

M.Sc. 2nd Semester Examination, 2025

ELECTRONICS

(Signals and Systems)

PAPER – ELC-202

Full Marks : 50

Time : 2 hours

Answer any four questions each from Group-A and Group-B and two questions from Group-C

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

Answer any four questions : 2 × 4

- 1. What is the significance of the 'signals and vector analogy' ?**

(Turn Over)

2. What do you mean by unit step sequence ?
Give its graphical representation. 1 + 1
3. What do you mean by aliasing effect in digital signal processing ?
4. State Parseval's theorem for energy signals.
5. What is the basic difference between orthogonality and orthonormality of signal functions ?
6. What do you mean by the Power Spectral Density (PSD) of a signal ?

GROUP – B

Answer any four questions : 4 × 4

7. Define impulse response of an LTI system.
What is its significance ? 2 + 2

8. Find the output $y(n)$ of a filter whose impulse response is $h(n) = \{2, 1, 1\}$ and input signal $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 2\}$ using Overlap-Save method.

9. What do you mean by Energy Spectral Density (ESD) and Autocorrelation Function of a real signal? What is the relation between them? 3 + 1

10. If a system is represented by the following difference equation

$$y(n) = y^2(n-1) - nx(n) + 5x(n-1) - 2x(n-2); n \geq 0$$

(a) Is the system linear? Explain.

(b) Is the system causal? Justify your answer.

2 + 2

11. Given two LTI systems connected in cascade with impulse responses $h_1(t)$ and $h_2(t)$, prove

