KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: FNCE 212

COURSE TITLE: MANAGEMENT MATHEMATICS II

STREAM: Y2S1

DAY: THURSDAY

TIME: 3.00 – 5.00 A.M.

DATE: 12/08/2010

INSTRUCTIONS

1. The paper contains **FIVE** questions
2. Question **ONE** is compulsory
3. Answer any other two questions from the remaining four.

PLEASE TURNOVER

QUESTION ONE (30 MARKS)

a) What do you understand by the following terms as used in Decision theory

i) Action space **(2marks)**

ii) Decision maker **(2marks)**

iii) States of Nature **(2marks)**

Iv) Decision under certainty **(2marks)**

iv) Decision under uncertainty **(2marks)**

b) Explain the application of input-output model in economic analysis **(4marks)**

c) What do you understand by Markov process and explain its application in business **(5 marks)**

d) Explain the following terms as used in Markov process

v) Transitional probabilities **(2marks)**

vi) Steady- States **(2marks)**

vii) Absorbing state **(2marks)**

e) Outline steps in solving a Linear programming problems **(5marks)**

QUESTION TWO (20 MARKS)

Koima Agro mills ltd (KAM) is considering whether to enter a very competitive market. In case KAM decided to enter this market it must either install a new forging process or pay overtime wages to the entire workers. In either case, the market entry could result in

i. high sales
ii. medium sales
iii. low sales
iv. no sales

a) Construct an appropriate tree diagram **(4marks)**

b) Suppose the management of KAM has estimated that if they enter the market there is a 60% chance of their stakeholders approving the installation of the new forge. (this means that there is a 40% chance of using overtime) a random sample of the current market structure reveals that KAM has a 40% chance of achieving high sales, a 30% chance of achieving medium sales, a 20% chance of achieving low sales and a 10% chance of achieving no sales. Construct the appropriate probability tree diagram and determine the joint probabilities for various branches **(4marks)**

c) Market analysts of KAM have indicated that a high level of sales will yield shs 1,000,000 profit; a medium level of sales will result in a shs 600000 profit a low level of sales will result in a shs 200000 profit and a no sales level will cause KAM a loss of shs 500000 apart from the cost of any equipment. Entering the market will require a cash outlay of either shs 300000 to purchase and install a forge or shs 10000 for overtime expenses should the second option be selected. Draw the appropriate decision tree diagram **(8marks)**

QUESTION THREE (20 MARKS)

Unilever Kenya manufactures two brands of wahing powder, Handwash and machinewash. Handwash has a contribution of Sh.4 per unit and machinewash has a contribution of Sh.3 per unit. Handwash requires 30 machine minutes and 30 labor minutes to manufacture a unit. Machine wash requires 20 machine minutes and 30 labour minutes to manufacture a unit. Total available machine hours per day are 12hours whereas total available labour hours per day are 14hrs.

Required:

i) Formulate linear programming model. **(6marks)**

ii) How much of each brand should Unilever Kenya produce if it wishes to maximize its daily contribution assuming that all the washing powder produced is sold (Use graphical method) **(14marks)**

QUESTION FOUR (20 MARKS)

Determine the total demand x for the industries; Ketepa, Haco and Petrolium given the matrix of technical coeficients (A), Capital and the final demand vector B

$$A = \begin{bmatrix} 0.3 & 0.4 & 0.1 \\ 0.5 & 0.2 & 0.6 \\ 0.1 & 0.3 & 0.1 \end{bmatrix} \qquad B = \begin{bmatrix} 20 \\ 10 \\ 30 \end{bmatrix}$$

QUESTION FIVE (20 MARKS)

Three clients of Disrup, Ltd P, Q and Rare direct competitors in the retail business. In the first week of the year P had 300 customers Q had 250 customers and R had 200 customers. During the second week, 60 of the original customers of P transferred to Q and 30 of the original customers of P transferred to R. similarly in the second week 50 of the original customers of Q transferred to P with no transfers to R and 20 of the original customers of R transferred to P with no transfers to Q.

Required

a) Display in a matrix the pattern of retention and transfers of customers from the first to the second week **(4 marks)**

b) Re-expres the matrix that you have obtained in part (a) showing the elements as decimal fractions of the original numbers of customers of P, Q and R (2 marks) *Refer to this re expressed matrix as B*

c) Multiply matrix B by itself to determine the proportions of the original customers that have been retained or transferred to P, Q and R from the second to the third week. **(4 marks)**

d) Solve the matrix equation (xyz)B = (xyz) given that x + y + z = 1 **(8 marks)**

e) Interpret the result that you obtain in part (d) in relation to the movement of customers between P, Q and R **(2marks)**

(Total 20 marks)