ISRA UNIVERSITY
Islamabad Campus

DEPARTMENT OF ELECTRICAL ENGINEERING

FINAL TERM EXAMINATION - FALL 2016
Program: B.E. (Electrical)
"Solution"

Course Title: Signal & Systems	**Course Code:** EL-313
Total Marks: 50	**Duration:** 3 Hours
Day & Date: Wed, February 01, 2017	**Start Time:** 1000 PST

(Use CAPITAL letters)

Student Name:	Invigilator's Name:
Student Signature:	Invigilator's Signature:
Student Regd. No:	Date:

Section-I
Multiple Choice Questions

Marks: 10   **Time Allowed: 20 Minutes**

Each statement is followed by four answers, marked A, B, C & D; only one of them is the best answer. Encircle the best answer. Each correctly circled best answer carries one mark. There is no negative marking for incorrect answer. No mark will be given for over writing, cutting or more than one encircled answers.

PLEASE DO NOT OPEN THE PAPER UNTIL ASKED TO DO SO

***************Good Luck***************

1. Two sequences x_1 (n) and x_2 (n) are related by x_2 (n) = x_1 (-n). In the z-domain, their ROC's are:
   a) The same.
   b) Reciprocal of each other.
   c) Negative of each other.
   d) None of the above.

   Answer: (b)

2. The Fourier transform (FT) of a function x [n] is $X(e^{j\omega})$. The FT of $nx[n]$ will be:
   a) $\frac{dx(t)}{dt}$
   b) $jfX(e^{j\omega})$.
   c) $j\frac{dX(e^{j\omega})}{d\omega}$.
   d) None of the above.

   Answer: (c)

3. If R_1 is the region of convergence of x (n) and R_2 is the region of convergence of y (n), then the region of convergence of x (n) convoluted y (n) is:
   a) $R_1 + R_2$.
   b) $R_1 - R_2$.
   c) $R_1 \cap R_2$.
   d) $R_1 \cup R_2$.

   Answer: (c)

4. The Fourier transform of impulse function is:
   a) $\delta(\omega)$.
   b) 1.
   c) $2\pi\omega$.
   d) None of the above.

   Answer: (b)

5. $x[n] = a^{|n|}, |a| < 1$ is:
   a) An energy signal.
   b) A power signal.
   c) Neither energy nor a power signal.
   d) None of the above.

   Answer: (a)

6. A band pass signal extends from 1 KHz to 2 KHz. The minimum sampling frequency needed to retain all information in the sampled signal is:
   a) 1 KHz.
   b) 2 KHz.
   c) 3 KHz.
   d) None of the above.

   Answer: (b)

7. Given a unit step function u (t), its time-derivative is:
    a) A unit impulse.
    b) Another step function.
    c) A unit ramp function.
    d) None of the above.

Answer: (a)

8. z-transform converts convolution of time-signals to:
    a) Multiplication.
    b) Addition.
    c) Division.
    d) None of the above.

Answer: (a)

9. The system having input x [n] related to output y [n] as $y[n] = log_{10}|x[n]|$ is:
    a) Nonlinear, causal, not stable.
    b) Nonlinear, non-causal, not stable.
    c) Nonlinear, causal, stable.
    d) None of the above.

Answer: (c)

10. To obtain $x(4 - 2n)$ from the given signal x [n], the following procedure (or priority) rule is used for operations on the independent variable n:
    a) Time scaling ➔ Time shifting ➔ Reflection
    b) Time shifting ➔ Time scaling ➔ Reflection
    c) Reflection ➔ Time shifting ➔ Time scaling.
    d) None of the above.

Answer: (b)

11. Discrete-time system is stable if the poles are:
    a) Within unit circle.
    b) Outside unit circle.
    c) On the unit circle.
    d) None of the above.

Answer: (a)

12. A system is said to be shift invariant only if:
    a) A shift in the input signal also results in the corresponding shift in the output.
    b) A shift in the input signal does not exhibit in the corresponding shift in the output.
    c) A shifting level does not vary in an input as well as output.
    d) None of the above.

Answer: (a)

13. The ROC of the z-transform of the signal $x[n] = \{2,1,1,2\}\,;n(0) = 1$ is:
    a) *All z, except z = 0* .
    b) *All z, except z = ∞.*
    c) *All z, except z = 0 and z = ∞.*
    d) None of the above.

    Answer: (c)

14. A continuous-time periodic signal x (t), having a period T, is convolved with itself. The resulting signal is:
    a) Not periodic.
    b) Periodic having a period T.
    c) Periodic having a period 2T.
    d) None of the above.

    Answer: (b)

15. Let $H(e^{j\omega})$ be the frequency response of a discrete-time LTI system, and $H_1(e^{j\omega})$ be the frequency response of its inverse. Then:
    a) $H(e^{j\omega})H_1(e^{j\omega}) = 1$.
    b) $H(e^{j\omega})H_1(e^{j\omega}) = \delta(\omega)$.
    c) $H(e^{j\omega}) * H_1(e^{j\omega}) = \delta(\omega)$.
    d) None of the above.

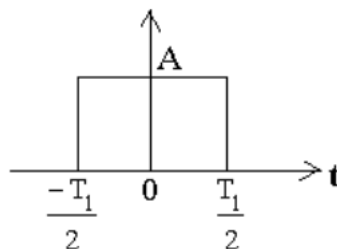   **Answer: (a)**

16. If the Fourier series coefficients of a signal are periodic then the signal must be:
    a) Continuous-time, periodic.
    b) Continuous-time, non periodic.
    c) Discrete-time, non periodic.
    d) Discrete-time, periodic.

    Answer: (d)

17. The average power of the following signal is:

    a) $\dfrac{A^2}{2}$.
    b) A^2.
    c) $A^2 T_1$.
    d) None of the above.

    Answer: (c)

18. What is the Nyquist frequency for the signal $x(t) = 3\cos 50\pi t + 10\sin 300\pi t - \cos 100\pi t$?
    a) 100 Hz.
    b) 300 Hz.
    c) 60 Hz.
    d) None of the above.

    Answer: (b)

19. The function which has its Fourier transform, Laplace transform and Z-transform unity is:
    a) Gaussian.
    b) Sinc.
    c) Pulse.
    d) Impulse.

    Answer: (d)

20. The z-transform of $\delta[n - m]$ is:
    a) z^{-m}.
    b) z^{m}.
    c) $\dfrac{1}{z}$.
    d) None of the above.

    Answer: (a)