# GUJARAT TECHNOLOGICAL UNIVERSITY

### BE - SEMESTER– IV EXAMINATION – SUMMER 2020

**Subject Code: 3141706**                                      **Date:26/10/2020**

**Subject Name: Analog Signal Processing**

**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.

|   |   |   | MARKS |
|---|---|---|---|
| Q.1 | (a) | Define Following terms: <br> 1. CMRR <br> 2. SVRR <br> 3. Slew Rate | 03 |
|  | (b) | Draw and explain in brief the internal block diagram of an Op-Amp. | 04 |
|  | (c) | Derive the equation of voltage gain of differential amplifier using one Op-Amp (Closed loop configuration) with its circuit diagram. | 07 |
| Q.2 | (a) | Draw and explain Voltage follower circuit using an Op-Amp. | 03 |
|  | (b) | Explain Bandwidth and Total output offset voltage for Inverting Amplifier with feedback. | 04 |
|  | (c) | Derive the equation of voltage gain of Non-Inverting Summing amplifier using an Op-Amp with its circuit diagram. | 07 |
|  |  | **OR** |  |
|  | (c) | Draw and explain Voltage to Current converter with floating load using an Op-Amp. | 07 |
| Q.3 | (a) | Explain Subtractor circuit using an Op-amp. | 03 |
|  | (b) | Explain Zero Crossing detector circuit using an Op-Amp with input/output waveforms. | 04 |
|  | (c) | Explain Practical Differentiator circuit using an Op-Amp with its circuit diagram. Frequency response, input/output waveforms. | 07 |
|  |  | **OR** |  |
| Q.3 | (a) | Draw and Explain Voltage limiter circuit using an Op-Amp. | 03 |
|  | (b) | Draw and explain Sample and Hold circuit using an Op-Amp. | 04 |
|  | (c) | Draw Op-amp based full wave rectifier (absolute value output) circuit. Explain its working with necessary input/output waveforms. | 07 |
| Q.4 | (a) | Design + 5V power supply using 7805 with its circuit diagram | 03 |
|  | (b) | Explain adjustable voltage regulator using LM 317. | 04 |

(c) Explain Instrumentation Amplifier using three Op-Amp   **07**
Configuration and also derive the equation for the output
voltage.

**OR**

Q.4  (a) Explain Voltage controlled Oscillator (VCO) using IC   **03**
566.

(b) Draw and explain Square wave generator circuit using an   **04**
Op-Amp.

(c) Explain Successive Approximation type Analog to Digital   **07**

Q.5  (a) Explain All Pass filter.   **03**

(b) Draw and explain Programmable Gain Amplifier.   **04**

(c) Explain first order Low pass Butterworth Active filter   **07**
with circuit diagram and derivation of its transfer function.

**OR**

Q.5  (a) Explain Notch filter with its circuit diagram and necessary   **03**
waveforms.

(b) Explain Ramp Generator circuit using 555 timer in   **04**
Astable mode operation.

(c) Explain Monostable operation of 555 timer with its   **07**
internal block diagram with its output voltage and
capacitor voltage waveforms.

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