SE323

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S.E. (Computer) (Sem-III) (Revised Course 2016-2017)
EXAMINATION NOV/DEC 2019
Logic Design

[Duration : Three Hours] **[Total Marks : 100]**

Instructions:
1) Answer any two full questions from Part A.
2) Answer any two full questions from Part B.
3) Answer any two full questions from Part C.
4) Assume necessary data wherever required.

PART-A

Q.1 a) State the following: [3]
i. Arbitration in priority encoders
ii. Absorption law with its logical equation
iii. Checksum as error detecting code

b) Prove the following using Boolean algebra laws and also state the appropriate law used [8]
i. $(A+B)(\bar{A}\bar{C}+C)(\overline{\bar{B}+AC}) = \bar{A}B$
ii. If $A\bar{B}+\bar{A}B = C$ then show that $A\bar{C}+\bar{A}C = B$

c) Perform the following computations. [9]
i. Convert $(4433)_5$ to gray code
ii. Perform the BCD subtraction of (305.5-168.8) using 9's complement
iii. Expand $A + B\bar{C} + AB\bar{D} + ABC\bar{D}$ to maxterms and minterms.

Q.2 a) Reduce the following expression using kmaps and implement the real minimal expression in universal logic system. [8]

$$F = \sum m(1,5,6,12,13,14) + d(2,4)$$

b) Differentiate between [4]
i) Weighted code and non-weighted codes
ii) PLA and PROM

c) Explain ripple carry adder with neat diagram also state its potential drawbacks. [6]

d) State any two applications of multiplexer. [2]

Q.3 a) Use a multiplexer having three data select inputs to implement the logic for the function given below. Also realize the same using a 16:1 MUX. [8]

$$F = \sum m(0,1,2,3,4,10,11,14,15)$$

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b) Design a 10 to 4 line encoder. Show truth table and its logic diagram. [5]

c) Design a logic circuit with 4 inputs A,B,C,D that will produce output '1' only Whenever two adjacent input variables are 1s. A & D are also to be treated as Adjacent. Implement it using universal logic circuit. [5]

d) State the importance of EPI (Essential Prime Implicants) and RPI (Redundant Prime Implicants) [2]

PART-B

Q.4

a) Design 3 bit Johnson's counter. Explain its working. [8]

b) Explain the steps involved in the design of a synchronous counter. [5]

c) Distinguish between combinational and sequential circuits? List some applications of sequential circuits. [7]

Q.5

a) Draw a 4 bit universal shift register by explaining the different modes of operation. [10]

b) Explain how a Serial in Parallel out shift register works with a logic diagram. [10]

Q.6

a) What is 'Race around Condition'? Explain the ways how race around condition can be eliminated. [10]

b) Explain the design of mod 6 asynchronous counter using T Flip Flop. [6]

c) Explain and list the applications of a finite state model. [4]

PART-C

Q.7

a) Draw and explain the working of a parallel adder. Mention the advantages and disadvantages over the serial adder. [10]

b) Draw a 4 bit universal shift register by explaining the different modes of operation. [10]

Q.8

a) Design a three bit Johnsons counter. Explain the working of the same. [10]

b) Explain self-complementary code with the help of examples. [6]

c) State and Prove Distributive laws of Boolean algebra. [4]