

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

COURSE CODE: OMGT 510

COURSE TITLE: QUANTITATIVE TECHNIQUES

STREAM: MBA – S1

DAY: THURSDAY

TIME: 5:30 – 8:30P.M.

DATE: 26/08/2010

INSTRUCTIONS:

- i.) Answer Any **FIVE** Questions
- ii.) All Questions Carry Equal Marks
- iii.) Illustrate Where Possible

PLEASE TURN OVER

QUESTION ONE

- (a) A manufacturer of a new patented product has found that he can sell 70 units a week direct to the customer if the price is ksh.480. In error, the price was recently advertised at ksh. 780, and as a result, only 40 units were sold in a week. The manufacturer's fixed costs of production as Ksh.17,100 a week and variable costs are ksh. 90 per unit
- Show the equation of the demand function linking price to quantity demand, assuming it to be a straight line (3mks)
 - Find the point at which the manufacturer breaks even (4mks)
- (b) Cool carpets, a carpet manufacturing and exporting firm has to supply an order of as many pieces as possible of woolen carpets of two varieties X and Y to Egerton for its conference rooms and offices. The joint cost of function for the two varieties of the carpets is given as:

$$15,000,000 = 100X^2 + 150Y^2$$

The quantity of X and Y are not specified and so the firm is forced to supply any combination. The firm wishes to maximize the output of carpets subject to the cost of producing the carpets. Determine how many of each type of carpet the firm will produce (4mks)

- (c) Suppose that MATATA Company limited is a small efficient which cannot produce more than 6 units of its product each week. If its cost function is $C(q) = 100 + 20q - 6q^2 + q^3$, Determine the profit function. (1mks)

QUESTION TWO

- (a) Consider a small town with three grocery stores. There could be a total of 100,000 people who shop at the three grocery stores during any given month. 40,000 people may be shopping at Exotic food store, 30,000 at Organic food store and 30,000 at Traditional food store. Using historical data, we assume the following transition probabilities have been established:

$$P = \begin{matrix} & \begin{matrix} 0.8 & 0.1 & 0.1 \end{matrix} \\ \begin{matrix} 0.1 & 0.7 & 0.2 \\ 0.2 & 0.2 & 0.6 \end{matrix} & \end{matrix}$$

- What is Markovian analysis? (1mks)
 - Determine the vector of state probabilities (2mks)
 - Determine and explain the market share for the following month (3mks)
- (b) (i) What is Bayes theorem? (1mks)
- (ii) A manufacturer of VCRs purchases a particular chip called LS-24 from three suppliers: Hall electronics, Schuller sales and Crawford components. 30 percent of the LS-24 chips are purchased from Hall electronics, 20 percent from Schuller sales and the

remaining 50 percent from Crawford components. The manufacturer has extensive histories on the three suppliers and knows 3 percent of the LS-24 chips from Hall electronics are defective, 5 percent of the chips from Schuller sales are defective and 4 percent of the chips purchased from Crawford components are defective. When the LS-24 chips arrive at the manufacturer, they are placed directly in a bin and not inspected or otherwise identified by supplier. A worker selects a chip for installation in a VCR and finds it defective. What is the probability that it was manufactured by Schuller sales? (5mks)

QUESTION THREE

- (a) Suppose a Lumber firm wishes to construct a new plant and is faced by three options: building a large plant, a small plant or doing nothing (status quo). The owner has evaluated the potential profits associated with the various outcomes. With favourable market, he thinks a large facility would result in net profit of ksh.200,000 but make a net loss of ksh.180,000 if the market turns out to be unfavourable. A small plant would give net profit of ksh.100,000 in a favourable market but a net loss of ksh.20,000 with unfavourable market. However, doing nothing would result in zero profit in either market. Suppose the owner believes that the probability of a favourable market is exactly the same the probability of unfavourable market, determine what size of plant he will construct (5mks)
- (b) (i) Why do firms keep inventory? (3mks)
- (ii) A company uses 50,000 widgets per year which are ksh.10 each to purchase. The ordering and handling costs are ksh.150 per order and the carrying costs are 15 percent of the purchase price per year. Determine
 - i.) the EOQ (2mks)
 - ii.) the number of orders (1mks)
 - iii.) the average stock (1mks)

QUESTION FOUR

- (a) Suppose an insurance agent has six contacts and he believes that for each, the probability of making a sale is 0.7.
 - i.) Determine the binomial probability distribution for the experiment (2mks)
 - ii.) Calculate and interpret the mean and the variance of the distribution (4mks)
- (c) Consider that you have five products to market. The new strategy is to market all the products taking three at each promotional tour to minimize costs of marketing. If the cost of product promotion is as follows:

Product	Cost
A	3000
B	3000
C	2000
D	3000
E	2000

- (i) Generate the sampling distribution of the mean costs (4mks)
(ii) Calculate and interpret the expected value for the distribution (2mks)

QUESTION FIVE

- (a) Describe the three properties of a good estimator (3marks)
(b) Given the data on quantity-price relationship in a firm during the last one year:

Quantity	Price
69	9
76	12
52	6
56	10
57	9
77	10
58	7
55	8
67	12
53	6
72	11
64	8

- i.) Estimate the regression function (4mks)
ii.) Is it a demand or supply function? Explain (2mks)
iii.) Is the coefficient consistent with theory? (1mks)
iv.) Calculate the average price elasticity for the relationship (2mks)

QUESTION SIX

- (a) Under what circumstances is the Chi-square statistic used? (2mks)
(b) Genetic theory states that children having one parent of blood type A and the other of blood type B will always be one of the three types: A, AB, B and that the proportion of three types will on average be as: 1:2:1. A report states that out of 300 children having one A parent and B parent, 30% were found to be types A, 45% type AB and the remainder type B. Using the Chi-square statistic, test whether the data supports this genetic theory (7mks)
(c) A fast food chain in Nakuru sells 10000 hamburgers, 6000 cheeseburgers and 12000 milk shakes in a week. The price of a hamburger is Ksh.45, a cheeseburger Ksh.60 and a milk shake Ksh.50. The cost to the chain of a hamburger is Ksh.38, a cheeseburger Ksh.42 and a milk shake Ksh.32. Using the matrix approach, find the firm's profit for the week using the per unit analysis to prove that matrix multiplication is distributive (3mks)

QUESTION SEVEN

- (a) Distinguish between uncertainty and risk as decision making environments (2mks)
 (b) Consider the following payoff matrix, which represent player A's gain in market share

		Player B			
		1	2	3	4
Player A	1	8	6	2	8
	2	7	5	3	5
	3	7	3	-9	5
	4	6	7	-8	-9

- Use the minimax and maximin criteria to determine if the game has a saddle point (2mks)
 (c) Consider a small project consisting of 8 activities and has the following characteristics

Activity	Preceding Activity	Time Estimates		
		A	m	b
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B and C	9	9	9
G	D	3	3.5	7
H	E, F and G	3	5	5

- i.) Draw the path network for the project (3mks)
 ii.) Calculate the expected times and variance for each activity (3mks)
 iii.) Determine the critical path from the activity schedule for the project (2mks)