(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

END OF SEMESTER EXAMINATION

2021/2022 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELORS OF SCIENCE IN

(INFORMATION TECHNOLOGY)

COURSE CODE: BIT 415

COURSE TITLE: SIMULATION AND MODELING

DATE: 20/05/2022   TIME: 2.00 P.M. – 4.00 P.M.   2HRS

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTION ONE AND ANY OTHER TWO.

Paper Consists of 4 Printed Pages. Please Turn Over ➡

QUESTION ONE (COMPULSORY) [30 M ARKS]

a. To study a system often assumptions/approximations are made and hence **model** is formed explain at least three assumptions/approximations The model takes   **[3 marks]**

b. Discuss two uses of Uses of simulation modeling   **[2 marks]**

c. Differentiate between Monte Carlo simulations and System Simulation.   **[2 marks]**

d. Give the **TWO** reasons for the steadily increasing interest in simulation applications.

               [2 marks]

e. What is difference between simulation and modeling?   **[2 marks]**

f. Analytical models can be classified into two categories,- explain the TWO categories

               [4 marks]

g. Discuss why visualization of simulations are distinct from other computer graphic media?

               [2 marks]

h. There are two key elements that make a model white-box, explain these elements **[2marks]**

i. Define black box approach as used in simulation modelling   **[2 marks]**

j. Briefly explain Maximum Likelihood Estimation   **[2 marks]**

k. Explain The Least Mean Square (LMS) error as used in Simulation modelling   **[2 marks]**

l. Briefly explain the basic features of MATLAB   **[4 marks]**

m. What is the function of Simulation Tools?   **[1 mark]**

QUESTION TWO [20 MARKS]

a. The MATLAB system consists of five main parts: explain   [10 marks]

b. What is the difference between Equivalence partitioning and Boundary value analysis as used in typical black-box test design techniques   [4 marks]

c. Give the functions of the following System Models.   [6 marks]

   (i) Context **models**

   (ii) Data flow **models**

   (iii) State machine **models**

QUESTION THREE [20 MARKS]

a. A simulator is a device, computer program, or system that performs simulation. A simulation is a method for implementing a model over time. Discuss the three types of commonly used simulations.   [6 marks]

b. Explain four applications of modeling and simulation   [4 marks]

c. Discuss the difference between true random number generators (TRNGs) and pseudo-random number generators (PRNGs).   [2 marks]

d. Discuss the Use of simulation methodology.   [6 marks]

e. Define linear regression.   [2 marks]

QUESTION FOUR [20 MARKS]

a. Different models present the system from different perspectives explain the three perspectives.   [6 marks]

b. State and explain at least FOUR main aspects of descriptive modeling   [4 marks]

c. What does Linear in parameters mean in Linear Regression?   [2 marks]

d. State and explain the **FOUR** main aspects of descriptive modeling   [8 marks]

QUESTION FIVE [20 MARKS]

a. Explain the FIVE Important considerations in Random Numbers routines [5 marks]

b. Potential problems with deterministic generators, in practice, the output from many common pseudo-random number generators (PRNGs) exhibit artifacts that cause them to fail statistical pattern-detection tests. These include?   [5 marks]

c. What are the Potential problems with deterministic generators   [2 marks]

d. Explain the following types of simulation models   [8 marks]

    i.   Task Trainer Simulation

    ii.   Manikin-based Simulation

    iii. Virtual Reality Simulation

    iv. Tissue-based Simulation