Course Specification

Course Code: EPE٣٢٠٤ **Course Title: Power System Analysis (1)**

1. 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	EPE3204			
Prerequisties	----------			
Year/level	Third year / Second Semester (4th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Solve the load flow and fault problems to analyze power system modeling efficiently under controlled guidance and supervision. (AM5)

3. Learning Outcomes (LOs)

CLO17	Select the main principles and methodologies of Per-unit system.
CLO18	Model the methodologies of fault analysis and load flow control.
CLO19	Analyze the main principles Symmetrical components.
CLO33	Analyze fault analysis, short circuit current and different methods of solutions for electrical load flow analysis.

4. Course Contents	
Topics	**Week**
Per Unit System Analysis	1
Symmetrical components	2
Fault Analysis	3
Unsymmetrical Shunt Faults	4
Unsymmetrical series faults	5
General examples on different fault cases.	6
Load flow equations	8
Approximate solution to of power flow equations	9
Numerical techniques to solve load flow problem	10
Gauss and Gauss-Siedel Method.	11
Newton-Raphson Method.	12
Different Examples on electric power system analysis.	13
Revision	14

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
CLO17	√		√	√		√						
CLO18	√	√		√		√				√	√	
CLO19	√	√	√	√		√	√	√		√	√	
CLO33	√			√		√	√	√			√	

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	Reports	CLO17, CLO19.
2	Sheets	CLO17, CLO18, CLO19, CLO33.
3	Quizzes	CLO17, CLO33.
4	Mid-term Exam	CLO17, CLO18.
5	Final Exam	CLO17, CLO18, CLO19, CLO33.

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Reports	Bi-weekly
2	Sheets	Weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	7
5	Final Exam	15

7.3 weighting of Assessment

	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

8. List of References

[1] Elgerd O., "Electric Energy Systems Theory", McGraw Hill Pub., 2ed, 1982.
[2] Nagrath , I.J. & Kothari, D.P., Modern Power System Analysis.
[3] Hadi Saadat, "Power System Analysis", WCB/McGraw-Hill, 1999.
[4] Gungor, Behic R., "Power Systems", Harcourt Brace Jovanovich Pub.,1988.
[5] P.S.MURTY,'' Power System Analysis'', second edition 2017.

9. Facilities required for teaching and learning

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

10. Matrix of Course Content with Course LO's

Week No.	**Topics**	**Aim**	**LO's**
1	Per Unit System Analysis	1	CLO17
2	Symmetrical components	1	CLO19

3	Fault Analysis	1	CLO18
4	Unsymmetrical Shunt Faults	1	CLO18
5	Unsymmetrical series faults	1	CLO18
6	General examples on different fault cases.	1	CLO33
8	Load flow equations	1	CLO18
9	Approximate solution to of power flow equations	1	CLO33
10	Numerical techniques to solve load flow problem	1	CLO33
11	Gauss and Gauss-siedel Method.	1	CLO33
12	Newton-Raphson Method.	1	CLO33
13	Different Examples on electric power system analysis.	1	CLO17, CLO18, CLO19, CLO33.
14	Revision	1	CLO17, CLO18, CLO19, CLO33.

11. 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 main principles and methodologies of Per-unit system.
		CLO18	Model the methodologies of fault analysis and load flow control.
		CLO19	Analyze the main principles Symmetrical components.
PL18	Analyze the performance of electric power generation, control, and distribution systems	CLO33	Analyze fault analysis, short circuit current and different methods of solutions for electrical load flow analysis.

Title	Name	Signature
Course coordinator	**Dr. Zeinab Gamal Hassan**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: EPE 3261 **Course Title: Utilization of Electrical Power**

1. 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 3261**			
Prerequisite course	---------			
Year/level	Third year / Fourth Level (1st Semester)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management (AM3).

3. Learning Outcomes (LOs)

CLO27	Adopt suitable standards and codes to build, operate and maintain electrical equipment, systems and services to gain the methodology experience of the utilized electric power.
CLO28	Identify engineering problems in the fields of illumination and electric heating power engineering to solve.
CLO29	Formulate engineering problems for depositing metals of electrolytic processes and for train movement by study of the total effort delivered the train.

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4. Course Contents

Week	Topics
1	Define light rays, parameters and factors affecting on luminance, light rays colors and light measurement devices.
2	Explain the types of lighting units, function and their characteristics.
3	Recognize lighting system methods and their applications.
4	Estimate the luminance for indoor or outdoor areas and the required number of lighting units whether in interiors or outdoor areas.
5	Distribute lighting units and its required number of lighting units whether in interiors or outdoor areas.
6	Define the classification of electric heating devices. Types of heat transfer methods and the power dissipated to heat the charge.
8	Estimation electric power heating of different types of furnaces.
9	Discuss the types and its applications of electrolytic processes.
10	Estimate the deposited metals according to the applied method of electrolytes.
11	Define the electric traction trip with services.
12	Study the types of speed-time curve to be simplified. Identify and apply the parameters to get required speed for each trip.
13	Estimate the efforts and energy required to drive the train under speed time curve portions. Solving the specific electric energy of train driving
14	Revision

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
CLO27	√	√	√							√	√	
CLO28	√	√	√	√		√				√	√	
CLO29	√			√		√						

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	Sheets	CLO 27, CLO28, CLO29
2	Reports	CLO27
3	Quizzes	CLO27, CLO28
4	Mid-term Exam	CLO27, CLO28
6	Final Exam	CLO 27, CLO28, CLO29

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Reports / Sheets	Bi-weekly
2	Quizzes	5 & 12
3	Mid-term Exam	7
4	Final Exam	15

7.3 Weighting of Assessment	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

8. List of References

[1] R.K.Jupta, "Utilization of electric power & Electric Traction", Edition 10, 2022.
[2] J Srinu Naick, "Lecture Notes on Utilization of Electrical Energy", 2018- 2019.
[3] J B. Jupta, R. Manglic,"Utilization of Electrical Energy and Traction, May, 2014.
[4] P. Kothakota, Near Pakala, Chittoor, Lecture Notes of "Utilization of Electrical Energy", 2018-2019.
[5]https://www.smartzworld.com/notes/utilization-of-electrical-energy-pdf-notes-uee-pdf-notes/ "Utilization of Electrical Energy (UEE)", 2020.

9. Facilities required for teaching and learning

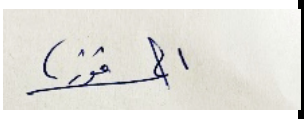
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Define light rays, parameters and factors affecting on luminance, light rays colors and light measurement devices.	3	CLO27
2	Explain the types of lighting units, function and their characteristics.	3	CLO27
3	Recognize lighting system methods and their applications.	3	CLO28
4	Estimate the luminance for indoor or outdoor areas and the required number of lighting units whether in interiors or outdoor areas.	3	CLO28
5	Distribute lighting units and its required number of lighting units whether in interiors or outdoor areas.	3	CLO28
6	Define the classification of electric heating devices. Types of heat transfer methods and the power dissipated to heat the charge.		CLO27
8	Estimation electric power heating of different types of furnaces.	3	CLO27, CLO28
9	Discuss the types and its applications of electrolytic processes.	3	CLO27
10	Estimate the deposited metals according to the applied method of electrolytes.	3	CLO28, CLO29
11	Define the electric traction trip with services.	3	CLO27
12	Study the types of speed-time curve to be simplified. Identify and apply the parameters to get required speed for each trip.	3	CLO27, CLO29
13	Estimate the efforts and energy required to drive the train under speed time curve portions. Solving the specific electric energy of train driving	3	CLO29
14	Revision	3	CLO27, CLO28 , CLO29

11. 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 equipment, systems and services.	CLO27	Adopt suitable standards and codes to build, operate and maintain electrical equipment, systems and services to gain the methodology experience of the utilized electric power.
PL16	Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	CLO28	Identify engineering problems in the field of electric power engineering to solve and release the mental skills.
		CLO29	Formulate engineering problems to solve problems in the field of electrical power and machines engineering.

