B.Tech IV sem (Main/Back) Exam April-May 2026
Electrical & Electronics Engg.
4EX4-07 Signals & Systems
Paper Code : 4E1323
EE, EX

Time: 3 Hours **Maximum Marks: 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. _____ 2. _____

Part A (Answer should be given up to 25 words only)

All questions are compulsory

Q.1 State the objectives and outcomes of this course.

Q.2 Differentiate between energy and power signals.

Q.3 What is periodicity? Give condition for periodic signal.

Q.4 Define stability of LTI system.

Q.5 What is Parseval's theorem?

Q.6 Define state-space representation.

Q.7 What is Nyquist rate?

Q.8 Define reason of convergence for Laplace transform.

Q.9 Explain signal reconstruction.

Q.10 Define zero-order hold. **10 x 2 = 20**

Part B (Analytical/Problem solving questions)

Attempt any Five questions

Q.1 A system engineer claims that "every real-world phenomenon can be modeled as a signal." Critically examine this claim with suitable examples and limitations.

Q.2 Can a system be linear but not time-invariant? Construct such a system and verify.

Q.3 Explain the properties of Laplace transform.

Q.4 A signal has maximum frequency 5kHz. Determine: Nyquist rate and minimum sampling frequency

Free RTU papers at ersanikalyan.com

Q.5 Explain sampling and reconstruction process in detail

Q.6 Compare DTFT and DFT

Q.7 Determine the convolution of the given signals

$x(t) = u(t-5)-u(t-5)$ and

$h(t) = e^{*}u(t)$ Where $u(t)$ is unit step function. 5 x 4 = 20

Part C (Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1 Explain even and odd signals mathematically and graphically

Q.2 A discrete-time signal is given by:

$x(n) = 3u(n)-2u(n-4)$

a) Sketch the signal for n=-2 to n=10

b) Determine whether it is periodic or aperiodic.

c) Compute the energy of the signal.

d) Test the signal for absolute integrability and comment on stability

Q.3 A discrete-time signal is $x(n)=(1/2)^{n}u(n)$

a) Compute the DTFT of the signal.

b) Verify Parseval's theorem for the signal.

c) Find the Z-transform X(z) and specify its ROC

d) Determine poles and zeros and sketch the pole-zero plot

Q.4 A causal LTI system has impulse response h(n), for which the z-transform is $H(z)=(1+z^{-1})/(1-0.5z^{-1})(1+0.25z^{-1})$. Is the system stable? Explain

Q.5 Write all the properties of DFT in detail and define the feedback control system

3 x 10= 30

Free PTU papers at ersanilkagyan.com