Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil technology institute	
Department	Electrical Dep.	
Module Name	Digital Logic Circuit	
Module Code	DLC205	
Semester	2nd	
Credits	6	
Module type	Prerequisite ☐ Core ☒ Assist. ☐	
Weekly hours	Four hours	
Weekly hours (Theory)	(2)hr Class	(2)hr Workload
Weekly hours (Practical)	(2)hr Class	(2)hr Workload
Lecturer (Theory)	Rezan Ahmad Ali	
E-Mail & Mobile NO.	Rezan.ali@epu.edu.iq	
Lecturer (Practical)		
E-Mail & Mobile NO.		

Course Book

Course Description	This course will give principals of the Digital logic circuits with all the fundamentals of Digital circuits in such a way that they will gain theoretical and practical experience of about the fundamental concepts of Digital logic circuits including Logic Gates, Boolean Algebra Theorem, Universal Gates, Adders, Subtractions & Flip Flops, and design Digital circuits.
Course objectives	After taking this course, students have ability to: 1-Providing a comprehensive understanding of the main principles of digital logic circuits. 2- Clarify the main digital laws. 3- Apply these principals practically.
Student's obligation	• Class attendance is important, and attendance will be taken every lecture. • The student submits a weekly report about what have done in the Lab section. For examination, there are semester exam and final exam for the practical and the theory parts. During the class hours there will be some quizzes
Required Learning Materials	White board, data show.
Assessment scheme	16% Mid Term (Theory and practical) 4% Quiz 40% Assignment (report, paper, homework, seminar..) 25% final practical 15% final theory
Specific learning outcome:	• By the end of the course, students should be able to: • 1. Recognize different numbering systems • 2. Convert numbers from system to other

	3. Execute binary arithmetic 4. Identifying different logic gates from their symbol & write their truth table 5. Convert any logic equation into logic circuit 6. Minimize logic equation to get minimized logic circuit 7. Implement any logic circuit using one type of logic gates either NOR or NAND gates 8. Use logic modules (Adder, decoder, multiplexer, demultiplexer) 9. Recognize different types of flip flops and convert one type into another. 10. Implement registers using flip-flop
Course References:	1. Godse, Atul P., and Deepali A. Godse. *Digital Logic Design & applications*.Technical Publications, 2. Paton, Barry. "Fundamentals of digital electronics." *National Instruments*. 3. Brown, Stephen D. *Fundamentals of digital logic with Verilog design*. Tata McGraw-Hill Education. 4. *Floyd, T. L., 2014. Digital Fundamentals, Prentice-Hall, USA* 5- Fundamentals of digital circuits A.Anand Kumar *6*- Internet

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction to Digital circuit	1	
Numbering systems (Decimal, Binary, Octal, and Hexadecimal). Number base Conversions.	2	
Conversion: Decimal Number , Binary Number, Conversion: Octal Number, Hexadecimal Number.	3	

Binary Arithmetic: Addition. Subtraction: 1st complement, 2nd Complement	4	
Logic Gates (NOT, AND, OR, NAND, NOR). Exclusive-OR (EX-OR), Exclusive-NOR (EX-NOR),	5	
Universal Gates (NAND Gate + NOR Gate).	6	
Rules in Boolean Algebra.	7	
De- Morgan's Theorems.	8	
Logic expression and truth table of a logic circuit Combination Circuit Sum Of Products And Product Of Sum.	9	
Adders (Half Adder /Full Adder). Subtractors (Half Subtractor/ Full Subtractor). Comparator	10	
Minimization With Karnaugh Maps,	11	
Decoders , Multiplexers, Demultiplexer	12	
Flip-Flops (RS Flip-Flop), (Clocked RS Flip-Flop). (J-K Flip-Flop) , (D Flip-flop), (T Flip-Flop).	13	
Practical Topics	Week	**Learning Outcome**
OR gate by using diodes & resistors. AND gate by using diodes & resistors . NOT gate by using transistor & resistors.	1	
OR , AND, NOT, NOR & NAND gates using ICs	2	
EX.OR gate. EX.NOR gate.	3	
DE MORGAN'S THEOREMS	4	
UNIVERSAL GATES.	5	
Half-Adder. Full-Adder.	6	

Half-subtractor Full-subtractor	7	
Comparator.	8	
Seven-Segment display.	9	
decoder	10	
Up Counter. Down Counter	11	
Clock Generation By Integrate Circuit (IC 555)	12	

Ministry of Higher Education & Scientific Research

Erbil Polytechnic University

Erbil Technology Institute

Final Exam: (Second Term)

Class: First

Subject: Digital circuit

Time: 120 Minute

Q1/ a) Convert the following Numbers below: 30 Mark

1- Hex. Number $(7AF)_{16}$ to Octal Number.

2- Binary Number $(101111.101)_2$ to Decimal Number.

b) Make a truth table for comparing two Bit numbers.

Q2/ Find the result for the following operation using (Full-Adder) and draw it: 20 Mark

1111

1011 -

Q3/ Simplify a Karnugh map shown below write the Boolean Expression and draw it.

25 Mark

CD / AB	00	01	11	10
00	1	1	0	1
01	0	0	1	1
11	0	0	1	1
10	1	1	0	0

Q4/ a) What are the types of multivibrators?

25 Mark

b) Draw the logic circuit for 3-bit J-K flip flop, with timing diagram.

Lecturer

Rezan.A.Ali

Extra notes: I feel we need to spend more time, we will not have enough time to go through the topics in detail,it will be better to increase the theoretical hours to make more imagination about this subject.

External Evaluator