Title	Name	Signature
Course coordinator	**Dr. Hend Abdel- monem Salama**	
Program coordinator	**Dr. Hend Abdel- monem Salama**	
Head of Department	**Ass. Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: EPE 3262 Course Title: Electrical network protection systems

1. 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 3262**			
Prerequisite	-----			
Year/level	Year 5/ Fourth level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Utilize roles and knowledge of professional engineering concepts to the protection of Power system. (AM4)

3. Course Learning Outcomes (CLOs)

CLO32	Protect components, equipment of the electrical power systems and machines.
CLO33	Analyze the performance of the switchgears.

4.Course content	
Topics	**Week**
Protection Engineering Introduction.	1
The effect of short circuit on electrical power systems	2&3
the basic components of protection systems, current transformers, voltage transformers,	4&5
types of protection relay electromechanical relay and static relay,	6
types of protection in electrical power systems,	8
differential protection in electrical power systems,	8
types of electromechanical relay,	10&11
protection in Basic loop systems, protection of parallel connected feed lines	12&13
Revision	14

5.Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods										
	Lectures (face to face / online)	Presentation	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO32	√		√	√		√	√			√		√
CLO33	√		√	√		√	√			√		√

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	Reports	CLO 33
2	Sheets	CLO 33
3	Quizzes	CLO 33
4	Mid-term Exam	CLO 32 &CLO 33
5	Final Exam	CLO 32 &CLO 33

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Biweekly
2	Sheets	Weekly
3	Quizzes	Biweekly
4	Mid-term Exam	7
5	Final Exam	15

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

8.List of References

1- Vishwakarma Ram, "Power System Protection and Switchgear". 2016
2- M.V. Bakshi, and U. A. Bakshi, "Switchgear and protection", 2014.
3.B. Ravindranath, and M. Chander, *Power System Protection and Switchgear*, 3rd ed. New Delhi, India: New Age International (P) Limited, 2021.
4.S. H. Horowitz, and A. G. Phadke, *Power System Relaying*, 5th ed. Hoboken, NJ: John Wiley & Sons, Inc., 2022.
5.J. Roberts, and A. Guzman, *Fundamentals of Modern Protective Relaying*, 2nd ed. Raleigh, NC: Schweitzer Engineering Laboratories, Inc., 2023.
6.IEEE Power and Energy Society, *IEEE Guide for Protective Relay Applications to Power System Buses*, New York, NY: IEEE, 2021

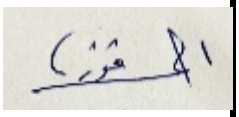
9.Facilities required for teaching and learning
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, etc.)

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	**Protection Engineering Introduction.**	1	CLO.33
2&3	**The effect of short circuit on electrical power systems**	1	CLO.33
4&5	**the basic components of protection systems, current transformers, voltage transformers,**	1	CLO.33
6	**types of protection relay electromechanical relay and static relay,**	1	CLO.32,CLO.33
8	**types of protection in electrical power systems,**	1	CLO.32,CLO.33
9	**differential protection in electrical power systems,**	1	CLO.32,CLO.33
10&11	**types of electromechanical relay,**	1	CLO.32,CLO.33
12&13	**protection in Basic loop systems, protection of parallel connected feed lines**	1	CLO.32,CLO.33
14	Revision	1	CLO.32,CLO.33

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PLO17	Test, examine, and protect components, equipment and electrical power systems and machines.	CLO.32	protect components, equipment of the electrical power systems and machines.
PLO18	Analyze the performance of electric power generation, control, and distribution systems.	CLO.33	Analyze the performance of the switchgears.

Title	Name	Signature
Course coordinator	**Dr. Dina Rostom**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Associate Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

	Ministry of Higher Education **Higher Institute of Engineering and Technology** Electrical Power & Machines Eng. Department	

Course Specification

Course Code: EPE 3263 **Course Title: Applications of Microprocessor**

1. 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 337			
Prerequisite	CSE 2101			
Year/level	Third year / Fourth Level (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	The ability of applying and developing microprocessor technologies successfully with their engineering skills to feed the demands of society. (AM6)

3. Learning Outcomes (LOs)

CLO23	Design elements of microprocessor.
CLO24	implement the modules and sub system of microprocessor and its technology.
CLO34	Integrate the electrical, electronic, mechanical components which interact with microprocessor and suitable controller.

4. Course Contents

Topics	Week
Introducing of microprocessor and the importance of the microprocessor in details	1
overall architecture of microprocessor	2
internal components of microprocessor	3
data unit and addresses and its connections with microprocessor	4
controllers and synchronization with microprocessor	5
basics of Assembly language and programming.	6
Microprocessor systems	8
interconnection between components, continuous and stopping methods.	9
Communication with external components of microprocessor	10
programmable chips, signal processing and data processing systems	11
applications of microprocessor in the field of control, measurements	12
protection in the field of power engineering and electrical machines and The role of controller in microprocessor application	13
Revision	14

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
CLO23	√	√									√	
CLO24	√	√	√	√								
CLO34	√	√	√	√	√							√

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	Reports	CLO23, CLO34
2	Sheets	CLO23, CLO24, CLO34
3	Quizzes	CLO23, CLO24, CLO34
4	Mid-term Exam	CLO23, CLO34,
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	7
5	Final Exam	15

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

8. List of References

[1] M. Morris Mano, and Michael D. Ciletti; “Digital Design with an Introduction to the Verilog HDL”; 5th Edition; Pearson; 2013.
[2] M. Morris Mano, Computer System Architecture, Prentice Hall, International edition, 1993.
[3] ramesh-s-gaonkar,”microprocessor architecture programming and applications with the 8085”Fifth edition, 2002.

9. Facilities required for teaching and learning

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

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introducing of microprocessor and the importance of the microprocessor in details	1	CLO23
2	overall architecture of microprocessor	1	CLO23, CLO34
3	internal components of microprocessor	1	CLO23, CLO34
4	data unit and addresses and its connections with microprocessor	1	CLO23, CLO34
5	controllers and synchronization with microprocessor	1	CLO34
6	basics of Assembly language and programming.	1	CLO34
8	Microprocessor systems	1	CLO23, CLO34
9	interconnection between components, continuous and stopping methods.	1	CLO23, CLO34
10	Communication with external components of microprocessor	1	CLO34
11	programmable chips, signal processing and data processing systems	1	CLO24, CLO34
12	applications of microprocessor in the field of control, measurements	1	CLO34
13	protection in the field of power engineering and electrical machines and the role of controller in microprocessor application	1	CLO24, CLO34
14	Revision	1	CLO23, CLO24, CLO34

11. 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 elements of microprocessor.
		CLO24	implement the modules and sub system of microprocessor and its technology.
PL19	Integrate electrical, electronic, mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.	CLO34	Integrate the electrical, electronic, mechanical components which interact with microprocessor and suitable controller.

