Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

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 Find the 9's and 10's complement of $(24579.12)_{10}$. (3)

2 Convert $(455)_{10}$ to base-4,8 and 16. (3)

3 Express the following functions as product of max-terms: (3)

a) F(X,Y,Z) = Y' +XZ' + XY'Z' b) F(A,B,C) = C (A+B') (A' +B' + C')

4 Use Boolean Algebra to show that A'BC'+AB'C'+AB'C+ABC'+ ABC = A+BC' (3)

PART B

Answer any two full questions, each carries 9 marks.

5 Simplify F(A,B,C,D)=Σ(1,4,6,7,8,9,10,11,15) using Tabulation method and determine the prime implicants, essential prime implicants and the minimized Boolean expression. (9)

6 a) Subtract $(9F2C)_{16}$ from $(A96B)_{16}$ using 15's and 16's complement method. (4)

b) Subtract 366 from 170 in BCD using 10's complement addition. (3)

c) Perform $(417)_8 - (232)_8$ using *8's complement addition*. (2)

7 a) Using K-map simplify the Boolean function F as Sum of Products using the don't care conditions d. (4)

F(w,x,y,z)=w'(x'y+ x'y' +xyz) + x'z'(y+w)

d(w,x,y,z)=w'x(y'z + yz) +wyz

b) Represent the following decimal numbers in signed 2's complement 8-bit numbers: i) +43 ii) –19 (3)

c) Convert the decimal number 3.248 x 10^4 to IEEE 754 standard single precision floating point binary number. (2)

PART C

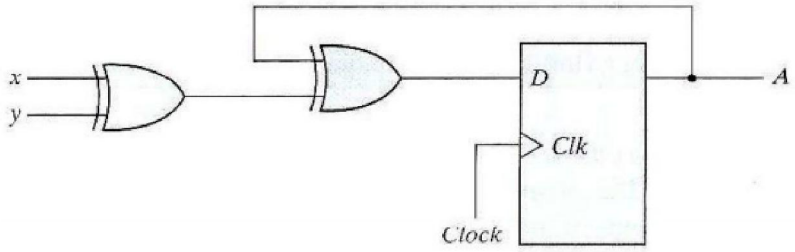
Answer all questions, each carries 3 marks.

8 Differentiate combinational and sequential circuits. (3)

9 Given the block diagram of half-subtractor, implement a full-subtractor using half-subtractors. (3)

10 Write the excitation tables of SR, JK and T flip-flops. (3)

11 Given below is a sequential circuit using D flip-flop. Write the state table and draw a state diagram. (3)



PART D

Answer any two full questions, each carries 9 marks.

12 a) Design a sequential circuit with JK Flip flops to satisfy the following state equation. (5)
A(t+1)=A'B'CD + A'B'C + ACD + AC'D' B(t+1)= A'C + CD' + A'BC'
C(t+1)= B D(t+1)=D'

b) Design and implement a decoder that decodes BCD digits (0000 to 1001). (4)

13 a) Design and implement a 2-bit magnitude comparator using 4X16 decoder. (5)

b) Implement f(A,B,C,D)= Σ(0,2,3,6,8,9,13,14) using 8 x 1 MUX . (4)

14 What is race around condition? Why does it occur? Discuss how master-slave flip-flop eliminates it. (9)

PART E

Answer any four full questions, each carries 10 marks.

15 a) Draw the logic diagram of a 4-bit Johnson counter and explain the working with a timing diagram. (8)

b) Compare Ring counter and Johnson counter. (2)

16 a) Explain the working of 3-bit *Universal* Shift Register. (8)

b) Give 2 applications of shift register. (2)

17 a) Design a combinational circuit using ROM that accepts a 3-bit binary number and generates output equal to the square of the input number. Use decoder of suitable size to implement ROM. (7)

b) What size of ROM would it take to implement (3)
i. A BCD adder/subtractor with a control input to select between the addition and subtraction.
ii. A binary multiplier that multiplies two 4-bit numbers.
iii. Dual 4-line to 1-line multiplexers with common selection inputs.

18 Design a synchronous counter using JK flip-flops to count the sequence 0,5,6,7,3,2 and then repeats. (10)

19 a) Compare static and dynamic RAMs. (3)

b) A combinational circuit is defined by the functions: (7)
F1(A,B,C)=Σ(3,5,6,7) F2= Σ(0,2,4,7)
Implement the circuit with a PLA having 3 inputs, four product terms and 2 outputs.

20 With the help of a flowchart explain the addition/subtraction of binary numbers in sign magnitude form. (10)

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