(Knowledge for Development)

# KIBABII UNIVERSITY

## UNIVERSITY EXAMINATIONS

## 2017/2018 ACADEMIC YEAR

## FIRST YEAR SECOND SEMESTER

## SPECIAL/ SUPPLEMENTARY EXAMINATION

## FOR THE DEGREE OF BACHELOR OF SCIENCE

**COURSE CODE:** STA 104/106

**COURSE TITLE:** BASIC STATISTICS

**DATE:** 18/10/18 **TIME:** 3 PM -5 PM

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**INSTRUCTIONS TO CANDIDATES**

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 5 Printed Pages. Please Turn Over.

**QUESTION ONE**

(a) Define the following terms

(i) Independent events

(ii) Mutually exclusive

(iii) Equally likely

(iv) Exhaustive (6mks)

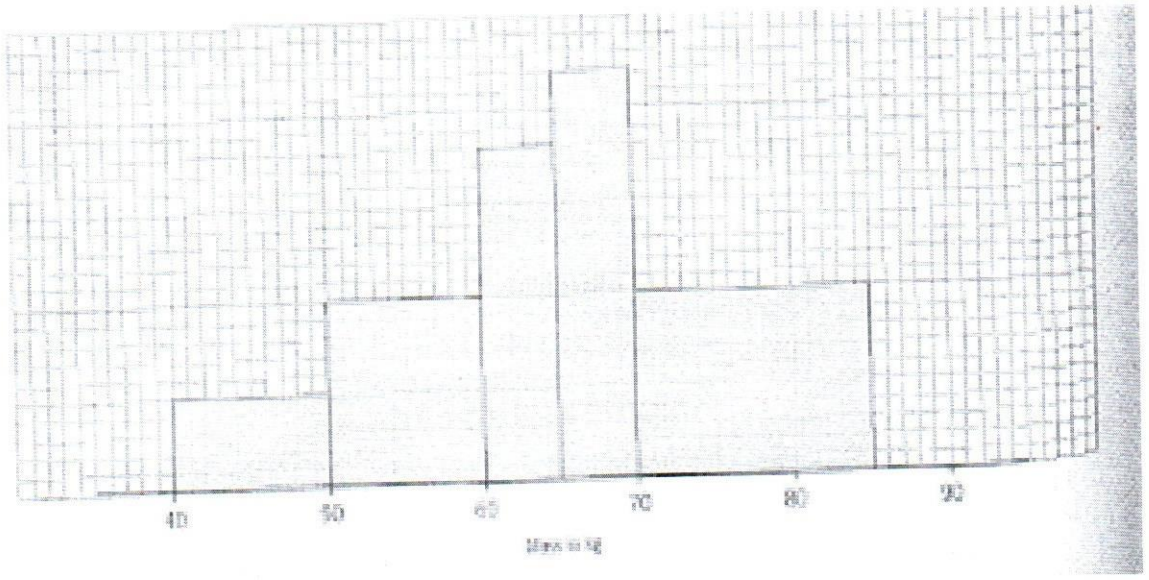
(b) Members of an orchestra were asked how many instruments they can play. Here is the number of instrument each can play

2,3,1,5,2,2,2,1,3,4,2,1,1,1,4,1,1,2,1,2,3,1,4,11,3,1,3,2,2.

(i) Find the mean number of instruments played. (3mks)

(ii) Find the standard deviation (3mks)

(c) The diagram shows the distribution of masses of 50 university students. All the rectangles are there but the vertical axis has been torn off.




(i) Complete the frequency table for the distribution (3mks)

(ii) Use the values of your frequency to determine the approximate mass of the students. (4mks)

(d) Define the product moment correlation coefficient (2mks)

(e) A group of children carry out a survey of the number of sweets in each of 50 packets. Their result is shown in stem and leaf diagram.

Key 20|4 means 24 sweets in a packet

20| 4 6 6 7 7 7 8 8 9 9 9
30| 0 0 0 0 0 1 1 2 2 2 3 3 4 4 4
30| 5 5 5 6 6 7 7 7 8 8 8 8 9 9
40| 0 0 1 1 2 4 4

(i) Calculate the median and quintile of this distribution (3mks)

(ii) Draw a box plot for the distribution (3mks)

(f) State Bayes theorem (3mks)

**QUESTION TWO**

(a) State the spearman's rank correlation (3marks)

(b) The table gives the number of days on which the rains fell in 36 conservative intervals of 30 days

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 19 | 6 | 12 | 8 | 18 | 9 | 8 | 11 | 17 | 15 | 13 |
| 16 | 9 | 17 | 18 | 9 | 24 | 17 | 7 | 8 | 17 | 17 | 8 |
| 7 | 11 | 16 | 17 | 8 | 5 | 13 | 22 | 20 | 16 | 20 | 13 |

Draw a stem and leaf diagram with the following class interval

(i) 5-9, 10-14, 15-19, 20-24 (4mks)

