

Roll No.

24422

**B. Tech 7th Semester (EE)
Examination – May, 2018**

DIGITAL SIGNAL PROCESSING

Paper : ECE-409-F

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is compulsory. Attempt one question from each Section A, B, C and D.

1. (a) Give applications of Z-transform. $5 \times 4 = 20$
(b) Give properties of Region of convergence.
(c) Explain the effects of finite word length.
(d) Give classification of signals.

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SECTION – A

- 2. (a) Explain classification of system. 10
- (b) Explain Parseval's theorem for energy signals. 10
- 3. (a) Explain any 5 properties of Fourier Transform. 15
- (b) Give Fourier transform of $\cos W_{ct}$. 5

SECTION – B

- 4. Explain with derivation sampling theorem. 20
- 5. (a) Determine Z-transform of sequence given by : 8

$$x(n) = \begin{cases} 2^n & n < 0 \\ \left(\frac{1}{2}\right)^n & n = 0, 2, 4, \dots \\ \left(\frac{1}{3}\right)^n & n = 1, 3, 5, \dots \end{cases}$$

- (b) Determine inverse z-transform of : 12

$$x(z) = \frac{z}{3z^2 - 4z + 1}$$

if ROC are (i) $|z| > 1$ (ii) $|z| < \frac{1}{3}$ (iii) $\frac{1}{3} < |z| < 1$

SECTION – C

- 6. (a) Derive condition for linear phase of FIR filters. 10
- (b) What is the need of window function in FIR filter ? Derive equation for rectangular window. 10
- 7. (a) Explain bilinear transformation method for IIR filter design. 15
- (b) Explain algorithm implementation, design considerations. 5

SECTION – D

- 8. (a) Explain digital filter bank. 10
- (b) Explain multistage decimator. 10
- 9. Obtain direct form I, direct form II, cascade and parallel structure realisation of system $y(n) = -0.1y(n-1) + 0.72y(n-2) + .7x(n) - 0.252x(n-2)$. 20