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

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Summer 2018 - 19Examinations

Semester: 4 **Date: 10/05/2019**
Subject Code: 03107303 **Time: 02:00pm To 04:30**
Subject Name: 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 - **(15)**

1. The function which relates output of a system to the input(signal) of a system is
   A) Periodic function B) Non-periodic function C) Transfer function D) None of the above
2. Determine the Fourier transform of unit step x(t) = u(t)
   A) 1/j ω B) 1/2j ω C) j ω D) 2j ω
3. An example of a discrete set of information/system is
   A) the trajectory of the Sun B) data on a CD
   C) universe time scale D) movement of water through a pipe
4. A discrete signal is said to be odd or asymmetric if x(-n) is equal to
   A) X(n) B) 0 C) –x(-n) D) ∞
5. Frequency and Time period are _____
   A) Proportional to each other B) Inverse of each other
   C) Same D) None of the above
6. Which mathematical notation specifies the condition of periodicity for a continuous time signal ?
7. Give basic equation of Z-transform.
8. Define ROC.
9. The period of the function cos (π/4)t is _____
10. Define Causal system.
11. _____ is defined as any physical quantity that varies with time, space or any other independent variable
12. Z-transform of u(n) _____
13. Define impulse function.
14. Define ramp function.
15. What is system?

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

A) Determine whether the signals are periodic or not.
   1) X1(t) = sin15πt
   2) X2(t) = sin20πt
   3) x(n)= cos(n/8) cos(nπ/8)

B) Give the comparison between energy signals and power signals.

C) Using power series method for determining Inverse Z transform(IZT) of
   X(Z) = $\frac{Z}{Z-1}$ for ROC $|Z| > 1$

D) Check the following systems are static, causal, stable and LTI.
   1) y (t) = x (t+10) + x(t)
   2) y (t) = 10x (t) + 5

Q.3 A) Find out linear convolution of given sequences using graphical method. **(07)**
x(n)= {1,2,3}, h(n)= {1,2,1}

B) Sketch the following sequence. x(n) = {3,4,1,2,3} **(08)**

↑

1) x(n-2) 3) x(n+2)

2) x(-n-2) 4) x(-n+2)

OR

B) Prove "Differentiation Property" and "Division by n" and Obtain the Z transform of unit step sequence using Differentiation Property. **(08)**

Q.4 A) Find Z transform of following sequence : **(07)**

1. $X(n) = (-1/3)^n u(n) – (-1/2)^n u(-n)$
2. $X(n) = [3*2^n – 4*3^n] u(n)$

OR

A) Determine x(n) using partial fraction expansion method **(07)**

$H(z) = \frac{0.8}{(Z-0.8)(Z-0.5)}$

B) A system has input - output relation given by y[n] = nx[n]. Determine whether the system is memory less, causal, linear, time invariant or stable **(08)**