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* Kp and Ka.	[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. $x2 = a12 \cdot x1 + a32 \cdot x3 + a42 \cdot x4 + a52 \cdot x5$ $x3 = a23 \cdot x2$ $x4 = a34 \cdot x3 + a44 \cdot x4$ $x5 = a35 \cdot x3 + a45 \cdot x4$ Here, x1 is the input and x5 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]	