CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–II–Semester End Examinations (Regular) - June- 2025
DIGITAL SIGNAL PROCESSING
(ECE)

[Time: 3 Hours]   **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.

      Part A is compulsory which carries 10 marks. Answer all questions in Part A.

      Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A   (10 Marks)

1. a) What are the advantages of DSP?   [1M]
   b) Check whether the given system $y(n) = T[x(n)] = x(-n)$ is time-invariant or not.   [1M]
   c) What are the differences between DIF and DIT algorithms?   [1M]
   d) Write the formula for IDFT.   [1M]
   e) Discuss Bilinear transformation.   [1M]
   f) Why impulse invariant method is not preferred in the design of IIR filter other than the low pass filter?   [1M]
   g) Give the expression for the frequency response of Hamming window.   [1M]
   h) Mention the advantages of FIR filter.   [1M]]
   i) What is interpolation?   [1M]
   j) Give any two applications of Multi Rate Signal Processing.   [1M]

PART-B   (50 Marks)

2. Describe the Digital Signal Processing systems.   [10M]

OR

3. Determine and sketch the Magnitude and Phase response of the given system   [10M]
   $y(n) = 1/3 [x(n) + x(n-1) + x(n-2)]$

4. Determine IFFT using DIT method for $X(K) = \{2,2,2,2,1,1,1,1\}$.   [10M]

OR

5. Compute 8-point DFT of the sequence $x[n] = \{1,1,1,1,1,1,1,1\}$ by using DIF algorithm.   [10M]

6. Design a Butterworth IIR low pass filter with the following specifications: [10M]
   Pass band ripple $\alpha_p = 1$ dB, stop band attenuation $\alpha_s = 40$dB, pass band edge frequency is 2000Hz, stop band edge frequency is 10000Hz and sampling frequency is 25000Hz, using bilinear transformation technique.

OR

7. Using the Bilinear transform, design a high pass filter monotonic in pass band with cut off frequency of 1000Hz and down 10dB at 350Hz. The sampling frequency is 5000Hz.   [10M]

8. Design a FIR low pass filter of length 11 to approximate the ideal filter with a pass band cut off frequency at 1 KHz. Use Rectangular window.   [10M]

OR

9. Compare IIR and FIR filters and discuss the various steps in designing FIR filter.   [10M]

10. a) Explain the interpolation process.   [5M]
    b) How do you change the sampling rate by I/D factor?   [5M]

OR

11. a) Explain the spectrum of Down Sampling.   [5M]
    b) Write the applications of Multi Rate Signal Processing.   [5M]

****