Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–I (NEW) EXAMINATION – WINTER 2023**

**Subject Code:3110016 Date:25-01-2024**

**Subject Name: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.**

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | Draw symbol and truth table for AND, NOR, EX-OR logic gates. | **03** |
| | **(b)** | Discuss forward and reverse bias operation of a P-N junction diode with depletion region. | **04** |
| | **(c)** | Draw CB configuration and discuss its input and output characteristics with $I_{CBO}$, $r_i$, $r_o$, and current gain $\alpha$. | **07** |
| **Q.2** | **(a)** | Describe Negative clamper circuit with necessary waveforms | **03** |
| | **(b)** | Describe RC filter with its limitations. | **04** |
| | **(c)** | Draw circuit diagram of Center-taped full wave rectifier and explain its operation with necessary waveforms and derivation of $V_{dc}$. | **07** |
| | | **OR** | |
| | **(c)** | Describe diode approximations in detail. | **07** |
| **Q.3** | **(a)** | Draw circuit for Voltage doubler and explain its operation. | **03** |
| | **(b)** | Briefly explain the effect of coupling capacitor and bypass capacitor on small signal transistor amplifier. | **04** |
| | **(c)** | Draw circuit for Emitter feedback bias and explain in detail with its advantages and disadvantages. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | State the difference between Avalanche breakdown and Zener breakdown. | **03** |
| | **(b)** | Discuss Zener diode as voltage regulator. | **04** |
| | **(c)** | Discuss load line, Q point, DC & AC load lines for BJT. | **07** |
| **Q.4** | **(a)** | Derive relation between $\alpha$ & $\beta$ for BJT. | **03** |
| | **(b)** | Compare different BJT configurations. | **04** |
| | **(c)** | Describe working principle and applications of PIN Photo diode and Solar cell. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Briefly explain regions of operation for BJT. | **03** |
| | **(b)** | Discuss seven segment displays with its types. | **04** |
| | **(c)** | Draw CE configuration and discuss its input and output characteristics with $I_{CEO}$, $r_i$, $r_o$, and current gain $\beta$. | **07** |

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|---|---|---|---|
| **Q.5** | **(a)** | Compare FET with BJT. | **03** |
| | **(b)** | Explain FET as a switch. | **04** |
| | **(c)** | State different logic families and compare them in terms of fan in, fan out, propagation delay, noise margin, power dissipation. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Construct AND & OR gates with diodes. | **03** |
| | **(b)** | Explain FET as an amplifier. | **04** |
| | **(c)** | Explain Drain characteristics and Transfer characteristics of JFET in detail with all related terms as Transconductance $g_m$, drain resistance $r_d$, and amplification factor $\mu$. | **07** |

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