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**Question Paper Code : 91390**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Second Semester

Computer Science and Engineering

CS 6201 – DIGITAL PRINCIPLES AND SYSTEM DESIGN

(Common to Information Technology)

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Classify the logic families by its operations.
2. State and prove the De Morgans' theorem.
3. Define Combinational circuits.
4. Design the combinational circuit with 3 inputs and 1 output. The output is 1 when the binary value of the inputs is less than 3. The output is 0 otherwise.
5. What is synchronous counter ?
6. Give the comparison between combinational circuits and sequential circuits.
7. Compare asynchronous and synchronous sequential circuit.
8. What is a critical race condition ? Give example.
9. What is memory address register ?
10. Write short notes on PLA.

PART – B

(5×16=80 Marks)

11. a) i) Simplify the following Boolean expression to a minimum number of literals. (8)  
 $A'B' + A'C'D' + A'B'D + A'B'CD'$
- ii) Convert the given expression in canonical SOP form  $Y = AC + AB + BC$ . (8)

(OR)



- b) i) List out the procedure for converting Binary to Gray Code. (4)  
 ii) Convert the following number from one base to other  $(65.342)_8 = ( )_7$ . (8)  
 iii) What are the different ways to represent a negative number? (4)
12. a) Design a full subtractor and derive expression for difference and borrow. Realize the circuit using gates. (16)  
 (OR)  
 b) Design a code converter that converts a 8421 to BCD code. Realize the circuits using gates. (16)
13. a) Implement the following Boolean function with a  $4 \times 1$  multiplexer and external gates. Connect inputs A and B to the selection lines. The input requirements for the four data lines will be a function of variables C and D these values are obtained by expressing F as a function of C and D for each of the four cases when AB = 00, 01, 10 and 11. These functions may have to be implemented with external gates.  $F(A, B, C, D) = \Sigma (1, 2, 5, 7, 8, 10, 11, 13, 15)$ . (16)  
 (OR)  
 b) Draw a neat sketch showing implementation of  $Z_1 = ab'd'e + a'b'c'e + bc + de$ ,  $Z_2 = a'c'e$ ,  $Z_3 = bc + de + c'd'e + bd$  and  $Z_4 = a'c'e + ce$  using a  $5 \times 8 \times 4$  PLA. (16)
14. a) Summarize the design procedure for asynchronous sequential circuit. Give an illustration of it with a classical example. (16)  
 (OR)  
 b) Explain the different types of hazards that occurs in asynchronous sequential circuits and Combinational circuits. (16)
15. a) i) Write short notes on Address multiplexing. (8)  
 ii) Briefly discuss the sequential programmable devices. (8)  
 (OR)  
 b) i) Implement the following two Boolean functions with a PLA. (10)  
 $F1 = A B' + A C + A' B C'$   
 $F2 = (AC + BC)'$   
 ii) Give the Internal block diagram of  $4 \times 4$  RAM. (6)