



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION**  
**DEPARTMENT OF SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION**  
**SIMULATION AND MODELLING**  
**PST 6375/PTE 6375**

**MAIN EXAMINATION PAPER**  
**DECEMBER 2024**

This Examination Paper consists of 3 pages

**Time Allowed:** 3 hours  
**Total Marks:** 100  
**Special Requirements:** NONE  
**Internal Examiner:** Ms D Moyo  
**External Examiner:** Dr B Moyo

**INSTRUCTIONS**

1. Answer any four (4) questions.
2. Each question carries 25 marks

**MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	25
2.	25
3.	25
4.	25
5.	25
<b>TOTAL</b>	<b>100</b>

### Question 1

- a) Define the following terms as used in simulation and modelling,
- i. Variable [3marks]
  - ii. Event [3marks]
  - iii. Simulation [3marks]
  - iv. System [3marks]
  - v. Model [3marks]
- b) Discuss the benefits of simulation and modelling using appropriate examples. [10marks]

### Question 2

- a) Discuss the idea of simulation and its appropriateness. [12marks]
- b) Explain the advantages and disadvantages of using simulation modelling. [13marks]

### Question 3

- a) Discuss the steps in simulation study giving appropriate examples. [12marks]
- b) Clearly outline the difference between continuous and discrete simulation. [13marks]

### Question 4

- a) Using the linear congruential generation methods by Lehmer, generate random numbers for  $x_0-x_i$  where :
- i.  $X_0=27$
  - ii.  $a = 13$
  - iii.  $c = 64$
  - iv.  $mod = 100$

Generate first 5 numbers. [15marks]

- b) Discuss the characteristics of a good generator. [10marks]

**Question 5**

Discuss how simulation and modelling can be used in the teaching and learning STEM subjects. [25marks]

**END OF QUESTION PAPER**