



Regulation: R17

Subject code: 1E5BE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Year I Semester Supplementary Examinations, January 2023

DIGITAL SIGNAL PROCESSING

(EEE)

Maximum Marks: 70

20-01-2023

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 Define the discrete time signal.
- 2 Define the frequency response of a discrete-time system.
- 3 Define discrete Fourier series.
- 4 Obtain the circular convolution of the sequence $x(n)=\{1,0,2\}$, $h(n)=\{1,1,1\}$.
- 5 What is meant by bilinear transformation technique.
- 6 Distinguish between Analog filters and Digital filters.
- 7 What are the disadvantages of Fourier series method.
- 8 What are the desirable characteristics of the window.
- 9 What is the need for anti-imaging filter after up sampling a signal.
- 10 What are the effects of Dead band.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 Explain the block diagram of DSP and its applications. 10

OR

- 12 Define & Test for Linearity, Causality & Time variance and Invariance for the given systems described by i) $y(n)=n x(n-1)$ ii) $y(n)=x(n^2)$ 10

- 13 Determine 4-point DFT of the sequence $x(n)=\{1,0,1,0\}$ 10

OR

- 14 Find the DFT of a given signal $x(n)=\{1,2,3,4\}$ by using DIT-FFT algorithm. 10

- 15 a) What are the advantages and disadvantages of digital filters. 04

b) Design Butterworth low pass filter with the given specifications $\alpha_p=1\text{dB}$, $\alpha_s=30\text{dB}$ and $\Omega_p=200\text{rad/sec}$, $\Omega_s=600\text{rad/sec}$. Convert this filter into digital filter by using step invariant method. 06

OR

- 16 Realize the following system 10
 $y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$ by using
 i) Direct form-I ii) Direct form-II

- 17 a) Define FIR filter? Explain the characteristics of FIR filter. 04
 b) Design an ideal low pass filter whose frequency response 06

$$H_d(e^{j\omega}) = 1 \text{ for } -\pi/2 \leq \omega \leq \pi/2$$

$$= 0 \text{ for } \pi/2 \leq \omega \leq \pi.$$

Find the values of $h(n)$ for $N=11$. Find $H(Z)$

OR

- 18 a) Explain the Design of FIR digital filter by using fourier series method 07
 b) What do you understand by linear phase response. 03
- 19 Explain the process of decimation using relevant expressions and block diagram. 10

OR

- 20 a) Compare fixed point and floating point arithmetic operations. 04
 b) Explain what are the methods used to prevent overflow. 06