

OLLSCOIL NA hÉIREANN
NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER II, SUMMER 2000 EXAMINATION

The B.Sc. Degree Examination in Information Technology

Systems Theory (CT423)

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Time Allowed: 2 hours

Answer any three questions

1. (a) Distinguish between “hard” and “soft” approaches to systems engineering.

(b) Checkland defines a holon as “...the abstract idea of a whole having emergent properties, a layered structure and processes of communication and control which in principle enable it to survive in a changing environment.” Discuss the importance of this concept in Soft Systems Methodology.
2. In his paper “Reengineering the University”, Tsichritzis argues that “Universities are due for a radical restructuring. After centuries of evolutionary changes, they are faced with carving out new roles and methods to get there.” Select what you believe is the most important relevant system for a modern university, and model this using the first four stages of Soft Systems Methodology.
3. Compare and contrast health-related case studies of SSM and System Dynamics. What criteria should be used in determining which methodology is most appropriate to a given problem?
4. (a) Generate causal loop diagrams for 1st, 2nd and 3rd order delays.

(b) Sketch (on one diagram) the output response to an impulse input for each of these delays.

(c) Produce a set of equations to model a 3rd order delay.

5. Produce a set of equations to model the following system, based on these assumptions:

- The simulation time is 90 days.
- DT is 0.25
- The minimum production rate is 20 units/day; the maximum rate is 80 units/day.
- Customer orders vary as follows:

Days 1-20:	40 units
Days 21-30:	70 units
Days 31-45:	130 units
Days 46-70:	100 units
Days 71-90:	5 units
- The production time is three days, and is modeled as a pipeline delay.
- The ideal stock level is 50 units.
- The production rate rises linearly to its maximum value as the stock falls below its ideal value.
- The production rate falls linearly to its minimum value as the stock rises above its ideal value.

