

[Time: 03 Hours ]

[ Marks:80]

Please check whether you have got the right question paper.

- N.B:**
1. Q.1 is compulsory.
  2. Attempt any three questions from remaining questions
  3. Assume suitable data wherever required.

- Q.1**
- a) If  $x[n] = \{3, 2, 4\}$   $h[n] = \{1, 2, 3\}$  Find  $y[n]$  using circular convolution. **05**
  - b) Prove any two properties of Fourier Transform **05**
  - c) Find the Z transform of the given function  $x(n) = (1/4)^n + u(n) + (1/5)^n u(-n-1)$  **05**
  - d) Check the linearity and Time variance property of the system  $y[n] = x[n^2]$  **05**

- Q.2**
- a) Find the even and odd components of  $x[n] = \{-1, 7, -2, 3, -7, 6\}$  **05**
  - b) Find the initial value and final value of **05**

$$X(z) = \frac{2z^{-1}}{1 - 1.8z^{-1} - 0.08z^{-2}}$$

- c) An LTI system is described by the difference equation **10**  
 $2y(n) + 3y(n-1) + y(n-2) = u(n) + u(n-1) - u(n-2)$   
 Find the response of the system when initial conditions are given  
 $y(-1) = 2, y(-2) = -1$  and unit step is applied at the input.

- Q.3**
- a) Explain all basic filters and plot their magnitude responses  $|H(w)|$  **10**
  - b) Identify the type of filter based on its pass band by analytical method. Draw pole-zero plot. **10**

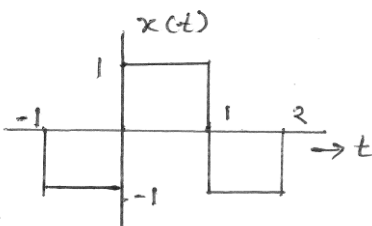
$$H(Z) = \frac{1}{1 + 0.8z^{-1}}$$

- Q.4**
- a)  $H(Z) = \frac{(1 - 0.5Z^{-1})(1 - Z^{-1})}{(1 + 0.2Z^{-1})(1 + 0.8Z^{-1})(1 - 0.8Z^{-1})}$  **10**

- i) Give ROC condition
- ii) Sketch pole Zero diagram
- iii) Find the response of the system
- iv) Comment on the stability

- b) A continuous time signal  $x(t)$  is given below. Sketch the following Signals: **10**

- a)  $x_1(t) = 2x(t)$
- b)  $x_2(t) = x(t-3)$
- c)  $x_3(t) = x(t/2)$
- d)  $x_4(t) = x(2t)$



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- Q.5** a) State sampling theorem. How aliasing occurs? How it can be eliminated? **10**  
b) Derive and sketch the ROC of any three infinite duration signals. Also comment on stability. **10**
- Q.6** a) An 8 point sequence is given by  $x(n)=\{2,4,6,8,2,4,5,8\}$ . Compute 8 point DFT of  $x(n)$  by radix -2 DIT - FFT method. **10**  
b) Prove any four DFT properties **10**

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