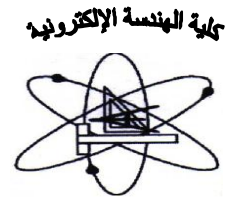


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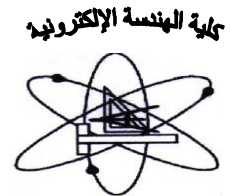


Department offering the program: Electronics and Electrical Communications Engineering
Department offering the course: Industrial electronics and Control Engineering

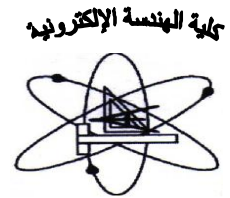
Course Specification

1-Course basic information :		
Course Code: ACE 216	Course Title:	Academic year: 2015-2016
Department requirement	Power Electronics	Level (2) – Semester : 1 st
Field: Basic Eng. Science	Teaching hours: Lecture [2] - Tutorial[1] - Lab[0]	

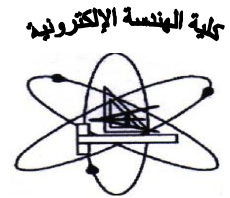
2- Course objectives	<ol style="list-style-type: none"> 1. To introduce students to power electronics and types of power electronic circuits. 2. To enhance student ability to demonstrate Power semiconductor devices, construction, operation, ratings and circuit applications. 3. To teach students resistance and RC triggering circuits for thyristors. 4. To acquire students a good knowledge for the design of firing circuits, Switching off circuits and protection. 5. To teach students single phase half wave rectifiers. 6. To enhance student ability to demonstrate single phase and three phase controlled rectifiers 7. To introduce students to commutation circuits.
3- Intended Learning Outcomes (ARS)	
A- Knowledge and Understanding:	<p>Course (ILOs):</p> <p>A1.1 Explain concepts and theories of sciences, appropriate to the Power semiconductor devices.</p> <p>A1.2 Explain concepts and theories of sciences, appropriate to the SCR, Triac, Gto, UJT, PUT and Diac circuits, and applications.</p> <p>A1.3 Explain concepts and theories of sciences, appropriate to the Triggering circuits.</p> <p>A1.4 Explain concepts and theories of sciences, appropriate to the firing circuit.</p> <p>A1.5 Explain concepts and theories of sciences, appropriate to the synchronizing a UJT pulse with AC line voltage.</p> <p>A1.6 Explain concepts and theories of sciences, appropriate to the Recovery of trapped energy.</p> <p>A1.7 Explain concepts and theories of sciences, appropriate to the Single and three phase controlled rectifiers.</p> <p>A3.1 Define characteristics of engineering materials related to the SCR, Triac, Gto, UJT, PUT and Diac devices.</p> <p>A3.2 Define characteristics of engineering materials related to the firing circuits.</p> <p>A3.3 Define characteristics of engineering materials related to the Switching off and protection circuits.</p>



	<p>A4) Explain Principles of design including elements design, process and/or a system related to Power Electronics Circuits.</p> <p>A8) Describe Current engineering technologies as related to Power Electronics Circuits.</p>	<p>A3.4 Define characteristics of engineering materials related to the Heat sinks.</p> <p>A4.1) Explain principles of design related to SCR, Triac, Gto, UJT, PUT and Diac circuits.</p> <p>A4.2) Explain principles of design related to Triggering circuits.</p> <p>A4.3) Explain principles of design related to firing circuits.</p> <p>A8.1) Describe current engineering technologies as related to Power semiconductor devices construction.</p> <p>A8-2) Describe current engineering technologies as related to Triggering circuits.</p> <p>A8.3) Describe current engineering technologies as related to Switching off and protection circuits.</p>
B- Intellectual Skills	<p>B.5 Assess and evaluate the characteristics and performance of components, systems and processes.</p> <p>B6) Investigate the failure of components, systems, and processes.</p>	<p>B5.1 Assess and evaluate the characteristics and performance of SCR, Triac, Gto, UJT, PUT and Diac.</p> <p>B5.2 Assess and evaluate the characteristics and performance of Triggering circuits.</p> <p>B5.3 Assess and evaluate the characteristics and performance of firing circuits.</p> <p>B5.4 Assess and evaluate the characteristics and performance of Switching off and protection circuits.</p> <p>B5.5 Assess and evaluate the characteristics and performance of Recovery of trapped energy process.</p> <p>B5.6 Assess and evaluate the characteristics and performance of Single and three phase controlled rectifiers</p> <p>B5.7 Assess and evaluate the characteristics and performance of Heat sinks and commutation circuits.</p> <p>B6.1 Investigate the failure of SCR, Triac, Gto, UJT, PUT and Diac devices.</p> <p>B6.2 Investigate the failure of thyristors.</p> <p>B6.3 Investigate the failure of Switching off and protection circuits.</p>
C- Professional Skills	<p>C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.</p> <p>C.12 Prepare and present technical reports.</p>	<p>C3.1 Create and/or re-design SCR, Triac, Gto, UJT, PUT and Diac.</p> <p>C3.2 Create and/or re-design Triggering circuits.</p> <p>C3.3 Create and/or re-design firing circuits.</p> <p>C3.4 Create and/or re-design Switching off and protection circuits.</p> <p>C3.5 Create and/or re-design Single and three phase controlled rectifiers.</p> <p>C12.1 Prepare and present technical reports on topics related to Power Electronics Circuits.</p>



