Course Specification

Course Code: HUM 4101 **Course Title:** Legislations and Contracts

1. Basic information

Program Title	Electrical Power Engineering Department			
Department offering the program	Electrical Power Engineering Department			
Department offering the course	Engineering Mathematics and Physics department			
Course Code	HUM 4101			
Prerequisites	None			
Year/level	Forth year / second Semester (5th Semester)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	2	1	0	3

2. Course Aims

No.	Aim
1	Identify student an overview of his liabilities and rights according to the valid laws and regulations governing the engineering works in all its specializations, It reviews and explains theoretically and practically.(AM2)

3. Course Learning Outcomes (CLOs)

CLO6	Apply engineering design process to produce cost- effective solution that recognize specified needs with consideration for social environmental and ethical aspect.
CLO14	Use creative , innovative and leadership skills to new situation related to human rights and practice other learning strategies

4.Course Contents

Topics	Week
1-Defining the law and the characteristics of the legal rule.	1
2- Legislation and its types.	2
3- Types of public and private law.	3
4- Contracting contracts in the Tenders Law.	4
5- Contracting contracts in the Tenders Law.	5
6- Contracting contracts in the Tenders Law.	6
Business offering procedures.	7
Types of tenders and practices.	8
The prevailing types of contracting contracts.	10
Special types of construction contracts.	11

The objectives of the syndicate and the conditions for membership in the syndicate.	12
The organizational structure of the Ministry of Electricity.	13
The strategy of each agency, with clarification of the terms of reference of each company.	14
revision	15

5. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
Clo6	√			√		√						
Clo14	√			√			√					

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	×

7. Students' Assessment

7.1 Students' Assessment Method		
No.	**Assessment Method**	**CLOs**
1	Attendance	CLO6
2	Sheets	Clo6,clo14
3	Quizzes	clo14
4	Mid-term Exam	CLO6
5	Final Exam	Clo6,clo14

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Sheets	Biweekly
3	Quizzes	Biweekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments			
	Assessment Method	**Weights%**	**Weights**
Teacher Opinion	Sheets	5%	5
	Attendance	10%	10
	Quizzes	5%	5
	Mid-term exam	20%	20

Final Exam		60%	60
Total		100%	100

8. List of References

[1] Law regulating tenders and auctions promulgated by law no.89 of 1998.
[2] Surya P. Subedi, OBE, QC, The Effectiveness of the UN Human Rights System: Reform and the Judicialization of Human Rights, 2019.
[3] Reis Monteiro, A., Ethics of Human Rights.2019

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Defining the law and the characteristics of the legal rule.	1	CLO6

2	Legislation and its types.	1	CLO6
3	Types of public and private law.	1	CLO6
4	Contracting contracts in the Tenders Law.	1	CLO6
5	Contracting contracts in the Tenders Law.	1	CLO6
6	Contracting contracts in the Tenders Law.	1	CLO6,CLO14
7	Business offering procedures.	1	CLO6,CLO14
8	Types of tenders and practices.	1	CLO6,CLO14
10	The prevailing types of contracting contracts.	1	CLO6,CLO14
11	Special types of construction contracts.	1	CLO6,CLO14
12	The objectives of the syndicate and the conditions for membership in the syndicate.	1	CLO14
13	The organizational structure of the Ministry of Electricity.	1	CLO14
14	The strategy of each agency, with clarification of the terms of reference of each company.	1	CLO6,CLO14
15	Revision	1	CLO6,CLO14

11. Matrix of Program LOs with Course Los

Program LOs	Course Los

PL3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	CLO6	Apply engineering design process to produce cost- effective solution that recognize specified needs with consideration for social environmental and ethical aspect.
PL9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	CLO14	Use creative , innovative and leadership skills to new situation related to human rights and practice other learning strategies

Title	Name	Signature
Course coordinator	Ass. Prof. Dr. Rehab Ali	
Program coordinator	**Dr Hend Salama**	
Head of Department	Ass. Prof. Dr Osama Elghandour	
Date of Approval	**3/9/2023**	

Course Specification

Course Code: HUM 3101 **Course Title:** Management and Marketing

4. Basic information

Program Title	Electrical power Engineering Department
Department offering the program	Electrical power Engineering Department
Department offering the course	Engineering Mathematics and Physics department

Course Code	HUM 3101			
prerequisites	None			
Year/level	Forth year / first Semester (5th level)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	2	1	0	3

5. Course Aims

No.	Aim
1	Adapt successfully to changing technologies, techniques, and skills to recognize the concepts, principles, problems, and applications of marketing and management. (AM6)

6. Learning Outcomes (LOs)

CLO1	Identify environmental factors that affect both global and domestic marketing decisions.
CLO3	Analyze the importance of social responsibility and ethics on marketing.
CLO14	Use creativity to Explain the concepts of the marketing mix in the development of marketing strategy and tactics.

4- course contents	
Topics	**Week**
An Overview of Marketing.	1
Strategic Planning for Competitive Advantage	2
Social Responsibility, Ethics, and the Marketing Environment.	3
Social Responsibility, Ethics, and the Marketing Environment.	4
Developing a Global Vision.	5
Consumer Decision Making.	6
Business Marketing.	7
Segmenting and Targeting Markets.	8
Product Concepts.	10
Services and Non-profit Organization Marketing.	11
Marketing Channels and Supply Chain Management.	12
Advertising and Public Relations.	13
Sales Promotion and Personal Selling.	14
Pricing Concepts.	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation

CLO1	√			√								
CLO3	√			√		√	√			√		
CLO14	√			√		√	√			√		

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

7. Students' Assessment

7.1 Students' Assessment Method		
No.	**Assessment Method**	**LOs**
1	Attendance	CLO1
2	Reports	CLO3,CLO14
3	Quizzes	CLO3,CLO14
4	Mid-term Exam	CLO3,CLO14
5	Final Exam	CLO1,CLO3,CLO14

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Sheets	Biweekly
3	Quizzes	Biweekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments			
	Assessment Method	**Weights%**	**Weights**
Teacher Opinion	Sheets	5%	5
	Attendance	10%	10
	Quizzes	5%	5
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

8. List of References

1. Course notes.
2. Essential books (text books) - Lamb, Hair and McDaniel, MKTG, South-Western Publishing U.S.A. 2009.
3. Recommended books. - Kotler, Philip, Kevin Lane Keller, Marketing management, Prentice hall, Europe,2008.
4. Periodicals, Web sites, etc http://marketing.about.com http://www.slideshare.net http://www.knowthis.com http://www.studymarketing.org Course Prof:Dr: - Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe,2008.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	An Overview of Marketing.	1	CLO1
2	Strategic Planning for Competitive Advantage	1	CLO1,
3	Social Responsibility, Ethics, and the Marketing Environment.	1	CLO1,CLO3,
4	Social Responsibility, Ethics, and the Marketing Environment.	1	CLO1,CLO3,
5	Developing a Global Vision.	1	CLO3,CLO14
6	Consumer Decision Making.	1	,CLO3,CLO14

7	Business Marketing.	1	,CLO3,CLO14
8	Segmenting and Targeting Markets.	1	CLO1,CLO3,CLO14
10	Product Concepts.	1	CLO1,CLO3,CLO14
11	Services and Non-profit Organization Marketing.	1	CLO1,CLO3,CLO14
12	Marketing Channels and Supply Chain Management.	1	CLO1,CLO3,CLO14
13	Advertising and Public Relations.	1	CLO1,CLO3,CLO14
14	Sales Promotion and Personal Selling.	1	CLO1,CLO3,CLO14
15	Pricing Concepts.	1	CLO1,CLO3,CLO14

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	CLO1	Identify environmental factors that affect both global and domestic marketing decisions.
		CLO3	Analyze the importance of social responsibility and ethics on marketing.
PL9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	CLO14	Use creativity to Explain the concepts of the marketing mix in the development of marketing strategy and tactics.

Title	Name	Signature

Course coordinator	**Dr. Ahmed Abdelbary**	
Program coordinator	**Dr.Hend Salama**	
Head of Department	**Ass.Prof. Dr. Osama Elgandour**	
Date of Approval	**3/9/2023**	

Course Specification

Course Code: EPE4263 **Course Title: Computer Application in Electrical Power Systems**

7. Basic information

Program Title	Electrical Power Engineering Depart.
Department offering the program	Electrical Power Engineering Depart.
Department offering the course	Electrical Power Engineering Depart.
Course Code	EPE4263
Prerequisties	----------

Year/level	Fourth year / Second Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

8. Course Aims

No.	Aim
1	Solve the power flow studies and compare the effect of various network components on the power flow to simulate power system components.(AM7)

9. Course Learning Outcomes (CLOs)

CLO20	Design the power system using main principles and methodologies of power system matrices.
CLO21	Model large systems considering the main principles of Circuits Programming.
CLO22	Analyze the concepts of power flow studies and generation control.
CLO34	Integrate power system components using simulation on computer packages.

10. Course contents

Topics	Week

Introduction: Power system matrices	1
Input and transfer matrices	2
Admittance matrices of the bus bars	3
Impedance matrices	4
Circuits representation Programming	5
Large system simulation and programming.	6
Power flow studies concepts and methods	7
Approximate and fast methods, Separation methods	8
Distribution factors	10
Optimal performance	11
Generation control	12
Error analysis	13
simulation of power system components	14
Application of some computer packages	15

11. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO20	√		√	√		√						
CLO21	√	√		√		√				√	√	
CLO22	√	√	√	√		√	√			√		
CLO34	√			√		√	√				√	

12. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

13. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Attendance	CLO34
2	Reports	CLO21, CLO22.
3	Sheets	CLO20, CLO21, CLO22, CLO34.
4	Quizzes	CLO22, CLO34.
5	Mid-term Exam	CLO20, CLO21.
6	Final Exam	CLO20, CLO21,

		CLO22, CLO34.

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	Weekly
4	Quizzes	Bi-weekly
5	Mid-term Exam	9
6	Final Exam	16

7.3 weighting of Assessment

	Assessment Method	Weights %	Weights
Teacher Opinion	Reports / sheets	5%	5
	Attendance	5%	5
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

14. List of References

[1] "Computer Application in Power system", MESFIN, 2020.

