MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2013/2014

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN SUPPLY CHAIN MANAGEMENT

(CITY CAMPUS - EVENING)

MSM 804: QUANTITATIVE ANALYSIS

Date: 14th July, 2014 Time: 5.30 - 8.30 p.m.

INSTRUCTIONS:

- **Answer Question ONE and any other THREE questions.**

Question One (Compulsory)

a) Explain the advantages and disadvantages of quantitative analysis in managerial problem solving (8 Marks)

b) Identify the steps in a Monte Carlo simulation (4 Marks)

c) Tin-Tin Plumbing and Heating maintains a stock of 30-litre hot water heaters that it sells to home owners and installs for them. The proprietor likes the idea of having a large supply on hand to meet customer demand on short notice, but also recognizes that it becomes more expensive to do so. He examines hot water heater sales over the past 50 weeks and notes the following:

Hot Water Heater Sales per week	**Number of weeks**
4	6
5	5
6	9
7	12
8	8
9	7
10	3
Total	**50**

(i) If Tin-Tin maintains a constant supply of 8 hot water heaters in any given week, find the number of times it will be out of stock during a 20-week simulation (8 Marks)

(ii) Compute the number of sales per week (including stock outs) over the 20-week period (6 Marks)

(iii) Using an analytic non-simulation technique, determine the expected number of sales per week (4 Marks)

Question Two

a) Describe the basic queuing system configurations (8 Marks)

b) A cafeteria sells hot dog and soft drinks next to the campus. Although the café can service up to 30 customers per hour on average, it normally gets only 20 customers per hour. Because it can serve 50% more customers than actually visit, it doesn't make sense to the owner that she should have waiting lines. Examine this problem to determine the following operating characteristics:

(i) Number of customers in the system (4 Marks)

(ii) Average time a customer spends in the system (4 Marks)

(iii) Number of customers waiting for service (4 Marks)

Question Three

Agunja is considering the possibility of opening a small dress shop in an upcoming trendy shopping mall along Campus Avenue, just a few blocks from the university. She has the options of opening a small shop, a medium-sized shop or no shop at all. She knows for a fact that the market for a dress shop can be good, average or bad. A small market survey has informed her that the probabilities for the three possibilities to be 0.2 for a good market, 0.5 for an average market and 0.3 for a bad market. The net profit or loss for the medium-sized and small shops for the various market conditions are as presented in the following table. Building no shop at all yields no loss and no gain.

	Market Condition		
	Good	Average	Bad
Alternatives	**Sh**	**Sh**	**Sh**
Small shop	75,000	25,000	-40,000
Medium-sized shop	100,000	35,000	-60,000
No shop	0	0	0

a) Using an analytical approach, show what you would recommend (6 Marks)

b) Calculate the expected value of perfect information (4 Marks)

c) Develop the opportunity loss table for this situation (4 Marks)

d) Present the decisions that would be made using:

(i) Minimax regret criterion (3 Marks)

(ii) Minimum expected opportunity loss criterion (3 Marks)

Question Four

a) Explain the meaning of the following:

(i) Marginal probability (2 Marks)

(ii) Joint probability (2 Marks)

b) Distinguish between:

(i) Mutually exclusive and collectively exhaustive events (4 Marks)

(ii) Conditional probability and revised probability (4 Marks)

c) A language class has 30 learners from different nationalities. Ten are female and Kenyan citizens, 12 are male Kenyans, 6 are female non-Kenyans, while 2 are male non-Kenyans. The instructor randomly selects a name from the class roster and notices that it is for a female. Determine the probability that the student is not a Kenyan national (8 Marks)

Question Five

a) State the requirements or characteristics of a linear programming problem (6 Marks)

b) Mini Warehouse Limited is planning to expand its business into the western region from its traditional coastal base. Using internal data available, the Logistics Manager has developed the following model to represent the prevailing circumstances:

Maximize monthly earnings = 50X1 + 20X2

Subject to:

2X 1 +	4X 2	≤ 400	(advertising budget available)
100X 1 +	50X 2	≤ 8000	(square footage required)
X 1		≤ 60	(rental limit expected)
	X 1, X 2	≥ 0	

Where:

X 1 = number of large spaces developed

X 2 = number of small spaces developed

Assist the manager in determining the appropriate number of storage rooms of each size to build. (14 Marks)

Question Six

a) Explain the terms:

(i) Activity (2 Marks)

(ii) Critical path analysis (2 Marks)

(iii) Project crashing (2 Marks)

b) A post graduate student has decided that after the forthcoming examination signaling the end of the rigorous course work, she must take a holiday before the next phase of the programme. She is now making plans and has identified the details of activities that will be necessary for the trip as follows:

Activity	Immediate Predecessor	Time (Days)
A	-	3
B	-	7
C	A	4
D	B	2
E	C,D	5
F	A	6
G	E,F	3

(i) Draw a network for this project (3 Marks)

(ii) Find the earliest, latest and slack times for each activity (9 Marks)

(iii) Determine the critical path, hence the project duration (2 Marks)