Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022**

**Subject Code:3132003 Date:24-02-2023**

**Subject Name:Design Concepts in Basic 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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Differentiate between analog and digital system. | **03** |
| | **(b)** | Explain De-Morgan's theorem with suitable examples. | **04** |
| | **(c)** | Attempt the following questions:<br>1. Perform binary division of 110 by 10.<br>2. Find 1's complement of 10111001.<br>3. Express $(-19)_{10}$ as 8 bit binary number using sign magnitude.<br>4. Convert $(531)_{10}$ to its equivalent BCD number.<br>5. Convert $(010101)_2$ to Octal number.<br>6. $(3F1)_{16}$ = (_____)$_2$.<br>7. Convert binary number 10110 to grey code. | **07** |
| **Q.2** | **(a)** | Explain working of series positive clipper with circuit diagram and waveforms. | **03** |
| | **(b)** | Draw the logic diagrams corresponding to the following Boolean expressions without simplifying them.<br>1. (A+C)(A+D)(A'+C+D)<br>2. A'B+ACD+BD' | **04** |
| | **(c)** | With circuit diagram and waveforms explain working of D flip-flop. | **07** |
| | | **OR** | |
| | **(c)** | Explain emitter feedback bias for transistor. | **07** |
| **Q.3** | **(a)** | Differentiate between combinational circuits and sequential circuits. | **03** |
| | **(b)** | Explain full-wave voltage doubler circuit with application. | **04** |
| | **(c)** | Simplify the following Boolean expression to minimum number of literals and implement it with logic Gates.<br>A[B+C'(AB+AC')'] | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain reverse bias condition for PN junction diode. | **03** |
| | **(b)** | Define RTL, TTL, ECL and CMOS. | **04** |
| | **(c)** | Explain different types of logic Gates with their functions and truth tables. | **07** |
| **Q.4** | **(a)** | Explain significance of rectifier with one application. | **03** |
| | **(b)** | Express the following functions in sum of minterms and product of maxterms.<br>1. F (A, B, C) = (A'+B)(A+C)(B+C')<br>2. F (X, Y, Z) = XY'+ Y'Z + XZ | **04** |
| | **(c)** | Design BCD to Seven segment decoder. | **07** |

**OR**

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|---|---|---|---|
| **Q.4** | **(a)** | Explain the effect of temperature on barrier potential. | **03** |
| | **(b)** | Design combinational circuits for half adder and half subtractor. | **04** |
| | **(c)** | Explain working of 4-bit ripple counter with diagram. | **07** |
| **Q.5** | **(a)** | Explain the capacitor input filter for half wave rectifier. | **03** |
| | **(b)** | Briefly explain Q-point for a transistor. | **04** |
| | **(c)** | Explain bidirectional shift register with parallel load. | **07** |

**OR**

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|---|---|---|---|
| **Q.5** | **(a)** | Explain conduction band and valence band. | **03** |
| | **(b)** | Explain the ideal and second approximation for diode in detail with example. | **04** |
| | **(c)** | Explain the input and output characteristic of common emitter configuration of transistor. | **07** |

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