

Roll No. _____

3037

**B. Tech. 3rd Semester (ECE)
Examination – February, 2022**

SIGNALS AND SYSTEMS

Paper : PCC-ECE-209-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Q. No. 1 is compulsory. Attempt five questions in all taking one question from each Unit.

1. (a) Define unit impulse function. 2.5
- (b) Check $x(t) = \cos(\pi/6 - \pi t)$ is periodic or nonperiodic. 2.5
- (c) Explain in brief the region of convergence. 2.5
- (d) Explain the condition for the existence of fourier transform. 2.5
- (e) Explain the relationship between z transform and fourier transform. 2.5
- (f) Explain in brief the applications of z transform. 2.5

3037-1000-(P-3)/(Q-9)/22

P. T. O.

UNIT-1

2. Define signal. Explain in detail the classification of signals with examples. 15
3. (a) Prove that sine wave $x(t) = A \sin \omega t$ is a periodic signal. 8
- (b) Write short notes on:
- (i) Linear and non linear system. 7
 - (ii) Invertible and non invertible system. 7

UNIT- II

4. Explain and prove the properties of fourier transform. 15
5. (a) Discuss the finite impulse response system and infinite impulse response system. 8
- (b) Explain in detail the cascade and parallel connection of LTI systems with examples. 7

UNIT- III

6. (a) Evaluate the Laplace transform of $x(t) = e^{at} u(t)$. Plot the ROC. 8
- (b) Explain the application of Laplace transform to the LTI systems. 7

7. (a) Determine ZT of the following system given as: 8

$$X(z) = \frac{z(z^2 - 4z + 5)}{(z - 1)(z - 2)(z - 3)}$$

- (b) Explain and prove the properties of z transform (any four). 7

UNIT- IV

8. Explain in detail the following:
- (a) State space representation of continuous time LTI systems. 8
 - (b) Multiple input and multiple output system. 7

9. A system is described by the differential equation: 15

$$\frac{d^3 y}{dt^3} + 6 \frac{d^2 y}{dt^2} + 11 \frac{dy}{dt} + 10y(t) = 8x(t)$$

Where $y(t)$ is the output and $x(t)$ is the input to the system. Obtain state space representation of the system.