3E1653

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3E1653

B. Tech. III Semester (Main) Examination-2014

Electronic Instrumentation & Control

3EI3 Digital Electronics

(Common for EC & EIC, EC, CS, IT)

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

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) Subtract the following using 9's complement method.

   i) 649-387

   ii) 891-786

   b) Minimize the following Boolean expression using basic laws of Boolean algebra:

   i) $Y = AB + \overline{AC} + A\bar{B}C(AB + C)$

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

OR

1. a) What is the importance of Gray code in engineering ? Find equivalent binary Gray code of $(478)_{10}$

   b) Convert the following

   i) $(AB\ 6)_{16}$ to decimal.

   ii) $(543.26)_{10}$ into Octal.

   iii) $(247.36)_{8}$ into Hexa decimal.

   iv) $(AF\ 9.\ BOD)_{16}$ into binary.

Unit - II

2. a) Explain the operation of tri-state TTL NAND gate with the help of a neat diagram.

   b) What are major advantages of totem - pole output arrangement?

OR

2. a) Define the following characteristics of digital ICs.

   i) Fan in

   ii) Power dissipation.

   iii) Noise margin

   iv) Propagation delay.

   b) compare the characteristics of TTL, ECL, RTL and CMOS.

Unit - III

3. a) Minimize the 4 - variable Boolean function using K-map :-

   $f(ABCD) = \Sigma m(0,1,2,3,5,7,8,9,11,14)$

   b) Find minimal SOP form for the function

   $f = \Sigma(1,2,3,7,8,9,10,11,14,15)$ using the Quine Mckluskey method.

OR

3. a) Simplify the following as much as possible.

   i) $A + \overline{A}B + \overline{A}\,\overline{B}C + \overline{A}\,\overline{B}\,\overline{C}D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}E$

   ii) $A\left(B + C\left(\overline{AB + AC}\right)\right)$

   b) Obtain the simplified expression in SOP for the following Boolean expression

   $f(ABCD) = \Sigma m(0,2,3,5,7,8,9,10,11) + d(4,15)$

Unit - IV

4. a) Design a full adder using 4×1 multiplexer.

   b) Design a excess - 3 to BCD code convertor using 4 bit adder.

Unit - II

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Unit - III

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   $f(ABCD) = \Sigma m(0,1,2,3,5,7,8,9,11,14)$

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   $f = \Sigma(1,2,3,7,8,9,10,11,14,15)$ using the Quine Mckluskey method.

OR

3. a) Simplify the following as much as possible.

   i) $A + \overline{A}B + \overline{A}\,\overline{B}C + \overline{A}\,\overline{B}\,\overline{C}D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}E$

   ii) $A\left(B + C\left(\overline{AB + AC}\right)\right)$

   b) Obtain the simplified expression in SOP for the following Boolean expression

   $f(ABCD) = \Sigma m(0,2,3,5,7,8,9,10,11) + d(4,15)$

Unit - IV

4. a) Design a full adder using 4×1 multiplexer.

   b) Design a excess - 3 to BCD code convertor using 4 bit adder.

OR

4. a) Write short note on Diode switching matrix.

   b) Design and explain the working of BCD to 7-segment decoder

Unit - V

5. a) What is difference between flip-flop and latch? Explain different types of flip-flops.

   b) Explain the construction and working of Master-slave JK flip-flop.

OR

5. a) Design a Mod 8 counter using T-flip flop.

   b) Explain the different types of Registers used in sequential circuits.
