed loop performance and stability					X				X		X					X			X
Digital PID control design – Pole placement digital control			X				X			X			X			X		X	
Applications in electrical power system						X			X		X					X	X	X	

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course specification

Forth Year

First Term

Course Specification

Course Title	**Electrical machines (4)**	
Course Code	EPM4117	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin M. Rashad	
Teaching Staff	Prof. Dr. Essam Eddin M. Rashad	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x4 h lectures**
	Practical	**14 x4 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the main types of synchronous machines
- Acquire information concerning the construction of synchronous machines
- Enable Studying the main methods of deriving the equivalent circuit of synchronous machines
- Enhance thought about the main characteristics of synchronous machines
- Assist the knowledge related to the main construction of reluctance machines and synchronous condensers
- Help dealing with the design aspects of synchronous machines.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the construction and the theory of operation of synchronous machines.
A2. List the equivalent circuit components of synchronous machine.
A3. State the effect of excitation level on the machine voltage and power factor.
A4. Enumerate the necessary condition for parallel operation of synchronous machines.

A5. Outline the excitation systems, effect of salient poles, losses, efficiency and power angle curves of synchronous machines.
A6. Mention the characteristics of reluctance and synchronous condenser.
A7. Describe the design aspects of synchronous machines.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Distinguish the different types of synchronous machines.
B2. Differentiate between synchronous machines, reluctance machines and synchronous condensers.
B3. Develop the mathematical formulas used in calculating the voltage regulation and efficiency of synchronous machines.
B4. Justify the advantages and the disadvantages of different methods of calculating voltage regulation.
B5. Develop the mathematical description of different types of reluctance machines and synchronous condensers

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Illustrate the main difference between synchronous and asynchronous machines.
C2. Accomplish the experiments for determining the machine parameters.
C3. Solve the equations of synchronous machines to get their performance.
C4. Put into practice the characteristics of the synchronous condenser.
C5. Validate the different methods of the starting for synchronous motors.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics .
D2. Deal with catalogue and manuals.
D3. Learn team working.

3. Course Contents

Week	Topics
1	Construction
2	Armature reaction , armature leakage reactance and equivalent circuit of cylindrical synchronous machine
3	Equivalent circuit of salient pole synchronous machine
4	Determination of parameters
5,6	Voltage regulation for unity, lagging and leading power factor loads
7	Parallel operation and synchronizing torque
8	Equivalent circuit of synchronous motors
9	V-curves and Synchronous Condenser
10	Synchronous motor starting
11	Excitation systems, effect of salient poles, losses and efficiency and power angle curves of syn. machines
12	Reluctance motors
13,14	Design aspects of synchronous machines

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solution
4.3-Web-sites show and demonstration
4.4-General reading and discussion
4.5-Lab experiments

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	13	10
Practical Examination	1	13	10
Semester work	2	Through Term	20

6. List of references

Course notes:

Essential Books:

- *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *A. E. Fitzgerald , Charles Kingsley Jr. and Stephen Umans, "Electrical machinery" , McGraw-Hill Science/Engineering/Math; 6 edition,2002.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*

- *B. L. Theraja,"Textbook of Electrical Technology", Chand (S.) & Co Ltd ,India, 2008.*

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen.
- Overhead Projector
- Lab facilities

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin M. Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4117/Electrical Machines (4)

Course Contents	Course outcomes ILOs																			
	Knowledge and Understanding							Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Construction	X							X					X					X		
Armature reaction , armature leakage reactance and equivalent circuit of cylindrical synchronous machine		X							X						X				X	
Equivalent circuit of salient pole synchronous machine		X							X						X					X
Determination of parameters			X							X				X				X		
Voltage regulation for unity, lagging and leading power factor loads			X							X	X				X			X		
Parallel operation and synchronizing torque				X	X				X							X			X	
Equivalent circuit of synchronous motors						X			X								X			X
V-curves and Synchronous Condenser							X			X		X				X		X		
Synchronous motor starting				X	X						X		X				X		X	
Excitation systems, effect of salient poles, losses and efficiency and power angle curves of syn. machines	X											X					X		X	
Reluctance motors						X						X			X			X		
Design aspects of synchronous machines							X				X			X					X	X

Course coordinator: Prof. Dr.Essam Eddin Mohamed Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Protection of Electrical Power Systems	
Course Code	EPM4118	
Academic Year	2014/2015	
Coordinator	Prof Dr.Essam Eedin Rashad	
Teaching Staff	Dr. Mohammed Abo El-Azm Hussein	
Branch / Level	**Electrical Power and Machines Engineering/Forth year**	
Semester	First term	
Pre-Requisite		
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire information concerning the principles of power system protection
- Enable studying the common types of fault detection method.
- Help dealing with the current and voltage transformers.
- Improve knowledge for the various types of relays according to its design.
- Enhance thought about the main methods of setting the relays of different type (overcurrent relays, differential relays and distance relays).
- Acquire information concerning the principles of overcurrent protection coordination.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the methods used in detection the abnormal condition in power systems
A2. List the protective relay types
A3. Give examples of the functions of current and voltage transformers
A4. Outline the bases (technical and practical) of overcurrent protection
A5. Identify the setting value of different types of differential protection
A6. Outline the bases (technical and practical) of distance protection

