

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

Course Code: IT201**Course Name: DIGITAL SYSTEM DESIGN**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Convert the hexadecimal number $(112.75)_{10}$ to decimal, binary and octal. (4)
 b) Perform subtraction using 10's complement and 2's complement for $3456 - 245$. (6)
 c) Represent 3851.2 and 349.8 in BCD and perform addition using BCD arithmetic. (5)
- 2 a) Represent 320.625 in single precision floating point representation (5)
 b) Simplify the following Boolean function into (i) sum-of-products form and (8)
 (ii) product-of-sums form:

$$F(A, B, C, D) = \sum_m(0, 1, 2, 5, 8, 9, 10)$$

 c) Determine the base of the number in the operation $155+12=200$ (2)
- 3 a) Simplify the following functions using Quine- McClusky method : (7)

$$F(w,x,y,z) = \sum_m(3,4,5,6,7,11,12,14,15)$$

 b) Using K-map simplify following Boolean expressions & give implementation of (8)
 same using gates

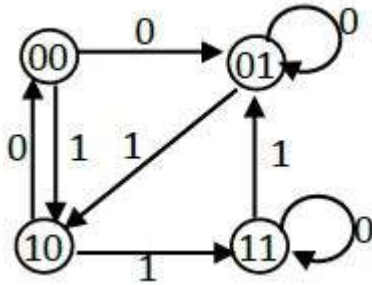
$$F(A,B,C,D) = AB(C+D) + \bar{A}(B+C+BCD)$$

$$d(A,B,C,D) = \bar{A}\bar{B}\bar{C} + AB\bar{C}D + A\bar{B}\bar{C}$$

PART B*Answer any two full questions, each carries 15 marks.*

- 4 a) Implement 8x1 MUX using 4x1 MUX. (8)
 b) Design & implement Full Adder with truth table. (5)
 c) Explain the functioning a D-Flip Flop with its circuit. (2)
- 5 a) Derive the circuit for two bit magnitude comparator (5)
 b) Design a sequential circuit with two D Flip-Flops, A and B, and one input x. (10)
 When $x = 0$, then the state of the circuit remains the same. When $x = 1$, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00, and repeats.

- 6 a) What is encoder? Design octal to binary encoder. (5)
 b) For the following state table (10)



- Draw the corresponding state diagram.
- Tabulate the reduced state table.
- Draw the state diagram corresponding to the reduced state table.
- Design the sequential circuit using flip-flops. [Hint: Unused states may be considered as don't cares.]

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Explain Booth's Algorithm. Perform $-5 * -7$ using this algorithm. (10)
 b) Design 3 bit up/down Asynchronous counter. (10)
- 8 a) Explain various types of ROMs. (5)
 b) Explain the purpose of Hamming Code, Given the 11-bit data word 00100101010, generate the corresponding 15-bit Hamming code word. (5)
 c) Design and implement a 4 bit binary synchronous up counter. (10)
- 9 a) Explain about different types of shift registers. (10)
 b) Tabulate the PLA programming table for the four Boolean functions listed below. (10)

$$F_1(A,B,C)=\sum m(0,2,4,7). \quad F_2(A,B,C)=\sum m(3,5,6,7).$$
