

- (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 ?



Printed Pages : 4

ECS301

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

PAPER ID : 0109

Roll No.

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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.