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Summarize the main steps used to protect a power system against different abnormal conditions
B2. Differentiate between the abnormal conditions to achieve the suitable protection for each state
B3. Estimate the advantages and the disadvantages of the different protection types
B4. Develop the mathematical formulas used for setting the protective relays
B5. Develop the mathematical formulas for dealing with the transients occurring in power systems due to DC decay

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply the protection methods for certain faults in power system
C2. Classify the electrical transducers used in electrical utilities
C3. Illustrate the equivalent circuits of CT and VT.
C4. Use the protective relays
C5. Compute the setting value for different relays
C6. Design a protection system for TL and distribution system.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn how to search for data
D2. Be trained to cooperate in analyzing the collected data
D3. Become skilled at reporting the processed data
D4. Be qualified for self and continuous learning
D5. Be trained for industrial and practical requirements.

3. Course Contents

Week	Topics
1	An introduction for power system protection
2	Methods used for detection abnormal conditions in power system.
3	Types of protective relays classified from the construction point of view.
4	Types of protective relays classified from the function of relay point of view
5	CT and VT used in protection systems.
6,7,8	Over current protection
9,10	Differential protection
11,12,13,14	Distance protection

4. Teaching and Learning Methods

4.1- Lectures
4.2- Problems solving
4.3- Web-sites show and demonstration
4.4- General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	68
Oral Assessment	0	0	0
Practical Examination	0	0	0
Semester work	2	Through Term	32

6. List of references

Course notes:
Essential Books:

- Arun G. Phadke, James S. Thorp, "Computer Relaying for Power Systems", Wiley; 2nd edition, 2009.
- Bhavesh Bhalja, Maheshwari and Nilesh Chothani , "Protection and Switchgear", Oxford University Press, USA, 2011.
- C. Christopoulos and A. Wright, "Electrical Power System Protection", Springer; Softcover reprint of hardcover 2nd ed. 1999.
- J. Lewis blackburn, "Protective relaying Principles and application", CRC Press; 3 edition, 2006.
- B.R.N. Gupta, "Power system analysis and design", A H Wheeler Publishing Co Ltd; 3rd edition, 1998.
- IEEE standard for transmission line protection.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Graphs from ABB, Siemens, and Cooper for protection devices.
- Computer packages (i.e. ETAP, PSS/E, MATLAB … etc.)

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4118/ Protection of Electrical Power Systems

Course Contents	Course outcomes ILOs																				
	Knowledge and Understanding						Intellectual					Practical						Transferable				
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
An introduction for power system protection	X						X					X						X				
Methods used for detection abnormal conditions in power system	X						X	X					X						X			
Types of protective relays classified from the construction point of view.		X	X					X		X					X			X				
Types of protective relays classified from the function of relay point of view		X	X					X		X			X		X			X	X			
CT and VT used in protection systems				X					X				X	X						X		
Over current protection					X						X					X	X			X		
Differential protection						X			X			X				X	X				X	X
Distance protection									X			X				X					X	X

Course coordinator: Prof. Dr.Essam Eddin Mohamed Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Applications of Computer in Electrical Power Systems	
Course Code	EPM4119	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Doaa Mokhtar	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x2 h lectures**
	Practical	**14 x3 h practical**
Parent Department	**Electrical power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

This course aims to providing the basic knowledge required by practicing engineers for dealing with computer applications in electrical power systems:

- Enhance thought about the main type of power system input and transfer matrices
- Improve knowledge for the construction of large system simulation and programming
- Help dealing with the main programming of power flow studies concepts and methods
- Enable Studying the main characteristics of programming of (optimal performance generation control - error analysis)
- Acquire information concerning the programming that used for simulation of power system components.
- Assist dealing with the application of some computer packages.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the electrical power system input and transfer matrices
A2. Outline the electrical power system impedance / admittance matrices
A3. Outline the large system simulation and programming
A4. Enumerate the main features of different programming of power flow studies concepts and methods
A5. Outline the programming for (optimal performance generation control and error analysis)

A6. State the applications of some computer packages

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Distinguish the different types of power system input and transfer matrices
B2. Correlate the electrical power system impedance / admittance matrices
B3. Manage the large system simulation and programming
B4. Develop the mathematical formulas used in calculating the different programming of power flow studies concepts and methods
B5. Develop the mathematical description of different types of application of some computer packages

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Illustrate the main difference between electrical power system impedance matrices and circuit representation of admittance matrices of the power systems
C2. Apply the characteristics of the large system required for simulation and programming
C3. Solve the power flow equations using concepts and programming methods
C4. Dealing with computer package for Put into practice the programming of (simulation of power system components)
C5. Validate the different applications of computer packages for power system analysis

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics
D2. Read manuals, books and literatures correctly with critic view
D3. Cooperate in collecting suitable data

3. Course Contents

Week	Topics
1,2	Power system input and transfer matrices
3	Power system admittance matrices of the bus bars
4	Power system impedance matrices and circuit representation
5	large system simulation and programming
6,7	Programming of power flow studies concepts and methods
8,9	Programming of approximate and fast methods – separation

	methods
10,11	Programming of (optimal performance generation control - error analysis)
12	Programming of (simulation of power - system components)
13,14	Application of some computer packages

4. Teaching and Learning Methods:

4.1-Lecturs
4.2-Problems solution and lab experiments
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60%
Oral Assessment	1	13	10%
Practical Examination	1	13	10%
Semester work	2	Through Term	20%

6. List of references

Course notes:

Lectures notes

Essential Books:

- W. D. Stevenson, "Power system analysis", McGraw-Hill Science/Engineering/Math; 1st edition, 2004.
- Mohamed E. El-Hawary, "Electrical Power System Design and Analysis", Wiley-IEEE Press; 1st edition, 2005.
- D. P. Kothari, "Modern Power System Analysis", McGraw-Hill Science/Engineering/Math; 1st edition, 2006.
- V. K. Mehta, Rohit Mehta, "Principles of Power System", S Chand & Co Ltd; 3rd edition, 2005.

