THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE

DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY

(DICT) MODULE III

END OF SEMESTER EXAMINATION

SERIES: APRIL/MAY 2010

QUANTITATIVE TECHNIQUE

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of **TWO** sections **A** and **B**.

Question **ONE** is COMPULSORY.

Answer any other **TWO** Questions from Section **B**.

SMP tables and Calculators can be used

SECTION A:

(Compulsory)

Question ONE

(a). Distinguish between additive and multiplicative models as used in time series. **(4 Marks)**

(b). The following numbers represent defective output observed at a manufacturing factory.

11	10	6	12	6	9	16	20	11	10	11	11
12	11	7	10	11	14	16	12	6	10	11	16

(i). Develop a frequency distribution table for the data. **(3 Marks)**

(ii). Calculate the mean. **(2 Marks)**

(c). Distinguish between the two terms as used in index numbers.

(i). Laspeyres price index.
(ii). Laspeyres quantity index. **(4 Marks)**

(d). Explain the meaning of the following terms as used in sampling.

(i). Bias sampling
(ii). Stratified sampling
(iii). Systematic **(6 Marks)**

(e). Describe the following types of probability distribution:

(i). Continuous probability
(ii). Discrete probability **(4 Marks)**

(f). An automatic production machine has been set to produce diskettes of weight 40gm. The expected standard deviation is 0.20 gm, and weekly output is 100,000 diskettes. To check the performance of the machine each day, a random sample of 100 diskettes is taken. These are measured and the following data shows the results for the last days.

Day	**Sample Mean** $\left(\bar{x}\right)$	**Sample Standard Deviation (s)**
1	39.6	0.19

2	41.5	0.50

(i). Calculate the standard error of the mean for day 1 sample. **(3 Marks)**

(ii). Calculate the 90% confidence interval for the population mean based on the day I sample. **(4 Marks)**

SECTION B

(Answer any **TWO** questions from this Section.)

Question FOUR

(a). Define the following:

(i). Index number
(ii). Expenditure index
(iii). Price index **(6 marks)**

(b). The table below shows the quantities and prices of commodities sold by a shopkeeper.

ITEMS	**1992**		**1993**	
	PRICE PER UNIT (KSH)	**QUANTITY (UNIT)**	**PRICE PER UNIT (KSH)**	**QUANTITY (UNITS)**
Sugar	30	50	50	56
Soap	40	100	40	120
Bread	10	60	20	60
Milk	10	30	15	24
Butter	20	40	30	36

Construct the laspeyres and paasches price index numbers and interpret the results. **(14 marks)**

Question THREE (20 Marks)

(a). Describe the following components of time series.

(i). Cyclical variations
(ii). Seasonal variations
(iii). General trend **(6 Marks)**

(b). The following data shows the daily takings (in ksh. "000") over three successive weeks. The shop is closed on Saturdays and Sundays.

Daily Takings			
Day	**1st Week**	**2nd Week**	**3rd Week**
Monday	15	13	16
Tuesday	14	18	21
Wednesday	19	21	25
Thursday	27	28	26
Friday	35	37	39

(i). Draw a graph to illustrate this information. **(5 Marks)**

(ii). Calculate suitable moving averages to obtain a smoother series and plot the moving averages on the graph in (i) above. **(7 Marks)**

(iii). Comment on the graphs you have drawn. **(2 Marks)**

Question FOUR

(a). Explain why it is more appropriate to complete the correlation coefficient before performing regression analysis. **(2 Marks)**

(b). The table below shows the results obtained from a study on the effect of numbers of servers on the mean response time.

No. of Servers	1	2	3	4	5	6	7	8	9	10
Mean Response Time	120	115	100	90	80	60	50	40	35	20

(i). Compute the pearson's product moment correlation coefficient and comment on the findings.

(ii). Determine the equation of the regression of the mean response time on the number of servers and interpret the results. **(18 marks)**

Question FIVE

(a). According to a survey done by a research firm, 50% of Kenyans redeem their Bonga points for free air time. If a random sample of 30 people is taking, find the probability that at least 19 of them redeem the points. **(4 marks)**

(b). (i). Outline **TWO** characteristics of the normal distribution. **(4 Marks)**

(ii). The performance of a particular type of ups is normally distributed with a mean of 80 minutes and a standard deviation of 30 min. If the manufacturer replaces all the up's which fail before the guaranteed minimum performance of 45 minutes, determine the percentage of ups that will be replaced. **(6 Marks)**

(c). In a random sample of 250 garages it was found that 89 sold car batteries at prices above that recommended by the manufacturer:

(i). Estimate the proportion of all garages selling below the recommended price. **(2 Marks)**

(ii). Calculate the 99% confidence interval for the above proportion. **(4 Marks)**