



Regulation: R17

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 1E5BE

B.Tech III Year I Semester Supplementary Examinations, July 2022

DIGITAL SIGNAL PROCESSING

(EEE)

Maximum Marks: 70

Date: 07.07.2022

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 Digital signal Processing .
- 2 Define the Z transform and write its properties
- 3 Define discrete Fourier series.
- 4 Define DFT and IDFT
- 5 Give the relationship between Z trans form and DTFT
- 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 multi rate digital signal processing
- 10 What are the effects of Dead band?

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 a) Explain the block diagram of DSP and its applications. 06
b) Define & Test for Linearity, Causality & Time variance and Invariance for the given systems described by 04
i) $y(n)=n x(n)$ ii) $y(n)=x(-n)$
- 12 a) Determine the convolution sum of two sequences $x(n)=\{3,2,1,2\}$, $h(n)=\{1,2,1,2\}$ where the arrow mark of given $h(n)$ will start at second sample sequence i.e at $h(0)=2$ 06
b) Determine the natural response of the system described by difference equation 04
 $y(n)+2y(n-1)+y(n-2)=x(n)+x(n-1)$ with initial conditions $y(-1)=y(-2)=1$.
- 13 a) Determine 4-point DFT of the sequence $x(n)=\{1,1,0,0\}$ 05
b) Find the Circular convolution between given sequences using concentric circle method 05
 $x_1(n)=\{1,2,2,1\}$, $X_2(n)=\{1,2,3,1\}$.

OR

- 14 a) Find the DFT of a given signal $x(n)=\{1,2,3,4\}$ by using DIT-FFT algorithm. 06
 b) Distinguish between DIT and DIF algorithms. 04
- 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 Explain bilinear transformation method 10
- 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 FIR filters and write advantages of FIR filters over IIR filters. 03
- 19 a) Explain the process of decimation using relevant expressions and block diagram. 07
 b) What is the need of Multirate signal processing? 03

OR

- 20 a) What are limit cycles and discuss types of limit cycles 06
 b) Explain up sampling and in briefly. 04