Web sites:

To be cited during the course

7. Facilities required for teaching and learning:

- PC, data show, portable display screen
- Computer lab.

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د.أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4119/Applications of Computer in Electrical Power Systems

	Course outcomes ILOs																	
	Knowledge and Understanding						Intellectual					Practical					Transferable		
Course Contents	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Power system input and transfer matrices	X						X						X				X		
Power system admittance matrices of the bus bars		X						X				X						X	
Power system impedance matrices and circuit representation		X						X				X							X
large system simulation and programming			X						X				X						X
Programming of power flow studies concepts and methods				X						X				X			X		
Programming of approximate and fast methods – separation methods						X				X		X					X		
Programming of (optimal performance generation control - error analysis)					X				X					X				X	
Programming of (simulation of power - system components)			X						X						X			X	
Application of some computer packages						X					X					X			X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Project	
Course Code	EPM4026	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Prof. Dr. Essam Eddin Mohamed Rashad Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy Dr. Ahmed Shebier, Dr. Mohamed El-Nemr Dr. Mohamed Abo El-Azm, Dr. Saaed Allam, Dr. Diaa Mansour Dr. Ayman Hob Allah, Dr. Abd El-Wahab Hasan Dr. Abd El-Salam Ahmed, Dr. Doaa Mokhtar, Dr. Kamal Shebl Dr. Hussien El-Dosoky, Dr. Ragab El-Sehemy, Dr. Eman Saad	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 1 h lectures**
	Practical	**14 x 3 h practical**
Parent Department	**Electrical Power and Machines Engineering.**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the scientific methods of carrying out a complete survey
- Help dealing with the previous subjects related to the project subject
- Acquire information concerning the packages suitable for accomplishing the project
- Enhance thought about deriving the results in a systematic manner

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. List the main procedures of carrying out a research in a certain field
A2. Mention the modern issues related to the topic of the project
A3. Outline the mathematical and practical bases of the subject of the project
A4. Classify the different approaches in the field of the project topic

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Comment on the different methods that can solve the problem under investigation
B2. Analyze the selected method of solving the problem under investigation
B3. Develop the suitable schedule for carrying out the task in the suitable sequence
B4. Give Recommendations depending on the obtained results

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Build up the investigated system in the correct form
C2. Measure the required variables correctly
C3. Confirm the theoretical results using the measured results

For theoretical projects

C1. Illustrate the main procedures required to accomplish the project topic
C2. Solve the mathematical formulas using suitable techniques to obtaining target
C3. Compute the requested outputs correctly

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Search and collect information about the project topics
D2. Carry out the task in the pre-specified time
D3. Cooperate in the steps of the project

3. Course Contents

Week	Topics
1,2,3,4,5,6	Survey
7,8	Data processing
9,10,11	Main professional and practical part
12	Conclusions and recommendations
13,14	Writing the project book

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Practical lab work
4.3-Applying Software packages
4.4-Web-sites show and demonstration

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	---	---	0
Oral Assessment	---	---	0
Practical Examination	---	---	0
Semester work	---	Through Term	20%

6. List of references

6.1- Course Notes

……..

6.2- Essential Books (Text Books)

- Depends on the subject

6.3- Periodicals, Web Sites, etc

- To be cited during the project

7. Facilities required for teaching and learning

- To be defined during the project

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د.عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4026**/** Project

Course Contents	Course outcomes ILOs													
	Knowledge and Understanding				Intellectual				Practical			Transferable		
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3
Survey	X	X					X					X	X	
Data processing			X	X	X								X	X
Main professional and practical part				X		X			X	X	X			X
Conclusions and recommendations								X			X			X
Writing the project book											X			X

Course Coordinator: Prof. Dr. Essam Eddin Mohamed Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Elective course (2) Electrical installation	
Course Code	EPM4121	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Mohamed Abo Elazm	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	**Lecture 3**	**14 x 3 h lectures**
	Practical 1	**14 x 1 h practical**
Parent Department	**Electrical power and machines engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the Egyptian and international codes used in the electric installation
- Enhance thought about the selection methods of cable sections depending on the loading conditions
- Help dealing with the different earthing techniques
- Enable Studying the main methods of avoiding abnormal operation by providing suitable protection techniques
- Acquire information concerning the internal and external illumination systems

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. State the standard specifications of the electric installation

A2. Outline the features of the Egyptian and international codes

A3. Enumerate the methods of estimating each load type

A4. Mention the methods of selecting the suitable cables and their corresponding cross section area depending on the predefined loads

