CMR Technical Campus

B. Tech. Mid Question Bank (R22 Regulation)

Academic Year: 2024-2025 **Semester: III**

Subject Name: Digital Electronics [22EC302ES]

Faculty Name: Dr. Mahesh V Sonth

PART A

QN	Questions	Marks	BL	CO	Unit No
MID-I Questions					
1	Convert $(36.52)_8$ to Decimal and Hexadecimal.	2M	L3	CO1	1
2	Subtract $(745.81)_{10}$- $(436.62)_{10}$ using 10's Complement.	2M	L3	CO1	1
3	Classify and explain Binary Codes.	2M	L2	CO1	1
4	State Duality Principle.	2M	L2	CO1	1
5	Express the Boolean function F = A + B'C as standard sum of minterms.	2M	L2	CO1	1
6	List out universal gates and why they are called as universal gates.	2M	L1	CO1	1
7	Map the expression to minterms $f = A'B'C + AB'C + A'BC' + ABC$	2M	L2	CO2	2
8	Map the expression to maxterms $f = (A + B + C)(A' + B + C')(A' + B' + C')(A + B' + C')(A' + B' + C)$	2M	L2	CO2	2
9	Reduce the expression $f = \Sigma m(0,2,3,4,5,6)$ using k-map.	2M	L3	CO2	2
10	Reduce the expression $f = \Pi M(0,1,2,3,4,7)$ using k-map.	2M	L3	CO2	2
11	Reduce the expression $f = \Sigma m(0,2,3,4)$ using k-map and implement using AOI gates.	2M	L3	CO2	2
12	Reduce the expression $f = \Sigma m(0,2,3,4,7)$ using k-map and implement using AOI gate.	2M	L3	CO2	2
13	Define combinational and sequential circuits.	2M	L1	CO3	3
14	Explain Half adder with truth table	2M	L2	CO3	3
15	Draw Full adder using Half Adder.	2M	L2	CO3	3
MID-II Questions					
16	Describe 1-bit Magnitude Comparator.	2M	L2	CO3	3
17	Brief about Multiplexer and Demultiplexers.	2M	L2	CO3	3
18	Discuss the 2 to 4 decoder with truth table.	2M	L2	CO3	3
19	Differentiate Latch and Flip-Flop.	2M	L4	CO4	4
20	Write excitation table of D and JK flip-flop.	2M	L4	CO4	4
21	Discuss the different types of shift registers.	2M	L2	CO4	4
22	List out the applications of Shift Registers.	2M	L1	CO4	4
23	Write characteristic equations of SR, J-K, D, and T Flip-Flops.	2M	L2	CO4	4
24	Distinguish between synchronous and asynchronous counters.	2M	L4	CO4	4
25	List out different types of RAM Memories.	2M	L1	CO5	5
26	Encode the message bits $(1110)_2$ into 7-bit even parity hamming code.	2M	L5	CO5	5
27	Discuss the different types of ROM.	2M	L2	CO5	5
28	Classify the PLDs.	2M	L2	CO5	5
29	Compare PROM, PLA and PAL.	2M	L1	CO5	5
30	List out IC classification based on Number of Transistors.	2M	L1	CO5	5

