Total No. of printed pages = 3

# EC 131404

Roll No. of candidate

## 2019

### B.Tech. 4th Semester End-Term Examination

### Electronics and Communication Engineering

### SIGNALS AND SYSTEMS

### (New Regulation) (w.e.f. 2017 – 18)

Full Marks – 70                                      Time – Three hours

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The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1.  Answer the following :                        (10 × 1 = 10)

    (i)   A signal is a continuous function of
          —————— variable.

    (ii)  The power of an energy signal is
          ——————.

    (iii) The causal signals are defined for ——————.

    (iv)  The response of an LTI system is given by
          —————— of input and impulse
          response.

[Turn over

(v) An arbitrary relaxed system is said to be —————————— stable if and only if every bounded input produces bounded output.

(vi) The Fourier series is frequency domain representation of —————————— signals.

(vii) If *x(n)* is finite duration right sided signal, then the ROC is entire z-plane except at ——————————.

(viii) The —————————— transform is used to transform a time domain signal to complex frequency domain.

(ix) The necessary and sufficient condition for causality of an LTI system is ——————————.

(x) The —————————— system is governed by constant coefficient differential coefficient.

2.  (a) Define energy and power signal?                                (2)

    (b) Determine whether the discrete time system $y(n) = \cos wn$ is static, stable, causal, linear and time invariant.                        (10)

    (c) Evaluate :                                                     (3)

        (i)   $\int_{-4}^{4} (t^2 + 2t + 1)\partial(t - 3)dt$

        (ii)  $\int_{-2}^{2} 2t\,\partial(t + 3)dt$

3.  (a) Determine the convolution sum of the given sequences using graphical method.       (5)

        $x(n) = \{1,2,4,3,3\}h(n) = \{1,2,1,1\}$

    (b) Determine whether the given signal is periodic or aperiodic signal.                (5)

        $$x(t) = 2\cos\frac{2\pi t}{3} + 3\cos\frac{2\pi t}{7}$$

    (c) Discuss about causality and stability property of an LTI system.                   (5)

4. (a) Consider a causal LTI system that is characterized by the difference equation.

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

Find the frequency response $H(e^{jw})$ and the impulse response $h(n)$ of the system. (10)

(b) State and prove the linearity property of DTFT. (5)

5. (a) Find the Laplace transform and ROC of unit stepsignal. (5)

(b) Determine the inverse Z- transform of (10)

$$x(z) = \frac{z}{3z^2 - 4z + 1} \text{ for ROC:} \frac{1}{3} < |z| < 1$$

6. (a) Derive a relationship between the Fourier transform and z transform of a discrete time signal. (5)

(b) Define autocorrelation and cross correlation signal. (3)

(c) Stare and prove sampling theorem. (2 + 5 = 7)

7. Write short notes on (any *three*) : (3 × 5 = 15)

(a) Classification of continuous and discrete time signal

(b) Standard input signals

(c) Properties of ROC of Z-transform

(d) Response of LTI discrete time system using discrete convolution

(e) Relationship between Laplace and Fourier transform.