A5. List the types of earthing systems with their benefits

A6. Identify the fundamentals of circuit breakers

A7. Define the bases of rationalizing the energy in illumination systems

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between selecting suitable cross section areas of cables and optimizing these values for minimum cost

B2. Evaluate the impact of types and arrangements of cables on their cross section area

B3. Justify the advantages and the disadvantages of each type of earthing methods

B4. Explain the advantages and the disadvantages of each type of circuit breakers

B5. Develop the mathematical formulas for calculating the required energy for illumination systems including minimizing this energy

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Perform load calculations in the project

C2. Calculate the required cross section areas of cables depending on the load

C3. Design the earthing system

C4. Apply the principles of circuit breakers to select suitable application of each type

C5. Illustrate the different illumination systems for both internal and external implementation

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1,2,3	An overview of standard specifications of electric construction and Egyptian and international codes
4,5	Evaluating different categories of loads
6,7	Computing the cable sections with different methods
8,9,10	Earthing systems
11,12	Circuit breakers
13,14	Illumination

4. Teaching and Learning Methods

Lectures
Problems solution
Web-sites show and demonstration
General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	70
Oral Assessment	-	-	-
Practical Examination	-	-	-
Semester work	2	Through Term	30

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- " التركيبات الكهربية في المنشآت الصناعية والتجارية العامة "

Translation: A. Abdel-Aal, "Electrical installation in general commercial and industrial constructions"

- "تخطيط و تصميم التمديدلت الكهربية الكبري" د. هاني عبيد

Translation: H.. Ebeed, "Planning and design of large electrical projects"

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4121/Elective course (2) Electrical installation

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding							Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
An overview of standard specifications of electric construction and Egyptian and international codes	X	X						X							X					X
Evaluating different categories of loads			X						X				X	X					X	
Computing the cable sections with different methods				X				X	X					X					X	
Earthing systems					X					X					X				X	
Circuit breakers						X					X					X		X		
Illumination							X					X					X			X

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	**Elective course (3)/Electric Machines Dynamics**	
Course Code	EPM4124	
Academic Year	2014/2015	
Coordinator	Dr. Said Mahmoud Allam	
Teaching Staff	Dr. Said Mahmoud Allam	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	First term	
Pre-Requisite	-	
Course Delivery	Lecture	14 x 3 h lectures
	Practical	14 x 1 h practical
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

This course aims at providing the basic knowledge required by practicing engineers for dealing with different electric machines in order to:

- Enhance thought about the meaning of dynamic modeling
- Acquire information concerning the fundamentals of developing dynamic models for conventional machines
- Help dealing with the computer packages that used in dynamic simulation of electrical machines
- Improve knowledge for the machine behavior under different loading conditions
- Enable studying the applications of dynamic models for special machines
- with solid-state circuitry.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the main features of different types of conventional machines
A2. Outline the modeling process of electric machines Illustrate the equivalent circuits of the Special Electrical Machines.
A3. Describe the Reference frame theory of electrical machines
A4. Describe the dynamic model of special machines
A5. Show the dynamic model of electrical machines using computer packages.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Distinguish the transient models and the steady-state models of electric machines

B2. Correlate the dynamic behavior and the control of the electrical machines
B3. Manage the behavior of conventional machines during starting and braking periods
B4. Develop the linearized model of electric machines
B5. Develop reduced-order models for electric machines

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Illustrate the dynamic models of conventional machines
C2. Apply simulation programme for dynamic modeling of different machines
C3. Predict the performance of machines under steady-state and disturbance conditions
C4. Illustrate the dynamic models of special machines

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Handle different duties within the required time
D2. Handle different tasks with the least possible resources
D3. Get high self-confidence

3. Course Contents

Week	Topics
1,2,3	Methods of representing conventional electrical machines (DC machines – Induction machines – Synchronous machines)
4,5,6, 7	Transients
8, 9	Using computer packages
10,11,12	Characteristics of electrical machines
13,14	Applications on some special machines (brushes – switched reluctance)

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3- Simulation programmes
4.4-Web-sites show and demonstration
4.5-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 hours	15	70 %
Oral Assessment	0	0	0
Practical Examination	0	0	0
Semester work	2 hours	Through Term	30 %

6. List of references

- *Course notes:* Prepared by the lecturer and handed to the students at the lectures.

Essential Books:

- *A. E. Fitzgerald , Charles Kingsley Jr. and Stephen Umans, "Electrical machinery" , McGraw-Hill Science/Engineering/Math; 6 edition,2002.*
- P.C. Krause, "Analysis of Electric Machinery and Drive Systems", Wiley-IEEE Press; 2 edition, 2002.

