

N.B.: (1) Question No. 1 is compulsory.

(2) Attempt any three questions out of remaining five questions.

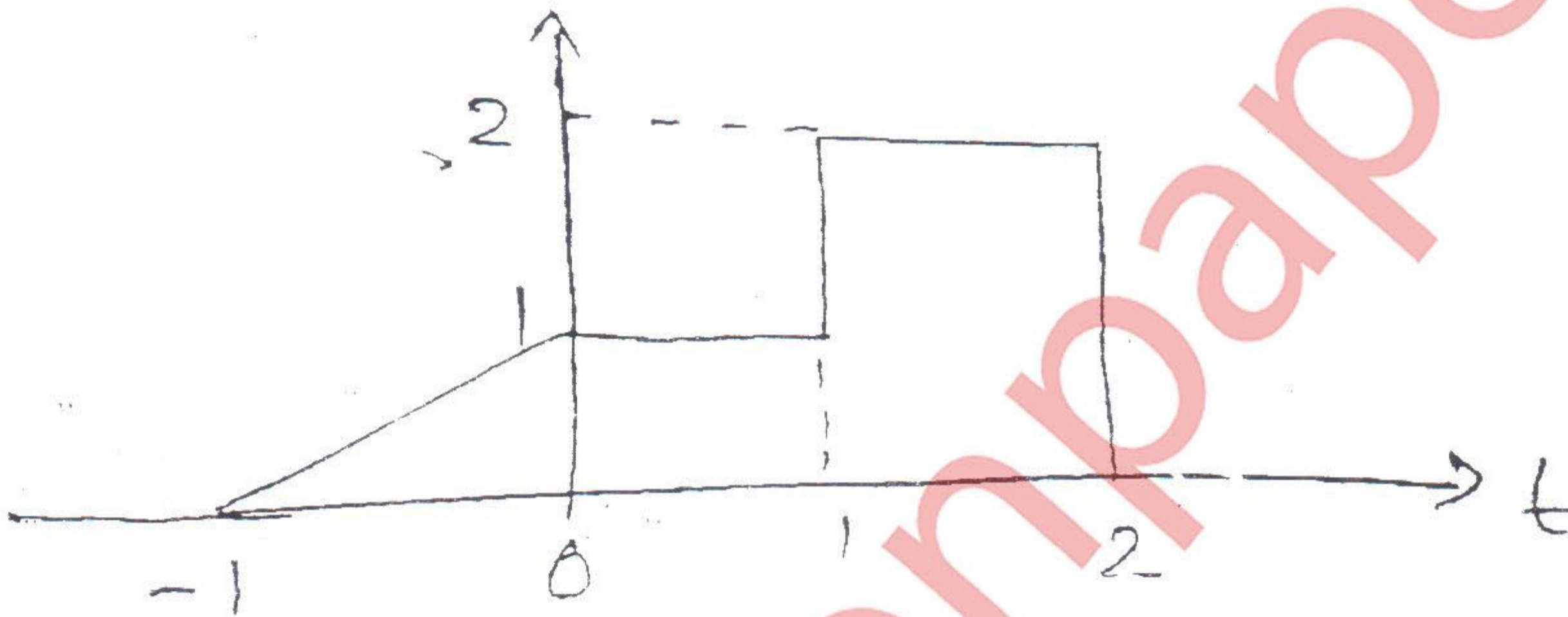
1. (a) Give the classification of signals and systems.

(b) What is ROC ?

(c) Differentiate between minimum, maximum and mixed phase.

(d) Write DFT properties.

2. (a) A continuous time signal  $x(t)$  given below.



Sketch

(i)  $X_1(t) = -2x(t)$

(ii)  $X_2(t) = x(t-3) - 2x(t)$

(b) Determine the stability and causality of the system describe by the transfer function. 10

$$H(z) = \frac{1}{1-0.25z^{-1}} + \frac{1}{1-2z^{-1}}$$

for ROC  $0.25 < |z| < 2$ .

3. (a) Consider the following linear constant co-efficient difference equation 10

$$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = 2x(n-1)$$

Determine  $y(n)$ , when  $x(n) = y(n)$ .

(b) Determine the periodicity of the following signals.

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(i)  $x(t) = 2\cos\frac{2\pi t}{3} + 3\cos\frac{2\pi t}{7}$

(ii)  $x(t) = 2\cos 3t + 3\sin 7t$

4. (a) Find  $x(n)$  considering all possible region of convergence.

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$$X(z) = \frac{10z}{(z-1)(z-2)}$$

(b) Find the Z-transform of the following sequence –

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(i)  $x(n) = u(n-2) - u(n-5)$

(ii)  $x(n) = \left[ \left(\frac{1}{2}\right)^n - \left(\frac{1}{4}\right)^n \right] u(n)$

5. (a) Find the DFT of  $x(n) = \{1, 2, 3, 4\}$  using DIT-FFT.

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(b) Obtain the magnitude and phase response of the following system by analytical and

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geometrical method  $h(n) = \left\{ 1, \frac{1}{2} \right\}$ .

6. (a) Sketch the signal

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(i)  $x(t) = 2u(t) - u(t-2) - u(t-4) - r(t-6) + r(t-8)$

(ii)  $x(t) = 2r(t) - 2i(t-1) - 2u(t-3)$ .

(b) Determine the inverse Z-transform of

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$$X(z) = \frac{1}{1 - 0.8Z^{-1} + 0.12Z^{-2}}$$

(i) if ROC is  $|z| > 0.6$

if ROC is  $|z| < 0.2$

if ROC is  $0.2 < |z| < 0.6$