Hall Ticket Number:

Code No. : 13206

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (CSE: CBCS) III-Semester Main Examinations, December-2017

Logic & Switching Theory

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Simplify the given function $f=(A+(BC)^1)^1 (AB^1+ABC)$
2. Determine the Sum of Minterms form for $F(x,y,z)=x^1y+z^1+xyz$
3. Implement EX-NOR gate using only NOR gates.
4. Implement the following Boolean function with NAND-NAND logic.
   $F(A,B,C)=\sum(0,1,3,5)$
5. Implement the following Boolean function using 4:1 multiplexer.
   $F(A,B,C)=\sum(1,3,5,6)$
6. Design a combinational logic circuit with three input variables that will produce a logic1 output when more than one input variables are logic1.
7. Compare Synchronous & Asynchronous Sequential Circuits.
8. Draw the logic diagram, logic symbol and Truth table of JK Flip flop.
9. Design a combinational circuit using ROM that accepts a 3-bit number and outputs a binary number equal to the square of the input number.
10. Draw the structure of PLA.

Part-B (5 × 10 = 50 Marks)

11. a) Prove using De-Morgans theorem that XOR and XNOR are complement to each other. [5]

    b) Convert the following equation into the standard POS form. [5]
    $Y= (A+B)(A+C)(B+C^1)$.

12. a) Simplify the following function and find essential prime implicants. [6]
    $F(A,B,C,D)=)=\sum m(0,1,2,3,4,6,8,9,10,11)$

    b) Implement Y=AC+BC+AB+D with NOR-NOR logic. [4]

13. a) Design a 2 to 4 decoder using NOR gates only. [5]

    b) Design a circuit with three inputs (A, B, C) and 2 outputs (X, Y), where the outputs are the binary count of the number of "ON" (HIGH) inputs. [5]

14. a) Design a sequence detector for the sequence 10110. Use JK Flip-Flop. [6]

    b) Show how a JK flip flop can be constructed using a T flip flop and other logic gates. [4]

15. a) Derive the PLA program table for a combinational circuit that squares a 3-bit number. Minimize the number of product terms. [5]

    b) Construct a 128×8 ROM with four 32×8 ROM chips with an enable input, external connections and a decoder. [5]

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16. a) Find the complement of $f=A+[(B+C^1).D+E^1]F$. [4]

    b) Express the following functions in sum of min terms and product of max terms. [6]

    i) F(A,B,C) = 1 ii) F(A,B,C) = (AB+C) (B+AC)

17. Answer any ***two*** of the following:

    a) Explain the design procedure for combinational circuits. [5]

    b) Design a 3-bit UP/DOWN counter which counts up when the control signal M=1 and counts down when M=0. [5]

    c) Write short notes on Programmable Array Logic. [5]