

3E1653

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**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)  $Y = AB + \overline{AC} + \overline{ABC}(AB + C)$
  - ii)  $Y = \overline{(AB + \overline{C})} + \overline{(A + B + C)}$

**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)  $(AB6)_{16}$  to decimal.
  - ii)  $(543.26)_{10}$  into Octal.
  - iii)  $(247.36)_8$  into Hexa decimal.
  - iv)  $(AF9.BOD)_{16}$  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)  $A + \bar{A}B + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}\bar{D}E$
  - ii)  $A(B + C(\overline{AB + AC}))$
- 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  $4 \times 1$  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.