**POORNIMA UNIVERSITY, JAIPUR.**

**END SEMESTER EXAMINATION, November 2022**

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|  | **3BT5101** | Roll No. | Total Printed Pages: 2 |
| **3BT5101** |  |
| B. Tech. III Year V-Semester (Main/Back) End Semester Examination, November 2022  **(EE / EC)** | |
| **BEC05101 / BEE05101 : Signals and Systems** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Briefly explain the classification of different types of systems with example. | **(6)** | **Remember** |
|  |  |  |  |  |
|  | **(b)** | Differentiate between energy and power signals with example. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | Discuss the following signals  (i) Periodic signal and nonperiodic signal (ii) even and odd signal. | **(6)** | **Remember** |
|  |  |  |  |  |
|  | **(b)** | Write short notes on: (i) Sampling theorem (ii) Aliasing effect. | **(6)** | **Understand** |
|  |  |  |  |  |
|  |  | **UNIT-II (CO2)** |  |  |
|  |  |  |  |  |
| **Q.3** | **(a)** | State and prove the Fourier transform property phase shifting | **(6)** | **Remember** |
|  |  |  |  |  |
|  | **(b)** | State and prove the following properties of Fourier transform: i)Time shift ii) Time scaling | **(6)** | **Understand** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.4** | **(a)** | Find the Fourier transform of x(t) = u(2t), where u(t) is the unit step function. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Obtain the Fourier transform of a periodic train of impulses with period T. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **UNIT-III (CO3)** |  |  |
|  |  |  |  |  |
| **Q.5** | **(a)** | Define bilateral and unilateral Laplace transform and explain the Region of convergence of the Laplace transform | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Find the Laplace transform of x(t) = -t2 e –at u(-t) and indicate its ROC | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.6** | **(a)** | State and prove the following properties of Laplace Transform  (i) Time domain differentiation (ii) Final value theorem | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Find the ROC of the signal x(t) = using Laplace transform | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **UNIT-IV (CO4)** |  |  |
|  |  |  |  |  |
| **Q.7** | **(a)** | What is an LTI system? Explain the properties involved. Check whether an ideal differentiator is LTI or not. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Define the following term (i) State (iii) State variable (iii) State Model | **(6)** | **Remember** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.8** | **(a)** | Write short notes on properties of state transition matrix | **(6)** | **Remember** |
|  |  |  |  |  |
|  | **(b)** | Find the time response of the system described by the equation | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **UNIT V (CO5)** |  |  |
|  |  |  |  |  |
| **Q.9** | **(a)** | State and prove following properties of Z transform: i) Multiplication by n ii) Accumulation iii) Convolution | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Find the Z transform of x [n] = an+1 u [n+1]. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.10** | **(a)** | Find Z transform of the sequences: i) x[n] = {3, −2,0,4,2} (ii) x[n] = a u(−n − 2) | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Find the unilateral z transform of 𝑥 (𝑛)= 𝛿 (𝑛 + 1) + 𝛿 (𝑛) + 𝑎𝑛+3 𝑢(𝑛 + 1) | **(6)** | **Evaluate** |