CBCS SCHEME

15MT73

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
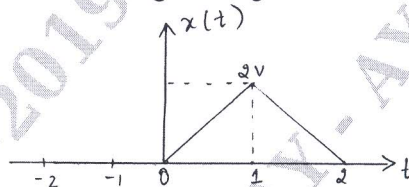### Signal Processing

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Find the even and odd component for the given signal   (04 Marks)

Fig.Q.1(a)
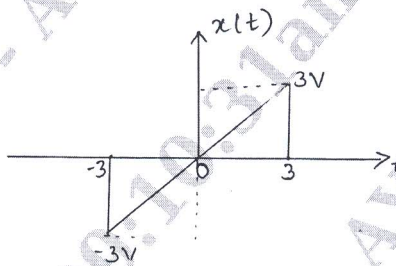

b. $x(t) = \begin{cases} 5-t & 4 \le t \le 5 \\ 1 & -4 \le t \le 4 \\ 5+t & -5 \le t \le -4 \\ 0 & \text{otherwise} \end{cases}$ sketch the signal.

Find whether it is periodic or not, and find the energy signal.   (06 Marks)

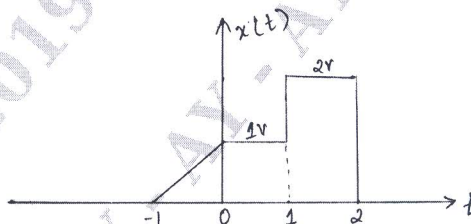c.   Sketch: i) $x(2t + 3)$ ii) $x(-t-3)$ iii) $x(-2t + 2)$ (06 Marks)

Fig.Q.1(c)

OR

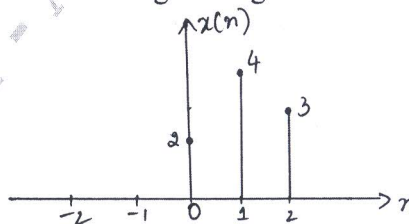2   a.   For the given signal x(t)

Fig.Q.2(a)

Sketch: i) $x(t)\, u(t-1)$ ii) $x(t)\, u(1-t)$ iii) $x(t)\, \delta\,(t-3/2)$ iv) $x(t)\, \{u(t) - u(t-1)\}$.   (08 Marks)

b.   Find the even and odd component for the given signal   (04 Marks)

Fig.Q.2(b)

c.   Define a signal. Mention the different classification of signal.   (04 Marks)

Module-2

3   a.   For the given question, x(n) = {3, 3, 2} and h(n) = {1, 2}. Find output is convolution sum
        y(n).   (08 Marks)
    b.   Find the convolution integral y(t) for the given signal, and sketch the o/p y(t)
        x(t) = u(t + 1)
        h(t) = u(t - 2)   (08 Marks)

OR

4   a.   Find the convolution integral y(t) for given signal.
        x(t) = u(t − 2) − u(t − 4)
        h(t) = u(t) − u(t − 2), sketch the output signal y(t).   (08 Marks)
    b.   Find the convolution sum y(n) for given signal
        x(n) = u(n-2)
        h(n) = u(n-6)   sketch the
        output signal y(n).   (08 Marks)

Module-3

5   a.   For x(n) = {1, 2, 2, 1} find DFT by Twiddle factor matrix method.   (04 Marks)
    b.   Prove properties of Twiddle factor: i) Periodicity   ii) Symmetry.   (06 Marks)
    c.   For x(k) = {10, -2+2j, -2, -2, -2j} find 4pt IDFT using DITFFT.   (06 Marks)

OR

6   a.   For x(n) = δ(n) find N pt DFT.   (04 Marks)
    b.   For x(n) = {2, 3, -1, 1, 3, 2, 4, 1, 2, 2}, h(n) = {1, 1, 1} take block as 5 find
        y(n) = x(n) ∗ h(n) by overlap save method.   (08 Marks)
    c.   For x(n) = {1, 2, 2, 1} find DFT using DIFFFT.   (04 Marks)

Module-4

7   a.   Distinguish between Butterworth and Chebyshev filter.   (06 Marks)
    b.   Design Chebyshev low pass filter for the following specification. Pass band ripple-2dB with
        edge frequency 2rad/sec, stop band attenuation can be more than -20dB with edge frequency
        16rad/sec.   (10 Marks)

OR

8   a.   Design Butterworth low pass filter for following specification, pass band gain is -1dB at
        2rad/sec, stop band attenuation can be more than 20dB at 8rad/sec.   (10 Marks)
    b.   Find order of Butterworth low pass filter for following specification, pass band attenuation is
        0.5dB at 1.2kHz, stop band attenuation can be more than 40dB at 2kHz.   (06 Marks)

Module-5

9   a.   Mention the difference between FIR and IIT filter.   (06 Marks)
    b.   For $H(z) = \dfrac{z(z+2)}{(z-3)(z+1)}$ realize cascade and parallel structure.   (10 Marks)

OR

10 a.   For $H(z) = \dfrac{0.5 + 0.32z^{-1} - 0.6z^{-2}}{1 + 0.8z^{-1} - 1.2z^{-2}}$. Find the ladder and lattice coefficient with respect to IIR
        filter.   (10 Marks)
    b.   For $H(z) = -6 - z^{-1} + z^{-2}$ realize in direct form and cascade with respect to FIR realization.
                                                                                                 (06 Marks)

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