

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.

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| 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
a) $(518)_{10} + (488)_{10}$ b) $(518)_{10} - (488)_{10}$ | (3) |
| 3 | Express the following function as sum of minterms and product of maxterms:
a) $F(A,B,C) = \bar{B} + A\bar{C} + A\bar{B}\bar{C}$ b) $F(A,B,C) = C(A + \bar{B})(\bar{A} + \bar{B} + \bar{C})$ | (3) |
| 4 | a) Find complement of function.
$F = A\bar{B} + B\bar{C} + \bar{A}C$ | (2) |
| | b) Prove $AB + \bar{A}C = (A + C)(\bar{A} + B)$ | (1) |

PART B

Answer any two full questions, each carries 9 marks.

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| 5 | a) Write the format of single precision floating point binary numbers. Convert the decimal number 3.248×10^4 to a single-precision floating-point binary number. | (5) |
| | b) Perform the following hexadecimal operations
1) $A5C4_{16} + 39A5_{16}$ 2) $A96B_{16} - 9F2C_{16}$ | (4) |
| 6 | Reduce the following expressions using K-map and implement the real minimal expression in universal logic.
1) $F(A, B, C, D) = \sum m(0,1,2,3,5,7,8,9,10,12,13)$
2) $F(A, B, C, D) = \prod M(2,8,9,10,11,12,14)$ | (9) |
| 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 4×1 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.
 $F_1(A, B, C) = \sum m(0,2,4,7)$ $F_2(A, B, C) = \sum m(3,5,6,7)$
- 20 Explain the algorithm for floating point addition and subtraction. (10)