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: EPE 4202 Course Title: Protection and switchgear

1. 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 4204**			
Prerequisite	----			
Year/level	Year 3/ Level 4 (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Utilize roles and knowledge of professional engineering concepts to the protection of Power system. (AM4)

3. Course Learning Outcomes (CLOs)

CLO32	protect components, equipment of the electrical power systems and machines.
CLO33	Analyze the performance of the switchgears.

4.Material covered per week	
Topics	**Week**
Introduction, Effects of short circuit current on power system, measures of protection systems, Basic elements of protection systems.	1
Current transformers	2
potential transformers, classification of relays. Relays' construction, trip circuit,	3
classification, (electromechanical, static, digital), time characteristics of relays)	4
Electromechanical relays, Relay types according to function (OC, UV, ...) & time characteristics	5
Electromechanical relays, Relay types according to function (OC, UV, ...) & time characteristics	6
Differential relays	8
Distance relays zones characteristics	9
zones protection concept, primary & backup protection schemes,	10
main protection schemes of different elements in the power system, fuse.	11
Circuit breakers: Types, Construction, Performance, and ratings	12
Interruption of fault currents & arcs in circuit breakers	13
Revision	14

5.Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Lectures (face to face / online)	Presentation	Discussions	Tutorials	Practical and lab. experiments	Problem Solving	Brain Storming	Projects and Team Working	Site Visits	Research / Reports	Self-learning	Modeling and Simulation
CLO32	√		√	√		√	√			√		√
CLO33	√		√	√		√	√			√		√

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	Reports	CLO 33
2	Sheets	CLO 33
3	Quizzes	CLO 33
4	Mid-term Exam	CLO 32 &CLO 33
5	Final Exam	CLO 32 &CLO 33

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Biweekly
2	Sheets	Weekly
3	Quizzes	Biweekly
4	Mid-term Exam	7
5	Final Exam	15

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

8.List of References

1-Vishwakarma Ram, "Power System Protection and Switchgear". 2016
2- M.V. Bakshi, and U. A. Bakshi, “Switchgear and protection”, 2014.
3-B. Ravindranath, and M. Chander, Power System Protection and Switchgear, 3rd ed. New Delhi, India: New Age International (P) Limited, 2021.
4-S. H. Horowitz, and A. G. Phadke, Power System Relaying, 5th ed. Hoboken, NJ: John Wiley & Sons, Inc., 2022.
5-J. Roberts, and A. Guzman, Fundamentals of Modern Protective Relaying, 2nd ed. Raleigh, NC: Schweitzer Engineering Laboratories, Inc., 2023.
6-IEEE Power and Energy Society, IEEE Guide for Protective Relay Applications to Power System Buses, New York, NY: IEEE, 2021

9.Facilities required for teaching and learning

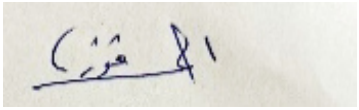
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, etc.)

10.Matrix of Course Content with Course LO's

Week No.	Topics	Aim	CLO's
1	Introduction, Effects of short circuit current on power system, measures of protection systems, Basic elements of protection systems.	1	CLO.33
2	Current transformers	1	CLO.33
3	potential transformers, classification of relays. Relays' construction, trip circuit,	1	CLO.33
4	classification, (electromechanical, static, digital), time characteristics of relays)	1	CLO.32,CLO.33
5	Electromechanical relays, Relay types according to function (OC, UV, ...) & time characteristics	1	CLO.32,CLO.33
6	Electromechanical relays, Relay types according to function (OC, UV, ...) & time characteristics	1	CLO.32,CLO.33
8	**Differential relays**	1	CLO.32,CLO.33
9	Distance relays zones characteristics	1	CLO.32,CLO.33
10	zones protection concept, primary & backup protection schemes,	1	CLO.32,CLO.33
11	main protection schemes of different elements in the power system, fuse.	1	CLO.32,CLO.33
12	Circuit breakers: Types, Construction, Performance, and ratings	1	CLO.32,CLO.33
13	Interruption of fault currents & arcs .	1	CLO.33
14	Revision	1	CLO.32,CLO.33

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PLO17	Test, examine, and protect components, equipment and electrical power systems and machines.	CLO.32	protect components, equipment of the electrical power systems and machines.
PLO18	Analyze the performance of electric power generation, control, and distribution systems.	CLO.33	Analyze the performance of the switchgears.

Title	Name	Signature
Course coordinator	**Dr. Dina Rostom**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Associate Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: HUM 3111 **Course Title:** Environmental Impact Assessment

1. Basic information

Program Title	Electrical Power Engineering Department			
Department offering the program	Electrical Power Engineering Department			
Department offering the course	Electrical Power Engineering Department			
Course Code	HUM 3111			
Prerequisites	None			
Year/level	Third year / first Semester (4th Level)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	2	1	0	3

2. Course Aims

No.	Aim
1	Adapt successfully to apply and develop Environmental Impact Assessment for Engineering Program.(AM6)

3. Learning Outcomes (LOs)

CLO7	Utilize multiple environmental factors, and environmental impacts related to economic dimensions, and avoiding risks of air pollution, water pollution, chemical pollution, electromagnetic pollution
CLO14	Use creative different types of thinking to give innovative improvements to daily problems.

4-Course contents	
Topics	**Week**
Introduction to environmental science and occupational safety.	1
Elements of environmental systems Elements of environmental systems	2
Air pollutions	3
Chemical Pollution	4
Water Pollution	5
Pollution caused by acid rain and acid fog	6
Oil Pollution	7
Biological weapons and mechanical methods to remove oil spills	8
Occupational safety and health against the regulation, inspection, and surveillance of workplaces and workers and uses scientific information to prevent injuries and illnesses in workplace settings	10
Human health related to the different types of pollution, and methods of prevention.	11
Definition of the phenomenon of warming, and greenhouses, and predict future hazards & The impact of climate change on the population, agriculture, industry, and economy.	12
Apply the Environmental Impact Assessment including all standard codes &Assessing the environmental impact and occupational safety of industrial applications.	13
Revision	14

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
CLO7	√			√			√			√		
CLO14	√		√	√			√			√		

6. Teaching and Learning methods of Disabled Students

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

7. Students' Assessment

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports / Sheets	Bi-weekly
2	Quizzes	5 & 12
3	Mid-term Exam	7
4	Final Exam	15

7.3 Weighting of Assessment	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

8. List of References

1) **Laurie Ann Mazur, A Pivotal Moment: Population, Justice, and the Environmental Challenge, scientific and medical journals.2009**
2) **Steven W. Mosher, Population Control: Real Costs, Illusory Benefits, Transaction Publishers (US), 2008**
3) **Lori M. Hunter, The Environmental Implications of Population Dynamics, RAND ,2012**
٤) **الانسان وتلوث البيئة – محمد السيد أرناؤوط – الهيئة المصريةالعامة للكتاب (2002)**
٥) **التلوث الكهرومغناطيسي – د.عبد المقصود حجو – الهيئة المصرية العامة للكتاب (2005)**

