Code: EC3T3

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

SIGNAL AND SYSTEMS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A
Answer *all* the questions.   All questions carry equal marks
$$11 \times 2 = 22 \text{ M}$$

1.

a) Determine whether the following signals are energy signals or power signals   i) $x(t)=u(t)$ ii) $x(t)=t\,u(t)$

b) Define the following: i) Unit Ramp   ii) unit parabolic

c) What are Dirichlet conditions? State them.

d) What is even symmetry? How does it help in simplification of calculations?

e) Sketch the ROC of a Laplace transform for a unit step function.

f) Distinguish between unilateral and bilateral Laplace transforms.

g) Find the DTFT of a sequence $a^n u(n)$.

h) State the Time shifting and frequency shifting property of DTFT.

i) What are the advantages of Z-Transform?

j) Find the Z-Transform of exponential sequence.

k) When does aliasing occur? How can it be avoided?

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2.

a) Find the even and odd components of :   8 M
   i) x (t) = cos t + sin t
   ii) x(t)= e ^{j2t}

b) Test the whether the signal is periodic or not. If so find the fundamental Period.   8 M
   i) x(t)= e ^{10t}
   ii) x(t)= cos(π/3 t) + sin (π/5 t)

3. Obtain the exponential Fourier series for the following periodic signals   16 M
   i) x(t)= A 0≤t≤∏, -A, ∏≤t≤2∏
   ii) x(t)= A sin ωt 0≤t≤1.

4.

a) Determine x(t) and ROC for the function.   8 M
   X(s)=(S+1)^2/(S^2-S+1);Re{s}>1/2

b) Determine the Laplace transform and sketch the pole zero plot of the following signals   8 M
   i) x(t) = e^{-t} cos(2t)
   ii) t e^{-t}u(t)

5.

a) State and prove multiplication property of DTFT.   8 M

b) Find the DTFT of the following signals:
   i) $\delta(n-1) + \delta(n+1)$ ii) $\delta(n+2) - \delta(n-2)$.
   Sketch and label one period of the magnitude of each Fourier Transform.   8 M

6.
  a) For the given signal as under: 8 M
     i) Determine the parameter values for which
        Z- Transform will exist
     ii) Find the Z-Transform
     iii) Plot the ROC
              $x(n) = -b^n\, u(-n-1) + (0.5)^n\, u(n)$ [$b = 1$]

  b) State and prove sampling theorem.   8 M