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Department offering the program: Electronics and Electrical Communications
Department offering the course: Computer Sciences and Engineering

Course Specification

1- Course basic information :		
Course Code: CSE 014 **Department Requirement**	**Course Title: Logic Design**	**Academic year:** 2015/2016 **Level (0) – Semester : 1st**
Field: Computer Applications and ICT	**Teaching hours: Lecture [2]** **Tutorial [0]** **Lab [2]**	

2- Course Objectives	1. To provide students with the basics of Binary representation, Codes and their conversions. 2. To enhance student skills in the field of Minimization of logic expressions by algebraic method and K-map method. 3. To provide students with the principles of design of logic gates, logic circuits and combinational logic circuits. 4. To enhance student ability to demonstrate the principles of Flip Flops and the design of sequential logic circuits.
3- Intended Learning Outcomes: ARS	**Course ILOs**

A- Knowledge and Understanding:	A.1. Explain concepts and theories of mathematics and sciences, appropriate to the Logic Design.	A1.1 Explain Concepts of Binary representation, Codes and their conversions, BCD, Octal, Hexadecimal, ASCII, Gray and Signed binary number representation with 1's and 2's complement methods. A1.2 Explain Concepts of Minimization of logic expressions by algebraic method and K-map method A1.3 Explain Concepts of Combinational circuits. A1.4 Explain Concepts of sequential logic circuits.
	A.2. Outline basics of information and communication technology (ICT)	A2.1 Outline the basics of binary representation. A2.2 Outline the basics of binary arithmetic and Boolean Algebra. A2.3 Outline the basics of logic gates and circuits. A2.4 Outline the basics of Flip Flops. A2.5 Outline the basics of Registers and counters.
	A.4 Demonstrate principles of design including elements design, process and/or a system related to specific Logic Design.	A4.1 Demonstrate principles of design for combinational circuits. A4.2 Demonstrate principles of design for sequential logic circuits
	A.8 Describe current engineering technologies as related to Logic Design.	A8.1 Describe current engineering technologies related to combinational circuits, Programming logic devices and gate arrays. A8.2 Describe current engineering technologies related to sequential circuits design methodology.
	A.13. Explain elementary science underlying electronic engineering systems and information technology.	A13.1 Explain elementary science underlying logic gates. A13.2 Explain elementary science underlying combinational circuits-Programming logic devices and gate arrays. A13.3 Explain elementary science underlying Flip-Flops. A13.4 Explain elementary science underlying Registers and counters.

B- Intellectual Skills	B.5 Assess and evaluate characteristics and performance components, systems and processes	B5.1 Assess and evaluate the characteristics and performance of logic gates. B5.2 Assess and evaluate the characteristics and performance of combinational circuits. B5.3 Assess and evaluate the characteristics and performance of Flip Flops. B5.4 Assess and evaluate the characteristics and performance of Registers and counters.
	B.8 Select and appraise appropriate ICT tools to a variety of engineering problems.	B8.1 Select appropriate logic gates to a variety of electronic engineering design problems. B8.2 Select appropriate adders, subtractors, encoders, decoders, comparators, multiplexers, de-multiplexers, parity generators, etc. to a variety of electronic engineering design problems. B8.3 Select appropriate Programming logic devices and gate arrays to a variety of electronic engineering design problems. B8.4 Select appropriate Flip Flops, Registers, counters and Irregular counters to a variety of electronic engineering design problems.
C- Professional Skills	C.1. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	C1.1 Apply knowledge of Boolean Algebra and Logic gates to design AND, OR, etc. gates. C1.2 Apply knowledge of Boolean Algebra and Combinational circuits to design adders, subtractors, encoders, decoders, comparators, multiplexers, de-multiplexers, parity generators, etc. C1.3 Apply knowledge of Boolean Algebra and Combinational circuits to design Programming logic devices and gate arrays C1.4 Apply knowledge of Boolean Algebra and Sequential Circuits to design Flip-Flops. C1.5 Apply knowledge of Boolean Algebra and Sequential Circuits to design Registers and Counters.
	C.5. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	C5.1 Use measuring instruments and laboratory equipment to design experiments to demonstrate the Fundamentals of AND, OR, EXCLUSIVE-OR logic gates.

		C5.2 Use measuring instruments and laboratory equipment to design experiments to understand the basics of Half Adders and Full Adders. C5.3 Use measuring instruments and laboratory equipment to design experiments to assess the performance of Binary-to-Decimal decoder. C5.4 Use measuring instruments and laboratory equipment to design experiments to build Practical multiplexer circuit. C5.5 Use measuring instruments and laboratory equipment to design experiments to demonstrate the performance of Modulus Counter.
	C.12. Prepare and present technical reports.	C12.1 Prepare and present technical reports on the design methodologies for Combinational circuits. C12.2 Prepare and present technical reports on the design methodologies for Sequential circuits.
D- General Skills	D.1. Collaborate effectively within multidisciplinary team.	D1.1 Collaborate effectively within multidisciplinary team during Lab times.
	D.3. Communicate effectively.	D3.1 Communicate effectively with demonstrators and colleagues in laboratory times.
	D.4. Demonstrate efficient IT capabilities.	D4.1 Demonstrate efficient IT capabilities relevant to Logic Design topics.
	D.6. Effectively manages tasks, time, and resources.	D.6-1. Effectively manages tasks, time, and resources in laboratory times and exams.

