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

**PAPER ID : 0323**   Roll No. ⎕⎕⎕⎕⎕⎕⎕⎕⎕⎕⎕

# B.Tech.

# Third Semester Theory Examination, 2011-12

## DIGITAL ELECTRONICS

*Time : 3 Hours]*                                    *[Total Marks : 100*

*Note :*   This question paper contains three Sections. Attempt
questions from each Section.

### Section A

Attempt *all* parts of this question. Each question
carries equal marks.                              2×10=20

1.   (a)   Distinguish between weighted binary code and
unweighted binary code.

     (b)   Convert the Gray code 111001 into binary code.
Also draw its logic circuit.

     (c)   Write the characteristic equation of J-K flip-
flop.

(d)    Choose the correct statement :

In a D flip-flop D stands for : –

(i)    Data

(ii)   Dominant input

(iii)  Dual input

(iv)   None.

(e)    How many address lines and input-output data line are required for memory unit 8K×8 ?

(f)    (i)    ROMS are volatile or non-volatile ?

(ii)   Is DRAM is slower than SRAM ?

(g)    How race can be avoided ?

(h)    Draw the logic diagram of Up-Down counter.

(i)    Where EX-OR function are used in Electronic circuit ?

(j)    Define Cyclic code. Is Gray code a Cyclic code ?

## Section-B

Attempt *all* parts of this question.                6×5=30

2.    (a)    (i)    Represent–9 in three different ways.

          (ii)    Add two unsigned BCD number 184 and 576.

         (iii)    Define Linear Block code. Is 1011, 1000, 1101, a Linear Block code ?

    (b)    (i)    Explain Hamming weight and Hamming distance.

         (ii)    What is relation between Hamming distance and Number of corrected bit error ?

        (iii)    Find the complement of function :

$$F(A,B,C) = (1,4,5,7).$$

        (iv)    Express the Boolean function $F=A+B'C$ as a sum of minterms.

    (c)    (i)    Simplify the Boolean function :

$$F(X,Y,Z)=(3,4,6,7)$$

using K-map.

0323                        (3)

(ii) Why NAND and NOR are called universal gate?

(iii) Distinguish between MEALY and MOORE models.

(d) Define prime implicants and essential prime implicants.

Find the prime implicant of the given function :

$$F(A, B, C, D) = (2, 6, 7, 8, 9, 10).$$

(e) (i) Define registers. Write the name of different types of registers. Construct 4-bit parallel shift register and explain it.

(ii) Write two merits/demerits of synchronous sequential circuit over asynchronous sequential circuit.

## Section-C

Attempt *all* questions.                      $10 \times 5 = 50$

3.    (a)    Convert BCD code to Excess 3 code.

(b)    Draw the logic diagram of CLA generator.

*Or*

(a)    Construct full adder using half adder. Also write sum and carry.

(b)    Draw block diagram of 4-bit subtractor.

4.    Attempt any one of the following :

(a)    In a magnitude comparator let $A = A_3 A_2 A_1 A_0$ and $B = B_3 B_2 B_1 B_0$ are two numbers. Draw the expression $A > B$ and $A < B$. Also draw its logic diagram.

(b)    Design a code converter that convert a from the $8, 4, -2, -1$ code to BCD code.

5. (a) Using K-map draw the circuit diagram of 4 to 1 line multiplexer.

(b) Distinguish between latch and flip-flops. Draw the logic diagram of D latch. What is the role of preset and clear input of flip-flop ?

*Or*

There are A and B two flip-flop. Whose state equation and output equation are given as :

$A(t+1)=Ax+Bx$

$B(t+1)=A'x$

$Y=Ax'+Bx'$,

where x is the input. Draw its state diagram.

6. Attempt any one of the following :

(a) Assume that the exclusive-OR gate has a propagation delay of 10ns and that the AND or OR have a propagation delay of 5ns. What is the total propagation delay time in the four bit adder ?

(b) Design combinational circuit that generate the 9's complement and 10's complement of BCD digit.

7. (a) Design a four bit binary synchronous counter with T flip-flop.

(b) Differentiate between PAL and PLA.

*Or*

(a) Write the PLA programmable table for BCD to Excess 3 codes.

(b) A memory size 4K×8 ROM is expanded to 8K×8. Find the number of chips required and the number of address lines in the expanded memory.