THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY
DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY
(DIT 2K 9J, DIT 9M)

ECS 2304: QUANTITATIVE TECHNIQUES II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2011
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer booklet*
- *Calculator and SMP Tables can be used*

Answer question **ONE (COMPULSORY)** in section A and any other **TWO** questions from section B
Maximum marks for each part of a question are clearly shown.

SECTION A – Compulsory

Question 1 (30 marks)

a) Define the following terms as used in sampling:
    i.   Population
    ii.   Sample
    iii. Sample statistic
    iv. Population Parameter   (8 marks)

b) A multinational company has 100,000 computers whose standard deviation is 35. Random sample of 6,000 computers each are selected. Find the standard error of the samples.   (4 marks)

c) During a normal day, the average number of Lorries that unload at a deport is 3 per hour. Find the probability that in any hour at most 2 Lorries will arrive to unload.   (4 marks)

d) Explain on the following types of estimators:

    i.   Point estimate
    ii.   Interval estimate   (4 marks)

e) It is estimated that 80% of PC users have installed proprietary operating system. In a group of 1,000 PC users, compute the:

    i.   Mean
    ii.   Standard deviation of the users of proprietary operating system   (5 marks)

f) A random sample of 50 debts showed that the mean debt was $92.50 with a standard deviation of $24.05. Determine a 95% confidence limit for the mean debt.   (5 marks)

SECTION B (ANSWER ANY TWO QUESTIONS)

Question 2   (20 marks)

a) With the aid of sketches, distinguish between a bar graph and a scatter diagram.   (4 marks)

b) Explain the term regression analysis.   (2 marks)

c) The table below the height of a random sample of 10 patients. Use it to answer the questions that follow.

Patient	A	B	C	D	E	F	G	H	I	J
Height	62	64	66	68	70	72	74	76	78	80
Weight	66	67	72	72	57	76	72	76	87	82

    (i) Represent the above data using a scatter diagram.   (4 marks)
    (ii) Using the least squares method, determine the equation of the regression line   (8 marks)
    (iii)Estimate the weight of a patient whose height is 71 inches   (2 marks)

Question 3   (20 marks)

a) Explain on the following sampling methods giving relevant examples on where they can be applied.
   i.   Systematic sampling
   ii.   Cluster sampling
   iii.   Multistage sampling   (9 marks)

b) In a random sample of 200 garages it was found that 79 sold car batteries at prices below that recommended by the manufacturer.
   i.   Estimate the proportion of garages selling below the recommended price.   (2 marks)
   ii.   Calculate the 99% confidence interval for the proportion.   (9 marks)

Question 4   (20 marks)

a) Describe the following terms as used in sampling
   i.   Sampling distribution of sample mean.
   ii.   Sampling distribution of sample proportion.
   iii.   Sampling error
   iv.   Unbiased estimator   (8 marks)

b) The time taken to learn the standing orders by the members of parliament is normally distributed with a mean of 80 hours. If a random sample of 16 members is selected, find the probability that the mean time to learn the standing orders will be more than 90 hours.   (4 marks)

c) A company manager wants production estimate to be within 0.002 of the population proportion with a 90% confidence level. Determine the most conservative estimate for the sample size that will limit the maximum error within 0.003 of the population proportion.   (6 marks)

Question 5   (20 marks)

a) The probability of getting a defective transistor from a factory is 0.07. A sample of 7 transistors was selected. Calculate the probability of getting:

   i.   2 non defective transistors
   ii.   At least 6 defective fuses.   **(6 marks)**

b) A hire firm has 2 ladders which it hires out by the day. Records show that the mean demand is 2.5 ladders per day. If it is assumed that the demand for ladders follow a poison's distribution, determine:

   i.   The percentage of days on which maximum demand for ladder is achieved.
   ii.   The percentage of days on which demand outstrips the supply   **(4 marks)**

c) During a survey, 42.5% of computer monitors can work for at most 500 hours. 85.5% of the computer monitors can work for at most 700 hours. Calculate the mean and standard deviation of this distribution.

                                                                                                                        (10 marks)