THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY – DIT 2K 9J & DIT 09M

ECS 2311: QUANTITATIVE TECHNIQUE IV

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- ***Calculator*** *and* ***SMP Tables*** *can be used*

This paper consist of **FOUR** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question one 20 marks

a) State THREE areas where Simulation can be applied. (3 marks)

b) State and explain TWO types of simulation. (4 marks)

c) Outline the procedure to be followed in hypothesis testing. (4 marks)

d) Explain the following term as used in inventory control systems:

i. Economic order Quantity (EOQ)
ii. Economic Batch Quantity (EBQ) (4 marks)

e) A manufacturer produces cables with a mean breaking strength of 2000 and a standard deviation of 100. By using a new technique the manufacturer claims that the breaking strength can be increased. To test this claim a sample of 50 cables produced by the new technique is tested and the mean breaking strength found to be 2050. Can the manufacturer claim be supported at the 1% level of significance? (5 marks)

SECTION B (ANSWER ANY TWO QUESTIONS)

Question two 20 marks

a) Define the term simulation. (2 marks)

b) State **THREE** advantages of simulation. (3 marks)

c) Outline the steps in the Monte Carlo method (4 marks)

d) The number of cars serviced at a garage on different days was recorded as follows:

Number of cars	0	1	2	3	4	5	6
Number of days	4	8	14	8	3	2	1

Using the above data,

i. Simulate the following random numbers, 68559050087244958193288960112 3 to determine the number of cars to be serviced for any given day.
ii. Calculate the expected number of cars serviced every day. Give your answer to the nearest number. (11 marks)

Question three 20 marks

a) Define the following:

i. A Hypothesis
ii. Significance Level (4 marks)

b) In a company, Machine A produced 60 diskettes whose mean mass was 40g with standard deviation 1.5g, Machine B produced 80 diskettes whose mean mass was 40.8g with standard deviation 1.8g . At the 1% level of significance, test whether there is a difference between the two machines. (6 marks)

c) In a particular dairy farm, milk production from the population of animals was found to occasionally vary due to weather changes. A periodic check is done on the milk production to ensure that the mean and standard deviation are 50 litres and 2.5 litres respectively. In a particular day a sample of 12 animals produced the following quantities of milk (in litres).

43 51 50 41 53 52 47 54 51 45 48 47

If the production manager will welcome any change of the population mean towards higher

values but safeguard against decreasing values:

i. Formulate the null and alternative hypotheses for this situation;
ii. Using 0.05 = ع, test the hypothesis. [10 marks]

Question four 20 marks

a) Define the following terms as used in inventory control systems.

i. Order cost
ii. Carrying cost
iii. Zero lead time (6 marks)

b) The yearly requirement of a manufacturer is 1,000 units of a part that is used at a uniform rate throughout the year. The machine set-up cost per lot is ksh. 30,640 while production cost is ksh. 3,900per unit. Interest, insurance and taxes are estimated at 12% on average on average. The cost of storing the parts is estimated at ksh. 612 per unit per year.

i. Calculate the economic batch quantity
ii. Calculate the total stock holding cost. (14 marks)