Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023**

**Subject Code:3131704 Date:24-07-2023**

**Subject Name:Digital Electronics**

**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.**
4. **Simple and non-programmable scientific calculators are allowed.**

| | | | Marks |
|---|---|---|---|
| **Q.1** | **(a)** | Write any three boolean laws with boolean expressions. | **03** |
| | **(b)** | Explain, how basic gates can be realized using NOR gates. | **04** |
| | **(c)** | Convert the following numbers form given base to the base indicates<br>(i) $(306.D)_{16}$ = (_____)$_2$<br>(ii) $(673.124)_8$ = (_____)$_2$<br>(iii)$(11010.11)_2$ = (_____)$_{10}$<br>(iv) $(41)_{10}$ = (_____)$_2$<br>(v) $(ABFF.FFCD)_{16}$ = (_____)$_8$<br>(vi) Obtain 1's and 2's complement of binary numbers 1010101 and 0111000 | **07** |
| **Q.2** | **(a)** | Evaluate using Boolean algebra<br>$A' B C' + A B' C' + A B' C + A B C' + A B C$ | **03** |
| | **(b)** | Explain 3-line to 8-line decoder with logic diagram. | **04** |
| | **(c)** | Explain parameters of Logic Families Noise margin, Fan out, Propogation delay, Power dissipation and compare ECL and TTL logic families. | **07** |
| | | **OR** | |
| | **(c)** | State and prove De Morgan's theorem which convert a sum into a product form and vice versa with necessary truth tables. | **07** |
| **Q.3** | **(a)** | Explain the difference between positive logic and negative logic with suitable examples. | **03** |
| | **(b)** | Convert the following expressions:<br>(i) $Y= AB+A\overline{C}+B\overline{C}$ into standard SOP form<br>(ii) $Y= (A+B).(A+\overline{C}).(B+C)$ into the standard POS form | **04** |
| | **(c)** | Simplify the following Boolean function using K map<br>$F(w,x,y,z) = \Sigma (1,3,7,11,15)$<br>and the don't care conditions<br>$d(w,x,y,z) = \Sigma (0,2,5)$ | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.3** | **(a)** | What is Shift register? Name different types of Shift registers. | **03** |
| | **(b)** | Explain working of Half adder circuit with necessary diagram and truth table. | **04** |
| | **(c)** | Explain working of Multiplexer with necessary diagram. Write applications of Multiplexer. | **07** |
| **Q.4** | **(a)** | Explain magnitude comparator. | **03** |
| | **(b)** | Write short note on memory. | **04** |
| | **(c)** | Design 3-bit even parity generator circuit. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.4** | **(a)** | What is Sequential logic circuit? Distinguish between combinational and sequential logic circuit. | **03** |
| | **(b)** | Write applications of Flip Flops. | **04** |
| | **(c)** | Design 4-bit Binary to Gray code converter. | **07** |
| **Q.5** | **(a)** | Implement T flip flop using D flip flop. | **03** |
| | **(b)** | Explain arithmetic micro-operations briefly. | **04** |
| | **(c)** | Explain working of J-K flip flop with circuit diagram and truth table. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Write applications of decoder. | **03** |
| | **(b)** | What is Finite state machine? How do we use it for digital systems? | **04** |
| | **(c)** | Explain ripple counter with necessary diagram. | **07** |