PART- B

MID-I Questions					
QN	Questions	Marks	BL	CO	Unit No
1	i) Convert the given binary number to equivalent gray code 0011, 0101, 1110, 0010. ii) Write the numbers 9, 6 and 3 in terms of following weighted binary codes a) 4,2,2,1 b) 8,4,2,1	4M	L3	CO1	1
2	11010-10000 Perform subtraction using 1's and 2's Complement method.	4M	L3	CO1	1
3	Prove Commutative, Associative and Distributive Laws of Boolean Algebra.	4M	L3	CO1	1
4	State and Prove DeMorgans Theorm.	4M	L3	CO1	1
5	Prove that $AB + A'C + BC = AB + A'C$(Consensus Theorem) $AB + A'C = (A + C)(A' + B)$ (Transposition Theorem)	4M	L4	CO1	1
6	Find the complement and dual of the function and then reduce it to minimum number of literals $f = [(ab)'a][(ab)'b]$	4M	L3	CO1	1
7	i) Convert $(8E47.AB)_{16}$ to Decimal, Binary and Octal numbers. ii) $(163.875)_{10}$ to Binary, Octal and Hexadecimal	8M	L3	CO1	1
8	i) Expand the given Boolean expression into maxterms and minterms. a) $A(B' + A)B$ b) $A(A' + B)(A' + B + C')$ ii) Write the Boolean Expression, Truth Table, Logic Symbol of Basic Gates, Universal Gates and Derived Gates	8M	L3	CO1	1
9	i)State and prove the following Boolean laws: a) Redundant Literal Rule b) Absorption Law ii) Reduce the Boolean expression $f = A[B + C'(AB + AC')']$	8M	L4	CO1	1
10	Minimize f = $\sum$ m(0,2,3,4,5,6,9,12,14,15) using k map and implement with AOI logic.	4M	L3	CO2	2
11	Minimize the following expressions using K-map and realize using NAND Gates. F= $\prod$ M (0,1,2,4,5,6,9,11,12,13,14,15)	4M	L3	CO2	2
12	Reduce the Boolean expression using K-map and implement using NOR gates F= Σ m (9,10,12)+d(3,5,6,7,11,13,14,15)	4M	L3	CO2	2
13	Reduce $\prod$ M (1,2,3,5,6,7,8,9,12,13) using K-map and implement using NOR gates.	4M	L3	CO2	2
14	Minimize the following functions using k map F(A,B,C,D) = $\sum$ m(0,1,2,5,8,15) + d(6,7,10)	4M	L3	CO2	2
15	Minimize the following functions using k map F(A,B,C,D) = $\prod$ M(0,1,3,56,7,9,10,11,12,13,15)	4M	L3	CO2	2
16	Reduce the Boolean expression using K-map and implement using both the universal gates f= Σ m (0,1,3,4,5,6,7,13,15)	8M	L3	CO2	2
17	i) Convert the Boolean expression $A + \bar{B}\bar{C}$ to minterms and reduce using K-map.	8M	L3	CO2	2

	ii) Obtain the maxterms for the Boolean expression $A(B + \bar{C})$ and minimize using K-map.				
18	Minimize the following expressions using K-map and realize using NAND and NOR Gates. f = Σ m (1, 3, 5, 8, 9, 11, 15) +d (2, 13).	8M	L3	CO2	2
19	Explain Design procedure of combinational circuits.	4M	L2	CO3	3
20	Explain Full Adder with k-map and logic diagram.	4M	L5	CO3	3
21	Explain Full Subtractor with k-map and logic diagram.	4M	L5	CO3	3
22	Design BCD Adder.	4M	L3	CO3	3
	MID-II Questions				
23	Design a 2-bit Magnitude Comparator.	4M	L3	CO3	3
24	Design Octal to Binary Encoder.	4M	L3	CO3	3
25	Explain 4 to 1 MUX and draw logic diagram.	4M	L3	CO3	3
26	Explain 1-to-8 DEMUX and draw logic diagram.	4M	L3	CO3	3
27	Discuss the design procedure of Sequential Circuit Design.	4M	L2	CO4	4
28	Give logic circuit diagram, characteristic equation, truth table and excitation table of the following flip-flops. (i) SR Flip-Flop (ii) D Flip-Flop	4M	L4	CO4	4
29	Give logic circuit diagram, characteristic equation, truth table and excitation table of the following flip-flops. (i) J-K Flip-Flop (ii) T Flip-Flop	4M	L4	CO4	4
30	Design Mod-6 asynchronous Counter.	4M	L3	CO4	4
31	Design Synchronous Mod-10 counter using Flip-flop.	4M	L3	CO4	4
32	Explain Shift register (SISO, SIPO, PISO, PIPO).	4M	L2	CO4	4
33	i) Convert JK to T flip-flop ii) Convert SR flip-flop to D flip-flop	8M	L4	CO4	4
34	Explain Ring and Johnson (Twisted ring) counter.	8M	L3	CO4	4
35	i) Design 3-bit synchronous DOWN counter ii) Design 3 bit asynchronous UP counter	8M	L3	CO4	4
36	Explain Memory Decoding.	4M	L2	CO5	5
37	Design a combinational circuit using a ROM. The circuit accepts a three-bit number and outputs a binary number equal to the square of the input number.	4M	L3	CO5	5
38	Explain Classification of IC.	4M	L2	CO5	5
39	Give a brief comparison between various logic families.	4M	L3	CO5	5
40	F1 = AB' + AC + A'BC' F2 = (AC + BC)' Implement using PAL.	4M	L4	CO5	5
41	Implement Full adder using PLA.	4M	L4	CO5	5
42	Device a single error correcting code for a 11 bit group 01101110101. Test the following hamming code sequence for a 11 bit message and correct it if necessary 101001011101011.	8M	L4	CO5	5
43	Realize basic logic gates using Diodes and transistors.	8M	L5	CO5	5
44	The message below coded in the 7-bit Hamming Code is transmitted through a noisy channel. Decode the message assuming that at most a single error occured in each code word. 1001001, 0111001, 1110110, 0011011	8M	L4	CO5	5