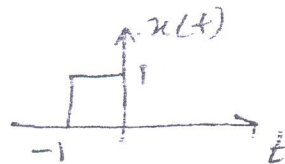


- N.B. : (1) Question no 1 is compulsory.
 (2) Attempt any five in all.
 (3) Assume suitable data, wherever necessary.

1. (a) Draw even and odd part of $x(t)$. 6



- (b) Determine the periodicity of the following signals if they are periodic : — 8
 (i) $x(t) = 5 \cos 4\pi t + 3 \sin 8\pi t$.
 (ii) $x(n) = (\sqrt{j})^n + (-\sqrt{j})^n$

- (c) Find $x(n)$ considering all possible region of convergence $x(z) = \frac{10z}{(z-1)(z-2)}$ 6

2. (a) Find inverse z transform of the following : — 10

$$x(z) = \frac{z}{3z^2 - 4z + 1} \text{ For following ROC conditions : —}$$

- (i) $|z| > 1$
 (ii) $|z| < \frac{1}{3}$
 (iii) $\frac{1}{3} < |z| < 1$

- (b) Define radix 2- DITFFT algorithm and draw diagram of $N=4$. 10

3. (a) Draw pole-zero plot and identify the filter based on its pass band by analytical method: — 10

$$H(z) = \frac{1}{1 + 0.8z^{-1}}$$

- (b) State and prove any four properties of DFT 10

4. (a) Find DTFT of $x(n) = \left(\frac{1}{2}\right)^n u(n)$ and sketch its magnitude and phase plot. 10
- (b) Find impulse response and step response of the system:— 10
 $y(n) + 3y(n-1) = x(n)$ given $y(-1) = 1$
5. (a) Sketch the signal using step and ramp signal:— 10
- (i) $x(t) = 2u(t) + r(t-2) - 2r(t-3) + r(t-4) - 2u(t-6)$
- (ii) $x(t) = 2\delta(n) + 3\delta(n-2)$
- (b) Check whether the following systems are static/dynamic causal/Anticausal stable/unstable and Time-invariant/ time variant. 10
- (i) $y(n) = x^2(n)$
- (ii) $y(n) = x(n^2)$
6. (a) find z-transform of the following sequence:— 10
- (i) $x(n) = u(n-6) - u(n-10)$
- (ii) $x(n) = \left[\left(\frac{1}{2}\right)^n - \left(\frac{1}{2}\right)^{n-10} \right] u(n)$
- (b) Find DFT of the following using DIT-FFT 10
 $x(n) = \{1, 2, 1, 2, 0, 2, 1, 2\}$
7. Write short notes on any two of the following :— 20
- (i) DSP processors.
- (ii) Properties of z-transform.
- (iii) Linear convolution and circular convolution with examples.
- (iv) Different types of signals.

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