



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

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

ECS 2304: QUANTITATIVE TECHNIQUE II

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

This paper consist of **TWO** sections **A** and **B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions from the list of questions below

Calculator and **SMP tables** can be used

This paper consists of **FOUR** printed pages

SECTION A COMPULSORY (30 MARKS)

Question 1

- a) State and explain the **TWO** methods used in solving linear programming problems. (4 marks)
- b) Explain the following terms with regard to network analysis (8 marks)
- (i) Critical path
 - (ii) Float
 - (iii) Pessimistic time
 - (iv) Optimistic time
- c) Explain the term dummy activity as applied in network diagrams (2 marks)
- d) List the stages involved in formulating a linear programming problem. (6 marks)
- e) Explain the use of the following symbols in multistage decision (4 marks)
- (i) The circle or node
 - (ii) The box (4 marks)
- f) Susan, a business lady, would like to borrow shs. 300,000 from a bank in order to finance a project. The money is to be repaid within one year. The bank charges a 15% p.a. simple interest. The bank may grant the loan or invest the same amount and be guaranteed a return of 9% p.a. From past experience at the bank, 4% of clients granted loans default on repayment.
- (i) Draw a decision tree to represent this information (3 marks)
 - (ii) Determine the best decision for the bank (3 marks)

SECTION B (ANSWER ANY TWO QUESTIONS)

*This section consists of FOUR questions 20 marks each.
Choose any two questions*

Question 2 (20 marks)

- a) Define the term linear programming (2 marks)
- b) State any **FOUR** limitation of linear programming (4 marks)
- c) A resourceful home decorator manufactures two types of lamps A and B. Both lamps go through two technicians first a cutter and then a finisher. Lamp A requires 2 hours of cutters time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutters time and 2 hours of finishers time. The cutter has 104 hours and finisher has 76 hours available time. Profit on one lamps of A is sh. 6 and one lamp of B is sh. 11. Assuming that the decorator can sell all that he produces:
- (i) Formulate the statement as a linear programming problem (LPP)
 - (ii) Using the graphical method show the feasible region (14 marks)

Question 3 (20 marks)

- a) Explain the following decision criteria's

- (i) Expected value of perfect information
 - (ii) Expected monetary value criteria
 - (iii) Minimax criteria
 - (iv) Maximum criteria
- (8 marks)

b) A company manufactures two products P and Q. The company has a limited budget of \$8000 to meet production costs. The production cost for each unit of product P is \$ and the corresponding cost for product Q is \$8. The time of assembly for a unit of product P is 4 minutes while that of Q is 12 minutes. Each week 80 man hours are available for assembly. The time required for packaging a unit of either product is 6 minutes and each week 60 man hours are available for packaging. The contribution to profit for each product P sold is \$5 and for each product Q sold is \$8.

- a) Formulate the above problem as a linear programming model
 - b) Using the Graphical method determine the number of products P and Q that the company should produce in order to maximize profit contribution and state the maximum contribution
- (12 marks)

Question 4 (20 marks)

- a) (i) Define a Decision tree
 - (ii) Distinguish between the following terms used in decision analysis
- Payoff matrix
 - Regret matrix
- (6 marks)
- b) Mombasa industries has 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 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 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 gain of ksh. 30,000 from the special machinery used.

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

Question 5 (20 marks)

- a) Explain the following terms with regard to Network Planning
- (i) Network diagram
 - (ii) Event
 - (iii) Critical activity
- (6 marks)

b) A project had the activities recorded as shown below

Activity	Preceding Activity	Duration in Days
A	-	6
B	-	12
C	-	12
D	A	6
E	B	30
F	C	30
G	D,E	30
H	B	29
J	H,F	28
K	G,J	28
L	K	6

- i) Draw the network for the project (9 marks)
- ii) Determine the critical path and the project duration (5 marks)