MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL ECONOMICS/AGRIBUSINESS MANAGEMENT WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

AAB 404: OPERATION RESEARCH

Date: 3rd December, 2016

Time: 12.00 – 3.00pm

INSTRUCTIONS:
- Answer ALL Questions in Section A and any other THREE in Section B
- Carefully read and follow the instructions contained in the answer booklets.

Section A (Compulsory)

1. a) Discuss briefly various steps for solving an operations research problem. Illustrate with one example from any functional area of your choice [5marks]
b) Explain how and why operations research techniques have been available in aiding decision making process. Give examples to support your views. [5marks]
c) Explain key features of operations research approach [5marks]

XYZ Advertising Agency has been asked to help a client to develop an advertising budget for the introduction of an improved product. Advertising funds are to be spent on both television and magazine announcements. The client has specified the following requirements:

- No more than Kshs.200,000 to be spend on television advertisement
- At least Kshs.100, 000 must be spend on magazine announcements.
- Advertisement cost of Kshs. 5000 on TV and Kshs. 2000 on magazine respectively
- Total expenditure should not exceed Kshs.500,000. From prior marketing research studies, the agency has determined that 300 people are exposed the message for each Kshs. Spend on television and 200 people are exposed to a message for each Kshs. Spend on Magazine. Determine the amounts to he spent on television and magazine

advertisement to maximize the total number of people exposed to the new product announcement. Only formulate the LP model [6marks]

d) Explain essential characteristics of problems that can be solved by linear programming method [4 marks]

Section B: Answer Any Three Questions

2. a) Explain assumptions made in the transport model. [5 Marks]

   b) A company has four warehouses and six stores. The warehouses altogether have a surplus of 22 units of a given commodity divided among them as follows :

   Warehouses:A B C D

   Surplus 5 6 2 9

The six stores altogether need 22 units of commodity. Individual requirements at stores 1, 2,3,4,5 and 6 are 4, 4,6,2,4, and 2 units respectively.

Cost of shipping one unit from warehouse to store in Kshs. is given in the table below

Required

Find the initial basic feasible solution to the transportation problem by...

   i. Least cost method [5 Marks]
   ii. North West Corner Rule [5Marks]

WAREHOUSES	STORES					
	1	2	3	4	5	6
A	9	12	9	6	9	10
B	7	3	7	7	5	5
C	6	5	9	11	3	11
D	6	8	11	2	2	10

State which of the method is better?

3. a) Briefly explain the advantages and disadvantages of simulation. [5 marks]

   b) A wholesaler stocks an item for which demand is uncertain. He wishes to assess two reordering policies i.e. order 10 units at a reorder level of 10 , or order 15 units at a reorder level of 15 units, to see which is most economical over a 10 day period.

   The following information is available

Demand per day [units]	Probability
4	0.10
5	0.15

6	0.25
7	0.30
8	0.20

Carrying costs is Kshs. 15 per unit per day, ordering costs Kshs. 50 per order. Loss of goodwill for each unit out of stock is Kshs 30.lead time 3 days. Opening stock 17 units

The probability distribution is to be based on the following random numbers.

41 92 05 44 66 07 00 00 , 14 62

20 07 95 05 79 95 64 26 06 48

Construct a simulation model and determine economical order policy over the 10 days simulated [10 marks]

4. a) Explain the modifications that are needed in an assignment problem when the objective is of maximization instead of minimization. Explain by use of suitable examples. [5 marks]

b) A company employs service engineers based at various locations throughout the country to service and repair their equipment installed in customer'spremises. Four requests for service have been received and the company finds the four engineers are available. The distance each of the engineers is from the various customers is given in the following table and the company wishes to assign engineers to customers to minimize the total distance to be travelled. [10 marks]

Customers

		W	X	Y	Z	
	Alfred	25	18	23	14	Distance in Miles from
	Bill	38	15	53	23	engineers to
Engineers	Charles	15	17	41	30	customers

	Dave	26	28	36	29	

5. a) Explain in details different types of models of inventory system.   [5 marks]

   b) The purchase manager of Sony Sugar Co. currently follows EOQ policy of ordering for an item in the stores of his company. The annual demand of the item is 1.600 units. Its carrying cost is 40% of the unit costs where the unit costs is Kshs.400. The ordering costs is Kshs.500 per order. Recently the vendor supplying that item gives a discount of 10 % in its unit cost if the order size is a minimum of 500 units.

   i.   Find EOQ and corresponding total cost per year.   [5 marks]

   ii. Check whether the discount offer given by the vendor can be considered by the purchase manager.   [5 marks]