

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. Winter 2019 – 20 Examination**

**Semester: 3**  
**Subject Code: 03106201 / 203106201**  
**Subject Name: Fundamentals of Signals & Systems**

**Date: 25/11/2019**  
**Time: 2:00pm to 4:30pm**  
**Total Marks: 60**

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Objective Type Questions - (Each of one mark) (15)**

1. Speech signal is \_\_\_\_\_ signal. (Deterministic/ Random)
2. Sampling frequency  $f_s \geq$  \_\_\_\_\_  $f_m$
3. Quantization is process to convert \_\_\_\_\_ signal in to Digital Signal.
4.  $y(t) = x(-t)$  system is \_\_\_\_\_ (Casual/Non Casual)
5. Laplace transform of  $\delta(t)$  Signal is \_\_\_\_\_.
6. Two signals having number of samples 5 & 6 respectively then how many samples are there in convolution of these two signals? \_\_\_\_\_
7. All Non-Casual systems are Dynamic and Vice –Versa its true? \_\_\_\_\_ (Yes/No)
8. \_\_\_\_\_ is equation of convolution for CT-LTI system.
9. Equation of CTFT  $X(\omega) =$  \_\_\_\_\_
10.  $u(t+2)$  signal start from  $t =$  \_\_\_\_\_
11. What is the value of  $\text{sgn}(0)$ , such that  $\text{sgn}(n)$  is the Signum function?  
 (A) 0 (B) 0.5 (C) 1.5 (D) 1
12. 1(one) is Z transform of \_\_\_\_\_  
 (A)  $\delta(n)$  (B)  $\delta(t)$  (C)  $\delta(s)$  (D)  $\delta(z)$
13. A discrete signal is said to be even or symmetric if  $x(-n)$  is equal to  
 (A) 0 (B)  $x(n)$  (C)  $-x(n)$  (D)  $-x(-n)$
14. What is full name of ROC in Z Transform \_\_\_\_\_.  
 (A) Registrar of Companies (B) Region of Convergence  
 (C) Real of Convergence (D) Region of Convolution
15. Which operation is amplitude scaling?  
 (A)  $2x(t)$  (B)  $x(2t)$  (C)  $x(t)$  (D)  $x(-t)$

**Q.2 Answer the following questions. (Attempt any three) (15)**

(A) Check whether the following system is Static/Dynamic, Stable/Unstable, Linear /Non-Linear, Time-Invariant/Time-Variant & Causal/Non causal.

$$y(n) = \{x(n) + x(n-1) + x(n-2)\}$$

(B) Derive equation for Even and Odd part of signal  $x(t)$ .

(C) Find Convolution of given signal using Multiplication method

$$x(n) = \{1, 1, 0, 1, 1\}$$

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

(D) Solve differential equation using Laplace-transform.

$$y'' - 6y' + 5y = 0$$

$$y(0) = 1, y'(0) = -3$$

**Q.3 (A) Find out Z-transform of following signal and also draw ROC. (07)**

$$x(n) = a^n u(n)$$

(B) Draw signal  $x(t) = r(t+1) - r(t) - r(t-2)$  (08)

**OR**

(B) Impulse Response of LTI system is given by (08)

$$h(t) = e^{-2t}; t \geq 0$$

With the help of convolution, find system output due to input:

$$x(t) = A; 0 \leq t \leq 2$$

Also sketch the output.

**Q.4** (A) Using Tabulation Method Determine output of DT LTI system whose input and impulse response are given as (07)

$$x(n) = \frac{1}{3}n; \text{ for } 0 \leq n \leq 6$$

$$h(n) = 1; \text{ for } -2 \leq n \leq 2$$

**OR**

(A) Obtain CTFT of following signal and plot magnitude & Phase graph. (07)

$$x(t) = e^{-at}u(t)$$

(B) Draw and Explain Standard Test signal. (08)