# UNIVERSITY EXAMINATIONS

## 2012 2013 ACADEMIC YEAR

### FOR THE DEGREE OF MASTER OF
### BUSINESS ADMINISTRATION

**COURSE CODE:** MBA 804

**COURSE TITLE:** QUANTITATIVE ANALYSIS

**DATE:** 23rd August 2013        **TIME:** 2.00- 5.00pm

_____

**Instructions to Candidates**

Answer any four questions

QUESTION ONE

a) The University of Philosophy of Knowledge has three departments namely, Epistemology, Metaphysics and Ethics. The university has a total enrolment of 1000 students of which 300 are registered in the department of Epistemology, 400 in Metaphysics and 330 in Ethics. The following additional information was provided:
   (i)  30 students enrolled for Epistemology and Metaphysics but not Ethics
   (ii) 170 enrolled for Metaphysics and Ethics
   (iii)120 enrolled for metaphysics and Ethics but not Epistemology
   (iv)70 enrolled for Epistemology and Ethics but not Metaphysics.

**Required.**

   (i)  Present the above  information in the form of set notation  symbols          (4 marks)
   (ii) Show the above  information in the Venn diagram                  (4 marks)
   (iii)Compute  the number of students enrolled in all the three department          (2 marks)
   (iv)How  many  students are enrolled in one course only                  (3 marks)
   (v) Compute  the number of students enrolled in none of the three courses  (2 marks)

b) A certain company's  records show that the weekly distance travelled by their salemen is approximately  normally distributed with mean value of 800 kilometres and standard deviation value of 90 kilometres.  The sales manager considers that salesmen who travel less than 600 kilometres in one week are performing poorly.

   (i)  If the company employs 200 salesmen, how many would be expected to perform poorly in a particular week.                                                (6 marks)
   (ii) The sales manager wishes to identify the number of miles travelled in one week, above which only 1 % of salesmen are expected to exceed.  What weekly mileage is this
                                                                                            (4 marks)

**QUESTION TWO**

a) Explain  the meaning of the following sampling fundamentals:
   (i)  Sampling error (2 marks)
   (ii) Central  limit theorem  (2 marks)
   (iii)Student distribution (2 marks)
   (iv)Sampling frame (2 marks)
   (v) Chi square distribution (2marks)

b) The following  are hypothetical data on the number of outpatient at a local dispensary and the number of  families in five villages:

| Number of families (X) | 70 | 75 | 80 | 60 | 90 |
|---|---|---|---|---|---|
| Number of outpatients (Y) | 25 | 28 | 30 | 22 | 35 |

   (i) Assuming   a simple linear relationship use ordinary least squares method to fit a regression equation of Y on X                                                (6marks)

(ii) Estimate the number of outpatients the dispensary would expect from a village with 100 families (3 marks)

(iii) Compute the coefficient of correlation and comment on the value (4 marks)

(iv) What is the significance of the error term in a regression model (2 marks)

QUESTION THREE

a) Below is the distribution of salaries paid to employees of Kelly Company in Bungoma

| Salary | 10000-11999 | 12000-13999 | 14000-15999 | 16000-17999 | 18000-19999 |
|---|---|---|---|---|---|
| No of Employees | 123 | 138 | 77 | 48 | 14 |

(i) Calculate the Median and the Mode (4 marks)

(ii) Compute the arithmetic mean using a suitable assumed mean (2 marks)

(iii) Calculate the standard deviation (2 marks)

(iv) Calculate Bowley's coefficient of skewness and comment (3 marks)

b) In a certain supermarket in Kanduyi customers arrive randomly at an average rate of 3.4 per minute. Assuming the customer arrivals form a Poisson distribution, calculate the probability that:

(i) No customers arrive in any particular minute (3 marks)

(ii) Exactly one customer arrives in any particular minute (3 marks)

(iii) Two or more customers arrive in any particular minute (4 marks)

(iv) One or more customers arrive in any 30 second period (4 marks)

**QUESTION FOUR**

a) A certain company has invested in a particular project in which it has been estimated that after X months of running, the cumulative profit in (shs 000) from the project is given by the function $31.5 - 3x^2 - 60$ , where x represents time in months. The project can run for nine months at most

**Required :**

(i) Draw a graph which represents the profit function (9 marks)

(ii) Calculate the 'breakeven' time points for the project (2 marks)

(iii) Compute the initial costof the project (2 marks)

(iv) Use the graph to estimate the best time to end the project (2 marks)

b) According to the Ministry of Cooperative Society the number of Loan application in SACCOs is 40% higher in December than in November. In 2011 a random sample of 6 SACCOs were selected, there percentage December loan application increases were discovered to be as follows:

19.2      18.4    19.8    20.2    20.4    19.0

Assuming a normal population: test the null hypothesis that the true mean percentage increase in loan application is 40% against a two sided alternative at the 10% level of significance. (10 marks)

## QUESTION FIVE

a) The total revenue obtained (in shs 000) from selling x hundred items in a particular day is given by 'R', which is a function of variable x

Given that $\frac{dR}{dx}$ = 20-4x, Calculate

   (i) The toatal revenue function R (4 marks)
   (ii) Find the number of items sold in one day that will maximize the total revenue and evaluate the this total revenue (5 marks)

b) 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 shs. 48. In a certain news paper, the price was recently advertised as shs. 78 as a result, only 40 units were sold in a week. The manufacturers fixed costs of production are shs 1,710 a week and variable costs are shs. 9 per unit. You are required:

   (i) To show the equation of the demand function linking price (P) to quantity demanded (x), assuming it to be a straight line, is P= 118 –x (4 marks)
   (ii) To find where the manufacturer breaks even (4 marks)
   (iii)To recommend a unit price which would maximize profit, and to find the quantity demanded and profit generated at that price. (4 marks)
   (iv)Assuming a sudden change in trading conditions resulting in a 20% reduction in demand at all price levels, to find the equation of the new demand function and to recommend how the manufacturers should respond. (4 marks)

## QUESTION SIX

a) In a research carried out by research students of MMUST of high income families and low income families; high income families send their children to private schools and low income families often send their children to government schools. To verify this, 1600 families were selected at random in a city and the following results were obtained:

| Income | Private Schools | Government Schools | Total |
|--------|-----------------|--------------------|-------|
| Low    | 506             | 494                | 1000  |
| High   | 438             | 162                | 600   |
| Total  | 944             | 656                | 1600  |

Test at 5% significance level if here is relationship between level of income and type of school using chi square distribution. (15 marks)

b) Two brands of raw materials which their mean weights are the same are being considered for use in manufacturing process. If a sample of 9 observations for supplier I gave a sample standard deviation of 12 kg and sampleof 16 observations from supplier II gave a sample standard deviation of 14 kg . Test whether or not the two population variance are equal at 2 % level of significance (10 marks)