

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024****Subject Code: 3130704****Date: 10-12-2024****Subject Name: Digital Fundamentals****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) (a) Perform the following mathematical operations using 2's complement method. (i) $(9)_{10} + (-5)_{10}$ (ii) $(3)_{10} - (8)_{10}$ (b) State and prove De-Morgan's theorems using truth-tables. (c) Explain the characteristics of Digital ICs.	03 04 07
Q.2	(a) Design a Full Adder circuit using basic logic gates. (b) Design a modulo-6 ripple counter using T-Flip-flops. (c) Design a 4-bit Binary to Gray Code Converter using K-map.	03 04 07
	OR	
	(c) Draw a two input TTL NAND gate and explain its operation.	07
Q.3	(a) Explain Race Around Condition in JK flip flop. (b) Design a 1 - bit Magnitude Comparator. (c) Explain Hamming codes for error correction with a suitable example.	03 04 07
	OR	
Q.3	(a) Find expression for the following and implement using logic gates. $F(A,B,C,D) = \pi M(0,2,3,6,7,8,9,12,13)$ (b) Implement D flip flop using JK flip flop. (c) Design a 4-bit twisted Ring Counter using JK flip flops.	03 04 07
Q.4	(a) Differentiate Synchronous Counters and Asynchronous Counters. (b) Implement the following using 8:1 MUX. $F = f(A,B,C,D) = \Sigma m(2,4,5,7,10,14)$ (c) Design a synchronous BCD counter using J-K flip-flops.	03 04 07
	OR	
Q.4	(a) Implement full subtractor using 3:8 decoder and write a truth table. (b) Explain the specifications of Digital to Analog Converters. (c) Explain Successive Approximation type A/D converter.	03 04 07
Q.5	(a) Differentiate Static RAM and Dynamic RAM. (b) Write a short note on FPGA. (c) Explain the operation of Dual-slope A/D converter.	03 04 07
	OR	
Q.5	(a) Explain basic structure of a CCD (Charge Coupled Device). (b) Write a short note on Programmable Array Logic. (c) Explain various types of Read Only Memory.	03 04 07
