This question paper contains **4** printed pages]

ND—22—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. CS (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper BCS-104 B

(Fundamentals of Digital Electronics)

(Wednesday, 6-12-2023) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if required.

(*iv*) Use of any electronic media such as mobile phone, digital diary and electronic calculator is not permitted.

1. Attempt any *five* of the following (**3** marks each) : 15

(*a*) Gray Code

(*b*) Half Adder

P.T.O.

(*c*) One's Complement of Binary

(*d*) Hexadecimal number system.

(*e*) Encoder

(*f*) Ex-OR Gate

(*g*) T flip-flop.

2. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Perform the following conversions :

(*i*) $(37)_{10} = (?)_2$

(*ii*) $(10101.01)_2 = (?)_{10}$

(*iii*) $(253)_8 = (?)_{16}$

(*iv*) $(D0E)_{16} = (?)_2$

(*v*) $(1632)_{10} = (?)_{16}$

(*b*) Perform the following Operations :

(*i*) $(1011)_2 + (11011)_2$

(*ii*) $(11000)_2 - (1011)_2$

(*iii*) $(111)_2 \times (101)_2$

(*iv*) $(1010)_2 \div (10)_2$

(*v*) $(10110)_2 = (?)_{2\text{'s Complement}}$

4F7E1712608DAC373252113778C2DDB2

(*c*) What is Logic Gate ? Explain AND, OR and NOT Gates in detail.

(*d*) What is Number System ? Explain Binary and Octal number systems in detail.

(*e*) What is Parity Checking ? Explain Hamming code in detail.

3. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Explain NAND and NOR Gates in detail.

(*b*) State and prove DeMorgan's first and second theorem.

(*c*) Minimize the following using K-map :

$f(A,B,C,D) = \Sigma m(0, 1, 2, 4, 5, 7, 8, 9, 10, 11, 14, 15)$

(*d*) Minimize the following using K-map :

$f(A,B,C,D) = \pi M\ (1, 2, 3, 5, 6, 8, 9, 12, 13, 14)$

(*e*) Draw the logic circuit for the following expression

$Y = A'B'C' + C' + (A.B)' + (B+C)'$

4. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Explain SOP and POS forms of the expression in detail.

(*b*) What is Multiplexer ? Explain 8 : 1 Multiplexer in detail.

(*c*) What is flip-flop ? Explain J-K flip-flop in detail.

P.T.O.

4F7E1712608DAC373252113778C2DDB2

(*d*) What is Analog to digital converter ? Explain any *one* type of Analog to digital converter in detail.

(*e*) What is Shift register ? Explain SISO and SIPO shift registers in detail.

5. Write short notes on any *three* of the following (**5** marks each) : 15

(*a*) BCD code

(*b*) K-map

(*c*) Full adder

(*d*) D flip-flop

(*e*) Asynchronous Counter.

4F7E1712608DAC373252113778C2DDB2