Printed Pages : 4 ECS301

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0109 Roll No.

B.Tech

(SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10

DIGITAL LOGIC DESIGN

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt all questions. Each question carry equal marks.*

1 Attempt any **four** parts of the following : 5×4

(a) Perform the following arithmetic operation using 1's complement method :

(i) Add $(-19)_{10}$ and $(29)_{10}$

(ii) Add $(21)_{10}$ and $(37)_{10}$

(b) What is error detecting and correcting codes ? Represent $(213.25)_{10}$ in single precision floating point representation.

(c) The Hamming code 010110110 is received at the receiving end. Correct the received data if there is any error. There are four parity bits and even parity is used.

(d) Convert the given expression in standard POS form :

$$f(A, B, C) = (A + \bar{B})(B + C)(A + C)$$

(e) Represent the boolean function using NOR-NOR implementation

$$Y = (A + \bar{B})(\bar{B} + C)(A + C)$$

(f) Simplify the following boolean expression using k-map :

$$f(a, b, c, d) = \sum m(1, 3, 5, 7, 9, 11, 13, 14, 15) + \sum dc(2, 4)$$

2 Attempt any **four** parts of the following : 5×4

(a) Minimize the following boolean function using tabular method (Quine Mc-Clusky method)

$$f(A, B, C, D, E) = \sum (0, 2, 4, 10, 15, 19, 23, 29, 31)$$

(b) Draw and explain the function of half-adder and full adder with suitable diagram.

(c) Draw and write the expression for a 4-bit parallel subtractor using full adder.

(d) Implement the following boolean function using 8:1 multiplexer :

$$f(A, B, C, D) = \sum (0, 2, 4, 7, 11, 13)$$

(e) Briefly describe the following :

(i) Decimal adder

(ii) Encoder.

(f) What is binary multiplier ? Draw and explain a 2 to 4 line decoder.

3 Attempt any **two** parts : 10×2

(a) Compare the synchronous sequential circuit and asynchronous sequential circuit. Also draw a positive edge triggered D flip-flop using NAND gates and explain its function.

(b) (i) Discuss the race around condition and its solution.

(ii) Briefly explain the state reduction technique.

(c) What is shift registers ? Design a 4-bit ripple counter using suitable wave form.

4 Attempt any **two** parts : 10×2

(a) Explain the static RAM and dynamic RAM. Describe the PLA and its application in detail.

(b) What is ASM chart ? Describe the design with multiplexer.

(c) Write short notes on the following :

(i) Comparison between PROM, PLA and PAL.

(ii) Structure of 4-byte diode ROM.

5 Attempt any **two** parts : 10×2

(a) Draw and explain the block diagram of asynchronous sequential circuit. Also write down the steps for analysis of asynchronous sequential circuit.

(b) Derive the transition table and output map for the asynchronous sequential circuit described by following function :

$$Y = x_1\bar{x}_2 + (x_1 + \bar{x}_2)y$$

$$z = y$$

Also describe in words the behaviours of the circuit.

(c) Explain the hazards in combinational and sequential circuit. Also explain the remedy for eliminating a hazard. What are critical race and non critical race ?