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

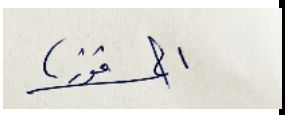
Week No.	Topics	Aim	LO's
1	Introduction to environmental science and occupational safety.	1	CLO7
2	Elements of environmental systems Elements of environmental systems	1	CLO7
3	Air pollutions	1	CLO7
4	Chemical Pollution	1	CLO7
5	Water Pollution	1	CLO7
6	Pollution caused by acid rain and acid fog	1	CLO7,CLO14
7	Oil Pollution	1	CLO7,CLO14

8	Biological weapons and mechanical methods to remove oil spills	1	CLO7,CLO14
10	Occupational safety and health against the regulation, inspection, and surveillance of workplaces and workers and uses scientific information to prevent injuries and illnesses in workplace settings	1	CLO7,CLO14
11	Human health related to the different types of pollution, and methods of prevention.	1	CLO7,CLO14
12	Definition of the phenomenon of warming, and greenhouses, and predict future hazards. The impact of climate change on the population, agriculture, industry, and economy	1	CLO7,CLO14 CLO7,CLO14
13	Apply the Environmental Impact Assessment including all standard codes. Assessing the environmental impact and occupational safety of industrial applications.	1	CLO7,CLO14
14	Revision	1	CLO7,CLO14

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	CLO7	Apply multiple environmental factors, and environmental impacts related to economic dimensions, and avoiding risks of air pollution, water pollution, chemical pollution, electromagnetic pollution

PL9	Use creative, innovative and flexible thinking to acquire leadership skills and respond to new situations.	CLO14	Use creative different types of thinking to give innovative improvements to daily problems.

Title	Name	Signature
Course coordinator	**Dr. Huda Awad**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Ass. Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: HUM 4204 **Course Title:** Feasibility study and project management

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 4204			
Prerequisites	None			
Year/level	Third year / first Semester (4th level)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	2	2	0	4

2. Course Aims

No.	Aim
1	Provide an efficient program environment that encourages continuous self-learning and progression in career. (AM5)

3. Learning Outcomes (LOs)

CLO4	Develop appropriate to analyze different types for planning projects and identify the productivity and types of costs.
CLO14	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to analyze the types of tenders and contracts to explain quality control and safety

4-Course contents	
Topics	**Week**
Introduction to project management	1
Review of statistics	2
Probabilistic time estimate	3
Time crashing	4
Production cost	5
Material requirement planning	6
Supply and demand theory	8
Cost concepts and design economics	9
Fore casting	10
Bonds	11
Financial decision making	12
Production management	13
revision	14

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
CLO4	√			√		√	√					
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	Sheets	CLO4,CLO14
2	Quizzes	CLO4,CLO14
3	Mid-term Exam	Clo4
4	Final Exam	CLO4,CLO14

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Sheets	Biweekly
2	Quizzes	Biweekly
3	Mid-term Exam	7
4	Final Exam	15

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

8. List of References

1. Krishnamurthy & Ravindra, Construction And Project Management, Second edition (PB 2017).
[2] Gould, Frederick E., and Nancy Nancy Eleanor Joyce, (2003), Construction Project Management, publisher: Pearson Prentice Hall, Third edition.https://lccn.loc.gov/2008007792/
[3] NUNNALLY and Stephens, (2007). Construction Methods and Management, publisher: Prentice Hall, eighth edition. https://lccn.loc.gov/00039179/
[4] Keith Potts and Ankrah Nii (2014). Construction cost management: learning from case studies. Routledge, 2014

9. Facilities required for teaching and learning

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

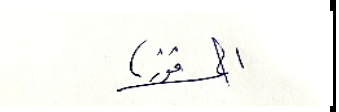
10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction to project management	1	CLO4
2	Review of statistics	1	CLO4
3	Probabilistic time estimate	1	CLO4
4	Time crashing	1	CLO4
5	Production cost	1	CLO4,CLO14
6	Material requirement planning	1	CLO4,CLO14
7	Mid Term	1	CLO4
8	Supply and demand theory	1	CLO4,CLO14
9	Cost concepts and design economics	1	CLO4,CLO14
10	Fore casting	1	CLO4,CLO14
11	Bonds	1	CLO4,CLO14
12	Financial decision making.	1	CLO4,CLO14
13	Production management	1	CLO4,CLO14
14	revision	1	CLO4,CLO14
15	Final Exam	1	CLO4,CLO14

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	CLO4	Develop appropriate to analyze different types for planning projects and identify the productivity and types of costs.

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 flexible thinking and acquire entrepreneurial and leadership skills to analyze the types of tenders and contracts to explain quality control and safety

Title	Name	Signature
Course coordinator	**Ass.Prof.Dr. Rehab Ali**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Ass. Prof. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: EPE 3202 **Course Title: Electric testing 4**

1. 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 3202			
Year/level	Third year / 4 th level (2nd Semester)			
Prerequisite	None			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	2	2

2. Course Aims

No.	Aim
1	Design and conduct experiments on electrical power systems and components and to analyze and interpret relevant data. (AM2)

3. Learning Outcomes (LOs)

CLO4	Develop meters and instruments of appropriate ranges and ratings for specific experimental tests
CLO5	conduct appropriate experiments and use statistical analyses and objective engineering judgment to draw conclusions.
CLO26	Measure the performance of an electrical system by some specific experiments.

4. Course Contents

Topics	Week
The main components of high voltage experiments.	1
Testing the breakdown in air using sphere-gap electrodes.	2

Testing the breakdown in oil using purification oil and polluted oil.	3
Testing the breakdown of solid insulator	4
Different types of switch gear circuit braker and its properties.	5
The operation of Earth Leakage Circuit Braker and its application	6
Power factor improvement using variable capacitance.	8
Simulation of Corona discharge phenomena to estimate corona voltage.	9
Open and short circuit of the transformer for 1 phase transformer	10
Loading Circuit of the transformer	11
Different connections of three phase transformer	12
Tests of three phase transformer	13
Oral Exam	14

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
CLO4			√		√							
CLO5			√		√							
CLO26					√			√				

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	project	CLO17, CLO26
2	Quiz 1 / Quiz 2	------
3	Mid-term Exam	------
4	oral exam	CLO17, CLO22, CLO26
5	Final Exam	CLO17, CLO22, CLO26

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports / Sheets	weekly
2	Quiz 1 / Quiz 2	----
3	Mid-term Exam	-----
4	Oral Exam	14
5	Final Exam	15

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Practical / Oral	Lab. Reports	60%	60	20	20
	Lab. Activities / Projects			15	15
	Final oral / practical exam			25	25
Final Exam				40	40
Total				100%	100

8. List of References

[1] Naidu, kamareju, High voltage engineering, 5 th edition , July 2017

[2] manual experiments note in laboratory

[3] Surya santoso, H.wayne beaty, electrical engineers 17 th edition , McGraw- hill education, 2018, ISBN:9781259642586