[2] "Computer Application to Power system", Abha Pathak & Hemant Mahala Raghvendra Pathak, January 2016.

[3] "Computer Techniques and Models in Power Systems", K.Uma Rao, India, 2007.

15. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

16. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Introduction: Power system matrices	1	CLO20
2	Input and transfer matrices	1	CLO20
3	Admittance matrices of the bus bars	1	CLO20
4	Impedance matrices	1	CLO20
5	Circuits representation Programming	1	CLO21
6	Large system simulation and programming.	1	CLO21
7	Power flow studies concepts and methods	1	CLO22
8	Approximate and fast methods, Separation methods	1	CLO22
10	Distribution factors	1	CLO22
11	Optimal performance	1	CLO22
12	Generation control	1	CLO22
13	Error analysis	1	CLO22
14	simulation of power system components	1	CLO34
15	Application of some computer packages	1	CLO34

17. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL12	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO20	Design the power system using main principles and methodologies of power system matrices.
		CLO21	Model large systems considering the main principles of Circuits Programming.
PL19	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO22	Analyze the concepts of power flow studies and generation control.
		CLO34	Integrate power system components using simulation on computer packages.

Course Specification

Course Code: EPE 4261 **Course Title: Special Electrical Machines**

Title	Name	Signature
Course coordinator	**Dr. Riham Hosney Salem** **Dr. Zeinab Gamal Hassan**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

18. Basic information

Program Title	Electrical Power and Machines Engineering Depart.
Department offering the program	Electrical Power and Machines Engineering Depart.

Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE4261			
Prerequisite	EPE 3105			
Year/level	Fourth Year / Fifth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

19. Course Aims

No.	Aim
1	Adapt successfully to apply and develop engineering concepts for different type of machines with studding its properties. (AM6)

20. Course Learning Outcomes (CLOs)

CLO20	Design the electrical component of different type of motors.
CLO22	Analyze the application for different type of motors with electrical accessory.

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21. Course Contents

Topics	Week
Theory of single-phase rotating electric machines	1
two-phase motors	2
single-phase induction motors, coils and connections	3
performance and protection of split-phase induction motors:	4
capacitor motor for starting, two-capacitor motor	5
shaded pole motor and drawn cup motor	6
linear motor Synchronous motors	7
reactor motors, magnetic hysteresis motors	8
permanent magnet motors	10
Induction reactor motor	11
stepper motor, general motor	12
DC motors for special use, variable speed electric drive systems	13
position control motors,	14
selection of suitable motors for use	15

22. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO20	√	√									√	
CLO22	√	√	√	√								

23. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	----------

24. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Lo
1	Reports	CLO20
2	Sheets	CLO20, CLO22
3	Quizzes	CLO20, CLO22
4	Mid-term Exam	CLO20
5	Final Exam	CLO20, CLO22

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights

Teacher Opinion	Reports / sheets	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

25. List of References

[1] Chapman, S. J, Electric Machinery fundamentals, McGraw Hill Co., 5th edition, 2011
[2] A.E. Fitzgerald, C. Kingsley, and S. D. Umans, Electric Machinery, McGraw Hill Co., 7th edition, 2014.
[3] M. E. El-Hawary, Principles of Electric Machines with Power Electronic Applications, McGraw-Hill, second edition2002 .
[4] T. Wildi, Electric Machines, Drives and Power Systems, Prentice Hall, Sixth Edtion, 2014.

26. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

27. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Theory of single-phase rotating electric machines	1	CLO20
2	two-phase motors	1	CLO20
3	single-phase induction motors, coils and connections	1	CLO20

4	performance and protection of split-phase induction motors:	1	CLO20, CLO22
5	capacitor motor for starting, two-capacitor motor	1	CLO22
6	shaded pole motor and drawn cup motor	1	CLO20
7	linear motor Synchronous motors	1	CLO20
8	reactor motors, magnetic hysteresis motors	1	CLO20, CLO22
10	permanent magnet motors	1	CLO20
11	, induction reactor motor	1	CLO20, CLO22
12	stepper motor, general motor	1	CLO20, CLO22
13	DC motors for special use, variable speed electric drive systems	1	CLO22
14	position control motors	1	CLO22
15	selection of suitable motors for use	1	CLO22

28. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL12	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO20	Design the electrical component of different type of motors.
		CLO22	Anlayze the application for different type of motors with electrical accessory.

	Name	Signature
tor	**Dr. Mohamed Farouk**	
nator	**Dr. Hend Abd-Elmonem Salama**	
ment	**Assoc. Prof. Dr. Osama ELghandour**	

l	3/9/2023	

Course Specification

Course Code: EPE4202 **Course Title: Electrical Machines (4)**

29. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	EPE4202			
Pre-requests	EPE3101			
Year/level	Fourth year / Second Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

30. Course Aims

No.	Aim
1	Addressing the induction machine, construction (types), theory of operation, understanding of the basic concepts of power flow diagram and torque production in induction motors. Investigate the torque-slip characteristics, stability, losses, efficiency, testing induction machines. Get skills for starting of induction motors and single-phase induction motor. (AM6)

31. Course Learning Outcomes (CLOs)

CLO25	Estimate of the performance and the construction of induction machines and torque production in induction motors
CLO26	measure the performance of the torque-slip characteristics of induction motor, investigate the effect of changing the supply voltage and its frequency
CLO31	Examine how to improve the power factor of induction motors and study the theories and techniques for motor starting methods.

4.Course Contents

Topics	Week
Introduction to induction machines.	1
Construction of induction machine and Principles of operation.	2
Power flow diagram of induction motors. Equivalent circuit of induction motor.	3
Power flow diagram of induction motors. Equivalent circuit of induction motor. (cont.)	4
Torque-slip characteristics and stability. Power-slip characteristics.	5

Effect of the supply voltage and its frequency on the mechanical characteristics of an induction motor.	
Torque-slip characteristics and stability. Power-slip characteristics. Effect of the supply voltage and its frequency on the mechanical characteristics of an induction motor. (cont.)	6
Speed control of induction motors.	7
Losses and efficiency.	8
Power factor correction for induction motors.	10
Power factor correction for induction motors. (cont.)	11
Starting of induction motors.	12
Starting of induction motors (cont.).	13
Single phase motors	14
General course revision.	15

32. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√	√	√	√		√	√			√	√	
CLO26	√	√	√	√		√	√			√	√	
CLO31	√	√	√	√		√	√			√	√	√

33. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	------

34. Students' Assessment

7.1 Students' Assessment Method		
No.	**Assessment Method**	**CLOs**
1	Attendance	CLO31
2	Reports	CLO25, CLO26, CLO31
3	Sheets	
4	Quizzes	CLO25, CLO26, CLO31
5	Mid-term Exam	CLO25, CLO26
6	Final Exam	CLO25, CLO26,CLO31

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	Weekly
4	Quizzes	Bi-weekly
5	Mid-term Exam	9
6	Final Exam	16

	Assessment Method	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	5%	5
	Attendance	5%	5
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

35. List of References

[1] Principles of Electric Machines with Power Electronics. P. C. SEN, Third Edition, Wiley 2013.
[2] Electrical Machines by Mr. S. K. Sahdev,2018.

36. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

37. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction to induction machines.	1	CLO25
2	Construction of induction machine and Principles of operation.	1	CLO25
3	Power flow diagram of induction motors. Equivalent circuit of induction motor.	1	CLO25
4	Power flow diagram of induction motors. Equivalent circuit of induction motor. (cont.)	1	CLO25
5	Torque-slip characteristics and stability. Power-slip characteristics. Effect of the supply voltage and its frequency on the mechanical characteristics of an induction motor.	1	CLO25, CLO26
6	Torque-slip characteristics and stability. Power-slip characteristics.	1	CLO25, CLO26

	Effect of the supply voltage and its frequency on the mechanical characteristics of an induction motor. (cont.)		
7	Speed control of induction motors.	1	CLO26
8	Losses and efficiency.	1	CLO26
10	Power factor correction for induction motors.	1	CLO31
11	Power factor correction for induction motors. (cont.)	1	CLO31
12	Starting of induction motors.	1	CLO31
13	Starting of induction motors (cont.).	1	CLO31
14	Single phase motors	1	CLO31
15	General course revision.	1	CLO25, CLO26, CLO31

38. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO25	Estimate of the performance and the construction of induction machines and torque production in induction motors
		CLO26	Measure the performance of the torque-slip characteristics of induction motor, investigate the effect of changing the supply voltage and its frequency

PL17	Test, examine, and protect components, equipment and electrical power systems and machines.	CLO31	Examine how to improve the power factor of induction motors and study the theories and techniques for motor starting methods.

Title	Name	Signature
Course coordinator	**Dr. Nada Mamdouh Hassan**	Nada Mamdouh
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

برنامج هندسة القوى الكهربية
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE4172 **Course Title: Applications of High Voltage**

39. Basic information

Program Title	Electrical Power and Machines Engineering Depart.			
Department offering the program	Electrical Power and Machines Engineering Depart.			
Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE 4172			
Prerequisite	EPE 3103			
Year/level	Fourth year / Fifth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

40. Course Aims

No.	Aim
1	Illustrate the new techniques, skills, and appropriate engineering tools, necessary for high voltage engineering(AIM3)

41. Course Learning Outcomes (CLOs)

CLO27	Adopt the performance of over voltage wave, transmission analysis and its effect on the insulation system.
CLO33	Analyze the effect of lighting wave on the electric grid and illustrate the sheering bridge circuit and precaution in estimating the permittivity and capacitance of insulation material.

