



*(Knowledge for Development)*

**KIBABII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**2017/2018 ACADEMIC YEAR**  
**FIRST YEAR SECOND SEMESTER**  
**MAIN EXAMINATION**  
**FOR THE DIPLOMA IN EDUCATION**  
**MATHEMATICS**

**COURSE CODE: EDM 103**

**COURSE TITLE: PROBABILITY AND STATISTICS II**

**DATE: 08/08/18**

**TIME: 9 AM -11 AM**

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**INSTRUCTIONS TO CANDIDATES**

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 4 Printed Pages. Please Turn Over.

**QUESTION ONE (30 MARKS)**

a. i) Given the following set of X values,  $X_1, X_2, X_3, X_4, X_5, \dots, X_n$  define their geometric: (2mks)

ii) List one advantage of using geometric mean as a measure of central tendency: (1mk)

b. Differentiate between interpolation and extrapolation. (2mks)

c. Use the following set of data of sales of ACBCO.LTD in the year 2001 to 2006 to fit a trend line using the semi average method. (4mks)

| <u>Year</u> | <u>Sales in Million.</u> |
|-------------|--------------------------|
| 2001        | 4                        |
| 2002        | 8                        |
| 2003        | 6                        |
| 2004        | 10                       |
| 2005        | 12                       |
| 2006        | 8                        |

d. List two properties of the normal distribution (2mks)

e. A perfectly fair conventional die is thrown 40 times. Use the Binomial probability distribution to find the probability that exactly three sixes are obtained. (4mks)

f. List four factors that affect time series. (4mks)

g. Differentiate between a sample design and a sample frame. (2mks)

h. A manager wants an estimate of sales of salesmen in his company. A random sample of 100 out of 500 salesmen is selected and average sales are found to be sh. 75,000. If a sample standard deviation is sh. 15,000 then, find out the population mean at 99% level of confidence given that sample mean is  $\pm 2.586$  in 99% level of confidence. (4mks)

i. State the central limit theorem (2mks)

j. A discrete random variable X has the probability function  $P(X=x) = x/10$ , for  $x=1,2,3,4$ . Find  $E(x^2)$  (3mks)

**QUESTION TWO: (15 MKS).**

- a. What is correlation (1mk)
- b. Calculate the Karl Pearson's coefficient of correlation for the following ages of husbands and wives at the time of their marriage. (10mks)

|                         |    |    |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| Age of husband (in yrs) | 23 | 27 | 28 | 28 | 28 | 30 | 30 | 33 | 35 | 38 |
| Age of wife (in yrs)    | 18 | 20 | 22 | 27 | 21 | 29 | 27 | 29 | 28 | 29 |

- c. Define the following types of correlation. (4mks)
- i) Positive correlation
  - ii) Linear correlation
  - iii) Simple correlation
  - iv) Multiple correlation

**QUESTION THREE (15MKS)**

- a. i Use the following distribution table to obtain the regression line. (5marks)

|   |     |     |     |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| X | 5.1 | 5.6 | 5.9 | 6.3 | 6.8 | 7.4 | 7.8 | 8.5 | 9.1 | 9.8 |
| y | 9.6 | 9.5 | 8.6 | 8   | 7.8 | 6.8 | 6.7 | 6   | 5.4 | 5.4 |

- ii. Use your regression line to estimate the value of y when  $x=10.2$  (2marks)
- b. List three importance of analyzing time series (3mks)
- c. The mean of a binomial distribution is 40 and the standard deviation 6. Calculate
- i) The number of events n (2mks)
  - ii) The probability of success p (1mk)
  - iii) The probability of failure q (2mks)

**QUESTION FOUR (15MKS)**

- a. Define the term regression as used in statistics (1mk)
- b. In the following table are the recorded data showing the test scores made by salesmen on an intelligence test and their weekly sales.

| Salesman    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Test scores | 45  | 75  | 50  | 60  | 80  | 90  | 85  | 40  | 80  | 55  |
| Sales (000) | 2.0 | 6.5 | 3.5 | 5.0 | 4.5 | 6.0 | 6.5 | 2.5 | 5.5 | 4.5 |

Calculate the regression line of sales on test score and estimate the most probable weekly sales volume if a salesman makes a score of 70. (10mks)

- c. i. Define the term 'sampling design' (1mk)
- ii. List three qualities of a good sampling frame. (3mks)

**QUESTION FIVE (15MKS)**

- a. The average number of Births per year in a hospital is 228. If each baby is equally likely to be a boy or a girl, use a suitable approximation to find the probability that next year;
- i) There will be more boys born than girls (6mks)
- ii) Exactly 100 boys will be born (4mks)
- b. i. Calculate the harmonic mean of the following data.

1,2,4,5,8,10,10

(4mks)

- ii. State one advantage of using Harmonic mean to describe data. (1mk)