



Regulation R17

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 1P6DC

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

DIGITAL SIGNAL PROCESSING

(ECE)

Maximum Marks: 70

17/01/23

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 an LTI system.
- 2 Define the frequency response of a discrete-time system.
- 3 Define discrete Fourier series.
- 4 Obtain the circular convolution of the sequence $x(n)=\{1,2,3\}$, $h(n)=\{1,1,1\}$.
- 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 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) $y(n)=x(-n)$

OR

- 12 a) Find the magnitude and phase response of the system described by difference equation 06
 $y(n)=1/2 [x(n)+x(n-2)]$
- b) Determine the impulse response for the given system by using time response analysis 04
 $y(n)-1/6 y(n-1)-1/6 y(n-2)=x(n)$.
- 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. $x(n) = \{0, 0, 3, -1, 0\}$, $h(n) = \{1, 1, 1\}$. 05

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 Realize the following system 10

$$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2) \text{ by using}$$

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 Explain the Design of FIR digital filter by using Fourier series method 10

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