42. Course Contents

Topics	Week
Overvoltage phenomena in electric power systems	1
propagation of waves on electric power lines and components	2
theory of traveling and stationary waves	3
electric field of ultra-high voltage lines	4
lightning strikes and their prevention	5
overvoltage in ultra-high voltage systems due to connection and disconnection processes	6
electric insulation properties in the wide air gaps, voltage	7
electric insulation properties when frequency is controlled	8
overvoltage phenomenon	10
test laboratory insulation tester for high voltage cables	11
Shering brige for perdict the permitivity and the capacitance of insulation material	12
design of high voltage lines	13
design examples of High voltage Arrangement	14
The basic information on chosen the surge arrestor for electric network	15

43. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation

CLO27	√	√		√		√						
CLO33	√	√		√		√	√		√		√	√

44. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	----

45. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Reports	CLO27
2	Sheets	CLO27, CLO33
3	Quizzes	CLO27, CLO33
4	Mid-term Exam	ClO33
5	Final Exam	CLO27, CLO33

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments			
	Assessment Method	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	10%	5
	Quiz 1 / Quiz 2	10%	5
	Mid-term exam	20%	30
Final Exam		60%	60
Total		100%	100

46. List of References

[1] E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering, 2nd edition, Newnes Press, 2000.
[2] Naidu, M.S., "High Voltage Engineering", Tata Mc Graw Hill Co., 1982.
[3] Abdel Salam, M., Anis, H., El-Morshedy, A., and Radwan, R., "High Voltage Engineering", Marcel Dekker Inc., 2000.
[4] M. Khalifa, High Voltage Engineering, Marcel Dekker, Inc.
[5] P. Rozga, Abde. Beroual," High Voltage Insulating material - Current State and Prospects",energies, 2021

47. Facilities required for teaching and learning

Lecture/Classroom
White board

Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

48. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Overvoltage phenomena in electric power systems	1	CLO27
2	propagation of waves on electric power lines and components	1	CLO27
3	theory of traveling and stationary waves	1	CLO27
4	electric field of ultra-high voltage lines	1	CLO27, CLO33
5	lightning strikes and their prevention	1	CLO27, CLO33
6	overvoltage in ultra-high voltage systems due to connection and disconnection processes	1	CLO27, CLO33
7	electric insulation properties in the wide air gaps, voltage	1	CLO33
8	electric insulation properties when frequency is controlled	1	CLO33
10	overvoltage phenomenon	1	CLO27
11	test laboratory insulation tester for high voltage cables	1	CLO33
12	Shering brige for perdict the permitivity and the capacitance of insulation material	1	CLO33
13	design of high voltage lines		CLO27, CLO33
14	design examples of High voltage Arrangement	1	CLO33
15	The basic information on chosen the surge arrestor for electric network	1	CLO33

49. Matrix of Program LOs with Course Los

Program Los		Course Los	
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.	CLO27	Adopt the performance of over voltage wave, transmission analysis and its effect on the insulation system.
PL19	Analyze the performance of electric power generation, control, and distribution systems.	CLO33	Analyze the effect of lighting wave on the electric grid and illustrate the sheering bridge circuit and precaution in estimating the permittivity and capacitance of insulation material.

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk**	

Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**6/09/2023**	

Course Specification

Course Code: EPE 4171 **Course Title: Theory of Electrical Machines**

50. Basic information

Program Title	Electrical Power and Machines Engineering Depart.			
Department offering the program	Electrical Power and Machines Engineering Depart.			
Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE4171			
Prerequisite	EPE 3101			
Year/level	Fourth year / Fifth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

51. Course Aims

No.	Aim
1	Apply knowledge of mathematics, science and engineering concepts to different machines problems with studding its performance. (AM1)

52. Course Learning Outcomes (CLOs)

CLO18	model the different type of machines.
CLO19	Analyze the suitable model of different machines by applying the concepts of machine
CLO28	identify the equation of different type of machine and its characteristic
CLO29	formulate the basic structure of various machine in order to use as application

53. Course Contents

Topics	Week
Basics of the general theory of electrical machines, basic bipolar machine.	1
primitive Crohn's machine. Linear transforms, fixed power, rotary axes reference	2

three-phase frame reference, conversion between systems of different reference	3
torque equations, application limits and limitations	4
application of general theory to electrical machines, DC machines:	5
stable and transient performance, Perpendiculars two-field generators.	6
electric stops, three-phase synchronous machines: synchronous machine constants	7
stable and transient performance, two-stage synchronous machines	8
three-phase induction motors: transformation parameters	10
stable performance for different cases	11
Transient performance and special performance cases	12
single-phase motors: circuit field theory, start-ups	13
alternating current AC electrical machines with changing currents	14
alternating current AC electrical machines with electrical transformers	15

54. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO18	√	√								√	√	
CLO19	√	√	√	√								
CLO28	√	√	√	√								
CLO29	√	√	√	√						√		

55. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	----------

56. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLos
1	Reports	CLO18, CLO19, CLO28
2	Sheets	CLO18, CLO19, CLO28, CLO29
3	Quizzes	CLO19, CLO28, CLO29
4	Mid-term Exam	CLO18, CLO19, CLO28, CLO29
5	Final Exam	CLO18, CLO19, CLO28, CLO29

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	Weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

57. List of References

[1] Electric Machinery fundamentals", Chapman, S. J., McGraw Hill Co., 4th edition, 2005.
[2] "Principles of Electric Machines with Power Electronic Applications", M. E. El-Hawary, McGraw-Hill, second edition, 2002.
[3] "Schaum's Electric Machines and Electromechanics", by Syed A. Nasar,1998.

58. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

59. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Basics of the general theory of electrical machines, basic bipolar machine.	1	CLO18
2	primitive Crohn's machine. Linear transforms, fixed power, rotary axes reference	1	CLO18, CLO19
3	three-phase frame reference, conversion between systems of different reference	1	CLO18, CLO19, CLO28
4	torque equations, application limits and limitations	1	CLO18, CLO19, CLO28

5	application of general theory to electrical machines, DC machines:	1	CLO28
6	stable and transient performance, Perpendiculars two-field generators.	1	CLO28
7	electric stops, three-phase synchronous machines: synchronous machine constants	1	CLO19, CLO28
8	stable and transient performance, two-stage synchronous machines	1	CLO18, CLO28
10	three-phase induction motors: transformation parameters	1	CLO18, CLO28
11	stable performance for different cases	1	CLO17, CLO28
12	Transient performance and special performance cases	1	CLO17, CLO28
13	single-phase motors: circuit field theory, start-ups	1	CLO34
14	alternating current AC electrical machines with changing currents	1	CLO34
15	alternating current AC electrical machines with electrical transformers	1	CLO34

60. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL11	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.	CLO18	model the different type of machines.
		CLO19	Analyze the suitable model of different machines by applying the concepts of machine
PL16	Identify and formulate engineering problems to solve	CLO28	identify the equation of different type of machine and its characteristic

	problems in the field of electrical power and machines engineering.	CLO29	formulate the basic structure of various machine in order to use as application

	Name	Signature
tor	**Dr. Mohamed Farouk**	
ator	**Dr. Hend Abd-Elmonem Salama**	
ent	**Assoc.Prof. Dr. Osama ELghandour**	
	3/09/2023	

Course Specification

Course Code: EPE4163 **Course Title: Electric Drive**

61. Basic information

Program Title	Electrical Power Engineering Depart.
Department offering the program	Electrical Power Engineering Depart.
Department offering the course	Electrical Power Engineering Depart.

Course Code	EPE4163			
Pre-requests	EPE3103			
Year/level	Fourth year / First Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

62. Course Aims

No.	Aim
1	Adapt successfully to apply and develop power electronics for speed control of the electrical motor, the characteristics of electric drive systems including AC, DC, and Stepper motors using the scientific skills (AM6)

63. Course Learning Outcomes (CLOs)

CLO23	Design the component of AC Drive with simple model
CLO24	implement the main scientific relations of stepper motor and its application.
CLO34	Integrate and interpret data Elements of electric drive systems. Practice research techniques and methods of DC chopper drives and Ac drives.

64. Course Contents

Topics	Week
Elements of electric drive systems (mech loads, elec. Motors, power sources, converters, and controllers)	1
Joint speed-Torque characteristics of electric motors and mechanical loads, required drive characteristics, and selecting drive elements.	2
Voltage and frequency control of the 3-phase induction motor drives	3
Current control of the 3 -phase induction motor	4
Closed loop control of induction motor drives	5
Control and operation of Stepper motor drives	6
Soft starters: theory, operation and control.	7
DC drives using controlled rectifiers.	8
DC drives using controlled rectifiers (cont.).	10
DC chopper drives.	11
Closed loop control of DC drives.	12
Root locus analysis.	13
Modeling by using Matlab	14
General course revision.	15

65. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO23	√	√								√	√	
CLO24	√	√										
CLO34	√	√	√	√		√	√			√	√	√

66. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason

1	Additional Tutorials	√
2	Online lectures and assignments	×

67. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Reports	CLO23, CLO24
2	Sheets	CLO23, CLO24, CLO34
3	Quizzes	CLO23, CLO24, CLO34
4	Mid-term Exam	CLO23, CLO24
5	Final Exam	CLO23, CLO24, CLO34

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

	Assessment Method	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

68. List of References

[1] M. H. Rashid, “Power electronics: circuits, devices, and applications,” Pearson - Prentice Hall, 3rd edition, 2003.

[2] S. B. Dewan, G. R. Slemon and A. Straughen, “Power Semiconductor Drives,” John-Wiley & Sons, 1984.

[3] B. K. Bose, “Modern Power Electronics and AC Drives,” Prentice Hall, 2002.

[4] W. Shepherd and L. N. Hulley,” Power Electronics and Motor Control,” Cambridge University Press, 1987.

[5] P. C. Sen,” Thyristor DC Drives,” John Wiley & Sons, 1981.

[6] Tirtharaj Sen, Pijush Kanti Bhattacharjee, Manjima Bhattacharya,” Design and Implementation of Firing Circuit for Single-Phase Converter”, International Journal of Computer and Electrical Engineering, Vol. 3, No. 3, June 2011.

69. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

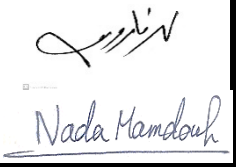
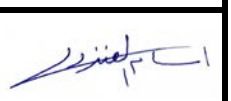
70. Matrix of Course Content with Course LO’s

Week No.	Topics	Aim	LO's

1	Elements of electric drive systems (mech loads, elec. Motors, power sources, converters, and controllers)	1	CLO24, CLO34
2	Joint speed-Torque characteristics of electric motors and mechanical loads, required drive characteristics, and selecting drive elements.	1	CLO23, CLO24, CLO34
3	Voltage and frequency control of the 3-phase induction motor drives	1	CLO23, CLO24
4	Current control of the 3 -phase induction motor	1	CLO24, CLO34
5	Closed loop control of induction motor drives	1	CLO24, CLO34
6	Control and operation of Stepper motor drives	1	CLO23, CLO24, CLO34
7	Soft starters: theory, operation and control.	1	CLO34
8	DC drives using controlled rectifiers.	1	CLO34
10	DC drives using controlled rectifiers (cont.).	1	CLO24, CLO34
11	DC chopper drives.	1	CLO24, CLO34
12	Closed loop control of DC drives.	1	CLO34
13	Root locus analysis.	1	CLO34
14	Modeling by using Matlab	1	CLO34
15	General course revision.	1	CLO34

71. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL13	Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.	CLO23	Design the component of AC Drive with simple model
		CLO24	implement the main scientific relations of stepper motor and its application.
PL19	Integrate electrical, electronic, mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO34	Integrate and interpret data Elements of electric drive systems. Practice research techniques and methods of DC chopper drives and Ac drives.

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk** **Dr. Nada Mamdouh Hassan**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

Course Specification

Course Code: EPE 4162 **Course Title: Extra High Voltages**

72. Basic information

Program Title	Electrical Power and Machines Engineering Depart.			
Department offering the program	Electrical Power and Machines Engineering Depart.			
Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE 4162			
Perquisite	EPE 3202			
Year/level	Four year / Fifth Level (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

73. Course Aims

No.	Aim
1	Adapt successfully to apply and develop tools necessary to study the different types of excessive voltage waves which effect on power system and its equipment. (AM6)

74. Course Learning Outcomes (CLOs)

CLO23	Design the protective system against the different type of over voltage waves
CLO24	Implement the performance of excessive voltage waves
CLO34	Integrate the effect of Traveling waves on the electric power generation and study the transient voltage waves and how you can protect the electrical system

75. Course Contents

Topics	Week
Introduction to the types of excessive voltages	1
The excessive voltages waves created from electrical power systems	2
the voltages waves caused by lightning of clouds	3
the phenomenon of lightning strike	4
the interference of lightning strikes with electrical power systems	5
the effect of lightning strikes on the design factors of overhead lines and the electrical equipments.	6
the voltages resulting from opening and closure circuit.	7
the transient voltages resulting from opening the circuit breaker,	8
the double transient voltage Transient potentials caused by opening and connecting power capacitors	10
Traveling waves	11

wave equalization	12
reflection and passage of the wave, lattice diagram	13
Wave decay	14
Wave distortion	15

76. Teaching and Learning methods

Course learning Outcome	Teaching and Learning Methods

s (CLOs)	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO23	√	√									√	
CLO24	√	√	√	√								
CLO34	√	√	√	√						√		

77. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	----------

78. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Reports	CLO23, CLO24
2	Sheets	CLO23, CLO24, CLO34
3	Quizzes	CLO23, CLO24
4	Mid-term Exam	CLO23, CLO24
5	Final Exam	CLO23, CLO24, CLO34

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Reports	Bi-weekly
2	Sheets	Weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments			
	Assessment Method	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

79. List of References

[5] E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering, 2nd edition, Newnes Press, 2000.
[6] Naidu, M.S., "High Voltage Engineering", Tata Mc Graw Hill Co., 1982. 8.
[7] Abdel Salam, M., Anis, H., El-Morshedy, A., and Radwan, R., "High Voltage Engineering", Marcel Dekker Inc., 2000.
[8] M. Khalifa, High Voltage Engineering, Marcel Dekker Inc., 1990.
[9] High Voltage Engineering Practice and Theory Dr JP Holtzhausen Dr WL Vosloo ... Hileman, A.R., Insulation coordination for power systems Marcel Dekker,1999.
[10] Dr WL Vosloo," High voltage Engineering practice and Theory", 2007.

80. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

81. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction to the types of excessive voltages	1	CLO23
2	The excessive voltages waves created from electrical power systems	1	CLO23, CLO24
3	the voltages waves caused by lightning of clouds	1	CLO23, CLO24
4	the phenomenon of lightning strike	1	CLO23, CLO24
5	the interference of lightning strikes with electrical power systems	1	CLO23, CLO24
6	the effect of lightning strikes on the design factors of overhead lines and the electrical equipment's.	1	CLO34
7	the voltages resulting from opening and closure circuit.	1	CLO23, CLO24, CLO34
8	the transient voltages resulting from opening the circuit breaker,	1	CLO23, CLO24, CLO34
10	the double transient voltage Transient potentials caused by opening and connecting power capacitors	1	CLO23, CLO24, CLO34
11	Traveling waves	1	CLO23, CLO24, CLO34
12	wave equalization	1	CLO23, CLO24, CLO34

13	reflection and passage of the wave, lattice diagram	1	CLO23, CLO24, CLO34
14	wave decay	1	CLO23, CLO24, CLO34
15	Wave distortion	1	CLO23, CLO24, CLO34

82. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL13	Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.	CLO23	Design the protective system against the different type of over voltage waves
		CLO24	Implement the performance of excessive voltage waves
PL19	Integrate electrical, electronic, mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO34	Integrate the effect of Traveling waves on the electric power generation and study the transient voltage waves and how you can protect the electrical system

	Name	Signature
tor	**Dr. Mohamed Farouk**	

ator	**Dr. Hend Abd-Elmonem Salama**	
ent	**Assoc.Prof. Dr. Osama ELghandour**	
	3/09/2023	

Course Specification

Course Code: EPE4161 **Course Title: Planning of Electrical Networks**

83. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	EPE4161			
Prerequisties	EPE 3202			
Year/level	Fourth year / First Semester (5th level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total

	3	2	0	5

84. Course Aims

No.	Aim
1	Analyze electric power system planning and train the student to solve power system planning using computer facilities. (AM5)

85. Course Learning Outcomes (CLOs)

CLO17	Select the concepts of planning to electrical networks
CLO18	Model different examples for transmission planning
CLO19	Analyze the main principles of different generating stations
CLO33	Analyze the methods of programming and reliability studies

86. Course contents

Topics	Week
Planning of Electrical Networks	1
Load Forecasting	2
Generation Planning	3

Transmission Planning	4
Transmission planning methodology and examples	5
Renewable Energy sources Planning	6
Utility Financial Accounting	7
Co-generation overview and regulations	8
Steam turbine co-generation cycles	10
Gas turbine cycles	11
Dynamic programming	12
Approximate techniques for resource planning	13
Reliability Studies and Evaluation	14
Small improvement projects	15

87. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO17	√		√	√		√						
CLO18	√	√		√		√				√	√	
CLO19	√	√	√	√		√	√			√		
CLO33	√			√		√	√				√	

88. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason

1	Additional Tutorials	√
2	Online lectures and assignments	√

89. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Attendance	CLO33.
2	Reports	CLO17, CLO19.
3	Sheets	CLO17, CLO18, CLO19, CLO33.
4	Quizzes	CLO17, CLO33.
5	Mid-term Exam	CLO17, CLO18.
6	Final Exam	CLO17, CLO18, CLO19, CLO33.

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	Weekly
4	Quizzes	Bi-weekly
5	Mid-term Exam	9
6	Final Exam	16

7.3 weighting of Assessment

	Assessment Method	Weights %	Weights
Teacher Opinion	Reports / sheets / Activities	5%	5
	Attendance	5%	5
	Quizzes	10%	10
	Mid-term exam	20%	20

Final Exam		60%	60
Total		100%	100

90. List of References

[1] “Power Distribution Planning”, H.Lee Willis, Second Edition, U.S.A, 1997.
[2]”Electric Power System Planning: Issues, Algorithms and Solutions Power Systems”, Hossein Seifi. Mohammad Sepasian, Springer, Berlin, 2011.
[3] ‘Power System Planning Technologies and Applications: Concepts, Solutions and Management’’,Fawwaz Elkarmi, Nazih Abu Shikhah, February, 2012.

91. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

92. Matrix of Course Content with Course LO’s

Week No.	Topics	Aim	CLO's
1	Planning of Electrical Networks	1	CLO17
2	Load Forecasting	1	CLO17
3	Generation Planning	1	CLO18
4	Transmission Planning	1	CLO18
5	Transmission planning methodology and examples	1	CLO18
6	Renewable Energy sources Planning	1	CLO19
7	Utility Financial Accounting	1	CLO19
8	Co-generation overview and regulations	1	CLO18, CLO19
10	Steam turbine co-generation cycles	1	CLO17
11	Gas turbine cycles	1	CLO18
12	Dynamic programming	1	CLO33
13	Approximate techniques for resource planning	1	CLO33
14	Reliability Studies and Evaluation	1	CLO33
15	Small improvement projects	1	CLO18, CLO33

93. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL11	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.	CLO17	Select the concepts of planning to electrical networks
		CLO18	Model different examples for transmission planning
		CLO19	Analyze the main principles of different generating stations
PL18	Analyze the performance of electric power generation, control, and distribution systems	CLO33	Analyze the methods of programming and reliability studies

Title	Name	Signature
Course coordinator	Dr. Riham Hosney Salem Dr. Zeinab Gamal Hassan	
Program coordinator	Dr. Hend Abd-Elmonem Salama	
Head of Department	Assoc.Prof. Dr. Osama ELghandour	
Date of Approval	3/9/2023	

برنامج هندسة القوى الكهربية
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE4103 **Course Title: Power System Analysis (2)**

94. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	EPE4103			
Prerequisties	EPE3203			
Year/level	Fourth year / First Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

95. Course Aims

No.	Aim
1	Adapt successfully to apply and develop the effect of disturbances for some problems related to power system and train the student to solve power system analysis using computer facilities. (AM6)

96. Course Learning Outcomes (CLOs)

CLO25	Estimate the concepts of electrical power systems Dispatch describing different methods of solution.
CLO26	Measure the concepts of transient stability and main analysis of small signal stability.
CLO34	Integrate transient stability analysis and the main principles of Park's Transformation to salient and non-salient machines in power system analysis.

