



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Semester Examination, Spring 2026

Course Code: 325, Course Title: Instrumentation and Control

Level:4

Term:1

Batch:64

Time: 2:00 Hrs

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered *sequentially*.]

1.	a)	Define the Time-of-Flight method for liquid level measurement.	[2]	CO1
	b)	Recall why an amplifier should have high input impedance and low output impedance.	[2]	
	c)	State K_p and K_a .	[2]	
	d)	List steps involved in A/D conversion.	[2]	
	e)	Explain the phenomenon of aliasing.	[2]	
2.	a)	Analyze the block diagrams of complete telemetering system from measurand to end devices to describe the process.	[6]	CO2
	b)	Formulate a table to compare the steady-state error of Type 0, Type 1, and Type 2 systems for step, ramp, and parabolic inputs.	[6]	
3.	a)	Design a unity feedback control system with open-loop transfer function $G(s) = \frac{108}{s^2(s+1)(s^2+3s+12)}$ for the input $r(t) = 2 + 5t + 2t^2$ by finding system type, static error constants (K_p, K_v, K_a) and the steady-state error.	[6]	CO3
	b)	Construct the signal flow graph representation of the given system and calculate the transfer function x_5/x_1 Mason's Gain Formula. $x_2 = a_{12} \cdot x_1 + a_{32} \cdot x_3 + a_{42} \cdot x_4 + a_{52} \cdot x_5$ $x_3 = a_{23} \cdot x_2$ $x_4 = a_{34} \cdot x_3 + a_{44} \cdot x_4$ $x_5 = a_{35} \cdot x_3 + a_{45} \cdot x_4$ Here, x_1 is the input and x_5 is the output.	[6]	
	c)	Design a stability analysis for a control system with the characteristic equation $s^5 + 2s^4 + 2s^3 + 4s^2 + 11s + 10 = 0$ by applying the Routh-Hurwitz criterion to determine system stability.	[6]	