



SOUTH EASTERN KENYA UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF SCIENCE IN BACHELOR OF PROCUREMENT AND SUPPLY CHAIN
MANAGEMENT**

BIT 305: SIMULATION AND MODELLING

(Main Campus)

DATE: 13TH APRIL, 2017

TIME: 4.00 – 6.00 PM

INSTRUCTIONS TO CANDIDATES

- a) Answer **ALL** questions from section A(Compulsory)
b) Answer **ANY TWO** questions from section B
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QUESTION ONE

- a) Define the term Modelling (2 Marks)
- b) Differentiate between
- i. Model and System (2 marks)
 - ii. Simulation and Computer Simulation (2 marks)
 - iii. Stochastic and Deterministic Simulation (2 marks)
 - iv. Static and Dynamic Models (2 Marks)
- c) Explain the following terms in relation to Simulation Modelling
- i. Probability theorem (2 marks)
 - ii. Random number generator (2 marks)
 - iii. Bootstrapping (2 marks)
- d) Outline any FOUR Characteristics of a good Model (4 marks)

- e) Discuss the importance of modeling and simulation as an enterprise (4 Marks)
- f) Generate four-digit random numbers by linear congruential method with $X_0 = 21$, $a = 34$, and $c = 7$. (4 Marks)
- g) Describe the Evolution of the Simulation systems (2 Marks)

SECTION B

QUESTION TWO

- a) Differentiate between the following terms
 - i. Static and Dynamic Simulation (2 Marks)
 - ii. Inversion method and acceptance rejection method (2 Marks)
- b) Using a Diagram, describe the process of Discrete event Simulation (10 Marks)
- c) Classic Car Care has one worker who washes cars in a four-step method-soap; rinse, dry, vacuum. The time to complete each step is exponentially distributed, with mean 9 minutes. Every car goes through every step before another car begins the process. On the average, one car every 45 minutes arrives for a wash job, according to a Poisson process.
 - i) What is the average time a car waits to begin the wash job?
 - ii) What is the average number of cars in the car wash system?
 - iii) What is the average time required to wash a car (6 Marks)

QUESTION THREE

- a) Differentiate between the following as used in stochastic model
 - i. Time and state (2 Marks)
 - ii. Activity and transition (2 Marks)
- b) Explain the Steps in the Monte Carlo Simulation (6 Marks)
- c) Take a typical operations system, preferably one that can be observed (e.g. a supermarket or airport), and complete the following.
 - i. Develop a conceptual model for this problem (6 Marks)
 - ii. Outline the objectives, experimental factors, model scope and assumptions (4 Marks)

QUESTION FOUR

- a) Differentiate between the following
- i. Continuous and Discrete Models (2 Marks)
 - ii. Exogeneous and endogenous variable (2 Marks)
 - iii. Event and entity (2 Marks)
- b) An automobile insurance company places its policy holders into one of the two categories when the policy renew; low risk or high risk, based on a company data, a motorist that is currently high risk has a 60% chance being denoted high risk again when the policy renews and a 40% chance of being moved to low risk on the other hand a low risk driver has a 15% chance of moving to the high risk category and an 85% chance of remaining low risk using the above information
- i. Define the markov property (2 Marks)
 - ii. set up the a probability tool for the above information (2 Marks)
 - iii. Explain the scenario using a transition diagram (6 Marks)
 - iv. Explain the above scenario with the aid of a transition matrix (4 Marks)