

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017**

**Course Code: CS203**

**Course Name: SWITCHING THEORY AND LOGIC DESIGN (CS)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

- |   |  | Marks |
|---|--|-------|
| 1 | a) Represent +51 and -51 in 1's complement and 2's complement form.  | (2)   |
|   | b) Convert decimal $(378.93)_{10}$ to octal.   | (1)   |
| 2 | Perform the following decimal operations in the 8421 BCD code  | (3)   |
|   | a) $(518)_{10} + (488)_{10}$ b) $(518)_{10} - (488)_{10}$  |       |
| 3 | Express the following function as sum of minterms and product of maxterms:                                   | (3)   |
|   | a) $F(A,B,C)=\bar{B} + A\bar{C} + A\bar{B}\bar{C}$ b) $F(A,B,C)=C(A + \bar{B})(\bar{A} + \bar{B} + \bar{C})$ |       |
| 4 | a) Find complement of function.  | (2)   |
|   | $F=A\bar{B} + B\bar{C} + \bar{A}C$   |       |
|   | b) Prove $AB + \bar{A}C = (A + C)(\bar{A} + B)$  | (1)   |

**PART B**

*Answer any two full questions, each carries 9 marks.*

- |   |   |     |
|---|---|-----|
| 5 | a) Write the format of single precision floating point binary numbers. Convert the decimal number $3.248 \times 10^4$ to a single-precision floating-point binary number. | (5) |
|   | b) Perform the following hexadecimal operations   | (4) |
|   | 1) $A5C4_{16} + 39A5_{16}$ 2) $A96B_{16} - 9F2C_{16}$   |     |
| 6 | Reduce the following expressions using K-map and implement the real minimal expression in universal logic.  | (9) |
|   | 1) $F(A, B, C, D)=\sum m(0,1,2,3,5,7,8,9,10,12,13)$   |     |
|   | 2) $F(A, B, C, D)=\prod M(2,8,9,10,11,12,14)$   |     |
| 7 | a) Simplify the Boolean function $F(A, B, C, D)=\sum m(1,3,4,5,10,12,13,15)$ using Quine-McCluskey method.  | (9) |

**PART C**

*Answer all questions, each carries 3 marks.*

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|----|--|-----|
| 8  | Differentiate between combinational and sequential circuits.   | (3) |
| 9  | Draw the logic diagram of $4 \times 1$ MUX and list down the applications of MUX.                          | (3) |
| 10 | Give the truth table, characteristics table, excitation table and characteristic equation of SR flip-flop. | (3) |
| 11 | Compare Synchronous and Asynchronous sequential circuits.  | (3) |

**PART D***Answer any two full questions, each carries 9 marks.*

- 12 a) Design a 4-bit Binary to Gray code converter. (7)  
 b) Implement the logic function  $F = A \oplus B \oplus C$  using a 8:1 multiplexer. (2)
- 13 a) Explain race around condition in JK flip-flop. Explain how a master slave flip-flop avoids race around condition. (6)  
 b) Convert JK Flip-Flop to T Flip-Flop. (3)
- 14 a) Design and implement full subtractor by using only NAND gates. (5)  
 b) Explain 2 bit magnitude comparator using logic diagram. (4)

**PART E***Answer any four full questions, each carries 10 marks.*

- 15 Design a synchronous counter using JK flip-flop which counts through the states 0,1,3,4,5,6,0..... Is the counter self starting? (10)
- 16 Draw and explain 4 bit Johnson counter. Also draw its timing sequence. (10)
- 17 a) Draw and explain the different types of shift registers. (8)  
 b) List down the applications of shift registers. (2)
- 18 a) Write short notes on PLA. (3)  
 b) Give any 2 applications of ROM. (3)  
 c) Compare Static RAM and Dynamic RAM. (4)
- 19 Find the minimum size of PLA required to implement the following functions? (10)  
 Hence implement the following function using PLA.  

$$F_1(A, B, C) = \sum m(0,2,4,7) \quad F_2(A, B, C) = \sum m(3,5,6,7)$$
- 20 Explain the algorithm for floating point addition and subtraction. (10)

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