विश्वजीवनामृतं ज्ञानम्

ABV- Indian Institute of Information Technology & Management, Gwalior

EE201: Signals and Systems

Major Examination (Session 2023–24)

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

Note: Attempt all questions. Justify all steps clearly.

1. (a) Define system properties: linearity, time-invariance, causality, and stability with examples.
   (b) Test whether the system $y[n] = x[n] + x[n-1]$ is linear and time-invariant. (10 Marks)

2. Obtain the convolution of $x(t) = e^{-t}u(t)$ and $h(t) = u(t-1)$. (7 Marks)

3. State and prove the Fourier Transform time-shifting and frequency-shifting properties. (7 Marks)

4. Compute the Fourier series coefficients of a periodic square wave of amplitude A and time period T. (7 Marks)

5. Derive the Laplace Transform of the unit step function $u(t)$ and discuss its region of convergence. (7 Marks)

6. State and prove Parseval's theorem for Fourier series. (7 Marks)

7. Determine the Z-transform of $x[n] = (0.5)^n u[n]$. Find its ROC. (7 Marks)

8. Write short notes on any two: (i) Hilbert Transform (ii) Sampling Theorem (iii) Properties of Discrete-Time Fourier Transform (DTFT) (10 Marks)