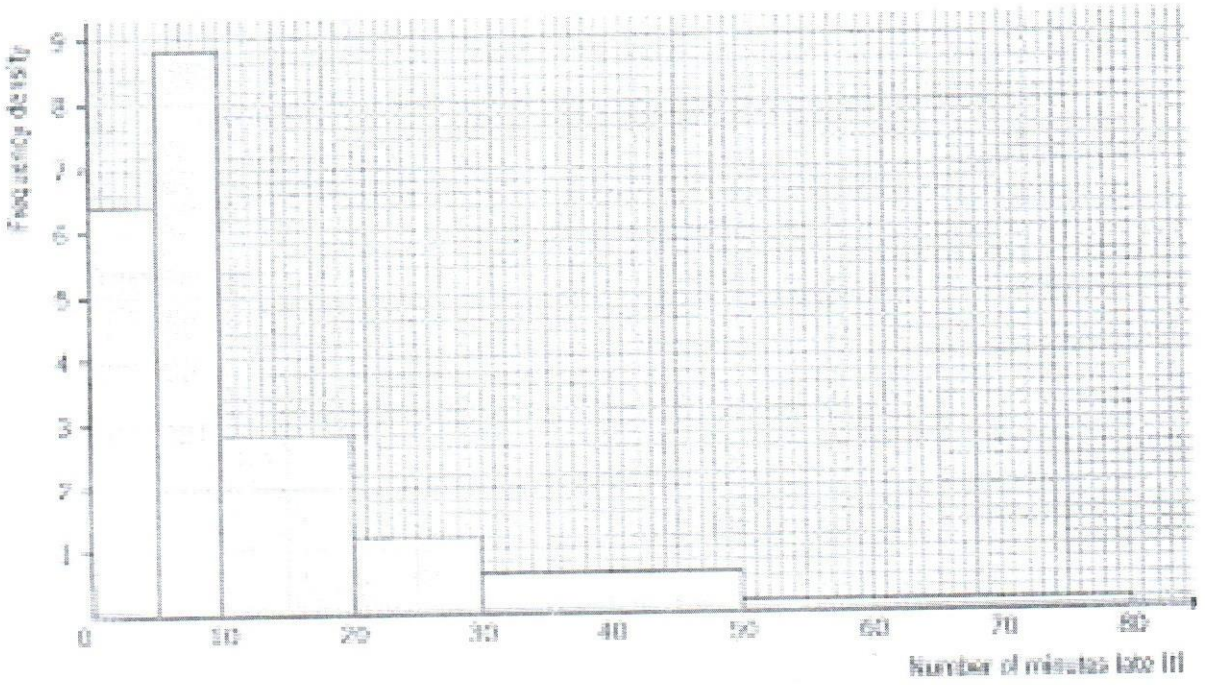
(ii) 4-6, 7-9, 10-12, 13-15, 16-18, 19-21, 22-24. (4 marks)

(c) A passenger association conducted a survey on the punctuality of trains using a particular station. The histogram illustrates the result.

(i) Construct the frequency distribution (5mks)

(ii) How many trains were there in the survey (4mks)

Histogram to show lateness of trains




**QUESTION THREE**

(a) (i) state the objectives of statistics (4mks)

(ii) Draw a frequency polygon to compare the age distribution of teachers in two colleges A and B below.

| Age | 20- | 25- | 30- | 35- | 40- | 45- | 50- | 55- | 60- | 65- |
|---|---|---|---|---|---|---|---|---|---|---|
| College A | 4 | 6 | 11 | 14 | 9 | 5 | 5 | 3 | 0 | 0 |
| College B | 0 | 2 | 4 | 7 | 11 | 12 | 11 | 8 | 5 | 0 |

(8mks)

(b) A machine is supposed to cut lengths of rod 50cm long. A sample of 20 rods gave the following results for the lengths, x.

$\Sigma fx$ =997 $\Sigma fx^2$ =49711

(i) Calculate the mean length of the 20 rods (4mks)

(ii) Calculate the variance of the lengths of the 20 rods (4mks)

## QUESTION FOUR

(a) An old film is treated with a chemical in order to improve its contrast. Preliminary test from a sample of the segment of the film produced the following result.

| sample | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |
| y | 49 | 60 | 66 | 62 | 72 | 64 | 89 | 90 | 96 |

The quantity x is a measure of the amount of chemical applied and y is the contrast index.

(i) Plot a scatter diagram to illustrate the data. (4mks)

(ii) It was discovered that one of the sample was damaged and produced wrong result. State which sample you think it is. (4mks)

(iii) Calculate the product moment correlation coefficient. (4mks)

(iv) Are *x* and *y* linearly correlated, explain. (3mks)

(b) Draw a pie chart to capture the following data from a supermarket shoping. (5mks)
Eggs shs1200, mangoes shs 450, oranges shs 650, cooking oil shs 1500.

## QUESTION FIVE

(a) In how many ways can the letter of the word statistics be arranged (2mks)

(b) The probability of A and B are such that $p(A/B)=0.4$, $p(B/A)=0.25$, $p(A\cap B)=0.12$

(i) Calculate the value of P(B) (3mks)

(ii) Give reason why A and B are not independent (3mks)

(iii) Calculate the value of $p(A\cap B)$ (4mks)

(c) If two events A and B are independent prove that A' and B' are also independent. (8mks)