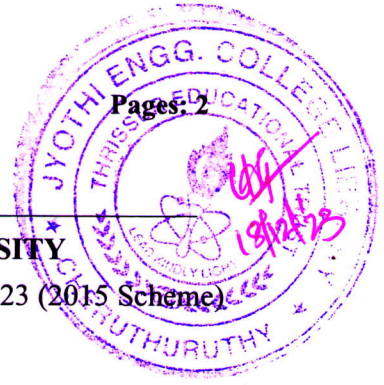


Reg No.: \_\_\_\_\_

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S3 (S, FE) / S1 (PT) (S, FE) Examination December 2023 (2015 Scheme)

**Course Code: CS203****Course Name: SWITCHING THEORY AND LOGIC DESIGN**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 3 marks.*

Marks

1. Convert the following numbers from the given base to the bases indicated
  - a)  $(161.68)_{10}$  into Hexadecimal (1)
  - b)  $(-85)_{10}$  into 2's complement (1)
  - c)  $(11001001101.1011011)_2$  into octal (1)
2. Represent decimal number  $(-67)_{10}$  in single precision floating point format. (3)
3. Show the K-map contents for the following Boolean functions:
  - a)  $F = (\bar{x} + \bar{y})(y + z)$  (3)
  - b)  $F = \sum m(0, 2, 7) + d(4)$
4. State and prove Demorgan's theorems using gates (3)

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

5. Simplify the Boolean function  $F = \sum (1, 3, 5, 8, 9, 11, 13, 14, 15)$  using Quine-McCluskey method. (9)
6. a) Perform the following operations: (4)
  - i)  $(F47)_{16} + (A2B)_{16}$       ii)  $(745)_8 + (342)_8$
- b) Perform subtraction of the following using r's complement and (r-1)'s complement methods:  $1000100_2 - 1010101_2$  (5)
7. a) Simplify the given Boolean function using Karnaugh Map and obtain the minimum Sum of Products expression  $F = \sum (1, 5, 7, 9, 10, 11, 13, 15)$  (5)
- b) i) Using the Boolean theorems simplify the following expression (4)
 
$$F = ABC + \bar{A}B + AB\bar{C}$$
- ii) Find the complement of the function  $F = X\bar{Y} + \bar{X}Y$

**PART C***Answer all questions, each carries 3 marks.*

8. Implement  $F = A\bar{B} + B(C+D)$  with NAND gates (3)

- 9 Implement the Boolean function  $F = \sum m(1, 3, 6, 7)$  using 4:1 MUX (3)
- 10 Explain race around condition in flip flops (3)
- 11 Differentiate between edge and level triggering (3)

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

- 12 a) A digital circuit has four inputs and one output. The output is equal to 1 (4)  
 i) when an even number of inputs are equal to 1 ii) none of the inputs are equal to 1 and iii) any one input is 1
- b) Design a 2-bit magnitude comparator (5)
- 13 a) Explain state table and state diagram with an example. (4)
- b) Convert T Flip-Flop to JK Flip-Flop (3)
- c) Draw the circuit of JK flip flop with NAND gates only (2)
- 14 a) Design a 4-bit Gray to Binary code converter (5)
- b) Differentiate between truth table and excitation table. Write the truth and excitation table of RS flipflop (4)

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

- 15 a) Design a synchronous counter with the following repeated binary sequence 0,2,5,7 (7)  
 using T flip flop
- b) Explain serial adder (3)
- 16 Draw a flow chart and explain the addition and subtraction of two binary numbers (10)  
 in signed magnitude representation
- 17 a) Compare RAM and ROM. (3)
- b) What is meant by HDL? Write an HDL code for a full adder in any of the modelling styles. (7)
- 18 a) Draw and explain 4-bit ring counter with its timing sequence. (7)
- b) Compare synchronous and asynchronous counter (3)
- 19 a) Implement the following Boolean functions using a  $3 \times 4 \times 2$  PLA. (6)  
 $F1 = \sum m(3, 5, 6, 7)$   $F2 = \sum m(0, 2, 5, 7)$
- b) Explain the different types of ROMs. (4)
- 20 Draw the circuit diagram of a 4-bit bidirectional shift register with parallel load (10)  
 and explain its working

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