

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2022 – 23 Examinations

Semester: 4
Subject Code: 203113259
Subject Name: Basics of Signal & Systems

Date: 20/03/2023
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 -**(15)**

1. Define Signal.
2. Define System.
3. Define ROC.
4. Give equation of DFT.
5. Give equation of double sided Z-transform.
6. Which of the following is an even function of t?
 - a. t^2
 - b. t^2+4
 - c. $\sin(2t) + 3t$
 - d. t^3+6
7. Determine the Fourier transform of unit step $x(t) = u(t)$
 - A. $1/j\omega$
 - B. $1/2j\omega$
 - C. $j\omega$
 - D. $2j\omega$
8. 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
9. 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. ∞
10. Signals can be _____.
 - A) analog
 - B) digital
 - C) either (a) or (b)
 - D) neither (a) nor (b)
11. Frequency and period are _____.
12. Define:- Unit ramp
13. Define:- Unit step
14. Define:- Unit impulse
15. Find the odd and even components of the $x(n) = \{1, 2, 2, 3, 4\}$

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

- A) Sketch the signal $F(t) = u(t) - u(t-1)$
- B) Define the classification of systems. Explain any four systems in detail.

C) Determine linear convolution of given sequences.

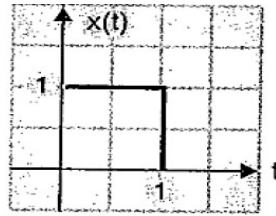
$$X(n) = \{1,2,3,4\}, h(n) = \{1,2,1,2,1\}$$

D) Explain Linear convolution.

Q.3 A) Find whether following system is linear/non-linear, time variant/invariant, memory/memoryless or causal/anticausal with justification. (07)

$$Y(t) = 4\sin(x(t)) + 5\cos(x(t))$$

B) Function $x(t)$ is as shown in figure. Draw even and odd parts of $x(t)$. (08)



OR

B) Explain following Z Transform properties: (08)

(i) Time shifting (ii) Scaling

Q.4 A) Sketch the following sequence. $x(n) = \{1,2,3,4,1\}$ (07)

↑

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

2) $x(-n-1)$ 4) $x(-n+1)$

OR

A) Determine the Z – transform and sketch ROC : (07)

1. $X_1[n] = [1/3]^n$; for $n \geq 0$

2. $X_2[n] = x_1[n+4]$

B) Using power series method for determining Inverse Z transform (IZT) of (08)

$$X(Z) = \frac{1}{1-1.5Z^{-1}+0.5Z^{-2}}; \text{ For ROC } |Z| > 1$$