Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

Roll No .....

EE-503 (GS)

B.E. V Semester

Examination, December 2017

Grading System (GS)

Signals and Systems

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) i) Check if the systems are time invariant. 4

   1) $y(n) = 4x(n)$

   2) $y(n) = 12x(n-1) + 11x(n-2)$

   ii) Check if the system is non linear 3

   $F[x(n)] = n[x(n)]^2$

   b) Explain the following : 7

   i) Causal and Non-causal systems

   ii) Stable and Unstable system

   iii) Time variant and time invariant systems

2. a) Explain and prove linearity, symmetry and scaling properties of Fourier transform. 7

   b) State and explain three properties of an LTI system. Also state Parseval's theorem. 7

3. a) Compute convolution $y(n) = x(n) * h(n)$ of signals

   $x(n) = \{1, 1, \underset{\uparrow}{0}, 1, 1\}$ and $h(n) = \{1, -2, -3, \underset{\uparrow}{4}\}$ 7

   b) State various properties of DFT. 7

4. a) What is ROC? Explain significance of poles and zeros with regard to stability in *s* domain. 7

   b) Find Laplace transform of 7

   i) $f(t) = \cos^3 3t$

   ii) $f(t) = t^3 + 3t^2 - 6t + 4$

   iii) $f(t) = t \sin \alpha t$

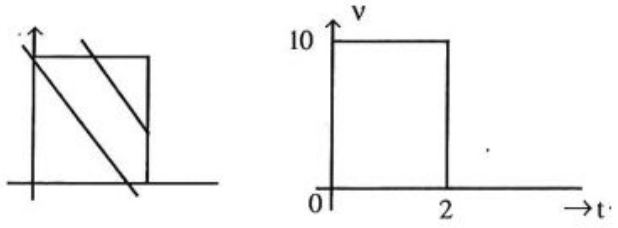
5. a) Prove the following: 7

   i) If $x(n) \overset{z}{\longleftrightarrow} X(z)$ then $x(-n) \overset{z}{\longleftrightarrow} X\left(z^{-1}\right)$

   ii) If $x(n) \overset{z}{\longleftrightarrow} X(z)$ then $x(n-k) \overset{z}{\longleftrightarrow} z^{-k} X(z)$

   b) Find Z-transform of $x(n) = 2^n u(n-z)$. List the important properties of ROC for the Z-transform. 7

6. a) State sampling theorem. Obtain Fourier transform of a rectangular pulse, 2 seconds long with a magnitude 10 volts as in figure 1. 7



b) Explain the following terms in relation to Laplace transform: 7

i) Linearity

ii) Scaling

iii) Time shift

iv) Time convolution

7. a) Find the causal signal $x(n)$ having Z-transform as 7

i) $X(z) = \dfrac{1}{(1+z^{-1})(1-z^{-1})^2}$

ii) $X(z) = \dfrac{z^{-1}}{1-3z^{-1}}$

b) State the differentiation property of Z-transform and compute Z-transform using it for given sequence 7

$x(n) = n^2 u(n)$

8. Write short notes on any three : 14

a) LTI system, its impulse response and stability

b) Convolution of signals

c) Frequency shifting property of Fourier transform

d) Flat Top Sampling

******

214