Kathir College of Engineering

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Neelambur, Avinashi Road, Coimbatore-62

SAMPLE QUESTION PAPER FOR CONTINUOUS ASSESSMENT

Branch	ECE	Sem.	III	Date		Duration	90 min
Subject code & Name		EC8392 Digital Electronics				Max. Marks	50

Course Outcomes: **RBT**

CO1	Relate mathematical concepts and digital fundamentals and apply minimization techniques for logic optimization	AP
CO2	Analyse the specifications and design various combinational digital circuits using logic gates	AN
CO2	Analyse the specifications and design various synchronous and asynchronous sequential circuits by successfully considering the constraints if any	AN
CO3	Understand the concept of semiconductor memories and related Technologies	U
CO4	Understand essential logic families involved in the design of logic gates	U

	Part – A (07 x 02 = 14 Marks)	RBT	CO	Marks
	Answer All Questions			
1	The solution to the quadratic equation x^2 -11x+22=0 is x=3 and x=6. What is the base of the numbers?	U	1	2
2	Show that A(B' + A · C')' can be implemented using only one 3-input AND gate	AP	1	2
3	Implement the Boolean function F(A,B,C)= ∑ (1,5,7) using 8*1 MUX	AP	2	2
4	Implement full adder's output functions using decoder	AP	2	2
5	Derive the excitation table of a JKFF from its characteristic table and the characteristic equation	AP	3	2
6	Infer the term "Universal Shift register"	U	3	2
7	Illustrate a 4-bit Switch-tail Ring Counter with the count sequence	U	3	2

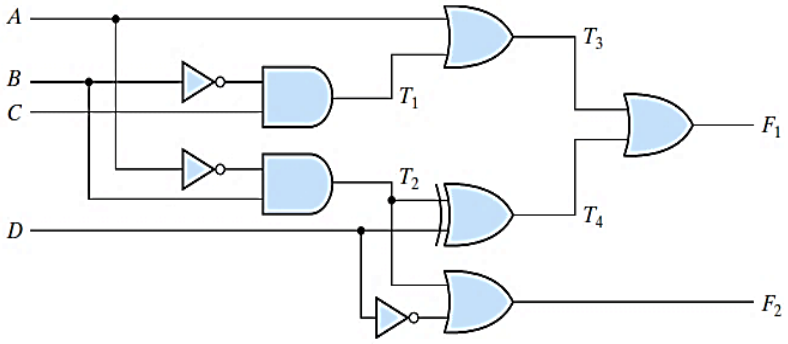
	Part – B (02 x 10 = 20 Marks)	RBT	CO	Marks
	Answer All Questions			
8 (a)	Simplify the following expression using the postulates and theorems	AP	1	10

of Boolean algebra. Eliminate all group complements. Justify each step by stating or referring to the Boolean theorem or postulate you use. Don't skip any steps! **Do NOT use a Karnaugh map to simplify the expressions.**

$$F= (A \cdot B \cdot C)'(A + C)(A + C')$$

(OR)

8 (b)	Simplify the following Boolean expressions, using four-variable map: $F(w,x,y,z) = x'z + w'xy' + w(x'y + xy')$	AP	1	10
9 (a)	Consider the combinational circuit shown in Fig.	AP	2	10



a) Derive the Boolean expressions for T_1 through T_4. Evaluate the outputs F_1 and F_2 as a function of the four inputs.

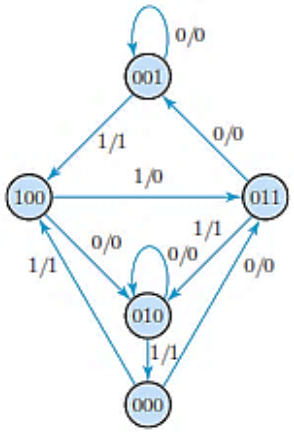
b) List the truth table with 16 binary combinations of the four input variables. Then list the binary values for T_1 through T_4 and outputs F_1 and F_2 in the table.

a. Plot the output Boolean functions obtained in part (b) on maps and show that the simplified Boolean expressions are equivalent to the ones obtained in part (a).

(OR)

9 (b)	Implement the following Boolean function with a 4 x 1 multiplexer and external gates. $F(A, B, C, D) = \sum (1, 3, 4, 11, 12, 13, 14, 15)$ Connect inputs A and B to the selection lines. The input requirements for the four data lines will be a function of variables C and D. These values are obtained by expressing F as a function of C and D for each of the four cases when AB = 00, 01, 10, and 11. These functions may have to be implemented with external gates.	AP	2	10

	Part – C (01 x 16 = 16 Marks)	RBT	CO	Marks
	(To be framed to test Higher Order Thinking skills)			
10 (a)	A sequential circuit has three flip-flops A, B, C; one input x_in; and one output y_out. The state diagram is shown in Fig. The circuit is to be designed by treating the unused states as don't-care conditions. Analyze the circuit obtained from the design to determine the effect of the unused states. Use JK flip-flops in the design	AN	3	16



(OR)

10 (b)	A sequential circuit with two D flip-flops A and B, two inputs, x and y; and one output z is specified by the following next-state and output equations $A(t + 1) = xy' + xB$ $B(t + 1) = xA + xB'$ $z = A$ (a) Draw the logic diagram of the circuit. (b) List the state table for the sequential circuit. (c) Draw the corresponding state diagram.	AN	3	16

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