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** questions are compulsory and carry equal marks.

(2) Draw neat and well labelled diagrams wherever necessary.

EITHER

1. (A) What is an Excess 3 code ? What are the advantages of XS3 code over 8421 code ? Express the following numbers in XS3 code :

(I) 821

(II) 2065

Add the following decimal numbers by first converting them into XS3 code.

(a) $(42)_{10} + (16)_{10}$

(b) $(84)_{10} + (56)_{10}$

(c) $(75)_{10} + (9)_{10}$ 1+1+2+6

OR

(B) Explain the method of converting decimal number to Hexadecimal with suitable example.

Convert the following :

$(9F2)_{16} = (\quad)_8$

$(27.16)_{10} = (\quad)_2$

Explain 1’s complement and 2’s complement subtraction method with suitable examples. 3+2+5

EITHER

2. For the logic expression $Y = A\overline{B} + \overline{A}B$

(a) Obtain the truth table

(b) Name the operation performed

(c) Realize this operation using AND, OR, NOT gates

(d) Realize this operation using NAND gates only

Using De Morgan's theorem, solve the following equation :

$$\frac{\overline{\overline{AB} \cdot \overline{CD}}}{(\overline{A + B}) + (\overline{C + D})} = \frac{AB + CD}{(A + B)(C + D)}$$ 5+5

OR

Draw the logic symbol, truth table and logic equation for NOR and NAND gate and explain its working.

Explain X-NOR gate with the help of logic diagram equation and truth table. Why X-NOR gate is called an equality gate ? 3+3+3+1

EITHER

3. What is K-map ? What is minterm and maxterm in K-map ? For the logic equation $f = ABC + B\overline{C}D + \overline{A}BC$:

(I) Make a truth table

(II) Simplify using K-map

(III) Draw logic circuit for given equation. How does K map differ from the truth table ?

1+2+6+1

OR

Explain SOP and POS terms in K-map with an example. Simplify the function using K-map

$f(ABCD) = m(0, 1, 3, 5, 6, 9, 11, 12, 13, 15)$. 4+6

EITHER

4. Explain working of 3-bit parity checker with logic diagram. Draw the logic circuit of 4-bit Adder/Subtractor circuit and explain its working with suitable example. 5+5

OR

What are MUX and DEMUX ? Draw 1 : 4 demux using logic gates and explain its working with truth table. Draw the logic circuit of full adder with truth table. 2+5+3

5. Solve any **ten** of the following :

(i) What is radix ?

(ii) How negative numbers are represented by 2's complement method in binary number system ?

(iii) What is BCD code ?

(iv) State AND laws of boolean algebra.

(v) Give application of X-OR gate.

(vi) State duality theorem.

(vii) What is pair and quad of K-map ?

(viii) What is Don't care condition in NAND gate ?

(ix) What is rollover in K-map ?

(x) Draw the circuit of half subtractor with truth table.

(xi) Draw the block diagram of 4 : 1 MUX.

(xii) What is decoder ? 1×10