Web sites: To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Dr. Said Mahmoud Allam	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	د.سعيد محمود علام	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4124/ Electric Machines Dynamics

Course Contents	Course outcomes ILOs																
	Knowledge and Understanding					Intellectual					Practical				Transferable		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3
Methods of representing conventional electrical machines (DC machines – Induction machines – Synchronous machines)	X	X				X					X				X		X
Transients		X	X						X	X		X			X		
Using computer packages					X				X	X		X					
Characteristics of electrical machines			X				X	X					X			X	
Applications on some special machines (brushes – switched reluctance)				X		X								X	X		

Course Coordinator: Dr. Said Mahmoud Allam

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course specification

Forth Year

Second Term

Course Specification

Course Title	**Electrical drives**	
Course Code	EPM4227	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohammed Rashad	
Teaching Staff	Dr. Abdelsalam Ahmed	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	Second term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the main parts of electrical drives
- Acquire information concerning the dynamics of electrical drives
- Enhance thought about the main factors affecting the selection of motor power rating
- Help dealing with the performance of traction drives
- Enable studying the main methods used for operating dc and ac drives

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. List the main features of electrical drives

A2. Mention the main parts of electrical drives

A3. State the properties of different parts of electrical drives

A4. Outline the performance of traction drives

A5. Enumerate the main features of dc and ac drives

A6. Define the main factors affecting the selection of motor power rating

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate the drives of dc, induction, and synchronous motors

B2. Summarize the different parts of electrical drives

B3. Evaluate the advantages of the four quadrant operation of electrical drives

B4. Develop the mathematical formulas used in calculating the traction drive rating

B5. Develop the mathematical formulas used for determining of electric motor rating

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Calculate the load torques under different conditions

C2. Solve the dynamic relations applicable to all types of electrical drives

C3. Illustrate the effect of different factors on the selection of electric motor rating

C4. Classify the characteristics of dc and ac drives

C5. Compute the traction drive rating for different operation

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Become skilled at Information Technology to show suitable IT capabilities

D3. Learn how to report some subjects related to the design problem

3. Course Contents

Week	Topics
1	Different loads characteristics
2	Four quadrant torque speed curve
3	Traction drives
4	Different duty cycles
5	Ratings and Tractive effort
6	Traction motors
7,8	DC drives: Basic equations, Methods of speed control using armature voltage control or field control or combined armature and field
9	Closed loop control
10	Chopper control of PM DC motors
11	Induction motor drives - Basic equations and control
12	Braking and Plugging
13	Synchronous motor drives: Frequency control and voltage control
14	Selection of drives

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration

4.4-Lab experiments
4.5-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	14	10
Practical Examination	1	14	10
Semester work	2	Through Term	20

6. List of references

Course notes: notes provided by the lecturer

Essential Books:

- *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
- *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*
- Theodore Wildi, "Electrical Machines, Drives and Power Systems", Prentice Hall; 6 edition, 2005.

Web sites:
to be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen

  Overhead Projector

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohammed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4227/Electrical drives

Course Contents	Course outcomes ILOs																	
	Knowledge and Understanding					Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Different loads characteristics	X	X	X				X	X				X					X	
Four quadrant torque speed curve	X		X						X			X						X
Traction drives		X	X	X				X						X			X	
Different duty cycles			X			X					X			X			X	X
Ratings and Tractive effort			X	X		X				X				X		X	X	X
Traction motors			X			X				X					X	X	X	X
DC drives: Basic equations, Methods of speed control using armature voltage control or field control or combined armature and field					X		X	X					X		X			X
Closed loop control									X				X					
Chopper control of PM DC motors					X			X					X					
Induction motor drives - Basic equations and control					X		X	X					X		X			
Braking and Plugging									X							X		
Synchronous motor drives: Frequency control and voltage control				X	X		X	X					X					
Selection of drives						X					X			X	X	X	X	

Course coordinator: Prof. Dr. Essam Eddin Mohamed Rashad **Head of Department:** Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	**Control of Electrical power systems (2)**	
Course Code	EPM4228	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Ayman Hob Allah	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	Second term.	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance thought about the principles of components and model of a power system
- Acquire information concerning the power and frequency control for synchronous generators
- Enhance the capability for controller design for electrical power systems
- Improve knowledge for SCADA system for control in power plants and networks

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Outline the components and model of a power system

A2. Identify the power and frequency control for synchronous generators

A3. Identify the excitation and voltage control

A4. Mention the controller design for electrical power systems

A5. Identify the SCADA system for control in power plants and networks

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Summarize the components and model of a power system

B2. Differentiate the power and frequency control for synchronous generators

B3. Estimate the reactive power control for transmission and distribution networks

B4. Develop the controller design for electrical power systems

B5. Develop the SCADA system for control in power plants and networks

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Solve for the components and model of a power system

C2. Use the excitation and voltage control

C3. Illustrate the reactive power control for transmission and distribution networks

C4. Design controllers for electrical power systems

C5. Apply SCADA system for control in power plants and networks

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn how to search for data about course topics.

D2. Cooperate in analyzing the collected data.

D3. Communicate with others in the field.

