



B.Tech V Semester Supplementary Examinations, June/July 2023

Digital signal processing

(EEE)

Maximum Marks: 70

Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.  
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.  
3. Part B consists of 5 Units. Answer any one full question from each unit.  
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 What is signal processing .writes its types
- 2 Explain region of convergence and its properties.
- 3 Define DFT? Write advantages of FFT
- 4 State and prove Time reversal property of DFT.
- 5 Write the differences between Butterworth and Chebyshev filters.
- 6 What are the advantages of Bilinear transformation technique.
- 7 What is Gibbs phenomenon?
- 8 Explain the procedure for designing FIR filters using window.
- 9 What is overflow oscillations.
- 10 Define Decimation.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 Determine the solution of the difference equation  $y(n)=5/6 y(n-1)-1/6 y(n-2)+x(n)$  for  $x(n)=2^n u(n)$  10

OR

- 12 Discuss the various types of discrete time sequences. 10
- 13 a) Find the output  $y(n)$  of a filter whose impulse response is  $h(n)=\{1,1,1\}$  and input signal  $x(n)=\{3,-1,0,1,3,2,0,1,2,1\}$  using overlap save method. 07  
b) Derive the relationship between DTFT and DFT. 03

OR

- 14 a) Calculate the number of complex multiplications and additions needed in the calculation of DFT and FFT with 64-point sequence. 04  
b) Find the IDFT of the given signal  $X(k)=\{10,-2+2j,-2,-2-2j\}$  by using DIT-IFFT algorithm. 06
- 15 Design low pass Butterworth filter with the specifications: Pass band attenuation =3dB, Stop band attenuation =16dB,  $f_p=1\text{kHz}$ ,  $f_s=2\text{kHz}$ , convert this filter in to digital filter by using Backward difference algorithm. 10

OR

- 16 For the given specifications design an analog Butterworth low pass filter 10  
 $0.9 \leq |H(j\Omega)| \leq 1$  for  $0 \leq \Omega \leq 0.2\pi$   
 $|H(j\Omega)| \leq 0.2$  for  $0.4\pi \leq \Omega \leq \pi$

- 17 Design high pass filter whose cutoff frequency is  $1.4\text{rad/sec}$  and  $N=5$  using Hamming window. 10
- OR
- 18 Explain and compare various windowing functions. 10
- 19 a) Define Decimation and Interpolation processes 05  
b) Explain multirate systems and sampling rate conversions. 05
- OR
- 20 a) What are overflow errors and round off errors . 05  
b) consider a signal  $x(n)=\sin\pi n.u(n)$  05  
i) obtain a signal with a decimation factor 2  
ii) obtain a signal with a interpolation factor 2