Department of IT

B. Tech. Mid Question Bank (R22 Regulation)

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

Subject Name: Digital Electronics [22EC302ES]

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PART A

QN	Questions	Marks	BL	CO	UNIT
1	Convert $(36.52)_8$ to Decimal and Hexadecimal.	2M	L3	CO1	I
2	Subtract $(745.81)_{10}$- $(436.62)_{10}$ using 10's Complement.	2M	L3	CO1	I
3	Classify and explain Binary Codes.	2M	L2	CO1	I
4	State Duality Principle.	2M	L2	CO1	I
5	Express the Boolean function F = A + B'C as standard sum of minterms.	2M	L2	CO1	I
6	List out universal gates and why they are called as universal gates?	2M	L1	CO1	I
7	Map the expression to minterms $f = A'B'C + AB'C + A'BC' + ABC$	2M	L2	CO2	II
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	II
9	Reduce the expression $f = \Sigma m(0,2,3,4,5,6)$ using k-map.	2M	L3	CO2	II
10	Reduce the expression $f = \Pi M(0,1,2,3,4,7)$ using k-map.	2M	L3	CO2	II
11	Reduce the expression $f = \Sigma m(0,2,3,4)$ using k-map and implement using AOI gates.	2M	L3	CO2	II
12	Reduce the expression $f = \Sigma m(0,2,3,4,7)$ using k-map and implement using AOI gate.	2M	L3	CO2	II
13	Define combinational and sequential circuits.	2M	L1	CO3	III
14	Explain Half adder with truth table.	2M	L2	CO3	III
15	Draw Full adder using Half Adder.	2M	L2	CO3	III
16	Describe 1-bit Magnitude Comparator.	2M	L2	CO3	III
17	Brief about Multiplexer and Demultiplexers.	2M	L2	CO3	III
18	Discuss the 2 to 4 decoder with truth table.	2M	L2	CO3	III
19	Differentiate Latch and Flip-Flop.	2M	L4	CO4	IV
20	Write excitation table of D and JK flip-flop.	2M	L4	CO4	IV
21	Discuss the different types of shift registers.	2M	L2	CO4	IV
22	List out the applications of Shift Registers.	2M	L1	CO4	IV
23	Write characteristic equations of SR, J-K, D, and T Flip-Flops.	2M	L2	CO4	IV
24	Distinguish between synchronous and asynchronous counters.	2M	L4	CO4	IV
25	List out different types of RAM Memories	2M	L1	CO5	V
26	Encode the message bits $(1110)_2$ into 7-bit even parity hamming code.	2M	L5	CO5	V
27	Discuss the different types of ROM.	2M	L2	CO5	V
28	Classify the PLDs.	2M	L2	CO5	V
29	Compare PROM, PLA and PAL.	2M	L1	CO5	V
30	List out IC classification based on Number of Transistors.	2M	L1	CO5	V

PART- B

QN	Questions	Marks	BL	CO	UNIT
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	I
2	11010-10000 Perform subtraction using 1's and 2's Complement method. .	4M	L3	CO1	I
3	Prove Commutative, Associative and Distributive Laws of Boolean Algebra.	4M	L3	CO1	I
4	State and Prove DeMorgans Theorm.	4M	L3	CO1	I
5	Prove that $AB + A'C + BC = AB + A'C$(Consensus Theorem) $AB + A'C = (A + C)(A' + B)$ (Transposition Theorem)	4M	L4	CO1	I
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	I
7	i) Convert $(8E47.AB)_{16}$ to Decimal, Binary and Octal numbers. ii) $(163.875)_{10}$ to Binary, Octal and Hexadecimal.	8M	L3	CO1	I
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	I
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	I
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	II
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	II
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	II
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	II
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	II
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	II
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	II
17	i) Convert the Boolean expression $A + \bar{B}\bar{C}$ to minterms and reduce using K-map. ii) Obtain the maxterms for the Boolean expression $A(B + \bar{C})$ and minimize using K-map.	8M	L3	CO2	II
18	Minimize the following expressions using K-map and realize	8M	L3	CO2	II

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	using NAND and NOR Gates. $f = \Sigma m (1, 3, 5, 8, 9, 11, 15) + d (2, 13)$.				
19	Explain Design procedure of combinational circuits.	4M	L2	CO3	III
20	Design Full Adder and Full Subtractor.	4M	L5	CO3	III
21	Design BCD Adder.	4M	L5	CO3	III
22	Design a 2-bit Magnitude Comparator.	4M	L3	CO3	III
23	Design Octal to Binary Encoder.	4M	L3	CO3	III
24	Explain i) 4 to 1 MUX. ii)1-to-8 DEMUX.	4M	L3	CO3	III
25	Discuss the design procedure of Sequential Circuit Design.	4M	L2	CO4	IV
26	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	IV
27	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	IV
28	Design Mod-6 asynchronous Counter.	4M	L3	CO4	IV
29	Design Synchronous Mod-10 counter using Flip-flop.	4M	L3	CO4	IV
30	Explain Shift register (SISO, SIPO, PISO, PIPO).	4M	L2	CO4	IV
31	i) Convert JK to T flip-flop ii) Convert SR flip-flop to D flip-flop	8M	L4	CO4	IV
32	Explain Ring and Johnson (Twisted ring) counter.	8M	L3	CO4	IV
33	i) Design 3-bit synchronous DOWN counter ii) Design 3 bit asynchronous UP counter	8M	L3	CO4	IV
34	Explain Memory Decoding.	4M	L2	CO5	V
35	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	V
36	Explain Classification of IC	4M	L2	CO5	V
37	Give a brief comparison between various logic families	4M	L3	CO5	V
38	F1 = AB' + AC + A'BC' F2 = (AC + BC)' Implement using PAL	4M	L4	CO5	V
39	Implement Full adder using PLA	4M	L4	CO5	V
40	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	V
41	Realize basic logic gates using Diodes and transistors.	8M	L5	CO5	V
42	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	V

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