

Code No: 09A30503

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, June/July-2014

DIGITAL LOGIC DESIGN

(Computer Science and Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

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- 1.a) Convert the following hexa decimal numbers to binary numbers:
- ABC_{16}
 - $FB17_{16}$
 - $4A.67_{16}$
 - $8109.4A_{16}$.
- b) Explain the rules for binary subtraction using 1's and 2's complement methods and subtract the following numbers using 2's complement method:
- $+39 - (+16)$
 - $+62 - (+29)$.
- 2.a) What are universal logic gates and why they are called as universal logic gates, Realize the following Boolean functions using only universal logic gates:
- $Y = A + B\bar{C}\bar{D}$
 - $Y = (A + C)(A + \bar{D})(A + B + \bar{C})$.
- b) Differentiate positive and negative logic system.
- 3.a) Obtain the minimal sum of product expression for the following function and implement the same using NAND Gate only.
- $$f(A, B, C, D) = \sum m(1, 4, 7, 8, 9, 11) + \sum d(0, 3, 5).$$
- b) Reduce the following function using K-Map method
- $$f(A, B, C, D, E) = \sum m(0, 2, 4, 6, 9, 11, 13, 15, 17, 21, 25, 27, 29, 31).$$
- 4.a) Design a combinational logic circuit to output 2's complement of a 4bit binary numbers:
- Construct the truth table
 - Simplify each output function using K-Map and write reduced equations
 - Draw the resulting logic diagram.
- b) Construct a scheme to obtain a 4 to 16 line decoder using 74138(3-8 line decoder).
- 5.a) Explain the operation of an asynchronous inputs in a flipflop with suitable example.
- b) With a neat schematic diagram of Master Slave JK-FlipFlop discuss it's operation.
- 6.a) Explain with suitable logic and timing diagram:
- Serial-in Serial-out shift register
 - Parallel-in Parallel-out shift register.
- b) Design a counter using JK-Flipflop whose counting sequence is 000,001,100,110,111,101,000 etc. by obtaining its minimal sum equation.

7. Tabulate the PLA programming table for the four boolean functions listed below.
 $A(x, y, z) = \sum (1,2,4,6)$, $B(x, y, z) = \sum (0,1,6,7)$
 $C(x, y, z) = \sum (2,6)$, $D(x, y, z) = \sum (1,2,3,5,7)$.
8. Design an asynchronous sequential circuit with two inputs X_1 and X_2 and one output Z . Initially both inputs are equal to zero when X_1 and X_2 becomes '1' the output Z becomes '1'. When the second input also becomes '1', the output changes to '0'. The output stays at '0' until the circuit goes back to the initial state.

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