4- (a) Course Contents	Review of Data and number systems (Binary representation, Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, Gray) - Signed binary number representation with 1's and 2's complement methods, Binary arithmetic, Boolean algebra, logic gates and circuits, Minimization of logic expressions by algebraic method, K-map method - Combinational circuits-adder, subtractor, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, etc. Design of combinational circuits-Programming logic devices and gate arrays. Sequential Circuits: Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology**.**
4(b) Practical Laboratory:	- Fundamentals of AND LOGIC - Fundamentals of OR LOGIC - Basic AND Logic with ICs - Basic OR Logic with ICs - EXCLUSIVE-OR Logic with ICs - Half Adders and Full Adders - Binary-to-Decimal decoder - Practical multiplexer circuit - Modulus Counter

5- Teaching and Learning Methods	- Lectures - Labs - Laboratory assignments and reports
6- Teaching and Learning Methods for disable students	1-Assign a portion of the office hours for those students. 2- Give them specific tasks and evaluate them in it. 3- Repeat the explanation of some of the course material and Lectures and Laboratory times.
7- Student Assessment	
a- Assessment Methods	- Laboratory assignments and reports. - Quizzes - Labs attendance and exam. - Midterm, and final exams
b- Assessment Schedule	- Laboratory assignments and reports: Weekly - Quizz-1: Week no 3 - Mid-Term exam: Week no 8 - Quizz-2: Week no 11 - Lab exam: Week no 15 - Final – term examination: Week no 16
c- Weighting of Assessment	- Class tutorial and quizzes: 10 % - Mid-term examination: 10 % - Oral and Lab/practical exam: 20 % - Final – term examination: 60 % Total 100 %
8- List of text books and references:	
a- Course notes	There are lectures notes prepared in the form of a book.
b- Text books	[1] Thomas Floyd, "Digital fundamental", 11th edition Prentice-Hall, Inc., July 24, 2014**.**
c- Recommended books	Thomas Floyd, "Digital fundamental", 10th edition Prentice-Hall, Inc., March 29, 2008**.**
d- Periodicals, Web sites …etc	http://www.tutorialspoint.com/computer_fundamentals/ https://www.coursera.org/course/programming1 http://www.cprogramming.com/

Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Review of Data and number systems (Binary representation, Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, Gray) - Signed binary number representation with 1's and 2's complement methods.	1-2	A1.1, A2.1			D1.1, D3.1, D4.1, D6.1
Binary arithmetic, Boolean algebra	3	A2.2		C1.1	D1.1, D3.1, D4.1, D6.1

logic gates and circuits	4-5	A2.3, A13.1	B5.1, B8.1	C1.1, C5.1	D1.1, D3.1, D4.1, D6.1
Minimization of logic expressions by algebraic method, K-map method.	6-7	A1.2			D1.1, D3.1, D4.1, D6.1
Combinational circuits- adder, subtractor, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, etc.	9	A1.3	B5.2, B8.2	C1.2, C5.2, C5.3, C5.4	D1.1, D3.1, D4.1, D6.1
Design of combinational circuits- Programming logic devices and gate arrays.	10	A4.1, A8.1, A13.2	B8.3	C1.3, C12.1	D1.1, D3.1, D4.1, D6.1
Sequential Circuits: Flip Flops	11-12	A1.4, A2.4, A13.3	B5.3, B8.4	C1.4	D1.1, D3.1, D4.1, D6.1
Various types of Registers and counters and their design, Irregular counter, State table and state transition diagram.		A2.5, A13.4	B5.4, B8.4	C1.5, C5.5	D1.1, D3.1, D4.1, D6.1
Sequential circuits design methodology.	13	A4.2,A8.2	B8.4	C12.2	D1.1, D3.1, D4.1, D6.1

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	A.1,A.2,A.4, A.8, A.13	B5,B8		D3
Labs	A.1,A.2,A.4, A.8, A.13	B5,B8	C1, C5	D1,D3,D.4,D.6
Laboratory assignments	A.1,A.2,A.4, A.8, A.13	B5,B8	C1, C5, C12	D.4,D.6

Assessment Methods - ILOs Matrix

Assessment Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Weekly Laboratory assignments	A.1,A.2,A.4, A.8, A.13	B5,B8	C.12	D1,D3,D.4,D.6
Labs attendance and Lab. exam	A.1,A.2,A.4, A.8, A.13	B5,B8	C.1, C.5	D1,D3,D.4,D.6
Quizzes, Midterm, and Final written exams	A.1,A.2,A.4, A.8, A.13	B5,B8		D.4,D.6

Authorized from department board at 15/05/2016
Authorized from college board at 05/06/2016

Course coordinator: Assc. Prof. Gamal Attia Mahrous

Head of Department: Prof. Fathi El-Sayed Abd El-Samie