

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2021****Subject Code:3130306****Date:14/09/2021****Subject Name:Fundamentals of 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
<b>Q.1</b>	(a) Define the following terms: (1) Buffer Register (2) Flip flop (3) Counter	<b>03</b>
	(b) Explain S-R Latch.	<b>04</b>
	(c) Perform the subtraction with the following decimal numbers (a) 14 from 25 using 8bit 1's compliment (b) 14 from 46 using 8 bit 2's compliments.	<b>07</b>
<b>Q.2</b>	(a) How does a counter work as frequency divider? Explain with suitable example	<b>03</b>
	(b) Explain Johnson counter.	<b>04</b>
	(c) Compare ROM, PLA and PAL.	<b>07</b>
<b>OR</b>		
	(c) Write short note on Programmable Logic Arrays.	<b>07</b>
<b>Q.3</b>	(a) Show that $AB+AB'C+BC' = AC+BC'$	<b>03</b>
	(b) Discuss NAND gate as universal gate (implement NOT, AND, OR & NOR gate using NAND gate)	<b>04</b>
	(c) Reduce using mapping the Expression $\sum m(0, 1, 2, 3, 5, 7, 8, 9, 10, 12, 13)$ and implement it in universal logic.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Convert the following to other canonical form $F(x, y, z) = \sum(1, 3, 7)$	<b>03</b>
	(b) Convert the following expression into sum of products and products of sums: $(BC + D)(C + AD')$	<b>04</b>
	(c) State and prove De'Morgan's Theorems with the help of truth tables.	<b>07</b>
<b>Q.4</b>	(a) Give the applications of Decoder.	<b>03</b>
	(b) Implement the given function using multiplexer $F(w, x, y, z) = \prod(3, 10, 11)$	<b>04</b>
	(c) Implement following logic function using 8X1 MUX. $P = \sum m(1, 2, 6, 7, 8, 10, 13, 14)$	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Explain the working of multiplexer	<b>03</b>
	(b) Design 4 X 16 decoder using two 3 X 8 decoder.	<b>04</b>
	(c) Design a 8 to 1 multiplexer by using the four variable function given by $F(A, B, C, D) = \sum m(0, 1, 3, 4, 8, 9, 15)$ .	<b>07</b>
<b>Q.5</b>	(a) Draw and explain Ring counter in brief.	<b>03</b>
	(b) What is race around condition in JK flip flop.	<b>04</b>
	(c) With logic circuit explain the working of 4-bit magnitude comparator.	<b>07</b>
<b>OR</b>		
<b>Q.5</b>	(a) Explain shift registers.	<b>03</b>
	(b) Draw & explain in brief a high assertion input SR latch.	<b>04</b>
	(c) Explain half and full adders in detail.	<b>07</b>

\*\*\*\*\*