Question Paper

Exam Date & Time: 23-Jan-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH. (INFORMATION TECHNOLOGY) EXAMINATIONS - JAN/FEB 2023
SUBJECT : ICT 2154 - DIGITAL SYSTEMS
(MAKEUP)

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1A)	Design a 4 - bit Carry Look Ahead binary adder using logic gates.	(5)
1B)	Design an asynchronous UP counter to count from 2 to 6 using positive edge triggered D - flip flops and minimum external gates.	(3)
1C)	Design T - flip flop using NOR latch and external gates.	(2)
2A)	Design a sequence detector using Moore model with one input Y and one output Z. The output Z is HIGH whenever the sequence "101" is detected, otherwise the output is LOW. Overlapping of the sequence is allowed. Implement using JK- flip flops and minimum number of external gates.	(5)
2B)	Realize the following Boolean functions using suitable ROM $F_1(A,B,C) = \overline{A}C + \overline{B}C + AB$ and $F_2(A,B,C) = ABC + \overline{B}C + \overline{A}$	(3)
2C)	Design a combinational circuit that compares two, 2 - bit numbers to check if A>=B using logic gates. The circuit output is equal to 1, if the two numbers satisfy the condition A>=B.	(2)
3A)	Design a code converter to convert a decimal digit represented in excess 3 to 8 4 -2 -1 code using 3:8 decoders and minimum external gates.	(5)
3B)	Design full subtractor using 4:1 MUXs ONLY.	(3)
3C)	Using synchronous hexadecimal counter ICs and external gates, design a 2 - digit hexadecimal down counter which counts from 94H to 35H and repeats.	(2)
4A)	Minimize the following using Tabulation Method and realize using basic gates. $Y(A,B,C,D) = \sum m(0,1,3,7,8,9,11,15)$	(5)
4B)	Design a sequence generator to generate the sequence 1101011 by ring counter using JK Flip flop and external gates.	(3)
4C)	Design and implement a full adder circuit using a 3:8 decoder.	(2)
5A)	Design synchronous divide by 10 counter using D-flip flops.	(5)
5B)	Design a 3X2 bit combinational multiplier using basic gates.	(3)
5C)	Solve the SoP function minimization of 5 variable K-Map using the following expression: F(A, B, C, D, E) = ∑(0, 2, 4, 6, 9, 11, 13, 15, 17, 21, 25, 27, 29, 31).	(2)

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