



**Strathmore**  
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES (SCES)  
BACHELOR OF BUSINESS AND INFORMATION AND TECHNOLOGY

END OF SEMESTER EXAMINATION  
UNIT CODE: BBT 3204  
SIMULATION AND MODELLING

DATE: 25<sup>th</sup> April 2025

Time: 16:00-18:00 Hours

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**Instructions**

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

**QUESTION ONE (20 MARKS)**

- a) Define simulation and modeling. (4 marks)
- b) What are the main differences between a model and a simulation? (4 marks)
- c) List and explain three characteristics of a system. (4 marks)
- d) Provide two examples of systems and their components. (4 marks)
- e) Why is simulation important in scientific research? (4 marks)

**QUESTION TWO (20 MARKS)**

- a) Differentiate between continuous and discrete-time systems. (4 marks)
- b) What is the principle of superposition in linear systems? (4 marks)
- c) Define time-variant and time-invariant systems. (4 marks)
- d) Explain the difference between quantized and non-quantized variable systems. (4 marks)
- e) What are the key factors that determine the boundaries of a system? (4 marks)

**QUESTION THREE (20 MARKS)**

- a) What is the difference between deterministic and stochastic models? (4 marks)

- b) Define Monte Carlo simulation and provide an example of its application. (4 marks)
- c) How does mathematical modeling differ from physical modeling? (4 marks)
- d) Explain how a Poisson process is used in stochastic modeling. (4 marks)
- e) What are the advantages of using simulation over real-world experimentation? (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) Define a queueing system and give an example. (4 marks)
- b) What are the two main types of time-advance mechanisms in discrete event simulation? (4 marks)
- c) Explain the term 'resource utilization' in the context of simulation. (4 marks)
- d) Provide the formula for calculating time-average number in queue and explain its components. (4 marks)
- e) What are the key components of a discrete-event simulation model? (4 marks)