



R20 Regulation

Subject code: 3P6DC

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech VI Semester Supplementary Examinations, February 2024

### DIGITAL SIGNAL PROCESSING (Electronics and Communication Engineering)

Maximum Marks: 70

Date:20.02.2024 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 which carries 10M.
  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)	CO	Bloom Tx
1	List the different types of operations performed on discrete – time signals?		CO1	L1
2	What are the properties of Z transform.		CO1	L1
3	What is the time shifting and frequency shifting property of the discrete Fourier transform?		CO2	L1
4	List out the applications of FFT algorithm		CO2	L1
5	Write the advantages of IIR filter?		CO3	L1
6	Compare analog filters and digital filters.		CO3	L1
7	State the condition for the linear phase characteristic of a FIR filter?		CO4	L1
8	What is the general form of FIR filter?		CO4	L1
9	List out the categories of multirate signal processing.		CO5	L1
10	What is the role of Barrel shifter in Programmable DSP?		CO5	L1

#### Part-B

Answer All the following questions.		(5X10M=50Marks)		
11	A. With the block diagram explain basic elements of Digital Signal Processing. B. Write the advantages of Digital Signal Processing? [6+4]		CO1	L3 L2
OR				
12	Find the Z transform and ROC of (i) $x(n)=\delta(n)$ (ii) $x(n)=[3(3)^n-4(2)^n]u(n)$ [10]		CO1	L3
13	A. What is the difference between linear & circular convolution. B. What do you mean by radix-2 FFT? [5+5]		CO2	L3 L3
OR				
14	An 8-point sequence is given by $x(n)=\{2,2,2,2,1,1,1,1\}$ compute 8-point DFT of $x(n)$ by Radix-2 DIF Algorithm. [10]		CO2	L4
15	A Butterworth-type IIR low-pass digital filter is needed with 3dB cut-off at of the sampling frequency $f_s/16$ , and a stop-band attenuation of at least 24 dB for all frequencies above $f_s / 8$ . (i) What order is needed? (b) Design it. [10]		CO3	L4

	OR		
16	Describe Transformation of Analog filters into equivalent digital filters using Bilinear transformation method. [10]	CO3	L4
17	Explain the design of FIR filters by Fourier series method. [10]	CO4	L4
	OR		
18	A. Compare the Hamming and Blackman window. B. Mention the advantages of FIR filters over IIR filters. [5+5]	CO4	L3 L2
19	A. Obtain the expression for interpolation by factor I. B. Describe the applications of Multirate Digital Signal Processing. [5+5]	CO5	L4 L2
	OR		
20	Explain the function of a MAC unit and also explain how overflow and underflow conditions can be avoided in MAC operations. [10]	CO5	L4