



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY

(DICT 2K10J/DIT 10M)

ECS 2313: QUANTITATIVE TECHNIQUE II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

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 **FIVE** 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 **FOUR** printed pages

SECTION A (COMPULSORY)

Question One (30 marks)

- a) List the steps involved in formulating a linear programming problem using the simplex method. (4 marks)
- b) Describe the following types of simulation
 - i) Analogue
 - ii) Discrete (4 marks)
- c) Nafuu Computer Company Ltd is contemplating putting up a computer shop which may be large or small. The table below is pay-off table generated after feasibility study.

		States of Nature	
		Favourable Market	Unfavourable Market
	Probability	0.5	0.5
Decision	Large Shop	Kshs 200,000	Kshs. - 180,000
Alternatives	Small Shop	Ksh. 100,000	Kshs. - 20,000

Using the expected monetary value method, determine the best decision for the company. (4 marks)

- d) Define the following terms as used in network analysis.
 - i) Critical Activity
 - ii) Slack (4 marks)
- e) Explain **TWO** areas where simulation can be applied. (2 marks)
- f) Define the term 'states of nature' as applied to decision theory. (2 marks)

SECTION B (Answer Any Two Questions)

Question Two (20 marks)

- a) Explain the main limitation of the graphical method used in linear programming. (2 marks)
- b) Explain the **TWO** main objectives of linear programming. (2 marks)
- c) A firm produces two brands of batteries, brand X and brand Y, which have a sale price of kshs 50 and kshs 80 respectively. The production of each brand involves assembling, testing and packaging. The time taken to complete each task per brand and the maximum time available for each task per month is as shown in the table below:

	HOURS REQUIRED FOR EACH TASK		
	Assembly	Testing	Packaging
Brand X	2	1	0
Brand Y	3	1	1
Hours Available per Month	600	250	150

- i) Formulate a linear programming model for the above problem. (4 marks)
- ii) Using the Simplex method, determine the optimum monthly production plan which maximizes sales. (12 marks)

Question Three (20 marks)

- a) Outline the rules of drawing a network diagram. (4 marks)
- b) State and explain **TWO** practical applications of network analysis. (4 marks)
- c) The table below shows activities necessary for development of strategic play by an organization.

Activity	Predecessor Activity	Optimistic Time	Mostly Likely Time	Pessimistic Time
A	-	1.5	2	2.5
B	A	2	2.5	6
C	-	1	2	3
D	C	1.5	2	2.5
E	B,D	0.5	1	1.5
F	E	1	2	3
G	B,D	4	5	8
H	G	3	4	5
I	F,H	2	3	4

- i) Draw a network diagram to represent the above data. (8 marks)
- ii) Determine the expected project duration (2 marks)
- iii) Determine the critical path and state the critical activities. (2 marks)

Question Four (20 marks)

- a) (i) Explain the term dominant strategy as used in decision theory.
(ii) Distinguish between maximum and minimax decision making techniques . (6 marks)
- b) Kiko Industries have developed a new product X. They can either test the market or even abandon due to competition from imported products. The details are set out below. Test market cost Kshs. 50,000, likely outcomes are favourable (P = 0.7) or failure (P = 0.3)

If favourable they could either abandon or produce it when demand is anticipated to be.

Low P = 0.25 Loss Kshs 100,000
Medium P = 0.6 Profit Kshs 150,000
High P = 0.15 Profit Kshs. 450,000

If the test market indicates failure the project would be abandoned. Abandonment at any stage results in a gain of Ksh 30,000 from the special machinery used.

- i) Draw the decision tree showing the modes and probabilities.
- ii) Evaluate the decision tree. (14 marks)

Question Five (20 marks)

- a) Describe the Monte Carlo type of simulation. (2 marks)
- b) Explain **TWO** disadvantages of simulation. (4 marks)
- c) The schedule of vehicles arriving at a big garage per day for service was recorded as follows:

Number of Vehicles	0 -6	7 - 9	10 -16	17 - 19	20 - 26	27 - 29	30- 36
Number of Days	9	14	17	22	10	5	3

- i) Using the following random numbers, 9359, 9582, 9900, 1007, 4849, 9522, 6639, 2212, 3722, simulate the number of vehicles arriving at the garage.
- ii) Calculate the expected number of vehicles arriving per day. Give the answer to the nearest whole number. (14 marks)