CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH -I-Semester End Examinations (Supply) - May- 2023
DIGITAL SIGNAL PROCESSING
(ECE)

[Time: 3 Hours]   [Max. Marks: 70]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 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.

PART-A   (20 Marks)

1. a) What is the necessary and sufficient condition on the impulse response for stability? [2M]
   b) Find the period of $x(n) = \cos[2\pi n/3 + 2]$. [2M]
   c) What are the properties of Twiddle factor? [2M]
   d) What are the advantages of FFT? [2M]
   e) What are the properties of bilinear transformation? [2M]
   f) What are the limitations of impulse invariant mapping technique? [2M]
   g) What is Gibb's phenomenon? [2M]
   h) Explain the Hamming window. [2M]
   i) Differentiate between Round Off and Overflow Noise. [2M]
   j) How to prevent overflow in design of digital filters? [2M]

PART-B   (50 Marks)

2. Find the Natural response of the system described by the difference equation [10M]
   $y(n)-2y(n-2)+3y(n-4) = x(2n)-x(n-1)$ with initial conditions $y(-1) = y(-2) =1$.

OR

3. Check for following systems is linear, causal, time in variant, stable, static [10M]
   i. $y(n) = x(n+2) \cos(x(n+3))$
   ii. $y(n) = x(3n) + x(2n-1)$.

4. Compute the DFT of the given data $x(n)= \{0,1,2,3\}$. [10M]

OR

5. Quantization errors in FFT Algorithm and explain the DFT as A Linear Transformation. [10M]

6. A digital low pass filter is required to meet the following specification: [10M]
   Passband ripple: ≤ 1dB
   Passband edge :4kHz
   Stopband attenuation: ≥ 40 dB
   Stopband edge :6KHz
   Sample rate:24kHz
   The filter is to be design by performing a bilinear transformation on an analog system
   function.

OR

7. Convert the analog filter $H(s) = 2(s+2)/(s+3)(s+4)$ using impulse invariant transformation [10M]
   and Consider T=0.31416s.

8. Is FIR filter a linear-phase system? And prove it. [10M]

OR

9. Explain the principle and procedure for designing FIR filter using rectangular window. [10M]

10. What are limit cycles? Explain the interpolation by a Factor I. [10M]

OR

11. Explain Sampling rate conversion by a Rational Factor I/D. [10M]
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