

(OLD COURSE)

QP Code : 4263

 $\frac{3}{2}$  Hours)

[ Total Marks : 100

- N.B.:** (1) Question No. 1 is compulsory.  
 (2) Attempt any four out of the remaining six questions.  
 (3) Assume suitable data wherever necessary.

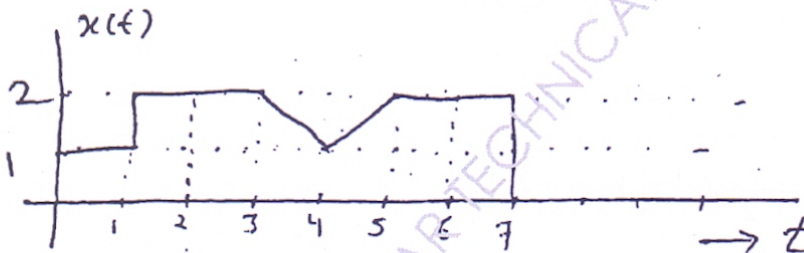
1. a) Find Z transform of the following : 05  
 $x(n) = (1+n)u(n)$

b) Impulse response of DT-LTI system is 05  
 $h(n) = \{-2, 1, 3, 0, -4\}$ , find out  $y'(n)$  to the input  $x(n) = \{-1, 2, 1\}$

c) Separate out the even and odd component. 05  
 $x(n) = \{1, 3, 2, 1, -2\}$

↑

d) Express  $x(t)$  in term of step and ramp signal :- 05



2. a) Check the following systems for static / dynamic, linear/non-linear, casual/anticasual and time variant / invariant. 10  
 (1)  $y(n) = 2x(n) - y(n-1)$   
 (2)  $y(n) = e^{x(n)}$

b) Sketch the magnitude response for :- 10  
 $h(n) = \{1, -\frac{1}{2}\}$ . Draw pole zero plot.

3. a) Find out circular convolution of the following sequence using DFT and IDFT method. 12  
 $x(n) = \{1, -2, 3, 0\}$   
 $h(n) = \{1, 2, -2, 4\}$

b) Prove :  $X_1(n) * X_2(n) \xleftrightarrow{Z} X_1(Z) X_2(Z)$  8

4. a) State and prove any four properties of Fourier Transform. 10
- b) Determine whether the following systems are minimum, maximum or mixed phase. 10
- i)  $H_1(Z) = 1 - \frac{5}{2} Z^{-1} - \frac{3}{2} Z^{-2}$
- ii)  $H_2(Z) = 1 + \frac{5}{3} Z^{-1} - \frac{2}{3} Z^{-2}$

5. a) Obtain linear convolution using circular convolution for : 05  
 $X(n) = \{1, 3, 2\}$  and  $h(n) = \{1, 2\}$   
 $\uparrow \qquad \qquad \qquad \uparrow$
- b) What is ROC ? How stability can be obtained by ROC, explain with example. 05
- c) Determine the inverse Z transform of :-

$$X(Z) = \frac{Z^{-1}}{\left(1 - \frac{1}{2} Z^{-1}\right) \left(1 - \frac{1}{3} Z^{-1}\right)}$$

for the following condition :- (i) Casual (ii) Anti casual (iii) stable

6. a) A LTI system is described by the following difference equation :- 10  
 $y(n) = x(n) + 2x(n-1) - 6y(n-1) - 8y(n-2)$   
 find the Impulse response.
- b) Compute radix - 2 DITFFT for given 8 - point sequence  
 $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$
7. a) Write short notes on any two :-
- i) Properties of Z transform.
  - ii) DSP Processor
  - iii) Energy/Power signal.
-