97. Course Contents	
Topics	**Week**
Optimal Dispatch of Generation Neglecting System Limits and Losses	1
Economic Dispatch Including System Limits and Losses	2
Introduction to Synchronous Machines	3
Transient Stability Analysis	4
Analysis of Equal Area Criterion	5
Calculation of Transient Stability Margin	6
Calculation of Clearing Time to Different Cases.	7
Plotting the swing equation as relation between rotor angle and time.	8
Small Signal Stability Analysis	10
Free Response of Small Signal Stability	11
Forced Response of Small Signal Stability	12
Park's Transformation	13
Non Salient Synchronous Machine	14
Salient Synchronous Machine	15

98. Teaching and Learning methods

Course learning Outcome	Teaching and Learning Methods

s (CLOs)	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√		√	√		√	√			√		
CLO26	√	√	√	√		√	√				√	
CLO34	√	√	√	√		√	√			√	√	

99. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

100. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Attendance	CLO34.
2	Reports	CLO26, CLO34.
3	Sheets	CLO25, CLO26, CLO34.
4	Quizzes	CLO17, CLO33.
5	Mid-term Exam	CLO25, CLO26.

6	Final Exam	CLO25, CLO26, CLO34.

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	Weekly
4	Quizzes	Bi-weekly
5	Mid-term Exam	9
6	Final Exam	16

7.3 weighting of Assessment

	Assessment Method	Weights %	Weights
Teacher Opinion	Reports / sheets	5%	5
	Attendance	5%	5
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

101. List of References

[1] V. Venikov, “Transient Processes in Electrical Power Systems”, MirPublishers Moscow, 1980
[2] Olle I. Elgerd, “Electric Energy System Theory: An Introduction”, TATA McGraw-Hill Ltd., 1971.
[3] Hadi Saadat, “Power System Analysis”, WCB/McGraw-Hill, 1999.
[4] R. Billinton, and R.N. Allan, "Reliability Evaluation of Power Systems", Plenum Publishing, N.Y, 1996.
[5]’’ Power System Analysis’’, P.S.MURTY, second edition 2017.

102. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

103. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Optimal Dispatch of Generation Neglecting System Limits and Losses	1	CLO25
2	Economic Dispatch Including System Limits and Losses	1	CLO25
3	Introduction to Synchronous Machines	1	CLO25, CLO26
4	Transient Stability Analysis	1	CLO26
5	Analysis of Equal Area Criterion	1	CLO26
6	Calculation of Transient Stability Margin	1	CLO26
7	Calculation of Clearing Time to Different Cases.	1	CLO26
8	Plotting the swing equation as relation between rotor angle and time.	1	CLO26, CLO34
10	Small Signal Stability Analysis	1	CLO26
11	Free Response of Small Signal Stability	1	CLO26
12	Forced Response of Small Signal Stability	1	CLO26
13	Park's Transformation	1	CLO34
14	Non Salient Synchronous Machine	1	CLO34
15	Salient Synchronous Machine	1	CLO34

104. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application	CLO25	Estimate the concepts of electrical power systems Dispatch describing different methods of solution.
		CLO26	Measure the concepts of transient stability and main analysis of small signal stability.

PL19	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO34	Integrate transient stability analysis and the main principles of Park's Transformation to salient and non-salient machines in power system analysis.

Title	Name	Signature
Course coordinator	**Dr. Zeinab Gamal Hassan**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

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المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE 4102 **Course Title: Electrical Machines (3)**

105. Basic information

Program Title	Electrical Power and Machines Engineering Depart.

Department offering the program	Electrical Power and Machines Engineering Depart.			
Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE 4102			
Prerequisite	EPE 3101			
Year/level	Four year / Fifth Level (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

106. Course Aims

No.	Aim
1	Use the techniques, skills, and appropriate engineering tools of synchronous machine and its design. With fundamental characteristic of salient, cylindrical synchronous generators and also motor to understand the principles and its behaviors. (AM3)

107. Course Learning Outcomes (CLOs)

CLO27	Adopt the construction of electrical synchronous machine and concepts of operation and Discuss the methodologies of synchronous generator and motor.
CLO34	Integrate the main component of synchronous machine to get the characteristics of machine and illustrate the performance of synchronous generator or motor with the suitable mathematical relations

108. Course Contents

Topics	Week
Introduction, Cylindrical-rotor and salient-pole synchronous machines	1
Types of windings in ac machines, Winding coefficients	2
Generator performance, Motor performance	3
Phasor diagrams in three-phase synchronous machines	4
Synchronous impedance steady state operation, Voltage regulation	5
Parallel operation, Synchronous machine to an infinite bus	6
The V curves, power angle characteristics, The two-reaction theory	7
Open circuit characteristics, Short circuit characteristics, Potier reactance,	8
Zero-power-factor characteristic, Damper bars, Testing of synchronous machines	10
Construction, Electrical Design, Main dimensions Analysis	11
Examples on the design of turbo-generators.	12
Examples on the low-speed generators.	13
Examples on the synchronous motor in power system network	14
Examples on the synchronous motor in electric car	15

109. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO27	√	√	√	√	√							
CLO34	√	√	√	√		√						√

110. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	---

111. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLos
1	Reports	CLO34
2	Sheets	CLO27, CLO34
3	Quizzes	CLO27, CLO34
4	Mid-term Exam	CLO27
5	Final Exam	CLO27, CLO34

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	Weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights

Teacher Opinion	Reports / sheets	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

112. List of References

[1] Say M. G."The Performance and Design of Alternating Current Machines" Pitman Publishers, 3rd edition, reprinted 1963.
[2] Chapman S. j."Electric Machinery Fundementals" McGraw-Hill Publishers, 2nd edition, 1991.
[3] T.A. Lipo,"Analysis of Synchronous Machines" ,Taylor & Francis Group, 2012.

113. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

114. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Introduction, Cylindrical-rotor and salient-pole synchronous machines	1	CLO27
2	Types of windings in ac machines, Winding coefficients	1	CLO27
3	Generator performance, Motor performance	1	CLO27
4	Phasor diagrams in three-phase synchronous machines	1	CLO27
5	Synchronous impedance steady state operation, Voltage regulation	1	CLO27, CLO34
6	Parallel operation, Synchronous machine to an infinite bus	1	CLO34
7	The V curves, power angle characteristics, The two-reaction theory	1	CLO27, CLO34
8	Open circuit characteristics, Short circuit characteristics, Potier reactance,	1	CLO27, CLO34
10	Zero-power-factor characteristic, Damper bars, Testing of synchronous machines	1	CLO27, CLO34
11	Construction, Electrical Design, Main dimensions Analysis	1	CLO27
12	Examples on the design of turbo-generators.	1	CLO27
13	Examples on the low-speed generators.	1	CLO27
14	Examples on the synchronous motor in power system network	1	CLO27, CLO34
15	Examples on the synchronous motor in electric car	1	CLO27, CLO34

115. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.	CLO27	Adopt the construction of electrical synchronous machine and concepts of operation and Discuss the methodologies of synchronous generator and motor.
PL19	Integrate electrical, electronic, mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO34	Integrate the main component of synchronous machine to get the characteristics of machine and illustrate the performance of synchronous generator or motor with the suitable mathematical relations

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	

Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2023**	

برنامج هندسة القوى الكهربية
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE4299 **Course Title: project (2)**

116. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	EPE4299			
Prerequisties				
Year/level	Fourth year / Second Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	4	-	4

117. Course Aims

No.	Aim
1	Investigate the effect of disturbances for some problems related to power system and train the student to solve power system analysis using computer facilities. (AM5)
2	Analyze operation of different electric systems through design work in electrical power engineering. (AM7)

118. Course Learning Outcomes (CLOs)

CLO25	Estimate engineering problems to solve problems in the field of electrical power and machines engineering for the graduation project
CLO26	Measure components, equipment and systems of electrical power and machines for the graduation project
CLO27	Adopt the performance of electric power generation, control, and distribution systems for the graduation project
CLO33	Analyze the performance of electric power systems for the graduation project.
CLO34	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems for the graduation project

119. Course contents

Topics	Week
Seminar to discuss the project progress	1:6,8,9
Students' Presentations	10:12
Project's Report examination and oral discussion	13:15
Final Report Examination and Oral Discussion and presentation	16

120. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√		√	√		√		√			√	
CLO26	√	√		√		√		√	√	√	√	
CLO27	√	√	√	√		√	√	√	√	√	√	√
CLO33	√			√		√	√	√			√	√
CLO34	√	√	√	√	√	√	√	√		√	√	√

121. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

122. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Attendance	CLO33, CLO34
2	Reports	CLO25,CLO26, CLO27,CLO33, CLO34
3	Oral Discussion and presentation	CLO25,CLO26, CLO27,CLO33, CLO34
4	Final Report Examination and presentation	CLO25,CLO26, CLO27,CLO33, CLO34

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Every Week
2	Reports	12
3	Oral Discussion and presentation	13,14
4	Final Report Examination and presentation	16

7.3 weighting of Assessment

	Assessment Method	Weights %	Weights
Teacher Opinion	Attendance	10%	10
	Reports	20%	20

	Oral Discussion and presentation	20%	20
	Final Report Examination and presentation	50%	50
Total		100%	100

123. List of References

A list of books regarding the project topic is given

124. Facilities required for teaching and learning

Lecture/Classroom
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show
Lab Facilities

125. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1:6,8,9	Seminar to discuss the project progress	1,2	CLO25,CLO26, CLO27
10:12	Students' Presentations	1,2	CLO25,CLO26, CLO27
13:15	Project's Report examination and oral discussion	1,2	CLO25,CLO26, CLO27,CLO33, CLO34
16	Final Report Examination and Oral Discussion and presentation	1,2	CLO25,CLO26, CLO27,CLO33, CLO34

126. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	**CLO25**	Estimate engineering problems to solve problems in the field of electrical power and machines engineering for the graduation project
		CLO26	Measure components, equipment and systems of electrical power and machines for the graduation project
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.	**CLO27**	Adopt the performance of electric power systems for the graduation project
PL17	Analyze the performance of electric power generation, control, and distribution systems.	**CLO33**	Analyze the performance of electric power generation, control, and distribution systems for the graduation project.
PL18	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	**CLO34**	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems for the graduation project

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk** **Dr. Riham Hosney Salem** **Dr. Zeinab Gamal Hassan** **Dr. Dina Rostom** **Dr. Nada Mamdouh**	

Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

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المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE 4262 **Course Title: Applications of switchgear and protection**

127. Basic information

Program Title	Electrical Power Engineering Depart.
Department offering the program	Electrical Power Engineering Depart.
Department offering the course	Electrical Power Engineering Depart.
Course Code	EPE4262

Year/level	fourth / 5th level (2nd Semester)			
Prerequisite	None			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

128. Course Aims

No.	Aim
1	Adapt successfully to change technologies to implement new protection schemes using technological and professional tools (AM6)

129. Course Learning Outcomes (CLOs)

CLO23	Design suitable protection schemes for different components in electric power systems such as: electric machines, transmission and distribution system, power electronic circuits, control systems, measuring instruments, control systems, insulation.
CLO24	Implement new protection schemes using technological and professional tools
CLO32	Protect components, equipment and electrical power systems and machines by studying the surges

4.Course Contents	
Topics	**Week**

Basic concepts of protection and over current relay setting	1
Basic concepts of differential protection	2
Protection of generators	3
Protection of transformers	4
Examples on protection of transformers	5
Protection of Transmission Lines	6
Protection schemes by an artificial intelligence technique	7
Neural networks	8
Protection of busbars	10
Surges	11
Traveling waves	12
Terminations	13
Special cases for terminations	14
Examples on travelling waves	15

130. Teaching and Learning methods

Course learning Outcome	Teaching and Learning Methods

s (CLOs)	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO23	√		√	√						√		
CLO24	√		√	√		√	√			√	√	
CLO32	√		√	√		√						

131. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

132. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	reports	CLO23, CLO24

2	Sheets	CLO23, CLO24
3	Quizzes	CLO23
4	Mid-term Exam	CLO23
5	Final Exam	CLO23, CLO24, CLO32

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	40%	40	10	10
	Quizzes			10	10
	Mid-term exam			20	20
Final Exam				60	60
Total				100	100

133. List of References

[1] Paul M.Anderson, Charles Henville, Rasheek Rifaat ,Brian Johnson, Sakis Meliopoulos “Power System protection”, John Wiley,2021

[2]Y.G. Paithankar, S.R. Bhide, “Fundamentals of power system protection”,prentice-Hall of india , 2004.

134. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show

135. Matrix of Course Content with Course LO’s

Week No.	Topics	Aim	LO's
1	Basic concepts of protection and over current relay setting	1	CLO23
2	Basic concepts of differential protection	1	CLO23
3	Protection of generators	1	CLO23
4	Protection of transformers	1	CLO23
5	Examples on protection of transformers	1	CLO23
6	Protection of Transmission Lines	1	CLO23, CLO24

7	Protection schemes by an artificial intelligence technique	1	CLO23, CLO24
8	Neural networks	1	CLO24
10	Protection of busbars	1	CLO23
11	Surges	1	CLO32
12	Traveling waves	1	CLO32
13	Terminations	1	CLO32
14	Special cases for terminations	1	CLO32
15	Examples on travelling waves	1	CLO32

136. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PLO13	Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.	CLO23	Design suitable protection schemes for different components in electric power systems such as: electric machines, transmission and distribution system, power electronic circuits, control systems, measuring instruments, control systems, insulation.
		CLO24	Implement new protection schemes using technological and professional tools
PLO17	Test, examine, and protect components, equipment and	CLO32	Protect components, equipment and electrical power systems and machines by studying the surges

	electrical power systems and machines.		

Title	Name	Signature
Course coordinator	**Dr.**Riham Hosny Salem	
Program coardinator	**Dr. Hend abdelmonem**	
Head of Department	**Prof. Dr. Osama elghandour**	
Date of Approval	**3/09/2023**	

Course Specification

Course Code: EPE 4203 **Course Title: Power Electronics (2)**

137. Basic information

Program Title	Electrical Power Engineering Depart.
Department offering the program	Electrical Power Engineering Depart.
Department offering the course	Electrical Power Engineering Depart.
Course Code	**EPE 4203**

Prerequisite	EPE 3104 Power Electronics (1)			
Year/level	Fourth year / Fifth Level (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

138. Course Aims

No.	Aim
1	Adapt successfully to apply and develop technologies with their skills in new contexts to meet the demands of society (AM6).

139. Course Learning Outcomes (CLOs)

CLO25	Estimate the performance of single phase ac voltage controller by using specific techniques.
CLO26	Measure the performance, the characteristics and methods of dc chopper circuit with its classifications to be utilized its outputs.
CLO33	Analyze the performance of half wave and full wave inverter circuits to investigate the outputs.

4.Course Contents

Topics	Week
Identify ON – OFF method of single phase AC voltage controller, formulates the outputs of voltage, current and power delivered to electric loads.	1
Estimate the outputs of single phase AC half wave controller circuit with R load.	2
Discuss the relation between the outputs of single-phase half wave phase controller and phase triggering angle α.	3
Calculate the outputs of Single – phase full wave of control method with R load to be analyzed.	4
Estimate the outputs of full-wave AC voltage controller circuit with R-L load by change the phase angle with its applications.	5
Investigate the change of full-wave phase voltage controller outputs and phase angle variation.	6
Plan of single phase-AC voltage controller circuits	7
Plan of single phase-AC voltage controller circuits	8
Identify the types of DC voltage choppers; step-up and step down circuits.	10
Estimate the outputs of voltage, current and power of step- down DC chopper circuit.	11
Draw the outputs of voltage, current and power of step- up DC chopper circuit.	12
Define the classification of DC choppers used in power system control.	13
Explain the half-wave Single phase inverter circuit.	14
Analyze the Single phase full-wave inverter circuit.	15

5. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation

CLO25	√	√	√				√			√	√	√
CLO26	√	√	√	√		√	√			√	√	√
CLO33	√			√		√					√	

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

7. 1 Student Assessment

No.	Assessment Method	LOs
1	Attendance	
2	Sheets	CLO25, CLO26, CLO33
3	Reports	CLO25, CLO26
4	Quizzes	CLO25, CLO26
5	Mid-term Exam	CLO25, CLO26
6	Final Exam	CLO25, CLO26, CLO33

No.	7.2 Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly

3	Sheets	Bi-weekly
4	Quizzes	5 & 12
5	Mid-term Exam	9
6	Final Exam	16

7.3 Weighting of Assessment	Assessment Method	Weights%	Weights
Teacher Opinion	Reports, sheets , and Attendance,	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

8. List of References

[1] Taylor & Francis Group, “Power Electronics, drives and Advanced Applications, printed by V. Kumar, R.K.Behra, D. Joshi and R.Bansal ,2020.
[2] M. H. Rashid, “Power electronics: circuits, devices, and applications,” Hand book 3rd edition, Elsevier Inc., 2007.
[3] https://getmyuni.azureedge.net/assets/main/study-materi/notes/electrical _power-electronics "AC chopper and DC chopper", 2018-2019.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	CLO's
1	Identify ON – OFF method of single phase AC voltage controller, formulates the outputs of voltage, current and power delivered to electric loads.	1	CLO25
2	Estimate the outputs of single phase AC half wave controller circuit with R load.	1	CLO25
3	Discuss the relation between the outputs of single-phase half wave phase controller and phase triggering angle α.	1	CLO25
4	Calculate the outputs of Single – phase full wave of control method with R load to be analyzed.	1	CLO26
5	Estimate the outputs of full-wave AC voltage controller circuit with R-L load by change the phase angle with its applications.	1	CLO25
6	Investigate the change of full-wave phase voltage controller outputs and phase angle variation.	1	CLO26
7	Plan of single phase-AC voltage controller circuits	1	CLO26, CLO33
8	Plan of single phase-AC voltage controller circuits	1	CLO26, CLO33
10	Identify the types of DC voltage choppers; step-up and step down circuits.	1	CLO26
11	Estimate the outputs of voltage, current and power of step-down DC chopper circuit.	1	CLO25

12	Draw the outputs of voltage, current and power of step- up DC chopper circuit.	1	CLO25
13	Define the classification of DC choppers used in power system control.	1	CLO26
14	Explain the half-wave Single phase inverter circuit.	1	CLO26
15	Analyze the Single phase full-wave inverter circuit.	1	CLO25,CLO33

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO25	Estimate the performance of electronic systems and specific applications of .ac voltage controller, dc chopper and inverter..
		CLO26	Measure the performance, the characteristics and methods of ac chopper and dc chopper types to be utilized its outputs.

PL18	Analyze the performance of electric power generation, control, and distribution systems.	CLO33	Analyze the ac chopper, dc chopper and inverter circuits to solve the problems.

Title	Name	Signature
Course coordinator	**Dr. Hend Abdel- Monem Salama**	
Program coordinator	**Dr. Hend Abdel- Monem Salama**	
Head of Department	**Ass. Prof. Dr. Osama El Ghandour**	
Date of Approval	**3/09/2023**	

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Course Specification

Course Code: EPE 4203 **Course Title: Economics of Generation &Operation**

140. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	**EPE 4203**			
Requisite	-------			
Year/level	Fourth year / Fifth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

141. Course Aims

No.	Aim
1	Utilize roles and knowledge of professional, ethical, social responsibilities and the importance of life-long learning in the conduct of their careers. (AM4).

