

3E1653

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B.Tech. III Semester (Main/Back) Examination Dec. - 2016

Applied Elect. & Inst. Engg

3A14 Digital Electronics

EE, EX, EC, EI, CS, IT, AI

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) For the integer with decimal representation 34567, give the corresponding bit vectors for BCD code and for excess - 3 code. (8)
- b) Design a network using only XOR gates which performs the following function.

$$Z = \begin{cases} x_i & \text{if } C = 0 \\ \bar{x}_i & \text{if } C = 1 \end{cases} \quad (8)$$

OR

1. a) What do you mean by sequential code, self complementing code, cyclic code and excess - 3 code? Give one example of each code. (8)
- b) Using the postulates of Boolean algebra and the theorems, prove the following:
- i. $a'b' + ab + a'b = a' + b$
- ii. $ab' + b'c' + a'c' = ab' + a'c'$ (8)

Unit - II

2. a) Discuss CMOS NAND and NOR gates. (8)
- b) Explain the working of CMOS inverter. (8)

OR

2. a) Draw a neat circuit of TTL (Transistor Transistor Logic) NAND gate with totem pole output and explain. (8)

- b) Draw a 3 input ECL (Emitter - Coupled Logic) OR/NOR gate and explain it's working? (8)

Unit - III

3. a) Simplify the following using the tabulation method :

$$F = \sum(1,2,3,7,8,9,10,11,14,15) \quad (8)$$

- b) A stair case light is controlled by two switches one at the top of the stairs and another at the bottom of stairs. Realize the circuit when the lamp (L) glows. (8)

OR

3. a) Compare k-map technique and quine - Mc cluskey minimization technique. (8)

- b) Simplify the expression $F(A,B,C,D) = ACD + \bar{A}B + \bar{D}$ (8)

Unit - IV

4. a) Implement the following function using 4×1 multiplexer.

$$f(A,B,C) = \sum m(0,1,4,7) \text{ use A and C as select lines.} \quad (8)$$

- b) What are the use of multiplexers and demultiplexers. Explain the construction and working of a multiplexer circuit. (8)

OR

4. a) Draw gate level schematic of a 1-to-4 decoder as component realize a 1-to-16 decoder. (8)

- b) Signals A,B,C,D and A are available. Using only one 8 to 1 MUX and no other gate, implement the expression.

$$F(A,B,C,D) = BC + AB\bar{D} + \bar{A}\bar{C}D \quad (8)$$

Unit - V

5. a) Draw a logic diagram of clocked S-R flip - flop and obtain its characteristic equation. Also show its excitation table. (8)

- b) Write short note on the following :

a. Asynchronous and synchronous counter.

b. Sequential and non sequential counter. (4×2)

OR

5. a) Construct 4-bit serial adder using shift registers and logic gates. Explain its operation. (8)

- b) Determine the next state for each of six unused states in the BCD ripple counter. Is the counter self - starting? (8)