

7E7072

Roll No. 15EEBE2021

Total No of Pages: 4

7E7072

B. Tech. VII Sem. (Main / Back) Exam., Nov. – Dec. - 2018  
Electronics & Communication Engineering  
7E12A Digital Signal Processing  
Common with AI, EC, EIC

Time: 3 Hours

Maximum Marks: 80  
Min. Passing Marks: 26*Instructions to Candidates:*

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)

1. NIL2. NILUNIT- I

Q.1 (a) Determine the Nyquist rate &amp; Nyquist interval for the following signal –

$$x(t) = \frac{1}{\pi t} \sin(600\pi t) \quad [6]$$

(b) Draw block diagram of continuous time processing of discrete time signals and write mathematical expression in term of time domain and frequency domain for output of each stage. [10]

[7E7072]

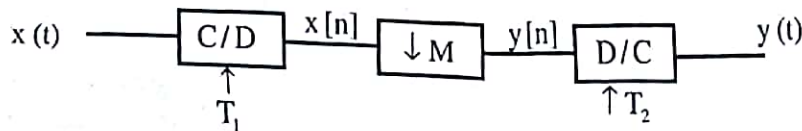
Page 1 of 4

[3700]

OR

Q.1 Consider the system in figure –

[16]



Assume that the input is band limited :

$$x_c(j\omega) = 0 \text{ for } |\omega| > 2\pi \cdot 1000$$

- What constraint must be placed on  $M_1T_1$  &  $T_2$  in order for  $y_a(t)$  to be equal to  $x_a(t)$ ?
- If  $f_1 = f_2 = 20$  KHz &  $M = 4$ , find the expression for  $y_a(t)$  in terms of  $x_a(t)$ .

UNIT- II

Q.2 (a) Determine the homogeneous solution of the system, described by – [8]

$$y(n) - 3y(n-1) - 4y(n-2) = x(n)$$

(b)  $H(z) = \frac{1+3z^{-1}}{1+\frac{1}{2}z^{-1}}$ , write an expression of inverse system of  $H(z)$ . [8]

OR

Q.2 (a) Define Minimum – phase system, write –

- Generalized expression of minimum – phase. [4]
- Discuss stability and causality condition for a discrete system. [4]

(b) Write short notes on the following –

(i) All – pass system [4]

(ii) Frequency response of LTI system [4]

### UNIT- III

Q.3 (a) Obtain direct form I and II realization of a system described by – [10]

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

(b) Realize the system with difference equation – [6]

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

in cascade form.

### OR

Q.3 (a) Draw the cascades and parallel realizations for the following system functions - [10]

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{\left(1 + \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}\right)}$$

(b) Explain the FIR system and Transposed form. [6]

### UNIT- IV

Q.4 Design an FIR linear phase filter using Kaiser Window to meet the following specification – [16]

$$0.99 \leq |H(e^{jw})| \leq 1.01, \text{ for } 0 \leq |w| \leq 0.19\pi$$

$$|H(e^{jw})| \leq 0.01, \text{ for } 0.21\pi \leq |w| \leq \pi$$

OR

Q.4 Write short notes on the following –

- (a) Bilinear transformation [8]  
(b) Impulse invariance transformation [8]

UNIT- V

Q.5 Explain the following –

- (a) Decimation in Time FFT Algorithm [10]  
(b) Properties of the DFT [6]

OR

Q.5 Determine the four point DFT of the sequence  $x(n) = (1, 0, 2, 1)$  using DIT Algorithm. [16]

-----