142. Course Learning Outcomes (CLOs)

CLO25	Estimate the performance of electric power stations through specified techniques to achieve the economics of total costing generation
CLO26	Measure the performance of utilities' load curves generation under specific conditions and explaining the types of utilities' characteristics.
CLO33	Analyze the methods of tariffs methods and power factor improvement techniques of electric power generation to achieve the economics of utility generation,

4.Course content

Topics	Week
Identify the construction of utility panel's establishment.	1
Explain various load curves for a consumer to detect the required effective economy demand.	2
Identify several factors affecting on the maximum demands and utilize them to estimate the annual energy required from the utility.	3
Explain the differences of maximum demands between sectors according to the load curve for each along the year seasons.	4
Define the total costing for utility construction and operation by two main objectives.	5
Analyze the total costing of station according to the type of station and consumer activates.	6
Apply the depreciation methods of utility to estimate the total costing.	7
Identify the methods of tariff to calculate the required bill of the utility.	8
Apply the applications of generated energy, coasting and required tariff to release the owner profit of utility.	10

Compare between the total costing and tariff of different types of utilities	11
Identify the methods of power factor Improvement of power generated from station and explain the suited capacitance for the coupled utility and consumers.	12
Apply the technique used to improve the power factor when constant electric power are generated from station.	13
Apply the second technique of power factor improvement when volt ampere generated is constant.	14
Define the characteristics of power plant types to be a suitable choice, providing the economics of power generation and operation.	15

143. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√	√	√	√		√	√					
CLO26	√	√	√							√	√	
CLO33	√	√	√	√		√	√			√		

144. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

145. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Attendance	CLO33
2	Sheets	CLO25, CLO33
3	Reports	CLO26
4	Quizzes	CLO25, CLO33
5	Mid-term Exam	CLO 25,CLO26, CLO33
6	Final Exam	CLO 25,CLO26, CLO33

7. 2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	Bi-weekly
4	Quizzes	5 & 12
5	Mid-term Exam	9
6	Final Exam	16

7.3 Weighting of Assessment	**Assessment Method**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets /Attendance	10%	10
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

146. List of References

[1] Daniel S. Kirschen, Goran Strba, "Fundementals of Power System Economics", 2018.

[2] B.R. Gupta, “Generation of Electrical Energy”-7th edition, Eurasia, Publishing House (PVT.) LTD, 2011.
[3] V.K. Mehta. Rohet Mehta, “Principles of Power Systems”, Delhi, 2006
[4] Harry G. Stall, "Least Cost Electric Utility Planning", John Wiley & Sons, 2005.

147. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

148. Matrix of Course Content with Course LO’s

Week	Topics	Aim	CLO's
1	Identify the construction of utility panel’s establishment.	1	CLO26
2	Explain various load curves for a consumer to detect the required effective economy demand.	1	CLO26
3	Identify several factors affecting on the maximum demands and utilize them to estimate the annual energy required from the utility.	1	CLO25
4	Explain the differences of maximum demands between sectors according to the load curve for each along the year seasons.	1	CLO25

5	Define the total costing for utility construction and operation by two main objectives.	1	CLO25
6	Analyze the total costing of station according to the type of station and consumer activates.	1	CLO25
7	Apply the depreciation methods of utility to estimate the total costing.	1	CLO25
8	Identify the methods of tariff to calculate the required bill of the utility.	1	CLO26
10	Apply the applications of generated energy, coasting and required tariff to release the owner profit of utility.	1	CLO25, CLO33
11	Compare between the total costing and tariff of different types of utilities	1	CLO25 ,CLO26
12	Identify the methods of power factor Improvement of power generated from station and explain the suited capacitance for the coupled utility and consumers.	1	CLO26, CLO33
13	Apply the technique used to improve the power factor when constant electric power are generated from station.	1	CLO26, CLO33
14	Apply the second technique of power factor improvement when volt ampere generated is constant.	1	CLO26, CLO33
15	Define the characteristics of power plant types to be a suitable choice, providing the economics of power generation and operation.	1	CLO26

149. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/ and circuit under specific input excitation, and evaluate its suitability for a specific application.	CLO25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
		CLO26	Measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
PL18	Analyze the performance of electric power generation, control, and distribution systems	CLO33	Analyze the performance of electric power generation, control, and distribution systems.

Title	Name	Signature
Course coordinator	**Dr.Hend Abd El-monem Salama**	
Program Coordinator	**Dr.Hend Abd El-monem Salama.**	
Head of Department	**Ass. Prof. Dr. Osama El Ghandour**	
Date of Approval	**3/09/2023**	

Course Specification

Course Code: EPE 4201 **Course Title: Electrical Testing (6)**

150. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	**EPE 4201**			
Prerequisite	-----			
Year/level	Level 5 (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	3	3

151. Course Aims

No.	Aim
1	Design and conduct experiments as well as analyze and interpret data. Work effectively within multi-disciplinary teams in the experiments of overload relays and induction

	machines. (AM2)

152. Course Learning Outcomes (CLOs)	
CLO27	Adopt suitable national and international standards of insulation material properties which helps in the design cable insulation and Electrical insulator for high voltage system.
CLO34	Integrate electrical features of 3ph Induction machine with the suitable Control (V/F control, frequency control, PLC control using ladder diagram with computer).

4.Course content	
Topics	**Week**
Three Phase Squirrel cage induction Motor (Star & Delta Starting of the motor)	1
Three Phase slip ring induction Motor (Star & Delta Starting of the motor)	2
Three Phase Squirrel cage induction Motor (Torque speed characteristic)	3
O. L Relays performance testing	4
Breakdown of air with different electrode under pressure. (sphere or nozzle).	5
Breakdown of solid (PVC or wood).	6
Flashover voltage of polymeric insulator.	7

mpulse wave generation (wide band or Narrow band).	8
Schering Bridge installment.	10
Test of cables and diagnose cross section.	11
classic control principle (ON-OFF).	12
Difference between the gas & solid and liquid insulation.	13
The main parts in H.V lab which used in experiment.	14
Experimental exam	15

5.Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO27			√		√		√	√		√		√
CLO34			√		√		√	√		√		√

6.Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	x

7.Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLos
1	Attendance	CLO34
2	Reports	CLO27, CLO34
3	Practical Exam	CLO27, CLO34

4	Final Exam	**CLO27, CLO34**

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Practical Exam	15
4	Final Exam	16

	Assessment Method	Weights%	Weights
Practical / Oral	Practical Attendance	15%	15
	Lab. Reports	15%	15
	practical exam	30%	30
Final Exam		40%	40
Total		100%	100

8.List of References

1.Laboratory manual
2. "Electric Machinery fundamentals", Chapman, S. J., McGraw Hill Co., 4th edition, 2005. (Text Book).
3. P. Rozga, Abde. Beroual," High Voltage Insulating material - Current State and Prospects",energies, 2021

9.Facilities required for teaching and learning

Lab.

10. Matrix of Course Content with Course LO's

Week	Topics	Aim	CLO's

No.			
1	**Three Phase Squirrel cage induction Motor (Star & Delta Starting of the motor)**	1	**CLO34**
2	**Three Phase slip ring induction Motor (Star & Delta Starting of the motor)**	1	**CLO34**
3	**Three Phase Squirrel cage induction Motor (Torque speed characteristic)**	1	**CLO34**
4	**O. L Relays performance testing**	1	**CLO34**
5	**Breakdown of air with different electrode under pressure. (sphere or nozzle).**	1	**CLO27, CLO34**
6	**Breakdown of solid (PVC or wood).**	1	**CLO27, CLO34**
7	**Flashover voltage of polymeric insulator.**	1	**CLO27, CLO34**
8	**mpulse wave generation (wide band or Narrow band).**	1	**CLO27, CLO34**
10	**Schering Bridge installment.**	1	**CLO27, CLO34**
11	**Test of cables and diagnose cross section.**	1	**CLO27, CLO34**
12	**classic control principle (ON-OFF).**	1	**CLO27, CLO34**
13	**Difference between the gas & solid and liquid insulation.**	1	**CLO27, CLO34**
14	**The main parts in H.V lab which used in experiment.**	1	**CLO27, CLO34**

Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.	CLO27	Adopt suitable national and international standards of insulation material properties which helps in the design cable insulation and Electrical insulator for high voltage system.
PL19	Integrate electrical, electronic, mechanical components and equipment with	CLO34	Integrate electrical features of 3ph Induction machine with the suitable

	transducers, actuators, and controllers in creatively computer-controlled systems.		Control (V/F control, frequency control, PLC control using ladder diagram with computer).

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk & Dr. Dina Rostom**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Ass. Prof. Dr. Osama El Ghandour**	
Date of Approval	**3/09/2023**	

برنامج هندسة القوى الكهربية
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE4199 **Course Title: project (1)**

153. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	EPE4199			
Prerequisties				
Year/level	Fourth year / First Semester (5th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	4	-	4

154. Course Aims

No.	Aim
1	Investigate the effect of disturbances for some problems related to power system and train the student to solve power system analysis using computer facilities. (AM5)
2	Analyze operation of different electric systems through design work in electrical power engineering. (AM7)

155. Course Learning Outcomes (CLOs)

CLO25	Estimate engineering problems to solve problems in the field of electrical power and machines engineering for the graduation project
CLO26	Measure components, equipment and systems of electrical power and machines for the graduation project

CLO27	Adopt the performance of electric power generation, control, and distribution systems for the graduation project
CLO33	Analyze the performance of electric power systems for the graduation project.
CLO34	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems for the graduation project

156. Course contents

Topics	Week
An introduction to the project and its application in industrial utilities – Students choose on of the following projects: • Speed control of engines • New and renewable energy • Distribution of electrical forces for the facilities • Protection and protection of electrical power systems • Industrial applications • Control with a Programmable Logic Controller Computer control	1,2
Project Layout	3:6
Discussing the Project Time Schedule (timed work tree)	8:10
Seminar to discuss the project progress	11:14

157. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	√

158. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√		√	√		√		√			√	
CLO26	√	√		√		√		√	√	√	√	
CLO27	√	√	√	√		√	√	√	√	√	√	√
CLO33	√			√		√	√	√			√	√
CLO34	√	√	√	√	√	√	√	√		√	√	√

159. Students' Assessment

7.1 Students' Assessment Method		
No.	**Assessment Method**	**CLOs**
1	Attendance	CLO25,CLO26
2	Reports	CLO25,CLO26, CLO27,CLO33, CLO34
3	Oral Discussion and presentation	CLO25,CLO26, CLO27,CLO33, CLO34
4	Final Report Examination and presentation	CLO25,CLO26, CLO27,CLO33, CLO34

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Every Week
2	Reports	12
3	Oral Discussion and presentation	13,15

7.3 weighting of Assessment

	Assessment Method	**Weights %**	**Weights**
Teacher Opinion	Attendance	10%	10
	Reports	20%	20
	Oral Discussion and presentation	20%	20
	Final Report Examination and presentation	50%	50
Total		100%	100

160. List of References

A list of books regarding the project topic is given

161. Facilities required for teaching and learning

Lecture/Classroom
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show
Lab Facilities

162. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1,2	An introduction to the project and its application in industrial utilities – Students choose on of the following projects: • Speed control of engines • New and renewable energy • Distribution of electrical forces for the facilities • Protection and protection of electrical power systems • Industrial applications • Control with a Programmable Logic Controller Computer control	1	CLO25,CLO26, CLO27
3:6	Project Layout	1	CLO25,CLO26, CLO27

8:10	Discussing the Project Time Schedule (timed work tree)	1	CLO25,CLO26, CLO27,CLO33, CLO34
11:15	Seminar to discuss the project progress	1,2	CLO25,CLO26, CLO27,CLO33, CLO34

163. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	**CLO25**	Estimate engineering problems to solve problems in the field of electrical power and machines engineering for the graduation project
		CLO26	Measure components, equipment and systems of electrical power and machines for the graduation project
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect,	**CLO27**	Adopt the performance of electric power systems for the graduation project

	and maintain electrical/electronic/digital equipment, systems and services.		
PL17	Analyze the performance of electric power generation, control, and distribution systems.	**CLO33**	Analyze the performance of electric power generation, control, and distribution systems for the graduation project.
PL18	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	**CLO34**	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems for the graduation project

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk** **Dr. Riham Hosney Salem** **Dr. Zeinab Gamal Hassan** **Dr. Dina Rostom** **Dr. Nada Mamdouh**	

		زينب جمال Dina Rostom Nada Hamdouh
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	**3/9/2023**	

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المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: EPE 4173 **Course Title: Advanced Control Systems in Electrical Power**

164. Basic information

Program Title	Electrical Power and Machines Engineering Depart.			
Department offering the program	Electrical Power and Machines Engineering Depart.			
Department offering the course	Electrical Power and Machines Engineering Depart.			
Course Code	EPE4173			
Prerequisite	EPE 3101			
Year/level	fourth year / Fifth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

165. Course Aims

No.	Aim
1	Describe the operation, control issues and planning of the electrical power distribution system through design work and good scientific management. (AM7)

166. Course Learning Outcomes (CLOs)

CLO25	Estimate the suitable structure of the control of electric power system
CLO33	Analyze the performance of electric power system distribution under control

167. Course Contents

Topics	Week
Basic operations in a control center	1
operation of electrical power systems,	2
operation and regulation activities, control center experience	3
supervisory and control services and information acquisition	4
Monitoring, event processing and control functions	5
reports and accounts as human-machine relationship and operator duties	6
simplified graphic function Building systems	7
infrastructure systems, systems degrees and systems interaction	8
performance and reliability considerations	10
performance standards, software, equipment,	11
databases, technical investigation, central system, communication system.	12
maintenance system and application fundamentals as real-time system modeling	13
Security examples of control systems in electrical power systems.	14
Training examples of control systems in electrical power systems.	15

168. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO25	√	√									√	
CLO33	√	√	√	√						√		

169. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	----------

170. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLos
1	Attendance	CLO33
2	Reports	CLO33
3	Sheets	CLO33
4	Quizzes	CLO25
5	Mid-term Exam	CLO25, CLO33
6	Final Exam	CLO25, CLO33

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Sheets	weekly
4	Quizzes	Bi-weekly
5	Mid-term Exam	9
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights
Teacher Opinion	Reports / sheets	5%	5
	Attendance	5%	5
	Quizzes	10%	10
	Mid-term exam	20%	20
Final Exam		60%	60
Total		100%	100

171. List of References

[11] Modern Control engineering, K. Ogata, 5th edition or higher, Prentice Hall., 2010
[12] Automatic Control Systems, B. C. Kuo and F. Golnaraghi, 9th edition or higher, John Wiley & Sons, Inc., 2010
[13] Modern Control Systems, R. C. Dorf, R. H. Bishop, 12th edition or higher, Prentice Hall, 2010.
[14] Automatic Control Systems with MatlaB programs, S. Hasan Saeed, 2013 .
[15] Control Systems Engineering, N. S. Nise, 6th edition or higher, John Wily, 2010.
[16] William S. LeVine, “Control System Applications”, CPC, 2019.

172. Facilities required for teaching and learning

Lecture/Classroom
White board

Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

173. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Basic operations in a control center	1	CLO25
2	operation of electrical power systems,	1	CLO25
3	operation and regulation activities, control center experience	1	CLO25
4	supervisory and control services and information acquisition	1	CLO25
5	Monitoring, event processing and control functions	1	CLO25
6	reports and accounts as human-machine relationship and operator duties	1	CLO33
7	simplified graphic function Building systems	1	CLO25, CLO33
8	infrastructure systems, systems degrees and systems interaction	1	CLO25
10	performance and reliability considerations	1	CLO25
11	performance standards, software, equipment,	1	CLO25
12	databases, technical investigation, central system, communication system.	1	CLO25, CLO33
13	maintenance system and application fundamentals as real-time system modeling	1	CLO25, CLO33
14	Security examples of control systems in electrical power systems.	1	CLO25, CLO33
15	Training examples of control systems in electrical power systems.	1	CLO25, CLO33

174. Matrix of Program LOs with Course Los

Program Los		Course Los	
PL14	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO25	Estimate the suitable structure of the control of electric power system
PL18	Analyze the performance of electric power generation, control, and distribution systems.	CLO33	Analyze the performance of electric power system distribution under control

	Name	Signature
tor	**Dr. Mohamed Farouk**	
ator	**Dr. Hend Abd-Elmonem Salama**	
ent	**Assoc.Prof. Dr. Osama ELghandour**	

	3/09/2023	

Course Specification

Course Code: EPE 4101 **Course Title: Electrical Testing (5)**

175. Basic information

Program Title	Electrical Power Engineering Depart.			
Department offering the program	Electrical Power Engineering Depart.			
Department offering the course	Electrical Power Engineering Depart.			
Course Code	**EPE 4101**			
Prerequisite	----			
Year/level	Year 4 /Level 5 (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	3	3

176. Course Aims

No.	Aim

1	Design and conduct experiments as well as analyse and interpret data. Work effectively within multi-disciplinary teams in the experiments of power electronics devices and synchronous machines. (AM2)

177. Course Learning Outcomes (CLOs)

CLO24	implement power electronics modules in power systems and control using PLC.
CLO33	Analyze the performance of electric power electronic circuit and synchronous machine.

4.Course content

Topics	Week
Introduction to safety percussions and used meters in electrical testing.	1
Introduction to MATLAB simulation tool.	2
Single Phase AC/AC Voltage Controller ON-OFF Control.	3
Single Phase AC/AC Voltage Controller (with R- LOAD).	4
Single Phase AC/AC Voltage Controller (with RL- LOAD).	5
Single phase half wave ac voltage controller (Unidirectional controller).	6
Single phase full wave ac voltage controller (Bidirectional Controller-R load).	7

Single phase full wave ac voltage controller (Bidirectional Controller-RL load).	8
Recognizing the synchronous machine components and their operational modes.	10
Three-phase salient pole synchronous Generator (No load test).	11
Three-phase salient pole synchronous Generator (S.C test).	12
Three-phase salient pole synchronous Generator (Load test).	13
PLC	14
Experimental exam	15

178. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation / Movies	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO24					√		√			√		√
CLO33					√		√			√		√

179. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√
2	Online lectures and assignments	

7.Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Attendance	**CLO24,CLO33**
2	Reports	**CLO24**
3	Lab. Simulation	**CLO33**
4	Practical Exam	**CLO24,CLO33**
5	Final Exam	**CLO24,CLO33**

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	Bi-weekly
3	Lab. Simulation	Bi-weekly
4	Practical Exam	15
5	Final Exam	16

	Assessment Method	Weights%	Weights
Practical / Oral	Practical Attendance	10%	10
	Lab. Reports	10%	10
	Lab. Simulation	10%	10
	practical exam	30%	30
Final Exam		40%	40
Total		100%	100

180. List of References

1.Laboratory manual
2. M. H. Rashid. Power Electronics, handbook, 3rd ed. Pearson Education Inc., 2016 (Textbook).
3. T.A. Lipo,"Analysis of Synchronous Machines" ,Taylor & Francis Group, 2012.
4. Electric Machinery. A.E. Fitzgerald, Charles Kingsley, JR., Stephen D. Umans, 6th edition, McGraw-Hill, January 1, 2005.

5-" Katsuaki Suganuma et al., "Wide Bandgap Power Semiconductor Packaging" ,2018,
6- Frede Blaabjerg et al. ,"Control of Power Electronic Converters and Systems", Volume 1 and 2, 2018.

181. Facilities required for teaching and learning

Lab.

8. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Introduction to safety percussions and used meters in electrical testing.	1	**CLO24,CLO33**
2	Introduction to MATLAB simulation tool.	1	**CLO24,CLO33**
3	Single Phase AC/AC Voltage Controller ON-OFF Control.	1	**CLO24,CLO33**
4	Single Phase AC/AC Voltage Controller (with R- LOAD).	1	**CLO24,CLO33**
5	Single Phase AC/AC Voltage Controller (with RL-LOAD).	1	**CLO24,CLO33**
6	Single phase half wave ac voltage controller (Unidirectional controller).	1	**CLO24,CLO33**
7	Single phase full wave ac voltage controller (Bidirectional Controller-R load).	1	**CLO24,CLO33**
8	Single phase full wave ac voltage controller (Bidirectional Controller-RL load).	1	**CLO24,CLO33**

10	Recognizing the synchronous machine components and their operational modes.	1	**CLO24,CLO33**
11	Three-phase salient pole synchronous Generator (No load test).	1	**CLO24,CLO33**
12	Three-phase salient pole synchronous Generator (S.C test).	1	**CLO24,CLO33**
13	Three-phase salient pole synchronous Generator (Load test).	1	**CLO24,CLO33**
14	PLC	1	**CLO24**

8.Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL13	Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.	CLO24	implement power electronics modules in power systems and control using PLC.
PL18	Analyze the performance of electric power generation, control, and distribution systems.	CLO33	Analyze the performance of electric power electronic circuit and synchronous machine.

Title	Name	Signature
Course coordinator	**Dr. Dina Rostom**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Ass. Prof. Dr. Osama El Ghandour**	
Date of Approval	**3/09/2023**	


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