



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

PAPER ID : 110310

Roll No.

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B.Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15 DIGITAL LOGIC DESIGN

Time : 3 Hours]

[Total Marks : 100

- Note :**
- (1) Attempt all questions
 - (2) Allocated marks are indicated against each question.
 - (3) Assume any missing data suitably.

Attempt any **Four** parts : (4×5=20)

- (a) Explain weighted and unweighted code with example.
- (b) Convert the following numbers as indicated :
 - (i) $(BC64)_{16} = ()_{10} = ()_2$
 - (ii) $(111011)_2 = ()_5$
- (c) Draw a NAND logic diagram that implements the complement of the following function

$$F(A,B,C,D) = \sum (0,1,2,3,4,8,9,10,11,12).$$

- (d) Draw suitable diagram of full adder.
- (e) Design and explain the logic and circuit of 4 bit magnitude comparator.
- (f) What is race around condition ? Explain in brief.

2 Attempt any **four** parts : (4×5=20)

- (a) Differentiate between EPROM and EEPROM.
- (b) A certain memory has a capacity of $8K \times 16$. How many bits are there in each word ? How many words are being stored ?
- (c) Differentiate between truth table, excitation table, state table. Design D flipflop using SR flipflop.
- (d) (i) The Hamming code 101101101 is received with even parity. Correct errors (if any).
- (ii) Simplify $\bar{A}BC\bar{D} + BC\bar{D} + B\bar{C}\bar{D} + B\bar{C}D$.
- (e) Design 16:1 multiplexer using 4:1 multiplexer.
- (f) Explain priority encoder.

3 Attempt any **Two** parts : (10×2=20)

- (a) Minimize the given Boolean function using K map and implement the simplified function using NAND gates only.
- $$F(A,B,C,D) = \sum m (0,1,2,9,11,15) + d(8,10,14).$$
- (b) Minimize the following functions by tabular method
- $$F(w,x,y,z) = \sum m (0,2,3,6,7,8,10,12,13).$$
- (c) Design a 4 bit combinational circuit which converts BCD to Excess-3 code.

4 Attempt any **Two** parts : (10×2=20)

- (a) Design a 3 bit combinational circuit which produce logic 1 output when more than one input variables are at logic 1.

- (b) Implement the following functions using 3 input, 4 product term and 2 output using PLA

$$F1 = \bar{A}\bar{B} + AC + \bar{A}'B\bar{C}'$$

$$F2 = (AC + BC)'$$

- (c) A sequential circuit with two D flip-flops A and B and an input X and output Y. The circuit is described by the following next state and output equations.

$$A(t+1) = AX + BX$$

$$B(t+1) = \bar{A}'X$$

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

- (i) Derive the state table.
- (ii) Draw the logic diagram of the circuit.
- (iii) Derive the state diagram.

5 Attempt any **Two** parts : (10×2=20)

- (a) What do you understand by fundamental mode of operation ? Explain different types of Hazards in Asynchronous sequential circuit by giving suitable example.
- (b) Draw and explain the working of universal shift register.
- (c) An asynchronous sequential circuit has two internal states and output. The excitation and Output functions describing the circuit are as follows.

$$Y = x_1x_2 + (x_1 + x_2)Y \text{ and } Z = Y.$$

- (i) Draw the logic diagram.
- (ii) Derive the transition table and output map.
- (iii) Obtain the flow table of circuit.