



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 10J

ECS 2311: QUANTITATIVE TECHNIQUES II

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

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 1 (20 marks)

a) Define the following as used in Decision theory

- i. Float [2Marks]
- ii. Critical activity [2Marks]
- iii. Decision tree [2Marks]

b) Gilgil 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 ksh. 50,000, likely outcomes are favorable ($P = 0.7$) or failure ($P = 0.3$).

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

- Low P = 0.25 loss Ksh. 100,000
- Medium P = 0.6 profit Ksh. 150,000
- High P = 0.15 Profit Ksh. 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 nodes and probabilities. [8Marks]
- ii. Evaluate the decision tree. [6Marks]

SECTION B (ANSWER ANY TWO QUESTIONS)

Question 2 (20 marks)

- a) Distinguish between types of nodes found in decision trees. [4Marks]
- b) Outline **THREE** decision making environments [3Marks]
- c) Explain **FOUR** main differences between a good and bad decision. [8Marks]
- d) A minimax character is to bet against a pokerman, He will only win if the pokerman toss a dice and the outcome is either 1 or 6. Otherwise he loss. If the die shows a 1 or 6 he wins 5 times the amount he bets against. If he has 750 to use for bet. Determine what he will do. [5Marks]

Question 3 (20 marks)

a) Define the following with respect to network analysis:

- i. Float [2Marks]
- ii. Critical activity [2Marks]
- iii. Earliest start time [2Marks]

b) State **THREE** differences between the critical path method and project evaluation and review technique. [3Marks]

c) A project had the activities recorded as Shown below.

Activity	Duration in weeks	Preceding activity
A	5	-
B	6	-
C	7	A
D	4	A
E	2	A,B
F	4	C,D,E
G	10	D,E
H	3	F,G

- i. Draw the network and mark the critical path. **[8Marks]**
- ii. Determine the total slack of the project. **[3Marks]**

Question 4 (20 marks)

a) Define the following

- i. Payoff **[2Marks]**
- ii. States of nature **[2Marks]**
- iii. Equally likely **[2Marks]**

b) Describe any **TWO** decision making criteria. **[4Marks]**

c) Zed and Adrian and run a small bicycle shop called "Z to A Bicycles". They must order bicycles for the coming season. Orders for the bicycles must be placed in quantities of twenty (20). The cost per bicycle is \$70 if they order 20, \$67 if they order 40, \$65 if they order 60, and \$64 if they order 80. The bicycles will be sold for \$100 each. Any bicycles left over at the end of the season can be sold (for certain) at \$45 each. If Zed and Adrian run out of bicycles during the season, then they will suffer a loss of "goodwill" among their customers. They estimate this goodwill loss to be \$5 per customer who was unable to buy a bicycle. Zed and Adrian estimate that the demand for bicycles this season will be 10, 30, 50, or 70 bicycles with probabilities of 0.2, 0.4, 0.3, and 0.1 respectively. Determine the choice of action by a realist. **[10Marks]**

Question 5 (20 marks)

a) State **two** objectives of linear programming. **[2 marks]**

b) Explain the components of a linear programming model. **[4 marks]**

c) A manufacturer of computer components produces two types of processors: standard and normal. The production time in hours per hundred units of each type and the capacity of each production process are given in the table below. The profit on each unit of standard and normal is sh. 6000 and sh. 8000 respectively.

Process	Standard	Normal	Capacity (Hours)
Pressing	2	4	160
Wiring	6	2	240
Assembly	4	4	200

- i. Formulate this information as a linear programming mode. **[4Marks]**

- ii. Use the simplex method to solve the linear programming model above. **[10 marks]**