

Name: _____

Regd. No. _____

MID SEMESTER EXAMINATION – FALL 2015
Program: B.E. (Electrical)

Course Title: Signal & Systems

Course Code: EL-313

Total Marks: 60

Duration: 2 Hours

Day & Date: Fri, December 04, 2015

Start Time: 1015 PST

Section-I: (30 Marks)

There are 30 multiple-choice questions (MCQs)

Time allowed: 30 minutes

Note. Choose one of the four options for each question. Each question carries 1 mark.

- 1) The signal $x(t) = e^{-3t}$ is:
 - a. Casual System.
 - b. Non-casual System (✓)
 - c. Partly (a) and partly (b)
 - d. None of the above

- 2) For a unit step function the value of the function should be:
 - a. 0 for $t < 0$ and -1 for $t \geq 0$
 - b. 0 everywhere except for the 0 itself.
 - c. 0 for $t < 0$ and 1 for $t \geq 0$ (✓)
 - d. None of the above

- 3) In Real Exponential function if $\sigma > 0$ then the graph will:
 - a. Decrease Exponentially
 - b. Grows Exponentially
 - c. Increase Exponentially
 - d. Both b and c (✓)

- 4) A quantitative description of a physical phenomenon, event or process it is known as:
 - a. Signal (✓)
 - b. System
 - c. Linear
 - d. None of the above

- 5) A system is defined as:
 - a. A function representing a physical quantity or a variable containing information about the behavior and nature of phenomenon.
 - b. Signals that can be described uniquely by a mathematical expression.
 - c. A device or a set of rules defining the functional relation between the input and output. (✓)
 - d. None of the above

- 6) A system is said to be casual if:
 - a. Its output depends on the present and future values of the input.
 - b. Its output depends on the present and past values of the input. (✓)
 - c. If it's output depends only on the past values of the input.
 - d. None of the above.

- 7) A signal $x(t)$ is said to be power signal if:
- $0 < P < \infty$ and $E = \infty$ (✓)
 - $0 < P < E$ and $E = 0$
 - $0 < P < \infty$ and $E = 0$
 - None of the above.
- 8) The Unit Impulse function is also known as:
- Step function.
 - Dirac Delta function. (✓)
 - Both A and B.
 - None of the above.
- 9) A Discrete time system is obtained by:
- Multiplying two continuous time signals.
 - Adding two continuous time signals.
 - Time sampling of continuous time signal. (✓)
 - None of the above.
- 10) Multichannel signals are defined as:
- Different signals are recorded from the same source are known as multichannel signals. (✓)
 - Signals, which can be described uniquely by mathematical expression.
 - Different signals are recorded from different sources are known as multichannel signals.
 - None of the above.
- 11) If a signal $x(t)$ does not have any definite values at certain points for certain values of t but has definite values at remaining points the signal is said to be:
- Multidimensional signal.
 - Real signal
 - Piecewise Continuous signal. (✓)
 - None of the above
- 12) When the correlation of two different sequences is performed it is known as:
- Auto-correlation.
 - Multi-correlation.
 - Both A and B.
 - None of the above (✓)
- 13) The system $y(t) = x(t) + \frac{1}{3}x(t - 3)$ is:
- Casual System. (✓)
 - Non-casual System.
 - Partly A and partly B.
 - None of the above
- 14) The system $\frac{dy(t)}{dt} + 3y(t) = x(t)$ is:
- Time invariant system.
 - Time variant system. (✓)
 - Partly A and partly B.
 - None of the above

- 15) The system $\frac{d^2y(t)}{dt^2} + 2\frac{dy(t)}{dt} + y(t) = x(t)$ is:
- Linear system. (✓)
 - Non-linear system.
 - Partly A and partly B.
 - None of the above
- 16) Find the linear system from the following:
- $y(n) = \{x(n)\}^2x(n - 1)$
 - $y(n) = x(n)x(n - 3)$
 - $y(n) = \frac{1}{3}nx(n)$ (✓)
 - None of the above
- 17) Memory in a Discrete time system is analog if:
- Energy storage in a continuous time system. (✓)
 - Memory in a continuous time system.
 - Sampled memory of a continuous time LTI system.
 - None of the above.
- 18) Non-periodic and deterministic signals are energy signals whereas periodic and random signals are power signals.
- False.
 - True. (✓)
 - May be.
 - None of the above
- 19) A power signal has infinite energy whereas an energy signal has zero average power.
- True. (✓)
 - False.
 - May be.
 - None of the above
- 20) The memory of the moving average system $y(n) = \frac{1}{4}x(n) + x(n - 1) + x(n - 2)$ as per the past time unit as:
- 3.
 2. (✓)
 - 4.
 - None of the above
- 21) Find the casual system of the following:
- $y(n) = \frac{1}{3}x(n) + x(n - 1) + x[n - (n - 2)]$ (✓)
 - $y(n) = \frac{1}{3}x(n) + x(n - 1) + x(n + 1)$
 - Both A and B.
 - None of the above
- 22) For a linear system $y=f(x)$, find the valid points:
- $f[x(t + T)] = f[x(t)] + f[x(T)]$
 - $f(kx) = kf(x)$
 - $f(x_1 + x_2) = f(x_1) + f(x_2)$
 - Both B and C. (✓)

23) Auto-Correlation function is maximum when:

- a. $l = 0 : R_{xx}(0) \geq |RR_{xx}(l)|$
- b. $l = 0 : R_{xx}(0) = |R_{xx}(l)|$
- c. $l = 0 : R_{xx}(0) \geq |R_{xx}(l)|$ (✓)
- d. None of the above.

24) Cross Correlation is commutative.

- a. True.
- b. False. (✓)
- c. May be.
- d. None of the above.

25) If $y(t) = x_1(t) * x_2(t)$, find the correct expression from the following:

- a. $y(t) = \int_{-\infty}^{\infty} x_1(T)x_2(t)dt$
- b. $y(t) = \int_{-\infty}^{\infty} x_1(t - T)x_2(t)dt$
- c. $y(t) = \int_{-\infty}^{\infty} x_1(T)x_2(t + T)dt$
- d. None of the above. (✓)

26) Find the correct expression:

- a. $\delta(t - t_1) * \delta(t - t_2) = x(t - t_0)$
- b. $\delta(t - t_1) * \delta(t - t_2) = \delta(t)$
- c. $\delta(t - t_1) * \delta(t - t_2) = \delta(t - t_1 - t_2)$ (✓)
- d. None of the above.

27) The associative property is defined as:

- a. $x_1(t) * x_2(t) = x_2(t) * x_1(t)$
- b. $x_1(t) * [x_2(t) + x_3(t)] = x_1(t) * x_2(t) + x_1(t) * x_3(t)$
- c. $x_1(t) * [x_2(t) * x_3(t)] = [x_1(t) * x_2(t)] * x_3(t)$ (✓)
- d. None of the above.

28) Find the correct expression:

- a. $x(t) * \delta(t - t_0) = x(t - t_0)$ (✓)
- b. $x(t) * \delta(t - t_0) = 1$
- c. $x(t) * \delta(t - t_0) = x(t_0)$
- d. None of the above.

29) The convolution of $x(t)$ and $h(t)$ is defined by:

- a. $y(t) = \int_{-\infty}^{\infty} x(T)h(t - T)\delta t$ (✓)
- b. $y(t) = x(T) + h(t - T)$
- c. Both A and B.
- d. None of the above

30) Auto-Correlation is an even function:

- a. True. (✓)
- b. False.
- c. May be.
- d. None of the above.