

ACADEMIC YEAR: 2023-2024

YEAR: III SEMESTER: I

FACULTY NAME: ABDUL AZEEM

SUBJECT : DIGITAL LOGIC DESIGN

REGULATION: R20

MID-I QUESTION BANK

UNIT-1

Q.No	Question	Marks	Cognitive level
1	a) Represent +65 and -65 in sign magnitude, sign 1's complement and sign 2's Complement representation.	5M	L2
	b) Convert $(97.75)_{10}$ to base 2 and Convert $(2468)_{10}$ to $()_{16}$	5M	L2
2	Given the 8bit data word 01011011, generate the 12 bit composite word for the hamming code that corrects and detects single error.	10M	L2
3	Perform the following addition using excess-3 code.	10M	L2
	i) $386+756$ ii) $738 + 444$		
4	Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend.	10M	L2
	i) $11010 - 10010$		
	ii) $11011 - 1101$		
	iii) $100 - 110000$		
	iv) $1010100 - 1010100$		
5	Describe different types of numeric codes? Explain them with suitable exam	10M	L1
6	a) Perform the following: (i) $(1523)_{16} = ()_{12}$ (ii) $(1101.11)_2 = ()_{10}$	10M	L2
	b) Discuss how the binary codes are obtained in weighted form? Encode decimal digits in 2 4 2 1, 7 3 2 -1 and 8 4 - 2 -1	10M	L1
7	a) Using 9's complement perform the following decimal arithmetic. Also justify answers with 10's complement	5M	L2
	i) $3765 - 4249$ ii) $-255 - 106$	5M	L1
	b) What is meant by BCD? Obtain binary codes for decimal digits in BCD and 2421 codes?		
8	Implement the following functions using NAND gates.	10M	L2
	a) $F1 = A(B+C D) + (B C)$ b) $F2 = w x + x^{\bar{}} y^{\bar{}} (z+w)$		
9	What are universal gates realize AND, OR, NOT, EX-OR using NAND	10M	L2

10	The message below coded in 7-bit hamming code is transmitted through a noisy channel. Decode the message assuming that at most a single error occurred in the code word. Code word= 1001001	10M	L3
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UNIT-2

Q.No	Question	Marks	Cognitive level
1	For the given Boolean function $F = x y' z + x' y' z + w' x y + w x' y + w x y$ Simplify the function to minimal literals using Boolean algebra	10M	L2
2	a) Convert the given expression in standard SOP form $f(A,B,C) = AC + BA + BC$ b) Convert the given expression in standard POS form $y = A.(A + B + C)$	5M 5M	L2 L2
3	Show that the dual of the exclusive-OR is equal to its complement.	10M	L2
4	Simplify and draw the AND/OR implementations for the following switching functions? i) $(A' + B)(B' + C) + (AB + C)$ ii) $(A + B)(ABC) + (A'C)$	10M	L2
5	Minimize the following function using K-map and also verify through tabulation method. $F(A, B, C, D) = \sum m(1,4,5,7,8,9,12,14) + d(0, 3, 6, 10).$	10M	L2
6	a) Convert each of the following expressions to extended sum of products (SOP) form i) $(a + b')(a + b' + c)$ ii) $(b'c + d')a + a'b'(c' + d)$ b) Implement the following functions with NAND and NOR gates i) $f(a, b, c, d) = a + b'(c + a'd)$ ii) $f(a, b, c, d) = ab'c'd + a'(bcd' + b'c')$	5M 5M	L2 L2
7	Reduce the expression $f = \sum m(0,2,4,6,7,8,10,12,13,15)$ using k-maps and implement the real minimal expression in universal logic.	10M	L3
8	Reduce the expression $f = \sum m(0,2,6,8,10,13,14,15)$ using k-maps and implement the real minimal expression in universal logic.	10 M	L3
9	Simplify using k-map i) $(ABC)' + B'CD' + A'BD + ABCD + AC'D + A'BC'D'$ ii) $(AB)' + A'C + BC + AB + AC' + (ABC)' + ABC$	10M	L2
10	Express the Boolean functions i) $F = AB + AC$	10M	L2

	ii) $F = x + y'z$ in a POS,SOP form		
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UNIT-3

Q.No	Question	Marks	Cognitive level
1	Implement the following logic functions using 4-to-16-line decoder and 16×1 De multiplexer ? i) $f_1 = \sum m(0, 1, 4, 7, 12, 14, 15)$ ii) $f_2 = \sum m(1, 3, 6, 9, 12)$	10M	L2
2	How full adder carries are calculated ahead? Discuss the design of carry look ahead adder	10M	L2
3	Realize the following logic functions with decoder i) $F_1(W, X, Y, Z) = \sum m(0, 2, 3, 4, 5, 6, 11, 12, 13, 14, 15)$ ii) $F_2(W, X, Y,) = \sum m(1, 2, 3, 5, 7, 9)$	10M	L2
4	Design a circuit to convert Excess-3 code to BCD code using discrete Logic gates	10M	L2
5	Implement Full adder using half adder, full sub tractor using half sub tractor	10M	L2
6	Discuss how four bit excess – 3 adder circuit is designed. Explain its operation	10M	L2
7	Design 4 bit Binary adder/sub tractor and explain circuit operation with an example?	10M	L2
8	Implement the Boolean function given below using 8×1 multiplexer $f(A, B, C, D) = \sum m(0, 2, 3, 5, 8, 11, 12, 14, 15)$	10M	L2
9	Design BCD adder circuit using 4-bit parallel binary adder and logic gates.	10M	L2
10	Implement full adder using half adder and derive output equations	10M	L2