

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER- III EXAMINATION – SUMMER 2020****Subject Code: 3130704****Date: 02/11/2020****Subject Name: Digital Fundamentals****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) Prove following using the Boolean algebraic theorems:	<b>03</b>
	1. $A + A'B + AB' = A + B$	
	2. $AB + A'B + A'B' = A' + B$	
	(b) List out three basic logic operations. Realize these operations using NOR gates only.	<b>04</b>
	(c) Do as directed:	<b>07</b>
	1. Express decimal number 60.875 into binary form.	
	2. One 8421 code word is transmitted in Hamming code with even parity checking. The received word is 0101000. Find out the correct code word and write decimal equivalent.	
<b>Q.2</b>	(a) Minimize following Boolean function using K-map:	<b>03</b>
	$X(A,B,C,D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 15)$	
	(b) 1. Convert $Y = AB + AC' + BC$ into canonical SOP form.	<b>04</b>
	2. Convert $Z = (A+B)(A+C)(B+C')$ into canonical POS form.	
	(c) Write a brief note on BCD-to-7-segment decoder/driver. Set up a single 7-segment LED display using 7447 BCD-to-7-segment decoder/driver.	<b>07</b>
	<b>OR</b>	
	(c) Write a brief note on full subtractor with the help of its TT. Also design full subtractor logic circuit using 3 x 8 decoder and OR gates. Use X, Y, & Z as input variables and D & B as output variables.	<b>07</b>
<b>Q.3</b>	(a) Construct D FF using SR FF. Write truth table of D FF.	<b>03</b>
	(b) Draw & explain in brief the logic diagram of 4-bit bidirectional shift register.	<b>04</b>
	(c) Design a 3-bit synchronous up counter using JK flip-flops.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) List out various application of the shift register and explain any one.	<b>03</b>
	(b) Construct a 3-bit ripple up counter with preset and clear facility using T FFs.	<b>04</b>
	(c) Write a short note on the applications of the flip-flops.	<b>07</b>
<b>Q.4</b>	(a) List out various methods of simplifying a given Boolean function. Solve $F = AB + AB'$ using any two methods.	<b>03</b>
	(b) Discuss any two characteristics of a D/A converter.	<b>04</b>
	(c) Draw & explain weighted-resistor D/A converter with necessary equations.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Minimize the following logic function using K-map:	<b>03</b>
	$F(A,B,C,D) = \sum m(1, 3, 5, 8, 9, 11, 15) + d(2,13)$	
	(b) Write a brief note on quantization and encoding.	<b>04</b>
	(c) Draw & explain Flash A/D converter with necessary decoding table. Also mention pros & cons of the same.	<b>07</b>
<b>Q.5</b>	(a) Differentiate between RAM & ROM.	<b>03</b>

- (b) How SR FF can be converted into JK FF? Draw & explain in brief. **04**  
(c) Write a short note on ROM & its types. **07**

**OR**

- Q.5** (a) Compare SRAM with DRAM. **03**  
(b) Draw & explain the block diagram of ALU. **04**  
(c) Draw and explain in brief block diagram of CPLD. Also compare CPLD with FPGA. **07**

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