B.TECH (SEM VI) THEORY EXAMINATION 2022-23 ANALOG SIGNAL PROCESSING

Time: 3 Hours

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

- (a) Briefly describe the active filter and its uses.
- (b) Draw the circuit of high pass filter using op-Amp.
- (c) Find the value of Chebyshev co-efficient $C_2(\omega)$.
- (d) Write only two properties for the given Buttreworth response

$$\left|T_n(j\omega)\right|^2 = \frac{1}{1+\omega^{2n}}$$

- (e) What is meant by constant-resistance lattice?
- (f) Which filter is used for delay equalization and how they minimize it.
- (g) Define FDNR and its application.
- (h) Define the LC ladders circuit and why its energy dissipation is zero?
- (i) Draw the grounded and floating resistor with the use of OTA
- (j) Draw the circuit diagram of summer using op- Amp.

SECTION B

2. Attempt any *three* of the following:

- (a) Design a three op-amp based biquad filter. Also, drive all the standard filter responses.
- (b) Explain the magnitude responses of the Buttreworth and Chebyshev with suitable example.
- (c) Explain the procedure of equalization of first order filter.
- (d) Briefly explain the Bruton's FDNR technique with neat sketch.
- (e) Design the switched capacitor cascaded filter with suitable example.

SECTION C

3. Attempt any *one* part of the following:

- (a) Explain the current conveyor and its advantages over the op-amp. Also, design the integrator and differentiator circuits using current conveyor.
- (b) Describe the Sallen-key biquad filter. Also, derive the filter responses

4. Attempt any *one* part of the following:

- (a) Describe the Butterworth filter and design the first order Butterworth low pass filter using Op-amp with the derivation of its transfer function.
- (b) Comparison of Maximally flat and Equal ripple responses.

10x1=10

10x1 = 10

10x3=30

13.220

 $2 \ge 10 = 20$

Total Marks: 100

Sub Code:KEC-064

5. Attempt any one part of the following:

Find out the transfer function of the inverting amplifier (considering op-amp (a) gain=A)and then calculate the sesitivity of the inverting amplifier w.r.t R₁ (assume $A=\infty$)



(b) Explain the strategies for Equalizer design

6. Attempt any one part of the following:

- (a) Explain the Gorski-Popiel's Embedding Technique with suitable example.
- (b) Draw the circuit of a Generalized Impedance Convertor (GIC). Realize a grounded impedance using GIC and find its value.

Attempt any *one* part of the following: 7.

(a) How is the higher order filters formed? From the given specifications, determine the voltage gain of second order high pass butter worth filter $R_3 = R_2 = 33\Omega$ $f=250H_z$

 $f_L=1KH_z$

- (b) Write a short notes on:
 - (i) Amplifiers
 - (ii) Gyrator. Also, draw the circuits using OTA device.

10x1 = 10

10x1 = 10

10x1 = 10