MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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EMPOWERING THROUGH INNOVATIONS
MLRS

II B.Tech I Sem Regular End Examination, February-2022
Digital Logic Design
(CSE, CSI & IT)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
   Each question carries 10 marks and may have a, b as sub questions.

PART- A
(10*2 Marks = 20 Marks)

1.	a)	Convert the number $(1984)_{10}$ into base 8	2M	CO1	L1
	b)	Given binary numbers a=1010.11 , b=101.01 , Perform a + b	2M	CO1	L2
	c)	Prove that if x and y are switching variable, then $x'=x\oplus1$.	2M	CO2	L2
	d)	What are the drawbacks of k-map method?	2M	CO2	L1
	e)	Draw the logic diagram of 4 x 16 decoder with two 3 x 8 decoders.	2M	CO3	L1
	f)	What are the advantages of three state gates?	2M	CO3	L1
	g)	Draw the synchronous clocked sequential circuit.	2M	CO4	L1
	h)	How the clock response for flip-flop and latch?	2M	CO4	L2
	i)	Compare logic and functional hazards.	2M	CO5	L2
	j)	What is primitive flow table?	2M	CO5	L1

PART- B
(10*5 Marks = 50 Marks)

2	a)	The following arithmetic operations is correct in at least one number system. Determine the possible bases of the numbers in each operation. 23+44+14+32 =223	5M	CO1	L3
	b)	Write a procedure to subtract two n-digit unsigned numbers M-N in base r with suitable example.	5M	CO1	L3

OR

3	(i)	Write the following Boolean expression in product of sums form: a'b+a'c'+abc	10M	CO1	L3
	(ii)	Determine whether the following Boolean equation is true or false: x'y'+x'z+x'z' = x'z'+y'z'+x'z			
	(iii)	For the Boolean function F=xy'z+x'y'z+w'xy+wxy Use Boolean algebra to simplify the function to a minimum number of literals.			

4	a)	Show that a positive logic NAND gate is a negative logic NOR gate and vice versa.	5M	CO2	L4
	b)	Implementing F=(AB'+A'B)(C+D') using NAND gates only.	5M	CO2	L4

OR

5	Use the K-map method to simplify the following function and draw the logic diagram:	10M	CO2	L5

$$f(v, w, x, y, z) = \sum (3,6,7,8,10,12,14,17,19,20,21,24,25,27,28)$$

6	a)	Write the design procedure of the combinational circuits.	5M	CO3	L3
	b)	Draw the logic diagram for BCD to excess-3 code converter.	5M	CO3	L3

OR

7	Design a ripple carry adder and write the respective HDL program.	10M	CO3	L3

8	a)	Show that the characteristic equation for the complement output of a JK flip-flop is	5M	CO4	L4

$$Q(n+1) =J'Q'+KQ$$

	b)	Write and verify an HDL behavioral description of a positive-edge-sensitive D flip-flop with asynchronous preset and clear.	5M	CO4	L3

OR

9	A sequential circuit has two JK flip-flops A and B, two inputs x and y and one output z. The flip-flop input equations and circuit output equation are	10M	CO4	L3

$$J_A = Bx + B'y' \quad K_A = B'xy'$$
$$J_B = A'x \qquad K_B = A + xy'$$
$$z = Ax'y' + Bx'y'$$

(i)   Draw the logic diagram of the circuit
(ii)   Tabulate the state table.
(iii)   Derive the state equations for A and B

10	a)	Given the 8-bit data word 01011011, generate the 13-bit composite word for the Hamming code that corrects single errors and detects double errors.	5M	CO5	L4
	b)	Derive the ROM programming table for the combinational circuit that squares a 4-bit number. Minimize the number of product terms.	5M	CO5	L3

OR

11	Find all the races in the flow table of the following table and indicate those that are critical and those that are not and also find another assignment that contains no critical races.	10M	CO5	L4

		state			
	x1x2				
y1y2	00	01	11	10
00	**00**	11	**00**	11
01	11	**01**	11	11
10	00	**10**	11	11
11	**11**	**11**	00	**11**

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