8. Write short notes on any two of the following: 14
   a) Singularity functions
   b) Existence condition for Laplace transform
   c) Comparison between Laplace and Z-transform
   d) System attributes

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EE-503

B.E. V Semester

Examination, December 2016

Signals and Systems

Time : Three Hours

Maximum Marks : 70

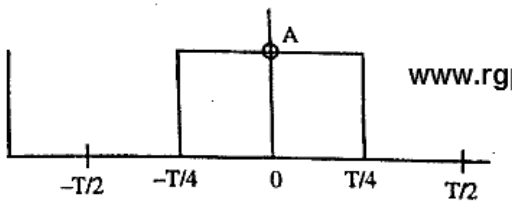
Note: i) Attempt any five questions.
ii) Part a of each question is compulsory.
iii) All questions carry equal marks.

1. a) Explain and derive necessary and sufficient condition for stability and causality of system. 7
   b) Explain following property 7
      i) Linearity
      ii) Time-Invariance

OR

   b) Convolve $x(n) = \{1, 2, 3, 4\}$ with $h(n) = \{1, 1, 2, 1\}$ 7

2. a) Find Fourier coefficients and Fourier series expansion of function given below: 7



   b) State and prove Parseval's theorem. 7

OR

b) Explain Time shifting and frequency shifting property of Fourier transfer. 7

3. a) A linear shift-invariance system has a frequency response $H\left(e^{j\omega}\right)=\frac{e^{j\omega}}{1.1+\cos\omega}$. Find an LCCDE that relates the input to the output. 7

b) Explain and prove phase rotation (periodicity) property of Twiddle factor. 7

OR

a) Find the DFT of the sequence $x(n)=\{1,1,0,0\}$ and find the IDFT of $y(k)=\{1,0,1,0\}$. 7

b) Establish relationship between DFT and Z-transform. 7

4. a) State and prove time differentiation and integration property of Laplace transformation. 7

b) Determine the inverse Laplace transform of the system transfer function given below. 7

$$y(s)=\frac{s+1}{s^3+5s^2+6s}$$

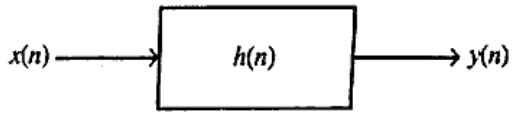
OR

b) Solve the second-order differential equation using

$\frac{d^2y}{dt^2}+4\frac{dy}{dt}+2y=x(t)$ Laplace transform. 7

5. a) Enlist different properties of ROC. 7

b) For system given below find $y(n)$ using Z-transform. 7



Where $x(n)=\mu(n)-\mu(n-N)$
and $h(n)=a^n\,\mu(n)$

OR

b) Solve the difference equations, where input sequence is $x(n)=(3)^{n-2}$, $n\geq 0$, using Z-transform.
where $2y\,(n-2)-3y(n-1)+y(n)=x(n)$ with the initial conditions $y(-2)=-\frac{4}{9}$, $y(-1)=-\frac{1}{3}$ 7

6. a) State and prove sampling theorem. 7

b) Explain signal reconstruction from its samples. 7

OR

b) Explain significance of poles and zero. Also comment on system stability. 7

7. Convolve given sequences circularly using graphical method. 14

$x(n)=\{1,2,\underset{\uparrow}{3},4,5\}$

$h(n)=\{1,\underset{\uparrow}{1},2,2\}$

OR

a) A function is given below, draw different characteristics for different values of $\alpha\leq 0$. 7
$x(t)=e^{-\alpha t}$.

b) Explain even symmetry property of DFT. 7