Semester:3rd	Department of AI/ML CSE AI/ML CSE	AY: 2026-27
Course Code: BCS303	Course Name: Digital Design and Computer Organization	

Question Bank

Q.	Module-01	M	L	C
1.	expression to minimum number of literals and draw the original and simplified expressions with logic diagram. i) xy + x'z + yz ii) x + x'y	10	L2	CO1
2.	Apply k - map Technique to simplify the function F (w, x, y, z) = ∑ (1, 3, 7, 11, 15) and d (w, x, y, z) = ∑ (0, 2, 5) and also implement the simplified function with NAND gate	10	L2	CO1
3.	Describe Map Method for three variables	10	L2	CO1
4.	Explain Positive and Negative logic and prove that positive AND is equal to negative OR.	10	L2	CO1
5.	Determine the complement of the following function: (i) F = xy' + x'y (ii) F = x'yz' + x'y'z	10	L2	CO1
6.	Describe map method for three variables Apply K map technique to simplify the following function: (i) F(x, y, z) = Σ(0, 2, 4, 5, 6) (ii) F(x, y, z) = x'y + yz' + y'z'	10	L2	CO1
7	Apply K map technique to simplify the function : F(w, x, y, z) = Σ(1, 3, 7, 11, 15) and d(w, x, y, z) = Σ(0, 2, 5)	10	L2	CO1
8	Determine all the prime implicants for the Boolean function F and also determine which are essential F(w, x, y, z) = Σ(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)	10	L2	CO1
9	Reduce the following Boolean expressions to the minimum number of literals. i) x(x' + y) ii) x + x'y iii) (x + y)(x + y') iv) xy + x'z + yz v) (x + y)(x' + z)(y + z)	10	L2	CO1
10	Determine the minimum SOP form using Karnaugh Map F = A'B'C' + B'CD' + A'BCD' + AB'C'	10	L2	CO1
11	Simplify the Boolean function F(w, x, y, z) = Σ(1, 3, 7, 11, 15) which has the don't care conditions d(w, x, y, z) = Σ(0, 2, 5)	10	L2	CO1
12	Simplify and implement the following Boolean function using NAND gates F(x, y, z) = Σ(1, 2, 3, 4, 5, 7)	10	L2	CO1
13	Obtain a minimum product of sums with a Karnaugh map. F(w, x, y, z) = x' z' + wyz + w' y' z' + x' y	10	L2	CO1
14	Find the minimum sum of products for each function using a Karnaugh map. i) F1(a, b, c) = M0 + M2 + M5 + M6	10	L2	CO1

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	ii) F2(d, e, f) = Σm(0, 1, 2, 4) iii) F3(r, s, t) = rt' + r's' + r's			
15	Identify the prime implicants and essential prime implicants of the following functions: i) f(A, B, C, D) = Σ (1, 3, 4, 5, 10, 11, 12, 13, 14, 15) ii) f(W, X, Y, Z) = Σ(0, 1, 2, 5, 7, 8, 10, 15)	10	L2	CO1
Module-02				
16	Design a combinational circuit that converts a four — bit BCD crxle to Excess 3 Code	10	L2	CO2
17	Design 3 to 8 decoder	10	L2	CO2
18	Describe 4 x 1 mux with block diagram and truth table.	10	L2	CO2
19	What is flip flop? Explain positive edge triggered D type of flip flop	10	L2	CO2
20	Explain the combinational circuit design procedure with code conversion example	10	L2	CO2
21	Design a full adder circuit	10	L2	CO2
22	What are storage elements? Explain the working of SR and D latch along with logic diagram and function table	10	L2	CO2
23	Implement the design of combinational circuit BCD and excess 3 code converter	10	L2	CO2
24	Implement full adder circuit using 3:8 decoders	10	L2	CO2
25	With Truth table and K-map simplification, implement the full adder with basic gates and using two half adders an OR gate	10	L2	CO2
26	Realize the Boolean function using 8:1 multiplexer F(A, B, C, D) = Σ(1, 3, 4, 11, 12, 13, 14, 15)	10	L2	CO2
27	What is Latch? With neat diagram, explain S-R latch using NOR gate. Derive characteristics equation.	10	L2	CO2
28	What is priority encoder? Design 4:2 priority encoder with necessary diagrams	10	L2	CO2
29	-.Design and explain four bit adder with carry look ahead	10	L2	CO2
30	What is multiplexer? Design 9:1 mux using 2:1 mux	10	L2	CO2

***Note:**

1. All modules should contain a minimum of **10** questions each and the total number of questions must be **50**.
2. Questions can carry marks of 06, 07, 08, 09, 10 and for problems: 04 or 05.
3. Follow the RBTL as per the keywords used to frame the questions.
4. Maintain the Course Outcomes (COs) as per the syllabus.
5. M: Marks, L: RBTL, C:COs.

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