SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B.Tech/ MBA Tech (IT) Year: II Semester: III

Academic Year: 2019-20

Subject: Digital Logic & System Design

Date: 12 November 2019

Marks: 100
Time: 2.00 pm - 5.00 pm
Durations: 3 (Hrs)
No. of Pages: 2

Final Examination (2019-20)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. _1_ is compulsory.
2) Out of remaining questions, attempt any __4___ questions.
3) **In all _5_ questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume suitable data if necessary.**

1. (A) Perform the following: 5
   a) Convert $(11010110111)_2$ to Hexadecimal
   b) BCD 37+45
   c) 2's complement subtraction of $(37)_2$-$(53)_2$

   (B) Prove De Morgan's Theorem and Design Ex-OR gate using only NAND gate. 5

   (C) Design a combinational logic circuit that compares two 1-bit numbers. 5

   (D) Explain the significance of Master Slave JK flip flop. 5

2. (A) Draw the logic circuit for the following equation 10
   $Y= (A+BC)(B+\overline{C}A)$
   Use Boolean algebra rules to simplify the equation. Then draw the simplified logic circuit.

   (B) Simplify the following Boolean function into SOP using K-Map and design using only NAND gates.
   $F(A,B,C,D) = \sum m(0,1,5,9,13,14,15) + d(3,4,7,10,11)$ 10

3. (A) Design BCD to Excess-3 code converter using minimum number of gates. 10

   (B) Explain the implementation of Full adder using 3-8 decoder. 10

4. (A) What is a multiplexer. State its applications. Implement the following Boolean function with 8:1 multiplexer. $F(A,B,C,D)=\sum m(0,1,2,3,6,8,9,12,14)$ 10

   (B) Convert JK flip flop to SR flip flop. 10

5. (A) Design a combinational circuit with three inputs, x, y, and z, and three outputs, A, B, and C. 10
   When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input.
   When the binary input is 4, 5, 6, or 7, the binary output is one less than the input.
   Draw truth table, K maps and circuit diagram.

   (B) What is a shift register. Explain different types of shift registers. 10

6. (A) What do you mean by modulus of a counter? Design Mod 6 ripple counter using JK flip flop. Explain the working with timing diagram. 10

   (B) What are Programmable Logic Devices? Explain Programmable Logic Array (PLA) with block diagram. 10

7. (A) Differentiate between the following 10
   a) Combinational and Sequential circuits
   b) Synchronous and Asynchronous counters

   (B) Explain 4-bit Binary Subtractor considering inputs A= 1001 and B= 0110 with its circuit diagram. 10