Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Summer 2018 - 19 Examination

Semester: 3 **Date: 29/05/2019**

Subject Code: 03106201 **Time: 02:00pm to 04:30pm**

Subject Name: Fundamentals of Signals & Systems **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** - (All are compulsory) (Each of **one** mark) **(15)**

1. Telegraph signals are examples of _____. (Analog signals/Digital signals)
2. For a system function $H(s)$ to be stable, the poles lie in _____ of the s-plane.
3. The bandwidth occupied beyond the Nyquist bandwidth of the filter is called as _____.
4. The Fourier transforms of $\delta(t)$ is _____.
5. If $f(t) \Leftrightarrow F(j\omega)$, $\frac{d^n}{dt^n} f(t) \Leftrightarrow$ _____.
6. Which Mathematical notation specifies the condition of periodicity for a continuous time signal?

(a) $x(t) = x(t + T_0)$ (b) $x(n) = x(n + N)$

(c) $x(t) = e^{-\alpha t}$ (d) None of the above

7. A discrete signal is said to be even or symmetric if $x(-n)$ is equal to

(a) $x(n)$ (b) 0

(c) $-x(n)$ (d) $-x(-n)$

8. As the time scaling rate increases,

(a) Width of each pulse increases (b) Width of each pulse decreases

(c) Width of each pulse remains unaffected (d) None of the above

9. Which block of the discrete time systems requires memory in order to store the previous input?

(a) Adder (b) Signal Multiplier

(c) Unit Delay (d) Unit Advance

10. Recursive systems are basically characterized by the dependency of its output on

(a) Present Input (b) Past Input

(c) Previous Outputs (d) All of the above

11. What is the possible range of frequency spectrum for discrete time Fourier series (DTFS)?
12. What should be the value of Laplace transform for the time domain signal $e^{-at} \cos \omega t \; u(t)$?
13. Give two examples of stable discrete time systems.
14. The Fourier transform of a conjugate symmetric function is always _____. (Real/Imaginary)
15. A function having frequency f is to be sampled. The sampling time T should be _____.

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

A) Define ROC of the Laplace transform.

B) Write the properties of convolution.

C) Check whether the following system is Static/Dynamic, Linear/Non-linear, Stable/Unstable, Causal/Non-causal and Time variant or Not? $y(n) = |x(n)|$

D) Distinguish between continuous time signal and discrete time signal.

Q.3 A) State relationship between Laplace transform and Fourier transform. **(07)**

B) **(08)**

$x(n) = \{3, 2, 1, \underset{\uparrow}{0}, 1, 2, 3\}$

$y(n) = \{-1, -2, -3, \underset{\uparrow}{0}, 1, 2, 3\}$

Sketch $x(2n) + y(n-4)$

OR

B) Find output of system with the help of convolution whose input and impulse response is given below: **(08)**

$x(t) = e^{-2t}u(t)$

$h(t) = u(t+2)$

Q.4 A) Define discrete time Fourier transforms. Find the DTFT of $x(n) = a^n u(n)$ **(07)**

OR

A) Explain classification of DT-signal. **(07)**

B) Find inverse Fourier transform of following signal **(08)**

$$X(w) = \frac{6jw + 16}{(jw)^2 + 5jw + 6}$$