QP Code: 13490

(3 Hours)

[Total Marks: 80

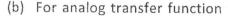
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- N.B.: (1) Question No. 1 is compulsory.
  - (2) Attemt any three questions from the remaining five questions.
  - (3) Assume suitable data if necessary.
  - 1. Answer the following any four :-
    - (a) Find the Z-transform of

(i) 
$$x(n) = a^n u(n)$$

(ii) 
$$x(n) = -u(-n-1)$$

also specify the ROC.



$$Ha(s) = \frac{3}{(s+1)(s+2)}$$
 Determine  $H(z)$  using

impulse invarient method assume T = 2sec

- (c) If  $x(k) = \{8, -2-2j, 0, -2+2j\}$  find the IDFT.
- (d) Difference b/w Linear and circular convolution.
- (e) Define sampling theorm. What are the advantages DSP.
- 2. (a) Find the DFT of  $x(n) = [1 \ 1 \ 2 \ 3]$  using the above result and not otherwise find the DFT of

$$x_1(n) = \{1, 0, 1, 0, 2, 0, 3, 0\}$$
  
 $x_2(n) = \{1, 0, 0, 1, 0, 0, 2, 0, 0, 3, 0, 0\}$   
 $x_3(n) = [1, 1, 2, 3, 1, 1, 2, 3]$ 

- (b)  $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$  compute 8 point DFT with Radix-2 DIT FFT algorithm. 10
- 3. (a) The input sequence x(n) = [1, 1, 2, -1, 2, -3, -1, 1, 2, 1, -3, -1] having the impulse response of FIR filter  $h(n) = \{2, 3, 4\}$  using overlap save method find o/p response.
  - (b) Determine the frequency response of the system y(n) = 0.9y(n-2) + 0.2x(n). Find magnitude 10 and phase response of it.
- 4. (a) Realize the systme using D.F. II, cascade and parallel realization 5  $y(n) = x(n) + \frac{1}{4}x(n-1) + \frac{1}{6}y(n-1) + \frac{1}{6}y(n-2)$ 
  - (b)  $H(e^{jw}) = e^{-j3w} [0.5 + 2.2\cos 3w] + [1.2\cos 2w + 0.4\cos w]$  obtain order and impulse response of s/m.
  - (c) Write a short note on comb filter and notch filter.

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5. (a) Design a digital Butterworth fiture that satisfy the following constraints using Bilinear transformation.

Assume T = 1 sec

$$0.9 \le H(e^{jW}) \le 1$$
  $0 \le w \le 0.25 \pi$   
 $H(e^{jW}) \le 0.2$   $0.6 \pi \le w \le \pi$ 

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(b) A linear phase FIR filure has desired response

$$\begin{aligned} H_{d}\left(e^{jw}\right) &= 0 \text{ for } -3\frac{\pi}{4} \leq w \leq \frac{3\pi}{4} \\ &= e^{-j2w} \text{ for } 3\frac{\pi}{4} < \left|w\right| \leq \pi \end{aligned}$$

Design the filter using Hamming window also draw linear phase realization.

6. (a) Write a short note on 'Decimation by integer factors'.

(b) Explain the application of DSP processor (Texas-320).

(c) If the order of filter N = 2 find the transfer function at IIR filter (poles of IIR filter).