Bachelor of Science (B.Sc.) Semester-I (C.B.S.) Examination

ELECTRONICS (FUNDAMENTALS OF DIGITAL ELECTRONICS)

Compulsory Paper—2

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** the questions are compulsory and carry equal marks.

(2) Draw neat diagrams wherever necessary.

EITHER

1. (A) List the symbols used in Hexadecimal number system. What are the place values of the various digits in the hexadecimal number system ?

Convert the following :

(1) $(A2)_{16} = (\quad)_2$

(2) $(1101.101)_2 = (\quad)_{10}$

(3) $(74.3)_8 = (\quad)_2$

(4) $(97.5)_{10} = (\quad)_{BCD}$

(5) $(75.25)_{10} = (\quad)_2$ 2+3+5

OR

(B) Explain 1's and 2's complement of a binary number.

Do as directed :

(1) $(-47)_{10}$ = (8-bit 2's complement code)

(2) $(22)_{10}$ = (8-bit is complement code)

(3) $(42 - 67)_{10}$ by 2's complement method. 2+2+6

EITHER

2. (A) Give the symbol and truth table of 2-input AND gate.

Implement a 2-input AND gate using NOR as the universal building block.

Prove that $(A + B)(A + \overline{B}) = A$ using Boolean algebra. 3+3+4

OR

(B) State Duality theorem. Write the dual of the expression :

$$y = (A + C)(\overline{A} + B).$$

Give the symbol and truth table of 2-input XOR gate.

State and prove De Morgan's Theorem. 2+3+5

EITHER

3. (A) Explain the terms with reference to K-Map :

(i) Pairs

(ii) Quads

(iii) Octets

(iv) Overlapping groups

(v) Rolling the K-Map.

A truth table has high outputs for 0000, 0001, 0010, 0011, 1010, 1011, 1100, 1101, 1110 and 1111. Draw its truth table and K-map. 5+5

OR

(B) Implement the logic function specified by the truth table using K-Map method using various gates :

A	B	C	Y (Output)
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

10

EITHER

4. (A) Design 8 : 1 multiplexer using two 4 : 1 multiplexers.

Give the construction and working of a half adder circuit. 5+5

OR

(B) Give the truth table of BCD to seven segment decoder.

Explain the construction and working of full subtractor circuit. 5+5

5. Solve any **TEN** :

(A) Convert $(27)_{10}$ in its binary and BCD equivalent.

(B) What is even and odd parity ?

(C) Subtract using 1's complement method :

$(11010)_2 - (101)_2$

(D) Draw symbol and truth table of X NOR gate.

(E) Why XOR gate is called as 'controlled invest' ?

(F) State the law for double inversion.

(G) What is K-Map ?

(H) What is Maxterm ?

(I) Draw the K-Map for f(ABC) = $\Sigma m(0, 2, 5, 6, 7)$.

(J) What is decoder ?

(K) What is encoder ?

(L) Draw the block diagram for 4 : 1 MUX. 1×10=10