

National Open University of Nigeria,

Plot 91 Cadastral, Nnmadi Azikiwe Expressway, Jabi, Abuja.

Faculty of Science and Technology

NOVEMBER, 2018 EXAMINATIONS

**Course code:** CIT 412

**Course Title:** Modeling and Simulation

CREDIT: 3 Units

**Time Allowed:** 2***½*** Hrs

**Instruction:** Answer Question one (1) and any other Four (4) questions.

1 (a) Differentiate between Modeling and simulation [4 marks]

(b) Explain briefly when simulation is particularly valuable [2 marks]

(c) Differentiate between the following

(i) Deterministic and stochastic model [2 marks]

(ii) Simulation and mathematical model [2 marks]

(d) What are the advantages of modeling? [3 marks]

(e) List the steps followed in modeling [3 marks]

(f) Given the following datasets 2,3,4,3,2,1,4,6,5,2. Compute the

(i) mean of the datasets [1 mark]

(ii) Median of the datasets [1 mark]

(iii) Mode of the datasets [1mark]

(iv) standard deviation of the datasets [3 marks]

2 (a) Give the properties of a good random number generator [3 marks]

(b) List the two methods of generating random numbers and state the formula and the

weakness for each method [4 marks]

(c) Define Monte Carlo method and state the usefulness of the method [ 5 marks]

3(a) Explain standard deviation in relation to the shape of a graph [2 marks]

(b) Differentiate (with examples) between discrete random variable and continuous random

variable [4 marks]

(c) Given the following datasets: 4, 14, 8, 14, 20, 12, compute the Z-score for each of the

datasets. [6 marks]

4 (a) Consider constructing a simulation of a petrol station with a single attendant on a single

pump. What constitute the following?

1. State (ii) Event (iii) Entities (iv) Queue (v) Random realization [1 mark each]

(b) State the factors necessary in evaluating a model [4 marks]

(c) With the aid of a diagram describe the steps of a physical simulation process [3 marks]

5 (a) Draw a diagram of a data model to show the level of architecture (ANSI/SPARC) and briefly explain the concept of conceptual schema [6 marks]

(b) Differentiate between a logical schema and a physical schema [4 marks]

(c) What is ANOVA? [2 marks]

6 (a) Give the procedure for constructing a stochastic queuing model [4 marks]

(b) State the uses of data screening [3marks]

(c) Define Gaussian random walk [2 marks]

(d) Describe two (2) types of non-probability sampling methods [3 marks]