

2405/304
APPLIED STATISTICS
Oct./Nov. 2009
Time: 3 hours

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/scientific calculator.

Answer any FIVE of the EIGHT questions in this paper.

All questions carry equal marks.

Maximum marks for each part of a question are as shown.

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 each of the following terms as used in statistics:
- population;
 - sample;
 - parameter;
 - statistic;
 - variable.
- (10 marks)
- (b) Table 1 shows the national income of a country for three years in millions of shillings.

Table 1

Sectors of the economy			
Year	Agriculture	Manufacturing	Others
2002	374	170	136
2003	480	240	80
2004	414	322	184

Using the data construct a percentage component bar chart. (10 marks)

2. (a) Explain each of the following methods of sampling:
- systematic;
 - stratified;
 - cluster;
 - quota,
- (8 marks)
- (b) Ten samples of five pieces were taken at regular intervals from a process. The dimensions measured are given in table 2.

Table 2 DIMENSIONS

Sample Number	1	2	3	4	5	Sample mean (\bar{x})	Range (R)
1	7.47	7.48	7.47	7.49	7.48	7.478	0.02
2	7.48	7.49	7.50	7.48	7.49	7.488	0.02
3	7.49	7.48	7.50	7.48	7.49	7.498	0.02
4	7.49	7.49	7.50	7.50	7.51	7.498	0.02
5	7.49	7.49	7.51	7.49	7.51	7.498	0.02
6	7.49	7.50	7.51	7.49	7.50	7.498	0.02
7	7.50	7.50	7.51	7.51	7.50	7.504	0.01
8	7.51	7.50	7.50	7.50	7.52	7.506	0.02
9	7.51	7.51	7.52	7.51	7.51	7.512	0.01
10	7.51	7.51	7.52	7.53	7.51	7.518	0.02

Calculate:

- (i) the control limits for \bar{x} and R;
- (ii) represent \bar{x} and R on a chart;
- (iii) comment on the state of the process. (12 marks)

3. (a) Explain five uses of agricultural statistics. (10 marks)

(b) Table 3 shows the prices of commodities for different years.

Table 3

Commodity	A	B	C	D	E
Year	2004	2005	2006	2007	2008
Price (shs)	120	125	140	150	135

Construct chain base index numbers from the given data. (10 marks)

4. (a) Explain four factors that may affect the growth of international trade. (8 marks)

(b) Table 4 shows the sales made by Malanda Ltd from 2006 to 2008.

Table 4

Year	Quarter	Sales '000's
2006	1	104
	2	78
	3	68
	4	96
2007	1	108
	2	84
	3	72
	4	104
2008	1	118
	2	99
	3	86

Using the four quarter moving average determine the trend. (12 marks)

5. (a) Explain four sources of bias in sampling. (8 marks)

(b) Table 5 shows the marks obtained by 60 students in a statistics examination.

Table 5

50	40	63	34	36	62	35	32
45	48	27	43	24	41	25	39
10	42	59	36	45	30	38	53
35	44	20	31	60	15	42	34
32	38	43	46	39	35	55	36
26	36	47	42	67	17	48	51

(i) Construct a frequency distribution table from the given data starting with 10 - 20.

(ii) Calculate:

- I. arithmetic mean;
- II. median;
- III. standard deviation.

(12 marks)

6. (a) Explain each of the following terms:

- (i) National Income;
- (ii) Gross Domestic Product;
- (iii) Personal Income;
- (iv) income per capita.

(8 marks)

(b) Demand for some spare part is given below.

Month	April 2008	May 2008	June 2008
Demand	200	50	150

The forecast for April 2008 was 100 units.

Determine the demand for July 2008 taking the value of $\alpha = 0.2$ (12 marks)

7. (a) Describe the procedure that should be followed when designing a double sampling plan. (10 marks)

(b) Explain each of the following types of price quotations:

- (i) ex-works;
- (ii) free on rail;
- (iii) franco price;
- (iv) freight note;
- (v) letter of credit.

(10 mark)

8. (a) Explain each of the following terms as used in quality control:

- (i) acceptance quality control;
- (ii) lot tolerance;
- (iii) consumer's risk;
- (iv) producer's risk.

(8 marks)

(b) The following data is available for a machine in a manufacturing unit.

Number of hours worked per day	8
Working days per month	25
Number of operators	1

Standard time per unit of operation:

Machine time	22 minutes
Operator time	08 minutes
Total time/unit	30 minutes

Determine the monthly output if:

- (i) the plant is operated at 75% efficiency, and the operator is working at 100% efficiency;
- (ii) the machine productivity is increased by 10%;
- (iii) the operator efficiency is reduced by 20% over the existing level.

(12 marks)