

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025**

**Subject Code: BE03024031**

**Date: 19-12-2025**

**Subject Name: Analog 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.**

|                                                                                                               | <b>Marks</b> |
|---------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1 (a)</b> Define PN junction diode and draw its symbol.                                                  | <b>03</b>    |
| <b>(b)</b> State merits of FET over BJT.                                                                      | <b>04</b>    |
| <b>(c)</b> Explain construction, and working of 555 IC. State its applications.                               | <b>07</b>    |
| <b>Q.2 (a)</b> Explain quiescent point (Q-point) in transistor amplifiers.                                    | <b>03</b>    |
| <b>(b)</b> Derive the expression for voltage gain of RC coupled amplifier.                                    | <b>04</b>    |
| <b>(c)</b> Explain thermal runaway in BJT amplifier.                                                          | <b>07</b>    |
| <b>OR</b>                                                                                                     |              |
| <b>(c)</b> Discuss the effect of load resistance on gain and bandwidth in a BJT amplifier.                    | <b>07</b>    |
| <b>Q.3 (a)</b> Define an operational amplifier. Draw its symbol.                                              | <b>03</b>    |
| <b>(b)</b> Explain the electrical characteristics of an ideal Op-Amp.                                         | <b>04</b>    |
| <b>(c)</b> With a neat diagram, explain the construction and working of LM741 operational amplifier.          | <b>07</b>    |
| <b>OR</b>                                                                                                     |              |
| <b>(a)</b> Define 1. input offset voltage, 2. common-mode rejection ratio (CMRR).                             | <b>03</b>    |
| <b>(b)</b> Explain the advantages of a differential input.                                                    | <b>04</b>    |
| <b>(c)</b> Describe the internal stages of the Op-Amp and explain the role of each block.                     | <b>07</b>    |
| <b>Q.4 (a)</b> Explain differential gain in Op-Amp circuits.                                                  | <b>03</b>    |
| <b>(b)</b> Describe the working of a non-inverting amplifier and write its gain expression.                   | <b>04</b>    |
| <b>(c)</b> Draw and explain inverting amplifier.                                                              | <b>07</b>    |
| <b>OR</b>                                                                                                     |              |
| <b>(a)</b> Define and explain the term "gain bandwidth product".                                              | <b>03</b>    |
| <b>(b)</b> Explain the importance of negative feedback.                                                       | <b>04</b>    |
| <b>(c)</b> Discuss the summing amplifier circuit, derive output voltage expression and list its applications. | <b>07</b>    |

- Q.5** (a) State the difference between an integrator and differentiator. **03**
- (b) Explain the working of a precision rectifier and derive its output equation. **04**
- (c) Explain the working of Op-Amp as a comparator with a circuit diagram. **07**

**OR**

- (a) State and explain main applications of Schmitt trigger. **03**
- (b) Describe the function and operation of clipper and clamper circuits. **04**
- (c) Explain the V-I and I-V converter circuits using Op-Amp. **07**

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