GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2024

Subject Code: 3131704   **Date: 21-11-2024**
Subject Name: Digital Electronics
Time: 10:30 AM TO 01:00 PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Show how a full adder can be converted to a full subtractor with the help of inverter circuit.	**03**
	(b)	Convert the following numbers into binary. (i) $(25.8)_{10}$ (ii) $(47FD)_{16}$ (iii) $(573.2)_8$	**04**
	(c)	Simplify the Boolean function F using don't care conditions d, in (i) sum of products and (ii) product of sums $F = w'(x'y + x'y' + xyz) + x'z'(y + w)$ $d = w'x(y'z + yz') + wyz$	**07**
Q.2	**(a)**	What do you mean by reflected code? Show one of the possible combination of 4-bit reflected code.	**03**
	(b)	Explain standard and canonical forms along with example.	**04**
	(c)	Design a combinational circuit for BCD to excess-3 code converter.	**07**
		OR	
	(c)	Explain clocked RS flip-flop with circuit diagram and truth table. Also discuss about limitation of RS flip-flop.	**07**
Q.3	**(a)**	Construct a 4 x 16 decoder with 3x 8 decoder.	**03**
	(b)	Differentiate between (i) Combination and sequential circuits (ii) Edge triggered and level triggered flip-flop	**04**
	(c)	Explain the 4-bit magnitude comparator with necessary diagrams and equations.	**07**
		OR	
Q.3	**(a)**	Implement NOT, AND & OR gates with the help of NAND gate.	**03**
	(b)	Explain Master-Slave flip-flop.	**04**
	(c)	Explain bus system for four registers.	**07**
Q.4	**(a)**	Prove the following Boolean expression using Boolean algebra simplification. $BC + AC' + AB + BCD = BC + AC'$	**03**
	(b)	Explain TTL gate with Totem-pole output	**04**
	(c)	Explain ring counter in detail.	**07**
		OR	

Q.4 **(a)** Represent the decimal number 8620 in   **03**
            (i)   BCD
            (ii)   Excess-3 code
            (iii)   5421 code

(b) Express the following function in a sum of minterms and a product of maxterms. **04**
$F(A, B, C, D) = D(A' + B) + B'D$

(c) Explain 4-bit bidirectional shift register with parallel load. **07**

Q.5 **(a)** Explain the working of JK flip-flop. **03**
(b) Define **04**
            (i)   Fan-out
            (ii)   Power Dissipation
            (iii)   Propagation delay
            (iv)   Noise Margin

(c) Design 3-bit Binary counter with T flip-flops. **07**

OR

Q.5 **(a)** Explain Macro-operations versus Micro-operations. **03**
(b) Explain arithmetic and logic micro-operations. **04**
(c) Design BCD counter with T flip-flops. **07**

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