1010 *Your Roll No.* ....

B.Sc. (Hons.) / II   C

ELECTRONIC SCIENCE – Paper 2.3 (X)

(Digital Electronics)

Time : 3 Hours *Maximum Marks : 38*

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt **Five** *questions in all, including
Question No.* **1** *which is compulsory.*

1. (a) Convert $(328)_{10}$ into

   (i) Gray   (ii) Excess-3

   (iii) Hexadecimal   (iv) Octal

   (b) Subtract $(11000)_2$ from $(01101)_2$ using

   (i) 1's complement method

   (ii) 2's complement method

   (c) Find the complement of the function using
   De Morgan's theorem

   $$\overline{A\overline{B} + ABC} + A\left(B + A\overline{B}\right)$$

P.T.O.

    (d) Distinguish between SRAMs and DRAMs.

    (e) The logic levels used in an 8-bit R–2R ladder DAC are : $0 = 0V$ and $1 = +5V$.

        What is the binary input when the analog output is 4 V ? $(2×5=10)$

2. (a) Minimize the following Boolean expression using K-maps and implement with NAND-NAND logic.

$$f = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D}$$

$$+ \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + A\bar{B}\bar{C}D + AB\bar{C}\bar{D} +$$

$$AB\bar{C}D + ABC\bar{D} \qquad\qquad (4)$$

    (b) Design a BCD adder.   (3)

3. (a) Design a BCD to XS–3 code converter.   (3)

    (b) Construct a $16 × 1$ Multiplexer with two $8 × 1$ multiplexers and one $2 × 1$ multiplexers. Use block diagram for the three multiplexers.   (4)

4. (a) Design a circuit of Tristate TTL inverter.   (4)

    (b) Convert D-flip-flop to J-K flip flop.   (3)

5. (a) A sequential circuit has two D-flip-flops D_A and D_B, one input x and one output y. It is described by the following flip-flop functions :

$$D_A = A\bar{B} + B\bar{x}$$

$$D_B = \bar{A}x + \bar{B}x + AB\bar{x}$$

$$y = \bar{B}x$$

   (i) Derive the state table for the circuit.

   (ii) Draw the state diagram.   (5)

   (b) Design a circuit of 2-bit Parallel-in-Serial-out shift register.   (2)

6. (a) Design a type T-counter that goes through states 0. 3. 5. 6. 0 - - - - . Is the counter self-correcting ?
                                                  (4)

   (b) Design the R-2R ladder type ADC and explain its working.   (3)

7. (a) A certain memory has a capacity of 8K × 16.

   (i) How many data input and data output lines does it have ?

   (ii) How many address lines does it have and what is its capacity in bytes ?   (2)

                                          P.T.O.

(b) Discuss the concept of floating inputs with reference to TTL and CMOS logic.   (3)

(c) What is FIFO memory ? How is data Stored in CCD memories ?   (2)