9. 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
Laboratory

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	The main components of high voltage experiments.	1	CLO4
2	Testing the breakdown in air using sphere-gap electrodes.	1	CLO4, CLO5, CLO26
3	Testing the breakdown in oil using purification oil and polluted oil.	1	CLO4, CLO5, CLO26
4	Testing the breakdown of solid insulator	1	CLO4, CLO5, CLO26
5	Different types of switch gear circuit braker and its properties.	1	CLO4, CLO5, CLO26
6	The operation of Earth Leakage Circuit Braker and its application	1	CLO4, CLO5, CLO26
8	Power factor improvement using variable capacitance.	1	CLO4, CLO5, CLO26
9	Simulation of Corona discharge phenomena to estimate corona voltage.	١	CLO4, CLO5, CLO26
10	Open and short circuit of the transformer for 1 phase transformer	١	CLO4, CLO5, CLO26
11	Loading Circuit of the transformer	١	CLO5, CLO26

12	Different connections of three phase transformer	١	CLO4, CLO5, CLO26
13	Tests of three phase transformer	١	CLO4, CLO5, CLO26
14	Oral Exam	1	CLO4, CLO5, CLO26

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	CLO4	develop meters and instruments of appropriate ranges and ratings for specific experimental tests
		CLO5	conduct appropriate experiments and use statistical analyses and objective engineering judgment to draw conclusions.
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.	CLO26	Measure the performance of an electrical system by some specific experiments.

Title	Name	Signature
Course coordinator	**Dr. Mohamed Farouk**	
Program coardinator	**Dr. Hend abdelmonem**	
Head of Department	**Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: EPE 3203 **Course Title: Transmission and distribution of electrical energy**

1. 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	EPE3203			
Year/level	Third year /4th level (1st Semester)			
Prerequisite	None			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	4	2	0	6

2. Course Aims

No.	Aim
1	Use the techniques and skills needed to identify the performance of a transmission line under different loading conditions (AM3)

3. Learning Outcomes (LOs)

CLO17	Select the optimum transmission system , transmission voltage and conductor sizing
CLO18	Model the transmission line to three different types.
CLO19	Analyze the models of transmission line
CLO27	Adopt suitable national and international standards and codes to design a complete design for distribution network.
CLO29	Formulate the sag and tension of transmission line to solve mechanical design problems

4.Course Contents	
Topics	**Week**
An introduction to electric power system	1
Transmission systems	2
Examples on transmission systems	3
Economics of transmission lines	4
Parameters of transmission lines (resistance)	5
Parameters of transmission lines (inductance of single phase system)	6
Inductance of three phase system and bundled conductors	8
Capacitance of transmission line	9
Examples on inductance and capacitance	10
Modeling of transmission lines (short and medium line)	11
Long transmission line.	12
Mechanical Design of Overhead Transmission Lines and Basic concept of electric power distribution.	13
project	14

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
CLO17	√		√	√		√						
CLO18	√		√	√		√						
CLO19	√			√		√					√	
CLO27	√		√					√			√	
CLO29	√		√	√		√			√			

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	project	CLO27
2	Quizzes	CLO17, CLO18, CLO19
3	Sheets	CLO17, CLO18

4	Mid-term Exam	CLO17, CLO18, CLO19,CLO29
5	Final Exam	CLO17, CLO18, CLO19,CLO29

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Sheets	weekly
2	Quizzes	Bi-weekly
3	Mid-term Exam	7
4	Project	14
5	Final Exam	15

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Sheets	40%	40	5	5
	Quizzes			10	10
	Project			5	5
	Mid-term exam			20	20
Final Exam				60	60
Total				100	100

8. List of References

[1] Stevenson, W.D., Elements of power system analysis, 3rd edition, McGraw hill, 1995.

[2]Manuel reta-hernandez, Electric power generation, transmission, and distribution, 3rd edition , CRC Press, 2012; ISBN, 9781315222424.

[3] Dr.MayureshV.Bakshi, Uday A. Bakshi, Transmission and distribution , technical publications,2020, ISBN 9789333223645.

9. 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

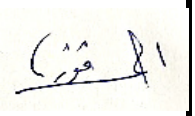
10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	An introduction to electric power system	1	CLO17
2	Transmission systems	1	CLO17
3	Examples on transmission systems	1	CLO17
4	Economics of transmission lines	1	CLO17
5	Parameters of transmission lines (resistance)	1	CLO18
6	Parameters of transmission lines (inductance of single phase system)	1	CLO18
8	Inductance of three phase system and bundled conductors	1	CLO18
9	Capacitance of transmission line	1	CLO18
10	Examples on inductance and capacitance	1	CLO18
11	Modeling of transmission lines (short and medium line)	1	CLO18, CLO19
12	Long transmission line.	1	CLO18, CLO19
13	Mechanical Design of Overhead Transmission Lines and Basic concept of electric power distribution.	1	CLO29, CLO27
14	project	1	CLO27

11. 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 optimum transmission system , transmission voltage and conductor sizing
		CLO18	Model the transmission line to three different types.
		CLO19	Analyze the models of transmission line
PL15	Adopt suitable national and international standards and codes to design, build, operate, inspect,	CLO27	Adopt suitable national and international standards and codes to build a complete design for distribution network.

	and maintain electrical /electronic / digital equipment, systems and services		
PL16	Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering	CLO29	Formulate the sag and tension of transmission line to solve mechanical design problems

Title	Name	Signature
Course coordinator	**Dr.**Riham Hosny Salem	
Program coardinator	**Dr. Hend abdelmonem**	
Head of Department	**Associate Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: ECE 3104 **Course Title: Power Electronics (1)**

1. 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	**ECE 3104**			
Prerequisite	ECE 2101			
Year/level	Third year/ Level 4 (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Apply knowledge of mathematics, science and engineering concepts to the solution of Power electronics circuits problems. (AM1)

3. Course Learning Outcomes (CLOs)

CLO21	Model an electrical power electronic components for a specific application; and identify the tools required to optimize this design.
CLO22	Analyze an electrical power electronic components for a specific application; and identify the tools required to optimize this design.

4- Course Contents	
Topics	**Week**
Introduction & classification of Power Converter circuits, characteristics of power electronics devices, diodes, Schottky and Zener diodes	1
Thyristors, Transistors	2
Power Computations in power electronics circuits	3
Uncontrolled single-phase rectifier circuit with R and RL loads.	4
Uncontrolled single-phase rectifier circuit with RLE and FWD	5
Controlled single-phase rectifier circuits (for R and RL loads)	6
Controlled single-phase rectifier circuits (for RLE loads)	8
Full wave uncontrolled single-phase rectifier circuits	9
Full wave uncontrolled single-phase rectifier circuits	10
Full wave controlled single phase rectifier circuits (for R and RL loads)	11
Full wave controlled single phase rectifier circuits (for RLE)	12
Uncontrolled/ Controlled three-phase rectifier circuits	13
Revision	14

5.Teaching and Learning methods

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

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	Reports	CLO 22
2	Sheets	CLO 21- CLO 22
3	Quizzes	CLO 22
4	Mid-term Exam	CLO 22
5	Final Exam	CLO 21- CLO 22

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
2	Sheets	Weekly
3	Quizzes	Bi-weekly
4	Mid-term Exam	7
5	Final Exam	15

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

8. List of References

1- Muhammad H. Rashid ,"Power Electronics: Devices, Circuits, and Applications",2018.

