# THE KENYA NATIONAL EXAMINATIONS COUNCIL

# DIPLOMA IN APPLIED STATISTICS

## APPLIED STATISTICS

### 3 hours

## INSTRUCTIONS TO CANDIDATES

*You should have the following for this examination:*
    *Answer booklet;*
    *Mathematical tables/non-programmable scientific calculator.*
*This paper consists of **EIGHT** questions.*
*Answer any **FIVE** questions.*
*All questions carry equal marks.*
*Maximum marks for each part of a question are indicated.*
***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) Explain the following terms as used in quality control:

   (i)   acceptance sampling;
   (ii)  lot tolerance;
   (iii) producer's risk. (6 marks)

   (b) Samples of 120 tubes are drawn randomly from the output of a process that produces thousand of units daily. Sample items are inspected for quality and defective items are rejected. The results of 12 samples are shown in Table 1.

   Table 1

   | Sample Number | Number of defective tubes | Sample Number | Number of defective tubes |
   |---|---|---|---|
   | 1 | 8 | 7 | 14 |
   | 2 | 10 | 8 | 6 |
   | 3 | 13 | 9 | 10 |
   | 4 | 9 | 10 | 13 |
   | 5 | 8 | 1 | 18 |
   | 6 | 10 | 12 | 15 |

   (i)  Construct the percentage fractional defective chart.

   (ii) Comment on the production process. (14 marks)

2. (a) Explain **four** demerits of price index numbers. (8 marks)

   (b) Table 2 shows the prices and quantities of some commodities for the years 2012 and 2013.

   Table 2

   | Commodity | 2012 | | 2013 | |
   | | Quantity (Kgs) | Price (Kshs) | Quantity (Kgs) | Price (Kshs) |
   |---|---|---|---|---|
   | A | 16 | 180 | 18 | 200 |
   | B | 18 | 200 | 20 | 240 |
   | C | 20 | 120 | 16 | 260 |
   | D | 12 | 100 | 14 | 140 |
   | E | 10 | 80 | 12 | 100 |
   | F | 14 | 60 | 15 | 80 |

   Calculate the:

   (i)   Laspeyre's Quantity Index;
   (ii)  Paasche's Quantity Index;
   (iii) Marshall Edgeworth's Quantity Index. (12 marks)

3. (a) Explain **four** uses of time series analysis. (8 marks)

(b) Table 3 shows the production of a commodity in tonnes by a company from the years 2004 to 2010.

**Table 3**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------|------|------|------|------|------|------|------|
| Production (tonnes) | 32 | 44 | 56 | 60 | 68 | 76 | 84 |

(i) Calculate the regression equation of the line in the form $Y = a + bz$.

(ii) Forecast on the production volume in the year 2014. (12 marks)

4. (a) Explain **four** limitations of free international trade to a country. (8 marks)

(b) Table 4 shows the salary of employees in thousands of shillings for company XYZ Limited.

**Table 4**

| Salary | Number of Employees |
|--------|---------------------|
| 30 - 39 | 4 |
| 40 - 49 | 8 |
| 50 - 59 | 6 |
| 60 - 69 | 12 |
| 70 - 79 | 7 |
| 80 - 89 | 5 |
| 90 - 99 | 3 |
| 100 - 109 | 1 |

(i) Draw the cumulative frequency curve.

(ii) Determine the number of employees who earn:

    I.    between Kshs. 52,000 and Ksh. 86,000;

    II.    Kshs. 85,000 and above. (12 marks)

5.   (a)   Outline **five** disadvantages of a decentralised statistical system.   (5 marks)

   (b)   Table 5 shows the marks obtained by some students in accounts and statistics tests.

   **Table 5**

| Marks | Number of students | |
|---|---|---|
|  | Accounts | Statistics |
| 0 - 9 | 6 | 10 |
| 10 - 19 | 4 | 8 |
| 20 - 29 | 12 | 16 |
| 30 - 39 | 15 | 22 |
| 40 - 49 | 10 | 18 |
| 50 - 59 | 8 | 14 |
| 60 - 69 | 3 | 7 |
| 70 - 79 | 2 | 4 |

Determine the:

   (i)   arithmetic mean;
   (ii)   coefficient of variation.   (15 marks)

6.   (a)   Explain **five** types of data classification.   (10 marks)

   (b)   (i)   Explain the **three** approaches used in computing national income of a county.

      (ii)   Outline **four** limitations of national income statistics.   (10 marks)

7.   (a)   With reference to statistical quality control, outline **four** distinctions between sampling and 100% inspection.   (8 marks)

   (b)   The measurement of the diameters of a random sample of 180 nuts made by a drilling machine during a certain period showed a mean of 0.622 cm and a standard deviation of 0.032 cm. Determine the 95% confidence limits for the mean diameters.   (4 marks)

   (c)   Explain **four** causes of inequality in the distribution of income amongst individuals.   (8 marks)

8.   (a)   Explain the following terms as applied in statistics:

   (i)   statistical inference;
   (ii)   statistical estimation;
   (iii)   testing of hypothesis.   (6 marks)

(b) Table 6 shows the production of a commodity by Alpha Limited in thousands of tonnes for the years 2001 and 2002.

**Table 6**

| Months | January | February | March | April | May | June | July |
|--------|---------|----------|-------|-------|-----|------|------|
| 2001   | 95      | 93       | 80    | 75    | 50  | 52   | 60   |
| 2002   | 96      | 95       | 80    | 72    | 48  | 55   | 65   |

(i) Construct the Z - chart.

(ii) Comment on the chart drawn in b(i).                          (14 marks)

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