THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
(BSC IT 9S)

ICS 2307: SIMULATION & MODELLING

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2012
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
   - *Answer Booklet*
This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer **ALL** questions in section **A** and any other **TWO** from section **B**
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

<u>**SECTION A (COMPULSORY)**</u>

Question One (30 Marks)

a) Using examples, explain the following terms: **(8 marks)**
   i) Exogenous variable
   ii) Endogenous variable
   iii) Parameter
   iv) Output variable

b) The Kenyan Ferry Services in Mombasa is an example of a queuing system. Describe the system is relation to the queuing models.   **(4 marks)**

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c) State any **SIX** classification of models   **(6 marks)**
d) Describe the Monte Carlo simulation   **(4 marks)**
e) State **TWO** shortcoming of using Ms. Excel as a simulation language.   **(2 marks)**
f) Explain the two modeling approaches stating one merit and demerit of each.   **(6 marks)**

SECTION B (Answer Any Two Questions)

Question Two (20 marks)

a) Explain **TWO** advantages and disadvantages of simulation   **(8 marks)**

b) Using an example describe how Bamburi Cement Ltd can apply simulation and modeling
                                                   (12 marks)

Question Three (20 marks)

a) A large garage is examining its inventory policy in relation to one type of tyre in stocks. Weekly demand tyres is distributed according to the following table:

Weekly Demand	Probability
20	0.1
30	0.6
40	0.3

The garage uses a reorder level of 100 for this tyre and the lead time is 3 weeks. The cost of placing each order of tyres is estimated to be 50. The storage cost is 300 per tyre per week. Use the random digits below to simulate the inventory operations for a period of 10 weeks in order to estimate the total weekly cost. NB: Initial stock is 150 tyres.

Random digits: 060901040701080903000408090605020405000041   **(20 marks)**

Question Four (20 marks)

a) Explain TWO features of M/M/1 and MD/1 Queues respectively   **(8 marks)**

b) In a simple queue situation, an average arrival rate of 15 per hour had been observed and the average service facility can an average deal with 20 items per hour. Determine:

    i) The traffic intensity
    ii) The average numbers of items in the queue including the times when there is no queue
    iii) The average time in the queue
    iv) The average time in the system   **(12 marks)**

Question Five (20 marks)

Using diagrams, illustrate the program logics for the following models:

    a) Arrival and departure routines for queuing models
    b) Order arrival and demand routine inventory models   **(20 marks)**