



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

*Faculty of Engineering & Technology*

## DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY (DIT 2K 10J)

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOG (DICT 2K 10J)

### ECS 2206/ECS2310: QUANTITATIVE TECHNIQUES I

END OF SEMESTER EXAMINATIONS

**SERIES:** DECEMBER 2011

**TIME:** 2 HOURS

#### **Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

## SECTION A (COMPULSORY)

### Question 1(30 Marks)

- a) Define the following terms as used in probability:
- i. Outcome [2Marks]
  - ii. Experiment [2Marks]
  - iii. Unbiased [2Marks]
  - iv. Event [2Marks]
- b) Differentiate between continuous and discrete probability distribution [4Marks]
- c) What is the probability that two dice will return a total greater than 9, if die 1 gives 5? [4Marks]
- d) An urn contains 6 red marbles and 4 black marbles. Two marbles are drawn without replacement from the urn. What is the probability that both of the marbles are black? [4Marks]

## SECTION B (ANSWER ANY TWO QUESTIONS)

### Question two 20 marks

- a) Explain the following:
- i. Binomial distribution [2Marks]
  - ii. Binomial Experiment [2Marks]
- b) Differentiate between binomial probability and cumulative binomial probability [4Marks]
- c) The probability that Manchester United will win against Harambee Stars in a friendly match is 0.3. What is the probability that Harambee stars will lose 6 matches if they played 7 friendly matches? [5Marks]
- d) The national team rugby coach is to select 7 members of the national rugby team from 9 members of safari seven's 7 members of KCB 13 members of Ulinzi and 11 of KPA. What is the probability that at most 2 members selected for the team would be from safari seven's team? [7Marks]

### Question three 20 marks

- a) Explain the meaning of the following as used in normal probability distribution:
- i. Mean score [2Marks]
  - ii. Standard deviation [2Marks]
- b) Highlight **THREE** importance of normal distribution [3Marks]
- c) The average number of lions seen on a 1-day safari is 5. What is the probability that tourists will see fewer than four lions on the next 1-day safari? [4Marks]
- d) An expert typist makes, on average, 2 typing errors every 5 pages. What is the probability that the typist will make at most 5 errors on the next fifteen pages? [4Marks]

- e) Bill claims that he can do more push-ups than 90% of the boys in his school. Last year, the average boy did 50 push-ups, with a standard deviation of 10 pushups. Assume push-up performance is normally distributed. How many pushups would Bill have to do to beat 90% of the other boys? [5Marks]

**Question four 20 marks**

- a) Define the following:
- i. Degrees of freedom [2Marks]
  - ii. Sample mean [2Marks]
- b) Differentiate sample mean from the population mean. [4Marks]
- c) Describe 3 main important properties of t – Distribution. [3Marks]
- d) A certain IQ test is normally distributed, with a mean of 100. Suppose 20 people are randomly selected and tested. The standard deviation in the sample group is 15. What is the probability that the average test score in the sample group will be at most 110? [4Marks]
- e) The Acme Battery Company has developed a new cell phone battery. On average, the battery lasts 60 minutes on a single charge. The standard deviation is 4 minutes. Suppose the manufacturing department runs a quality control test. They randomly select 7 batteries. The standard deviation of the selected batteries is 6 minutes. What would be the chi-square statistic represented by this test? [5Marks]

**Question five 20 marks**

- a) At the end of every school year, the state administers a reading test to a sample of third graders. The school system has 20,000 third graders, half boys and half girls.

This year, a proportionate stratified sample was used to select 36 students for testing. Because the population is half boy and half girl, one stratum consisted of 18 boys; the other, 18 girls. Test scores from each sampled student are shown below:

Boys                    50, 55, 60, 62, 62, 65, 67, 67, 70, 70, 73, 73, 75, 78, 78, 80, 85, 90  
 Girls                    70, 70, 72, 72, 75, 75, 78, 78, 80, 80, 82, 82, 85, 85, 88, 88, 90, 90

Using sample data, estimate the mean reading achievement level in the population. Find the margin of error and the confidence interval. Assume a 95% confidence level. [10Marks]

- b) The local utility company surveys 101 randomly selected customers. For each survey participant, the company collects the following: annual electric bill (in dollars) and home size (in square feet). Output from a regression analysis appears below.

Regression equation: Annual bill = 0.55 * Home size + 15				
Predictor	Coef	SE Coef	T	P
Constant	15	3	5.0	0.00
Home size	0.55	0.24	2.29	0.01

What is the 99% confidence interval for the slope of the regression line?

[10Marks]