3. Course Contents

Week	Topics
1, 2	Components and model of a power system
3, 4, 5	Power and frequency control for synchronous generators
6, 7	Excitation and voltage control
8, 9	Reactive power control for transmission and distribution networks
10, 11, 12	Controller design for electrical power systems
13, 14	Using SCADA system for control in power plants and networks

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	68 %
Oral Assessment	-	-	0 %
Practical Examination	-	-	0 %
Semester work	2	Through Term	32%

6. List of references

Course notes:

Essential Books:

- P. Kundur, "Power System Stability and Control", McGraw-Hill, Inc., 1994.
- Leonard L. Grigsby, "Power System Stability and Control", CRC Press; 2nd edition, 2007.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector
- Graphs from ABB, Siemens, and Cooper for protection devices

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د. أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: **EPM4228 / Control of Electrical power systems (2)**

Course Contents	Course outcomes ILOs																	
	Knowledge and Understanding					Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Components and model of a power system	X	X				X					X					X		
Power and frequency control for synchronous generators		X					X					X				X		X
Excitation and voltage control			X				X	X				X						X
Reactive power control for transmission and distribution networks			X					X					X		X		X	
Controller design for electrical power systems				X					X					X			X	
Using SCADA system for control in power plants and networks					X					X					X		X	

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy
Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Applications of protection Systems	
Course Code	EPM4229	
Academic Year	2014/2015	
Coordinator	Prof Dr. Essam Eddin M. Rashad	
Teaching Staff	Dr. Mohamed Abo El-Azm Hessuein	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	Second term	
Pre-Requisite	--	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Acquire information concerning the principles of digital protection
- Improve knowledge for the generator protection
- Help dealing with the transformer protection
- Enhance thought about the motor protection
- Enable Studying bus bar protection
- Assist the knowledge about high voltage transmission lines protection

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Outline the digital protection – methods for digital protection
A2. Mention the generator protection
A3. Identify the transformer protection
A4. Realize the motor protection
A5. Know the bus bar protection and high voltage transmission lines protection

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Summarize the steps of generator protection
B2. Develop the transformer protection
B3. Summarize the motor protection
B4. Conclude on the bus bar protection

B5. Estimate the high voltage transmission lines protection

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Apply the digital protection on the generator
C2. Classify the transformer protection
C3. Illustrate the motor protection
C4. Design bus bar protection
C5. Compute the high voltage transmission lines protection

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn how to search for data
D2. Be trained to cooperate in analyzing the collected data
D3. Read manuals, books and literatures correctly with critic view
D4. Become skilled at Information Technology to show suitable IT capabilities

3. Course Contents

Week	Topics
1	Digital protection – Methods for digital protection - Digital protection algorithms
2	Generator protection
3	Differential protection
4	Over and under-frequency protection
5	Stator ground fault protection
6	Over-excitation protection
7	Field lose protection - Field ground fault protection
8	Unbalance protection
9	Transformer protection
10	Transformer over-current protection
11	Differential protection for transformer
12	Tertiary transformer protection
13	Special problem for transformer protection and Motor protection
14	Bus bar protection and High voltage transmission lines protection

4. Teaching and Learning Methods

4.1- Lectures
4.2- Problems solving

4.3- Web-sites show and demonstration
4.4- General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	60
Oral Assessment	1	13	10
Practical Examination	1	13	10
Semester work	2	Through Term	20

6. List of references

Course notes:
Essential Books:

- Arun G. Phadke, James S. Thorp, "Computer Relaying for Power Systems", Wiley; 2nd edition, 2009.
- Bhavesh Bhalja, Maheshwari and Nilesh Chothani , "Protection and Switchgear", Oxford University Press, USA, 2011.
- C. Christopoulos and A. Wright, "Electrical Power System Protection", Springer; Softcover reprint of hardcover 2nd ed. 1999.
- J. Lewis blackburn, "Protective relaying Principles and application", CRC Press; 3 edition, 2006.
- B.R.N. Gupta, "Power system analysis and design", A H Wheeler Publishing Co Ltd; 3rd edition, 1998.
- IEEE standard for transmission line protection.

Web sites:

- To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Graphs from ABB, Siemens, and Cooper for protection devices
- Power system lab
- Computer package (i.e ETAP, PSS/E, MATLAB … etc)

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin M. Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د. عصام الدين رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: : EPM4229/ Applications of Protection Systems

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding					Intellectual					Practical					Transferable			
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3	D4
Digital protection – Methods for digital protection - Digital protection algorithms	X										X					X	X		
Generator protection		X				X					X						X		X
Differential protection		X				X					X						X	X	
Over and under-frequency protection		X				X					X								
Stator ground fault protection		X				X					X								
Over-excitation protection		X				X					X								
Field lose protection - Field ground fault protection		X				X					X								
Unbalance protection		X				X					X								
Transformer protection			X				X					X					X		X
Transformer over-current protection			X				X					X							
Differential protection for transformer			X				X					X							
Tertiary transformer protection			X				X					X							
Special problem for transformer protection and Motor protection			X	X			X	X				X	X				X		X
Bus bar protection and High voltage transmission lines protection					X				X	X				X	X		X		X

Course coordinator: Prof Dr. Essam Eddin M. Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Special Electrical Machines	
Course Code	EPM4230	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Prof. Dr. Essam Eddin Mohamed Rashad	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	second	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 4 h lectures**
	Practical	**14 x 1 h practical**
Parent Department	**Electrical power and machines Engineering**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Enhance thought about the main types of special electrical machines including conventional and non-conventional types.
- Improve knowledge for the principle of torque production.
- Help dealing with the basic electromagnetic concepts of Special Electrical Machines.
- Enable studying the operation principle of Special Electrical Machines.
- Acquire information concerning the roles of controlling the Special Electrical Machines with solid-state circuitry.

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. List the applications of Special Electrical Machines.
A2. Describe the construction of different Special Electrical Machines.
A3. Illustrate the equivalent circuits of the Special Electrical Machines.
A4. Outline the principle of operation of each Special Electrical Machines.
A5. State various curves and characteristics of Special Electrical Machines.
A6. Mention the components of control circuits for Special Electrical Machines.

