

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: BE03009011

Date: 19/06/2026

Subject Name: ANALOG AND 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.

- Q.1** (a) Define the following terms: Input offset voltage, Input offset current, PSRR. 03
- (b) Draw the equivalent circuit of an operational amplifier and explain the function of each component in the circuit. 04
- (c) Draw the circuit diagram of a practical op-amp integrator. Explain its operation when a step input and a square wave input are applied, and sketch the corresponding output waveform. 07

- Q.2** (a) Explain the concept of virtual Short and virtual ground in op-amp. 03
- (b) Compare combinational and sequential logic circuits. 04
- (c) Describe the working of an instrumentation amplifier with circuit diagram. 07

OR

- Q.2** (c) Explain the function of inverting comparator circuit using op- amp. 07

- Q.3** (a) Compare Wien bridge oscillator and RC phase shift oscillator. 03
- (b) Define a precision rectifier. Draw its basic circuit diagram and explain it. 04
- (c) List various characteristics of an ideal op- amp. 07

OR

- Q.3** (a) Compare square wave generator with triangular wave generator. 03
- (b) Define a peak detector circuit. Draw its basic circuit diagram and explain it. 04
- (c) Write a note on Half Adder and Full Adder. 07

- Q.4** (a) Define flip flop, latch and counter. 03
- (b) Classify the various modes of operation of shift registers. explain the serial in serial out operation of shift register. 04
- (c) Reduce following expression using karnaugh map 07

$$\sum m(0, 1, 5, 7, 8) + d(3, 4, 14, 15)$$

OR

- Q.4** (a) Define Multiplexer, Demultiplexer and Decoder. 03
- (b) Explain 4 - bit asynchronous down counter. 04
- (c) Implement the following function with a multiplexer 07

$$F(A, B, C, D) = \sum (0, 1, 3, 4, 8, 9, 15)$$

- Q.5** (a) Define ADC and DAC. 03
- (b) Explain the working of a binary weighted resistor DAC. 04

(c) Explain dual slope ADC.

07

OR

Q.5 (a) List different types of ADCs and DACs used in digital systems.

03

(b) Explain the working of successive approximation ADC.

04

(c) Explain the operation of an R - 2R ladder DAC.

07