2-" Katsuaki Suganuma et al., "Wide Bandgap Power Semiconductor Packaging" ,2018,

3- Frede Blaabjerg et al. ,"Control of Power Electronic Converters and Systems", Volume 1 and 2, 2018.

9. Facilities required for teaching and learning

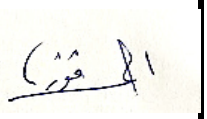
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, etc.)

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction & classification of Power Converter circuits, characteristics of power electronics devices, diodes, Schottky and Zener diodes	1	CLO22
2	Thyristors, Transistors	1	CLO22
3	Power Computations in power electronics circuits	1	CLO22
4	Uncontrolled single-phase rectifier circuit with R and RL loads.	1	CLO21, CLO22
5	Uncontrolled single-phase rectifier circuit with RLE and FWD	1	CLO21, CLO22
6	Controlled single-phase rectifier circuits (for R and RL loads)	1	CLO21, CLO22
8	Controlled single-phase rectifier circuits (for RLE loads)	1	CLO21, CLO22
9	Full wave uncontrolled single-phase rectifier circuits	1	CLO21, CLO22
10	Full wave uncontrolled single-phase rectifier circuits	1	CLO21, CLO22
11	Full wave controlled single phase rectifier circuits (for R and RL loads)	1	CLO21, CLO22
12	Full wave controlled single phase rectifier circuits (for RLE)	1	CLO21, CLO22
13	Uncontrolled/ Controlled three-phase rectifier circuits	1	CLO21, CLO22
14	Revision	1	CLO21, CLO22

11. Matrix of Program PLOs with Course CLOs

Program PLOs		Course CLOs	
PLO12	Design, model, and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO21	model an electrical power electronic components for a specific application; and identify the tools required to optimize this design.
		CLO22	analyze an electrical power electronic components for a specific application; and identify the tools required to optimize this design.

Title	Name	Signature
Course coordinator	**Dr. Dina Rostom**	
Program Coordinator	**Dr. Hend Salama**	
Head of Department	**Associate Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: EPE٣101 **Course Title: Electrical Machines (1)**

1. 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	EPE3101			
Pre-requests	EPE1201			
Year/level	Third year / First Semester (4th Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Use the techniques, skills, and appropriate engineering tools for the performance of DC electrical machines, , the concepts of e.m.f. generation, and torque production in D.C. machines and the methods of speed control, starting and braking of DC motors (AM3)

3. Learning Outcomes (LOs)

CLO21	Model the construction of DC machines, the methods of speed control of DC machines, armature windings.
CLO22	Analyze the operation of DC machines at braking and starting; and the tools required to be used for them.
CLO28	Identify the principals of DC machines and its equivalent circuit, types of DC machines and its characteristics, armature reaction problems.
CLO29	Formulate the emf's law, force and the production of torque in the DC motor by applying engineering fundamentals, basic science and mathematics.

4.Course Contents	
Topics	**Week**
Introduction to DC machines.	1
Construction of D.C. machine and Principles of operation of DC machines (motors& generators).	2
Armature winding.	3
Equivalent circuit, Types of DC machines, methods of field excitation. Generation of e.m.f and torque equations.	4
DC motors power flow, losses, efficiency.	5
Voltage building up in DC machines and testing.	6
Armature reaction.	8
Characteristics of D.C. generators.	9
Characteristics of D.C. motor.	10
Speed control of DC motors.	11
Starting of DC motors.	12
Braking of DC motors.	13
Revision	14

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
CLO21	√	√	√	√		√	√			√	√	
CLO22	√	√	√	√		√	√			√	√	
CLO28	√		√	√		√	√			√	√	
CLO29	√			√		√	√					

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	Reports	CLO22, CLO28
2	Sheets	CLO21, CLO22, CLO28, CLO29
3	Quizzes	CLO21, CLO28, CLO29

4	Mid-term Exam	CLO21, CLO28, CLO29
5	Final Exam	CLO21, CLO22, 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	7
5	Final Exam	15

	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

8. List of References

[1] Electric Machinery. A.E. Fitzgerald, Charles Kingsley, JR., Stephen D. Umans, 6th edition, McGraw-Hill, 2003.
[2] Electric Machinery Fundamentals. Stephen Chapman, 4th edition WCB/McGraw-Hill, 2005.
[3] Principles of Electric Machines with Power Electronics. P. C. SEN, Third Edition, Wiley 2013.

9. Facilities required for teaching and learning

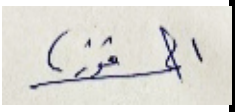
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction to DC machines.	1	CLO21
2	Construction of D.C. machine and Principles of operation of DC machines (motors& generators).	1	CLO21
3	Armature winding.	1	CLO21
4	Equivalent circuit, Types of DC machines, methods of field excitation. Generation of e.m.f and torque equations.	1	CLO21, CLO28, CLO29
5	DC motors power flow, losses, efficiency.	1	CLO28, CLO29
6	Voltage building up in DC machines and testing.	1	CLO28
8	Armature reaction.	1	CLO28
9	Characteristics of D.C. generators.	1	CLO28, CLO29
10	Characteristics of D.C. motor.	1	CLO28, CLO29
11	Speed control of DC motors.	1	CLO21, CLO28
12	Starting of DC motors.	1	CLO22, CLO29
13	Braking of DC motors.	1	CLO22, CLO29
14	Revision	1	CLO21, CLO28, CLO29

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PLO12	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO21	Model the construction of DC machines, the methods of speed control of DC machines, armature windings.
		CLO22	Analyze the operation of DC machines at braking and starting; and the tools required to be used for them.
PLO16	Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	CLO28	Identify the principals of DC machines and its equivalent circuit, types of DC machines and its characteristics, armature reaction problems.
		CLO29	Formulate the emf's law, force and recognize the production of torque in the DC motor by applying engineering

Title	Name	Signature
Course coordinator	**Dr. Nada Mamdoh**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: EPE 3102 **Course Title: Electrical Testing (3)**

1. 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 3102**			
Prerequisite	------			
Year/level	Year 3/ Level 4 (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	3	3

2. 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 power electronics devices and DC machines. (AM2)

3. Course Learning Outcomes (CLOs)

CLO24	implement systems in electrical and power electronic circuits.
CLO30	Examine rectifiers, DC machines, and solar applications.

4.Course content	
Topics	**Week**
Introduction to safety percussions and used meters in electrical testing	1
characteristics of diodes (Si and Ge)	2
Characteristics of Zener diodes	3
Characteristics of BJT.	4
Characteristics of MOSFETS.	5
Characteristics of Thyristors.	6
Single phase half wave rectifier with resistive load and RL load	8
Full wave rectifier with resistive load & RL load	9
Types of circuit breakers	10
DC Separately excited machine (no load & load test)	11
DC Compound machine (no load test & load test))	12
Photo cell sensors / Harmonics of led lamps	13
Experimental exams	14

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
CLO24					√		√			√		√
CLO30					√		√			√		√

6.Teaching and Learning methods of Disabled Students

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

7.Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOs
1	Reports	**CLO24**
2	Lab. simulation	**CLO30**
3	Practical Exam	**CLO24, CLO30**
4	Final Exam	**CLO24, CLO30**

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Weekly
2	Lab. simulation	Biweekly
3	Practical Exam	14
4	Final Exam	15

	Assessment Method	Weights%	Weights
	Lab. Reports	15%	15
	Lab. simulation	15%	15
	practical exam	30%	30
Final Exam		40%	40
Total		100%	100

8.List of References

1.Laboratory manual

2. M. H. Rashid. Power Electronics, handbook, 3rd ed. Pearson Education Inc., 2016 (Textbook).

3. Ned Mohan, "Power Electronics: A First Course", John Wiley and Sons Ltd, 2011.

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.

