

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech II Semester Supplementary Examinations, Dec-2023/Jan-2024

DIGITAL SIGNAL PROCESSING

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours**Max.Marks:75****Section – A (Short Answer type questions)****(25 Marks)****Answer All Questions**

	Course Outcome	B.T Level	Marks
1. Give the main difference between multi-channel and multi-dimensional signals?	CO1	L2	2M
2. What are the necessary and sufficient conditions for a stable signal?	CO1	L1	3M
3. State and prove the time-shifting property of FFT?	CO2	L2	2M
4. What are the advantages of FFT over DFT?	CO2	L1	3M
5. Give the advantages of Chebyshev filter over Butterworth filters?	CO3	L1	2M
6. List the steps to be followed to convert an analog IIR filter to its digital counterpart.	CO3	L1	3M
7. What are the advantages of FIR filter?	CO4	L1	2M
8. Give the equation for triangular and hamming window?	CO4	L1	3M
9. Determine the minimum sampling rate at which the signal $x(t) = 3 \cos(100\pi t)$ must be sampled to avoid aliasing.	CO5	L2	2M
10. What is overflow oscillations?	CO5	L1	3M

Section B (Essay Questions)**Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) Realize the system represented by $y(n) = 0.1y(n-1) + 0.72y(n-2) + 3x(n) + 0.6x(n-2)$ using cascade form and direct form-II.
- OR**
- B) Determine the inverse z-transform of $X(Z) = \frac{1}{(1-1.5Z^{-1}+0.5Z^{-2})}$ if ROC is $Z > 1$, ROC is $Z < 0.5$ and ROC $0.5 < |Z| < 1$
12. A) Implement decimation in time FFT algorithm for $N=16$ and calculate the Twiddle factors.
- OR**
- B) Define Twiddle factor. Find the DFT of the sequence $x(n) = \{1, 2, 1, 2, 1, 2, 1, 2\}$ using decimation in frequency algorithm?
13. A) Design an analog Butterworth filter that has -2dB pass band attenuation at 20rad/sec and at least -10dB stop band attenuation at 30 rad/sec.
- OR**
- B) Explain the design procedures of Butterworth and Chebyshev filters?
14. A) What are the different types or windows that can be used in designing a FIR filter?

OR

- B) Distinguish FIR and IIR filters with necessary expressions. CO4 L3 10M
15. A) Explain the application of multi rate signal processing? CO5 L3 10M
- OR**
- B) Let $x(n) = \{1, 2, 3, 4, 5, 1, 2, 3, 4, 5, 1, 2, 3\}$, find the sequence which is, CO5 L3 10M
- i) First interpolated by 2 and then decimated by 4.
 - ii) First decimated by 4 and then interpolated by 2.