R18 Regulation *Subject code:* 2E5BC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, July 2022
DIGITAL SIGNAL PROCESSING
(EEE)

Maximum Marks: 70 Date:06.07.2022 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 Define Z-transform and state any one properties of ROC.
2 What are the applications of digital signal processing?
3 State and prove time shifting property of DFT.
4 Define twiddle factor and give its values for N=4.
5 State the properties of IIR filter.
6 What are the advantages of Butterworth filter?
7 What is Gibbs phenomenon?
8 Write the characteristics of window in FIR filters.
9 Define limit cycle oscillations and give its types.
10 Write a short note on dead band.

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 a) Find the frequency response of 1st order system y(n) = x(n) + ay(n-1). [5]
b) With neat block diagram explain Digital signal Process and list out the advantages and draw backs. [5]

OR

12 Check the following filter for time invariant, causal and linear [10]
i) $y(n) = (n-1)\, x^2\, (n+1)$
ii) $y(n) = n^2\, x\, (n-2)$

13 a) How the computational speed of FFT algorithm has been improved over DFT. [5]
b) Compute the DFT of the sequence x[n] = {1, 2, 3, 4, 4, 3, 2, 1} using DIF FFT algorithm. [5]

OR

14 a) State and prove the Frequency shifting property of DFT? [5]
b) Perform Linear convolution of the two sequences x(n) = {1, 2, 3, -1, -2, -3, 4, 5, 6,2,1,3,5} and h(n) = {2, 1, -1} using Over-lap save method. [5]

15 a) Discuss in detail about spectral transformations. [5]
b) State the advantages of FIR filters over IIR filters. [5]

OR

16 Design a high pass FIR filter whose cut-off frequency is 1.4 rad/sec and N=5 using Hamming window. [10]

17 a) What is Gibbs phenomenon. [5]
b) Compare Butterworth and Chebyshew filters? [5]

OR

18 a) Write the characteristics of window in FIR filters. [5]
b) Realize the system function $\frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$ by linear phase FIR structure. [5]

19 a) Explain interpolation process with an example. [5]
b) Discuss the process of performing sampling rate conversion by a rational factor I/D. [5]

OR

20 a) Explain the process of decimation using relevant expressions and block diagram. [5]
b) What is over flow oscillations? [5]