9.Facilities required for teaching and learning

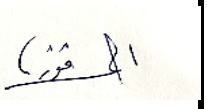
Lab.

10.Matrix of Course Content with Course CLO's

Week No.	Topics	Aim	CLO's
1	Introduction to safety percussions and used meters in electrical testing	1	CLO24, CLO30
2	characteristics of diodes (Si and Ge)	1	CLO24, CLO30
3	Characteristics of Zener diodes	1	CLO24, CLO30
4	Characteristics of BJT.	1	CLO24, CLO30
5	Characteristics of MOSFETS.	1	CLO24, CLO30
6	Characteristics of Thyristors.	1	CLO24, CLO30
8	Single phase half wave rectifier with resistive load and RL load	1	CLO24, CLO30
9	Full wave rectifier with resistive load & RL load	1	CLO24, CLO30
10	Types of circuit breakers	1	CLO24, CLO30
11	DC Separately excited machine (no load & load test)	1	CLO24, CLO30
12	DC Compound machine (no load test & load test))	1	CLO24, CLO30
13	Photo cell sensors / Harmonics of led lamps	1	CLO24, CLO30
14	Experimental exams	1	CLO24, CLO30

11. 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 systems in electrical and power electronic circuits.
PL17	Test, examine, and protect components, equipment and electrical power systems and machines.	CLO30	Examine rectifiers and DC machines.

Title	Name	Signature
Course coordinator	**Dr. Dina Rostom**	
Program coordinator	**Dr. Hend Salama**	
Head of Department	**Associate Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: EPE 3103 **Course Title: High Voltage Engineering**

1. 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 3103**			
Perquisite	----------			
Year/level	Third year / Fourth Level (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Apply knowledge of mathematics, science and engineering concepts to the solution of Power and machines problems (AM1).

3. Learning Outcomes (LOs)

CLO25	Estimate the performance of high voltage circuit under input excitation to evaluate the concepts of high voltage engineering; modeling breakdown in mediums, applying high voltage testing circuits and analysis the outputs of corona losses.
CLO26	Measure the performance of the electrical systems and circuits under specific conditions with the main principles, characteristics and methods of high voltage breakdown in mediums, corona discharge and earthing.
CLO29	Identify engineering problems to solve the problems of electric stresses incident on the insulators and insulation materials of underground cables.

4. Course contents

Week	Topics
1	Review of power system scheme - types of electric power stations - concepts of high voltage engineering. .Explain the Types and devices of high voltage generation with different waveforms.
2	Apply the methods and devices of high voltage measurements.
3	Examine high voltage circuits to define the types of high voltage generation waves.
4	Identify theories of breakdown in air and estimate breakdown current.
5	Recognize the breakdown in liquid and solid and testing of oil purification.
6	Analyze the corona phenomenon of high voltage transmission lines and estimate the corona loses through number of effected factors.
8	Define the relation between corona and spark-over between transmission lines.
9	Identify the types of insulators used in power transmission lines of power system scheme.
10	Calculation of electric stresses on insulators.
11	Explain the methods of testing the insulators and comparison between them.
12	Define the construction of underground cable and cable classifications. Estimate the electric stresses on cable insulation layers to release the effective cable construction.
13	Identify and explain Earthing concept and its methods.
14	Revision

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
CLO25	√	√	√			√	√		√	√		
CLO26	√	√	√	√			√		√	√	√	
CLO29	√		√	√		√				√		

6. Teaching and Learning methods of Disabled Students

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

7. 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	Sheets	CLO25, CLO26, CLO29
2	Reports	CLO26
3	Quizzes	CLO25, CLO29
4	Mid-term Exam	CLO25, CLO29
6	Final Exam	CLO25, CLO26, CLO29

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Reports / Sheets	Bi-weekly
2	Quizzes	5 & 12
3	Mid-term Exam	7
4	Final Exam	15

7.3 Weighting of Assessment	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

8. List of References

[1] Ayman El-Hag, "High Voltage Engineering and Applications", April 2020.
[2] Naidu, Kamareju, "High - Voltage Engineering", 5 edition, July, 2017.
[3] J. Duncan Gluver, M.S.Sarma, T. J.Overbey, "Power System, Analysis and design", 4th, edition, 2008.

9. Facilities required for teaching and learning

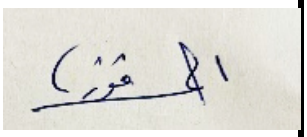
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Review of power system scheme - types of electric power stations - concepts of high voltage engineering.	1	CLO26
2	Explain the Types and devices of high voltage generation with different waveforms.	1	CLO26
3	Apply the methods and devices of high voltage measurements.	1	CLO25
4	Examine high voltage circuits to define the types of high voltage generation waves.	1	CLO26
5	Identify theories of breakdown in air and estimate breakdown current.	1	CLO25, CLO26
6	Recognize the breakdown in liquid and solid and testing of oil purification.	1	CLO26
8	Analyze the corona phenomenon of high voltage transmission lines and estimate the corona loses through number of effected factors.	1	CLO25, CLO26
9	Define the relation between corona and spark-over between transmission lines.	1	CLO26
10	Identify the types of insulators used in power transmission lines of power system scheme.	1	CLO26
11	Calculation of electric stresses on insulators.	1	CLO29
12	Explain the methods of testing the insulators and comparison between them.	1	CLO29
13	Define the construction of underground cable and cable classifications.	1	CLO26
14	Revision	1	CLO25 CLO26 CLO29

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	Explain the concepts of electrical power systems modeling and analysis under steady state conditions.
		CLO26	Identify the main principles, characteristics, and methodologies of Transmission Lines, and Under-Ground Cables.
PL16	Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	CLO29	Identify and formulate engineering problems to estimate the breakdown voltage in mediums, corona losses, and electric stresses of insulators and insulation materials of underground cables.

Title	Name	Signature
Course coordinator	**Dr. Hend Abdel- monem Salama**	
Program coordinator	**Dr. Hend Abdel- monem Salama**	
Head of Department	**Ass. Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/09/2024**	

Course Specification

Course Code: EPE3105 **Course Title: Automatic Control**

1. 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	EPE3105			
Pre-requests	CSE2101			
Year/level	Third year / Second Semester (4^{th} Level)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	4	2	0	6

2. Course Aims

No.	Aim
1	Address operation, control issues of System equations, Linear models, analysis of the dynamic response and control of the system through block diagram representation and signal flow graphs, stability, root-locus method, steady state error for controllers (AM7)

3. Learning Outcomes (LOs)

CLO23	Design the concepts of system control components, sub-systems, and knowing the response of them, and knowing it for some forcing inputs.
CLO24	Implement the methodologies of different control systems, response and knowing actions by studying the stability of the system, knowing the steady state error and controller's design.
CLO34	Integrate P, PI and PID controllers, root locus analysis in creatively computer-controlled systems.