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between the application of stepper and switched reluctance machines.

B2. Distinguish between different methods used to control special electrical machines.
B3. Develop the mathematical model of the permanent magnet dc machines.
B4. Chose the suitable special machine depending on the technical and the economical conditions.
B5. Identify the principle of operation of Switched Reluctance Motors.

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Use the forward and backward revolving fields to obtain the equivalent circuit of a single phase induction motor.
C2. Apply the control theory for studying dc servo and ac servo motors.
C3. Apply the operation of complete drive systems including a special electrical motor, a mechanical load, a drive circuit and a controller.
C4. Use the parameters of the previous system to obtain the required characteristics.
C5. Apply linear induction motors in Magnetic Levitation.

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Collect and process suitable data about different topics
D2. Communicate with correct language oral and written
D3. Become skilled at Information Technology to show suitable IT capabilities

3. Course Contents

Week	Topics
1, 2	Single-Phase induction motors
3	Shaded pole motors
4	Universal motors
5	Induction Generators
6	Linear Induction Motors
7	DC brushless motors
8	Permanent magnet motors
9, 10	Stepper motors
11, 12	Switched reluctance drive systems
13, 14	Servo motors

4. Teaching and Learning Methods

4.1- Lectures.

4.2- Problems solving and lab experiments
4.3- Web-sites show and demonstration

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3 hours	Week 15	60%
Oral Assessment	1 hours	Week 13	10%
Practical Examination	1 hours	Week 13	10%
Semester work	2 hours	Through Term	20%

6. List of references

Course notes:

Essential Books:

- *E. Fitzgerald , Charles Kingsley Jr. and Stephen Umans, "Electrical machinery" , McGraw-Hill Science/Engineering/Math; 6 edition,2002.*

Web sites:

To be cited during the course

7. Facilities required for teaching and learning

- PC, data show, portable display screen
- Overhead Projector

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د.عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4230/ Special Electrical Machines

Course Contents	Course outcomes ILOs																		
	Knowledge and Understanding						Intellectual					Practical					Transferable		
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3
Single-Phase induction motors	X		X								X	X					X		
Shaded pole motors				X					X	X			X						
Universal motors			X		X				X	X					X				
Induction Generators		X				X				X	X			X	X				
Linear Induction Motors	X			X					X	X						X		X	
DC brushless motors		X				X		X		X						X			
Permanent magnet motors				X							X			X					X
Stepper motors		X		X		X	X				X				X	X			X
Switched reluctance drive systems				X	X	X	X			X						X		X	
Servo motors				X	X				X	X			X		X			X	X

Course coordinator: Prof. Dr. Essam Eddin Mohamed Rashad **Head of Departmen:** Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	Project	
Course Code	EPM4026	
Academic Year	2014/2015	
Coordinator	Prof. Dr. Essam Eddin Mohamed Rashad	
Teaching Staff	Prof. Dr. Essam Eddin Mohamed Rashad Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy Dr. Ahmed Shebier, Dr. Mohamed El-Nemr Dr. Mohamed Abo El-Azm, Dr. Saaed Allam, Dr. Diaa Mansour Dr. Ayman Hob Allah, Dr. Abd El-Wahab Hasan Dr. Abd El-Salam Ahmed, Dr. Doaa Mokhtar, Dr. Kamal Shebl Dr. Hussien El-Dosoky, Dr. Ragab El-Sehemy, Dr. Eman Saad	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	Second term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 1 h lectures**
	Practical	**14 x 3 h practical**
Parent Department	**Electrical Power and Machines Engineering.**	
Date of Approval		

1. Course Aims

The aims of this course are to:

- Improve knowledge for the scientific methods of carrying out a complete survey
- Help dealing with the previous subjects related to the project subject
- Acquire information concerning the packages suitable for accomplishing the project
- Enhance thought about deriving the results in a systematic manner

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. List the main procedures of carrying out a research in a certain field
A2. Mention the modern issues related to the topic of the project
A3. Outline the mathematical and practical bases of the subject of the project
A4. Classify the different approaches in the field of the project topic

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Comment on the different methods that can solve the problem under investigation
B2. Analyze the selected method of solving the problem under investigation
B3. Develop the suitable schedule for carrying out the task in the suitable sequence
B4. Give Recommendations depending on the obtained results

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Build up the investigated system in the correct form
C2. Measure the required variables correctly
C3. Confirm the theoretical results using the measured results

For theoretical projects

C1. Illustrate the main procedures required to accomplish the project topic
C2. Solve the mathematical formulas using suitable techniques to obtaining target
C3. Compute the requested outputs correctly

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Search and collect information about the project topics
D2. Carry out the task in the pre-specified time
D3. Cooperate in the steps of the project

3. Course Contents

Week	Topics
1,2,3,4,5,6	Survey
7,8	Data processing
9,10,11	Main professional and practical part
12	Conclusions and recommendations
13,14	Writing the project book

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Practical lab work
4.3-Applying Software packages
4.4-Web-sites show and demonstration

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	---	---	0
Oral Assessment	---	Week 20	50%
Practical Examination	---	---	0
Semester work	---	Through Term	30%

6. List of references

6.1- Course Notes

……..

