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**QUANTITATIVE METHODS**

November 2017

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN SALES AND MARKETING  
DIPLOMA IN HUMAN RESOURCES MANAGEMENT  
DIPLOMA IN ROAD TRANSPORT MANAGEMENT  
DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY**

**MODULE II**

**QUANTITATIVE METHODS**

**3 hours**

**INSTRUCTIONS TO THE CANDIDATES**

*You should have the following for this examination:*

*Answer booklet;*

*Scientific calculator.*

*Answer any FIVE of the following EIGHT questions.*

*All questions carry equal marks.*

*Mathematical tables have been provided for use where necessary.*

*Candidates should answer the questions in English.*

**This paper consists of 5 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

1. (a) Differentiate between *categorical data* and *numerical data* as used in Statistics. (4 marks)
- (b) The data in Table 1 represents the frequency distribution of heights in centimetres of 250 male students in a certain secondary school in the year 2014.

| Height in cm    | 140 - 150 | 150 - 160 | 160 - 170 | 170 - 180 | 180 - 190 | 190 - 200 | 200 - 210 | 210 - 220 |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| No. of Students | 3         | 9         | 32        | 72        | 80        | 36        | 12        | 6         |

Table 1

- (i) Determine the following measures about the distribution of height:
- (I) median;
- (II) standard deviation. (7 marks)
- (ii) Determine the proportion of the students whose heights are between 162 cm and 184 cm. (5 marks)
- (iii) To join the basketball team, a student must have a minimum height of 182 cm. However, all the top 55% of the students based on height qualify to join the volleyball team. Assuming that the basketball team has picked all the students who qualify and a student cannot belong to two teams, determine the proportion of the students who joined the volleyball team. (4 marks)
2. (a) Differentiate between the terms *discrete data* and *continuous data* as used in Statistics giving two examples in each case. (4 marks)
- (b) Distinguish between the *mean* and the *median* in terms of their suitability in describing data sets. (4 marks)
- (c) The performance in Mathematics examination by candidates in the year 2014 fits a normal distribution with a mean of 52 marks and a standard deviation of 13.8 marks. If a random sample of 800 candidates is taken from the population:
- (i) estimate the number of candidates who passed if the pass-mark was set at 40. (3 marks)
- (ii) estimate the number of candidates who scored between 48 marks and 58 marks. (5 marks)
- (iii) Suppose the examining body wants only the top 68% of the candidates to pass, determine the pass-mark that should be set to achieve this. (4 marks)
3. (a) Explain each of the following types of statistics:
- (i) descriptive statistics;
- (ii) inferential statistics. (4 marks)

- (b) A research study was carried out on the relationship between road accidents and alcohol consumption. Data for the year 2014 was taken showing the number of road accidents in hundreds and the quantity of alcohol consumed in million litres as shown in Table 2. Use it to answer the questions that follow.

| Month     | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----------|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|
| Accidents | 55  | 23  | 65  | 42  | 70  | 54   | 80   | 32  | 60   | 22  | 42  | 58  |
| Alcohol   | 5.4 | 3.2 | 7.2 | 3.8 | 5.8 | 3.6  | 4.5  | 2.4 | 6.2  | 2.6 | 4.8 | 4.0 |

Table 2

- (i) Construct a scatter diagram to represent the data. (4 marks)
- (ii) Determine the *least squares regression line* of the number of road accidents on the quantity of alcohol consumed. (8 marks)
- (iii) Interpret the *least squares regression line* obtained in (ii). (4 marks)
- ✓4. (a) Define the following terms as used in project network analysis:
- (i) activity;
- (ii) network;
- (iii) event. (6 marks)
- (b) Differentiate between the terms *sampling interval* and *sampling fraction* as used in the collection of statistical data. (4 marks)
- (c) An educational researcher has found out that not all students who passed primary school examination eventually pass secondary school examination, and not all students who eventually pass secondary school examination passed primary school examination. He collected data from a random sample of 120 students and the findings were as follows:
- 54 passed in primary and passed in secondary
  - 26 passed in primary but failed in secondary
  - 18 failed in primary but passed in secondary
  - 22 failed in primary and failed in secondary
- (i) Present this information in a Venn diagram; (4 marks)
- (ii) Determine the probability that a student selected at random:
- (I) who passed primary eventually passed secondary;
- (II) who passed secondary had passed primary. (6 marks)
- ✓5. (a) Outline **four** uses of index numbers in economics. (4 marks)
- (b) Differentiate between *primary data* and *secondary data* as used in statistics. (4 marks)



- (c) A tertiary college offers courses which are categorised as Engineering, Business and Hospitality. The composition of the student population is as follows: Engineering 300, Business 1200 and Hospitality 900. A random sample of 120 students is to be selected using stratified random sampling technique.
- Determine the various sample sizes for each stratum assuming proportional allocation. (8 marks)
  - Select a random sample among engineering students using systematic random sampling procedure based on the size determined in (i). (4 marks)
6. (a) With the aid of mathematical symbols, outline **three** properties of the mean as a measure of central tendency: (6 marks)
- (b) By use of words, explain each of the following types of correlation as used in statistics:
- positive correlation;
  - negative correlation;
  - no correlation. (6 marks)
- (c) The project of constructing a lecture theatre in a college comprises various activities. The activities, their corresponding duration and prerequisite order are as shown in the precedence table below. Use it to answer the questions that follow.

| Activity | Preceding Activity | Duration (weeks) |
|----------|--------------------|------------------|
| A        | --                 | 8                |
| B        | --                 | 5                |
| C        | B                  | 10               |
| D        | A                  | 12               |
| E        | B                  | 5                |
| F        | C                  | 7                |
| G        | C                  | 9                |
| H        | D, G               | 6                |
| J        | F, E               | 4                |
| K        | H, J               | 6                |

With the aid of a network diagram, determine the critical path and the expected project duration. (8 marks)

- ✓7. (a) Explain each of the following terms as used in statistics:
- sampling;
  - census;
  - questionnaire;
  - sampling frame. (8 marks)