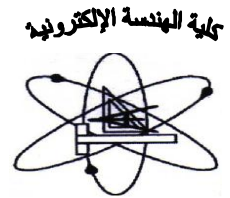
D- General Skills	D.3 Communicate effectively.	D3.1 Communicate effectively in class room with his colleagues, and teaching staff member.
	D.6 Effectively manages tasks, time, and resources.	D6.1 Effectively manages tasks, time, and resources in tutorial, while writing a report and exam times.
	D.7 Search for information and engage in life-long self learning Power Electronics Circuits.	D7.1 Search for information and engage in life-long self learning in topics related to Power Electronics Circuits.
4- Course Contents	Introduction to power electronics – Types of power electronic circuits – Power semiconductor devices, construction, operation, ratings, how to choose it, and circuits application: (SCR – Triac – Gto - UJT – PUT - Diac) Triggering circuits for thyristors, resistance trigger circuit – RC trigger circuits – UJT for trigger circuits – Diac and PUT to provide a pulse to trigger thyristors – Design of firing circuits – synchronizing a UJT pulse with AC line voltage – Switching off and protection circuits– switched DC source with different load circuits – Recovery of trapped energy – single phase half wave rectifier with different load circuits and with electromotive force (emf) – RL load circuit with freewheeling diode – Single phase and three phase controlled rectifiers with different load circuits and emf – Heat sinks specification – Commutation circuits.	
5- Teaching and Learning Methods	<ul style="list-style-type: none"> • Lectures. • Tutorials. • Research assignments. 	
6- Teaching and Learning Methods for disable students	<ul style="list-style-type: none"> • Assign a portion of the office hours for those students. • Give them specific tasks. • Repeat the explanation of some of the material at Lectures and tutorials. • Official low cost special classes for developing student skills, arranged by the faculty administration. 	
7- Student Assessment		
a- Assessment Methods	<ul style="list-style-type: none"> - Weekly sheet exercises at class room - Quizzes - Mid-term, and final exams 	
b- Assessment Schedule	<ul style="list-style-type: none"> - Exercise sheet : Weekly - Quizz-1: Week <u>no</u> 5 - Mid-Term exam: Week <u>no</u> 8 - Quizz-2: Week <u>no</u> 11 - Final – term examination: Week <u>no</u> 16 to 18 	
c- Weighting of Assessment	<ul style="list-style-type: none"> - Class work and quizzes : 15 % - Mid-term examination: 15 % - Final – term examination: <u>70 %</u> <p style="text-align: right;">Total 100 %</p>	
8- List of text books and references:		
a- Course notes	There are lectures notes prepared in the form of a book authorized by the department	
b- Text books	1. M. A. Rashid , " Power Electronics circuits, devices, and Applications ", Prentice Hall, 4 th Edition 2013.	



	2. V. Jagannathan, "Power Electronics : Devices and Circuits ", PHI Learning Pvt. Ltd., 2011
c- Recommended books	1. Y. S. Lee and M. H. L. Chow " Power Electronics Handbook ", San Diego, CA : Academic Press, 2001. 2. R. G. Hoft, " Semiconductor Power Electronics ", New York : Van Nostrand Reinhold, 1986.
d- Periodicals, Web sitesetc	<ul style="list-style-type: none"> • www.smpstech.com/books/booklist.htm • www.darnell.com

Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Prof. and practical skills	D- General and transferable skills
Introduction to power electronics – Types of power electronic circuits - Power semiconductor devices, construction, operation, ratings, how to choose it, and circuits application	1-2	A1.1, A8.1		C12.1	D3.1, D6.1, D7.1
SCR, Triac, Gto, UJT, PUT, Diac	3-5	A1.2, A3.1, A4.1	B5.1, B6.1	C3.1, C12.1	D3.1, D6.1, D7.1
Triggering circuits for thyristors, resistance trigger circuit – RC trigger circuits – UJT for trigger circuits – Diac and PUT to provide a pulse to trigger thyristors	6-7	A1.3, A4.2, A8.2	B5.2, B6.2	C3.2, C12.1	D3.1, D6.1, D7.1
Design of firing circuits	9	A1.4, A3.2, A4.3	B5.3	C3.3, C12.1	D3.1, D6.1, D7.1
Synchronizing a UJT pulse with AC line voltage –	10	A1.5		C12.1	D3.1, D6.1, D7.1
Switching off and protection circuits – switched DC source with different load circuits	11	A3.3, A8.3	B5.4, B6.3	C3.4, C12.1	D3.1, D6.1, D7.1
Recovery of trapped energy	12	A1.6,	B5.5	C12.1	D3.1, D6.1, D7.1
Single phase half wave rectifier with different load circuits and with electromotive force (emf) – RL load circuit with freewheeling diode – Single phase and three phase controlled rectifiers with different load circuits and emf	13-14	A1.7	B5.6	C3.5, C12.1	D3.1, D6.1, D7.1
Heat sinks specification – Commutation circuits.	15	A3.4	B5.7	C12.1	D3.1, D6.1, D7.1



Teaching and Learning Methods - ILOs Matrix

Teaching and Learning Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Lectures	A1,A3,A4,A8	B5, B6	C3, C12	D3
Tutorials.	A1,A3,A4,A8	B5, B6	C3, C12	D3, D6
Reports and assignments	A1,A3,A4,A8	B5, B6	C3, C12	D6, D7

Assessment Methods - ILOs Matrix

Assessment Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Weekly sheet exercises	A1,A3,A4,A8	B5, B6	C3	D3, D6, D7
Reports	A1,A3,A4,A8	B5, B6	C3, C12	D6, D7
Quizzes	A1,A3,A4,A8	B5, B6	C3	D6
Midterm, and Final Written exams	A1,A3,A4,A8	B5, B6	C3	D6

Authorized from department board at 15/05/2016

Authorized from college board at 05/06/2016

Course coordinator:

Prof. Abdelazem S. Ibrahim

Head of Department:

Prof. Fathi El-Sayed Abd El-Samie



جامعة المنوفية
كلية الهندسة الإلكترونية
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