6.2- Essential Books (Text Books)

- Depends on the subject

6.3- Periodicals, Web Sites, etc

- To be cited during the project

7. Facilities required for teaching and learning

- To be defined during the project

	Course Coordinator	Head of Department
Name	Prof. Dr. Essam Eddin Mohamed Rashad	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ. د.عصام الدين محمد رشاد	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: EPM4026**/** Project

Course Contents	Course outcomes ILOs													
	Knowledge and Understanding				Intellectual				Practical			Transferable		
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3
Survey	X	X					X					X	X	
Data processing			X	X	X								X	X
Main professional and practical part				X		X			X	X	X			X
Conclusions and recommendations								X			X			X
Writing the project book											X			X

Course Coordinator: Prof. Dr. Essam Eddin Mohamed Rashad

Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad

Course Specification

Course Title	**Elective course (4) Applications of Computers in Electrical Machines**	
Course Code	EPM4233	
Academic Year	2014/2015	
Coordinator	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	
Teaching Staff	Dr. Mohamed Kamal El-Nemr	
Branch / Level	Electrical Power and Machines Engineering/Forth year	
Semester	Second Term	
Pre-Requisite	-	
Course Delivery	**Lecture**	**14 x 3 h lectures**
	Practical	**14 x 2 h practical**
Parent Department	**Electrical Power and Machines Engineering**	
Date of Approval		

1. Course Aims

This course aims at providing the basic knowledge required by practicing engineers for dealing with principles of electromechanical energy conversion process in order to:

- Improve knowledge for the main types of electrical machines
- Acquire information concerning the computer modeling
- Enhance thought about the computer simulation for steady state and transient analysis of electrical machines using computer Packages

2. Intended Learning outcomes (ILOs)

A. Knowledge and understanding:

By the end of this course students should be able to:

A1. Mention the computer modeling methods

A2. Outline the computer simulation for steady state of electrical machines

A3. State the advantages and disadvantages of computer simulation for transient analysis of electrical machines

B. Intellectual skills:

By the end of this course, the students should be able to:

B1. Differentiate between different computer modeling methods

B2. Justify the computer simulation for steady state of electrical machines using computer Packages

B3. Develop the computer simulation for transient analysis of electrical machines using computer Packages

C. Professional and practical skills:

By the end of this course, the students should be able to:

C1. Illustrate the computer modeling of electrical machines

C2. Apply the computer simulation for steady state and transient analysis of electrical machines using computer Packages

D. General and transferable skills:

By the end of this course, the students should be able to:

D1. Learn reporting methods about defined topics

D2. Be qualified for self and continuous learning

D3. Get high self-confidence for leadership and motivation capabilities

3. Course Contents

Week	Topics
1,2,3	Computer modeling
4,5,6,7	Computer packages
8,9,10	Computer simulation for steady state analysis of electrical machines using computer Packages
11,12,13,14	Computer simulation for transient analysis of electrical machines using computer Packages

4. Teaching and Learning Methods

4.1-Lecturs
4.2-Problems solving
4.3-Web-sites show and demonstration
4.4-General reading and discussion

5. Student Assessment

Assessment Method	Assessment Length	Schedule	Proportion
Written Examination	3	15	70%
Oral Assessment	0	0	0
Practical Examination	0	0	0
Semester work	2	Through Term	30

6. List of references

Course notes:

- *Essential Books:*
  - *Stephen Chapman, "Electric Machinery Fundamentals", McGraw-Hill Science/Engineering/Math; 5 edition, 2011.*
  - *A. E. Fitzgerald , Charles Kingsley Jr. and Stephen Umans, "Electrical machinery" ,McGraw-Hill Science/Engineering/Math; 6 edition,2002.*
  - *P.C. Sen, "Principles of Electric Machines and Power Electronics",John Wiley & Sons, Inc.; 2nd edition, 1996.*
  - *B. L. Theraja,"Textbook of Electrical Technology", Chand (S.) & Co Ltd ,India, 2008.*

Web sites:

- *To be cited during the course*

7. Facilities required for teaching and learning

- *PC, data show, portable display screen, or*
- *Overhead Projector*

	Course Coordinator	Head of Department
Name	Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy	Prof. Dr.Essam Eddin Mohamed Rashad
Name (Arabic)	أ.م.د.أحمد محمد رفعت عزمى	أ. د. عصام الدين محمد رشاد
Signature		
Date	/ /2015	/ /2015

8. Course contents – Course ILOs Matrix

Course Code / Course Title: **EPM4233/ Elective course (4) Applications of Computers in Electrical Machines**

Course Contents	Course outcomes ILOs										
	Knowledge and Understanding			Intellectual			Practical		Transferable		
	A1	A2	A3	B1	B2	B3	C1	C2	D1	D2	D3
Computer modeling	X			x			x		X	x	X
Computer packages	x			x			X		x		
Computer simulation for steady state analysis of electrical machines using computer Packages		X	x		X	x		x		X	
Computer simulation for transient analysis of electrical machines using computer Packages		x	x		x	x		x	x		x

Course coordinator: Assoc. Prof. Dr. Ahmed Mohamed Refaat Azmy
Head of Department: Prof. Dr.Essam Eddin Mohamed Rashad