

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

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

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

Course Code: **CS203**

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

Max. Marks: 100

Duration: 3 Hours

**PART A**

*(Answer All Questions)*

1. Convert the following numbers from the given base to the bases indicated
  - a)  $(250.55)_{10}$  to Hexadecimal (1)
  - b)  $(357)_8$  to Decimal (1)
  - c)  $(110101.1011)_2$  to Octal (1)
2. a) Find the 9's and 10's complement of  $(13579)_{10}$  (1)
- b) Subtract  $(1101)_2$  from  $(11010)_2$  using i) 2's complement ii) 1's complement (2)
3. Prove the given Boolean identity using laws of Boolean algebra
 
$$x+x'y = x+y \quad (3)$$
4. a) Express the given function in sum of minterms form
 
$$F(x, y, z) = 1 \quad (1\frac{1}{2})$$
- b) Find the complement of the given Boolean function using De Morgan's theorem
 
$$F(x,y,z) = x(y'+z) \quad (1\frac{1}{2})$$

**PART B**

*(Answer Any Two Questions)*

5. a) What is the difference between canonical form and standard form? Which form is preferable while implementing a Boolean function with gates? (2)
- b) Simplify the given Boolean function  $F(w, x, y, z) = \sum(2, 3, 12, 13, 14, 15)$ 
  - i) Sum of Products and ii) Product of Sums (use K Map) (7)
6. a) Explain the format of single precision floating point number representation and find the decimal value corresponding to the given floating point number
 
$$(11000001011110110000000000000000)_2 \quad (4)$$
- b) Convert the decimal numbers 596 and 386 into BCD and do the addition and subtraction operations in BCD arithmetic. (3)
- c) What is an alphanumeric code? Why it is useful in digital computers? (2)
7. a) Express the following Boolean function in canonical form
 
$$F(x, y, z) = x'+yz+xz'+xy'z'+xyz' \quad (3)$$

- b) Simplify the Boolean function  $F(w, x, y, z) = \sum m(0, 5, 7, 8, 9, 10, 11, 14, 15)$  using Quine-McCluskey method. (6)

**PART C***(Answer All Questions)*

8. Differentiate between combinational and sequential circuits. (3)
9. Implement the Exclusive OR operation using NAND gates only. (3)
10. Give the excitation table of T Flip Flop. (3)
11. What is *state diagram*? Write down two advantages of state reduction technique. (3)

**PART D***(Answer Any Two Questions)*

12. a) What is the disadvantage of binary parallel adder? (2)
- b) Draw and explain the logic circuit of 4 bit full adder with look ahead carry. (7)
13. a) Explain the working of JK Flipflop. What is race around condition? How is it overcome? (4)
- b) Implement JK Flip Flop using D Flip Flop. (5)
14. a) Implement a full adder circuit using a  $3 \times 8$  decoder (additional gates can be used). (5)
- b) Explain clocked sequential circuits with an example. (4)

**PART E***(Answer Any Four Questions)*

15. a) What is a Universal shift register? (2)
- b) Explain how a shift register is used as a converter from i) serial to parallel data and ii) parallel to serial data (8)
16. a) How does ripple counter differ from synchronous counter? (3)
- b) Design a synchronous counter with the following repeated binary sequence 000, 100, 111, 010, 011 using T Flip Flops. (7)
17. a) Compare RAM and ROM. (3)
- b) Implement the following Boolean functions using a  $3 \times 4 \times 2$  PLA
- $$F1 = \sum (0, 1, 3, 4)$$
- $$F2 = \sum (1, 2, 3, 4, 5)$$
- (7)
18. Draw the block diagram of a 4 -bit ripple counter. Sketch the waveform at the output of each Flip Flop. Explain how this wave form is obtained. By what number N does this system divide? (10)
19. Write an HDL code for a full adder in all three modelling styles. (10)
20. Explain the algorithm for floating point subtraction. (10)