MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF ARTS IN BUSINESS STUDIES WITH INFORMATION TECHNOLOGY

CITY CAMPUS - DAY

AEC 409: OPERATION ANALYSIS I

INSTRUCTIONS:

- Answer Question ONE and any other TWO Questions
- Question ONE carries 30 marks and the rest 20 marks each.

Question One (Compulsory)

a) Explain what operation analysis is and using example; discuss the stages

Question One (Compulsory)

a) Explain what operation analysis is and using example; discuss the stages in an Operations Analysis study. (10 marks)

b) Give an economic interpretation of Hawkins Simon Conditions in the three industry case. The Leontief matrix is given by;

$$I - A = \begin{bmatrix} 1-a_{11} & -a_{12} & -a_{13} \\ -a_{21} & 1-a_{22} & -a_{23} \\ -a_{31} & -a_{32} & 1-a_{33} \end{bmatrix}$$

and give their economic interpretation (8 marks)

c) A client is faced with a maximizing problem given by the following non linear programming model:

Maximize $U = xy$

Subject to $x + y \leq 100$

$x \leq 40$ and $x, y \geq 0$

As a consultant formulate the Lagrangian Function and Kuhn-Tucker conditions (7 marks)

d) Discuss the limitations of operations analysis in its application in economics and business environments (5 marks)

Question Two

a) Explain the guidelines used in crashing a project duration (5 marks)

b) Provided below is the activities to be completed in order to accomplish a project.

Activity	Preceding Activity	Activity Duration
A	-	9
B	-	3
C	A	8
D	A	2
E	A	3
F	C	2
G	C	6
H	C	1
J	B,D	4
K	F,J	1
L	E,H,G,K	2
M	E,H	3
N	L,M	4

Required:
  i) Draw the network diagram for the project
  ii) Determine the project duration, critical path and critical activities
  iii) Calculate the Total, Free and Independent floats for each activity.

Question Three

a) Discuss the importance of input output analysis in economics

(6 marks)

b) Differentiate between an open system and closed system of input output
   analysis   (4 marks)

c) The following table gives the Input-output coefficient for three sector
   economy consisting of Agriculture, Industry and Service

From	Input-Output Coefficients		
	To		
	Agriculture	Industry	Service
Agriculture	0.3	0.4	0.2
Industry	0.2	0.0	0.5
Service	0.1	0.3	0.1

The projected forecast demand for the three sectors agriculture, Industry and
Service are 100, 40 and 50 Million shillings respectively (The coefficients
matrix is given in terms of money). Determine the gross output of the three
sectors that will meet this demand?   (10 Marks)

Question Four

a) Discuss the limitations of Linear programming in economics and
   business decision making   (7 marks)

b) Using simplex method, solve the following Linear Programming
   problem and interpret the solutions

Maximize $\Pi = 2x_1 + 12x_2 + 8x_3$

Subject to the constraints $2x_1 + 2x_2 + x_3 \le 100$,

$x_1 - 2x_2 + 5x_3 \le 80$

$10x_1 + 5x_2 + 4x_3 \le 300$,

$x_1, x_2, x_3 \ge 0$

(13 marks)

Question Five

a) Explain the three decision environments encountered by a decision maker

(6 marks)

b) A departmental store has to decide on the level of supplies it must stock to meet the needs of its customers. The exact number of customers is not known but it is expected to be in one of the four categories $E_1 = 300, E_2 = 350, E_3 = 400$ and $E_4 = 450$. Four levels of supplies are thus suggested with j being ideal (from the view point of incurred costs), If the number of customers falls in category j. Deviations from the ideal levels results in addition costs either because extra supplies are stocked needlessly or because demand cannot be satisfied. The table below gives these costs in thousands of Shs.

Customer	Supplies Level			
category	A_1	A_2	A_3	A_4
E_1	8	13	21	28
E_2	11	10	11	26
E_3	24	21	15	24
E_4	33	25	22	18

i). What alternative would the store choose on the principle of minimax regret

(8 marks)

ii). Will the alternative change if Hurwicz principle is applied? $(\alpha = 0.5)$

(6 marks)