4. Course Contents	
Topics	**Week**
Introduction, dynamics of electrical and mechanical systems.	1
Laplace transform of some basic functions, Step input, Exponential, Ramp, Sinusoidal, Impulse, translated functions, pulse. Laplace transform of derivatives and integral functions. Initial and final value theorem, Inverse Laplace transform.	2
Solution of differential equations, electrical systems, electrical systems integrated with operational amplifier.	3
Transfer function and transient response for the first order system with for some forcing functions (step, pulse, impulse and ramp).	4
Transient response of the second order linear systems for step and impulse inputs. Computation of rise, peak settling times and maximum overshoot.	5
Transient response of the second order linear systems for step and impulse inputs. Computation of rise, peak settling times and maximum overshoot. (cont.)	6
Block diagrams, open and closed loop transfer functions, reduction of block diagrams and Signal-flow graphs.	8
Routh stability criterion.	9
Steady state error.	10
Root locus analysis	11
Root locus analysis (cont.)	12
P, PI and PID controllers	13
General course revision.	14

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
CLO23	√	√	√	√		√	√			√	√	
CLO24	√		√	√		√	√			√	√	
CLO34	√	√	√	√		√	√			√	√	√

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	Reports	CLO23, CLO24, CLO34
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	7
5	Final Exam	15

	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

8. List of References

[1] Basic Dynamics and Control by Finn Haugen August 2010.
[2] Modern Control Engineering by Katsuhiko Ogata, Fifth Edition, 2010.

9. Facilities required for teaching and learning

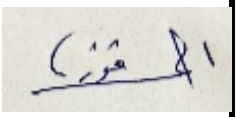
Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Data show

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Introduction, dynamics of electrical and mechanical systems.	1	CLO23
2	Laplace transform of some basic functions, Step input, Exponential, Ramp, Sinusoidal, Impulse, translated functions, pulse. Laplace transform of derivatives and integral functions. Initial and final value theorem, Inverse Laplace transform.	1	CLO23
3	Solution of differential equations, electrical systems, electrical systems integrated with operational amplifier.	1	CLO23
4	Transfer function and transient response for the first order system with for some forcing functions (step, pulse, impulse and ramp).	1	CLO23, CLO24
5	Transient response of the second order linear systems for step and impulse inputs. Computation of rise, peak settling times and maximum overshoot.	1	CLO23, CLO24
6	Transient response of the second order linear systems for step and impulse inputs. Computation of rise, peak settling times and maximum overshoot. (cont.)	1	CLO23, CLO24
7	Block diagrams, open and closed loop transfer functions, reduction of block diagrams and Signal-flow graphs.	1	CLO23, CLO24
8	Routh stability criterion.	1	CLO24
10	Steady state error.	1	CLO23, CLO24
11	Root locus analysis	1	CLO34
12	Root locus analysis (cont.)	1	CLO34
13	P, PI and PID controllers	1	CLO34
14	General course revision.	1	CLO23, CLO24, CLO34

11. 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 the concepts of system control components, sub-systems, and knowing the response of them, and apply it for some forcing inputs.
		CLO24	Implement the methodologies of different control systems, response and control actions by studying the stability of the system, knowing the steady state error and design controllers.
PLO19	Integrate electrical, electronic, mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems	CLO34	Integrate P, PI and PID controllers, root locus analysis in creatively computer-controlled systems

Title	Name	Signature
Course coordinator	**Dr. Nada Mamdouh Hassan**	
Program coordinator	**Dr. Hend Abd-Elmonem Salama**	
Head of Department	**Assoc.Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	

Course Specification

Course Code: EPE 3201 **Course Title: Electrical machines 2**

1. 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 3201			
Year/level	third / 4 th level (2nd Semester)			
Prerequisite	EPE3101 (Machines 1)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	4	2	0	6

2. Course Aims

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

3. Learning Outcomes (LOs)

CLO25	Estimate the performance of power transformers using equivalent circuit methods to define the transformer regulation under different types of electric loads.
CLO26	Measure the performance of the transformer by studying the losses and efficiency.
CLO30	Test the operation of the transformer in all conditions.
CLO31	Examine the operation of an auto transformer in all conditions

4. Course Contents

Topics	Week
Transformer Construction	1
Fundamental Laws of the power transformers	2

Theory of operation	3
Equivalent circuits of the transformer	4
Transformer testing	5
Examples on transformer tests	6
Transformer rating	٨
Voltage regulation of a transformer	٩
Transformer losses	10
Efficiency of the transformer	11
Separation of hysteresis and eddy current losses and Tap changers on transformers	12
Auto transformers and Three phase transformers	13
Review	14

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
CLO25	√		√	√						√		
CLO26	√		√	√		√	√					
CLO30	√			√		√						
CLO31	√			√		√	√					

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	Reports	CLO25,
2	Sheets	CLO25, CLO26, CLO30
2	Quizzes	CLO25, CLO26
3	Mid-term Exam	CLO25, CLO26
4	Final Exam	CLO25, CLO26, CLO30, CLO31

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Reports	Bi-weekly
	Sheets	weekly
2	Quizzes	4 & 10
3	Mid-term Exam	7
4	Final Exam	15

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

8. List of References

[1] Dr. P.S.Bimbra, Electrical Machinery, ISBN: 9788174091734, 8174091734, 7th Edition, 2011.

[2]Fitzgerald A. E., Kingsley C., Umans S. D. "Electric Machinery" McGraw- Hill Publishers, 5th edition, 1991.

[3]S.K. Sahdev, Electrical Machines, Cambridge university press, 2018, ISBN 978-1-108-43106-4

9. 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

10. Matrix of Course Content with Course LO's

Week No.	Topics	Aim	LO's
1	Transformer Construction	1	CLO25
2	Fundamental Laws of the power transformers	1	CLO25
3	Theory of operation	1	CLO25
4	Equivalent circuits of the transformer	1	CLO25
5	Transformer testing	1	CLO30
6	Examples on transformer tests	1	CLO30
8	Transformer rating	1	CLO30
9	Voltage regulation of a transformer	1	CLO26
10	Transformer losses	1	CLO26
11	Efficiency of the transformer	1	CLO26
12	Separation of hysteresis and eddy current losses and Tap changers on transformers	1	CLO26
13	Auto transformers and Three phase transformers	1	CLO26, CLO30, CLO31
14	Revision	1	CLO25 , CLO26, CLO30, CLO31

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 power transformers using equivalent circuit methods to define the transformer regulation under different types of electric loads.
		CLO26	Measure the performance of the transformer by studying the losses and efficiency.
Pl17	Test, examine, and protect components, equipment and electrical power systems and machines.	CLO30	Test the operation of the transformer in all conditions.
		CLO31	Examine the operation of an auto transformer in all conditions

Title	Name	Signature
Course coordinator	**Dr.**Riham Hosny Salem	
Program coordinator	**Dr. Hend abdelmonem**	
Head of Department	**Ass. Prof. Dr. Ahmed Fawzy**	
Date of Approval	**16/9/2024**	