

**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**

**DAY: MONDAY**

**TIME: 5:30 – 8:30 P.M.**

**DATE: 08/02/2010**

---

**INSTRUCTIONS:**

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

**PLEASE TURNOVER**

## QUESTION ONE

- (a) The Credit department at Equity bank is responsible for entering each transaction charge to the customer's monthly statement. In order to guard against errors/ensure quality control, each data entry clerk rekeys a sample of 1500 of their batch of work a second time and a computer program checks that the numbers match. The programme also prints a report of the number and size of any discrepancy. Seven people were working last and their results were:

Inspector	Number Inspected	Number Mismatch
A	1500	8
B	1500	12
C	1500	12
D	1500	4
E	1500	30
F	1500	8
G	1500	8

Construct the percent defective chart for this process and indicate whether we have "out of control clerk(s)" **(5mks)**

- (b) A sales manager of a certain company interested in establishing the characteristics of revenue received by the firm. From his analysis, he notices that when the price is fixed at Ksh.30 per unit, 100 units are sold while when the price is raised to Kshs.50, only 20 units are sold. Assuming a linear relationship between these data, determine the demand function **(3mks)**
- (c) Cool carpets, a carpet manufacturing and exporting firm has to supply an order for 500 pieces of wooden carpets of two varieties X and Y to Kabarak University for its conference rooms. The joint cost of function for the two varieties of the carpets is given as:

$$C = 100X^2 + 150Y^2$$

The quantity of X and Y are not specified and so the firm is forced to supply any combination. The firm wishes to minimize the cost of producing the carpets but meet the demand by Kabarak. Determine how many of each type of carpet the firm will produce to minimize the costs using the Lagrangian approach. **(4mks)**

## QUESTION TWO

- (a) Describe the properties of a good estimator **(3mks)**
- (b) Given the following data on annual profits of a firm and the amounts the firm has spent on training its employees for six years as;

Training Expenditure	Annual Profits
50	310
110	400
40	300
50	340
30	250
20	200

- (i) Compute the least squares regression line for the variables **(4mks)**
  - (ii) Interpret the economic meaning to the coefficient/slope **(1mks)**
  - (iii) Calculate and interpret the coefficient of determination. **(2mks)**
- (d) (i) What is inventory **(1mk)**
- (ii) A manufacturing process requires a continuous supply of 3000 items per year from store, which is replenished by production runs, each of which operates at the constant rate of 5000 items per year. Each production run has a set-up cost of ksh.18 and the holding cost per item per annum is 15cts. Calculate the economic batch quantity (EBQ) **(2mks)**

### QUESTION THREE

- (a) A fast food chain in Nakuru sells 1000 hamburgers, 600 cheeseburgers and 1200 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)**
- (b) Woolmatt supermarket CEO intends to establish if there are any significant differences between regions in terms of the degree of acceptance of a new product. Using a sample and the questionnaire technique, his statistician obtained the following data:

<u>Degree of acceptance</u>	<u>Region</u>				<u>Total</u>
	<u>East</u>	<u>Middle</u>	<u>South</u>	<u>West</u>	
<b>Poor</b>	22	35	0	5	<b>62</b>
<b>Moderate</b>	84	55	8	24	<b>171</b>
<b>Strong</b>	25	17	22	12	<b>76</b>
<b>Total</b>	<b>131</b>	<b>107</b>	<b>30</b>	<b>41</b>	<b>309</b>

- i.) Determine the expected frequencies **(3mks)**
- ii.) Calculate the Chi-Square statistic **(3mks)**
- iii.) Test the null hypothesis that the degree of acceptance does not differ from region to region at 5 percent significance level and give the conclusion of the findings? **(3mks)**

### QUESTION FOUR

- (a) The daily wages of 1000 workmen are normally distributed with mean wage of ksh.600 and wages standard deviation of ksh.30. Estimate the number of workers whose weekly wages are:-
- i) Between ksh.590 and ksh.630 **(2mks)**
  - iii) Less than ksh.550 **(2mks)**
- (b) Suppose an insurance agent has seven contacts and he believes that for each, the probability of making a sale is 0.6. Determine the binomial probability distribution for the experiment **(3mks)**

- (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:

<b>Product</b>	<b>Cost</b>
<b>A</b>	2000
<b>B</b>	3000
<b>C</b>	3000
<b>D</b>	4000
<b>E</b>	1000

- (i) Generate the sampling distribution of the mean costs **(4mks)**  
(ii) Calculate the expected value for the distribution **(1mks)**

### **QUESTION FIVE**

- (a) Describe the various steps involved in testing hypothesis **(5mks)**  
(b) What is significance level? **(2mks)**  
(c) In experimental research, an agricultural scientist is comparing maize yields per acre for which a nitrate based fertilizer has been used to those from plots having a sulphur based fertilizer. A sample of 100 acres using nitrate has yielded an average of 56.2 bags per acre with a standard deviation of 12.5 bags. The sample of 150 acres with sulphur fertilizer has yielded an average of 52.6 bags per acre with a standard deviation of 13.8 bags. Test the relevant hypothesis to validate or invalidate whether nitrate based fertilizer is superior at 10 percent significance level **(5mks)**

### **QUESTION SIX**

- (a) (i) What is Bayes theorem? (1mks)  
(ii) Suppose that a day's production schedule calls for 9000 items. Three machines each with a daily production capacity of 4000 are available and the probability that an item is defective is 1%, 2% and 4% for machines A, B and C respectively. On a given day, 4000 items were produced on machine A, 4000 on B and 1000 on C. One item was selected at random and found to be defective. What is the probability that it was produced on machine A? **(5mks)**
- (b) Consumer Consultants surveyed Nakuru market to study the consumer's switching for 3 soaps. A sample of 500 respondents has been chosen, which provided the following information regarding the use of Imperial Leather (I), Lux (L) and Rexona (R). From the undertaken sample, 180 were using (I), 170 Lux (L) and rest Rexona (R). Due to active marketing campaign, the following switching pattern has been observed. Out of the users of (I), 30 switched to (L), 20 to (R) and rest remained brand loyal. From the users of (L), 120 remained brand loyal, 40 switched to (I) and rest to (R). Similarly from the users of (R), 35 switched to (I), 100 remained brand loyal and rest switched to (L).
- i) Construct the state matrix **(1mk)**  
ii) Construct consumer's brand switching matrix **(3mks)**  
iii) If the given consumer's switching pattern persists, calculate the future market share for the three soaps **(2mks)**

**QUESTION SEVEN**

- (a) Distinguish between risk and uncertainty as decision making environments **(3mks)**
- (b) Consider the following payoff matrix, which represent player A's gain in market share

		<b>Player B</b>			
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Player A</b>	<b>1</b>	8	2	9	5
	<b>2</b>	6	5	7	18
	<b>3</b>	7	3	-4	10

- (i) What is a saddle point? **(1mk)**
- (ii) Use the minimax and maximin criteria to determine if the game has a saddle point **(3mks)**
- (c) Mr. X is a small investor with 11000 to invest in three stocks, KCB, Equity and Barclays. The returns depend on bullish and bearish characteristics. Changes in value would be:

Purchase	Bull market	Bear market
KCB	24000	10000
Equity	22000	11000
Barclays	19000	11500

- (i) On the basis of the table information only, which stock will this investor purchase **(2mks)**
- (ii) Based on records for ten years, it was discovered that market prices rose seven times and declined only three times. Using the expected monetary value approach, determine which shares this investor would purchase **(3mks)**