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2902/204 2908/204

2909/204 2920/204

QUANTITATIVE METHODS

November 2015

Time: 3 hours

Candidate's Signature _____

Date _____



THE KENYA NATIONAL EXAMINATIONS COUNCIL

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

QUANTITATIVE METHODS

3 hours

INSTRUCTIONS TO CANDIDATES*Write your name and index number in the spaces provided above.**Sign and write the date of the examination in the spaces provided above.**This paper consists of TWO sections; A and B.**Answer ALL the questions in section A and any FOUR questions from section B in the spaces provided in this question paper.**Show all your working.**Candidates should answer the questions in English.***For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
A		32	
B		17	
		17	
		17	
		17	
TOTAL SCORE			

This paper consists of 17 printed pages.

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

SECTION A (32 marks)

Answer **ALL** the questions in this section in the spaces provided after each question.

1. A supervisor in a factory recorded the following figures of lateness, in minutes, for 20 workers.

0	6	3	5
5	5	6	10
0	4	4	9
1	10	2	6
4	8	10	6

Construct a frequency distribution table for the above data, starting with the classes 0-2, 3-5 ... (4 marks)

2. Outline **three** advantages of using observation method in the collection of data. (3 marks)

3. Distinguish between a diagonal matrix and a scalar matrix, giving an example in each case. (4 marks)

4. A firm's labour force is growing at the rate of 5 percent per annum. Currently the firm has 500 employees. Determine its expected labour force in five years' time. (2 marks)

5. A farmer borrowed Ksh. 560,000 from a bank. He was required to repay the loan with simple interest for a period of 48 months. The repayment amount was Ksh. 21,000 per month. Determine the simple interest rate per annum. (4 marks)

6. The mean age of 15 teenagers in a self-awareness class was 19 years. On a day when one of the teenagers was absent, the rest gave their ages as follows: 21, 19, 20, 19, 18, 17, 20, 18, 21, 17, 18, 16, 22, 20. Determine the age of the absent teenager. (2 marks)

7. An investor preparing to purchase a business, estimated the profits in the first year to be as follows:

Profits (Ksh. '000's)	Probability
500	0.15
400	0.15
100	0.7

Calculate the expected value of profits in the first year. (2 marks)

8. State **three** rules followed when drawing a network diagram. (3 marks)

9. The prices of a certain commodity for a period of four months are given as follows:

Month	Price (Kshs.)
January	40
February	45
March	60
April	55

Using January as the base period, calculate the price index for each month. (4 marks)

10. Outline **four** components of a time series. (4 marks)

SECTION B (68 marks)

Answer any **FOUR** questions from this section in the spaces provided in this question paper.

11. (a) Explain **four** circumstances under which a researcher may prefer a sample to a census, in the collection of data. (8 marks)
- (b) The distribution of profits of 50 companies are shown in the table below:

Profits (Ksh. millions)	Number of companies
8-10	4
11-13	7
14-16	11
17-19	15
20-22	8
23-25	5

Calculate the:

- (i) arithmetic mean
(ii) variance.

(9 marks)

12. (a) In a survey of 200 clients of an insurance company, it was found that:

- 90 had a life insurance policy
- 70 had a medical policy
- 76 had an educational policy
- 36 had life and education policies
- 30 had life and medical policies
- 40 had education and medical policies
- 8 had life, education and medical policies

- (i) Present the information above in form of a Venn diagram;
- (ii) Determine the number of clients who had:
 - I. exactly one policy
 - II. at least two policies
 - III. none of the three policies.

(9 marks)

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13. (a) A firm has analysed their operating conditions and has developed the following functions:

$$\begin{aligned}\text{Revenue - (TR)} &= 400Q - 4Q^2 \\ \text{Cost (TC)} &= Q^2 + 10Q + 30\end{aligned}$$

Where Q is the number of units sold.
Determine the:

- (i) Level of output (Q) that the firm should sell in order to maximize profit;
- (ii) Price that maximize profit;
- (iii) Maximum profit.

(9 marks)

- (b) Explain the meaning of each of the following terms as used in Financial Mathematics:

- (i) compounding
- (ii) discounting
- (iii) perpetuities
- (iv) annuities.

(8 marks)

15. (a) A company intends to establish the relationship between employees' years of experience and productivity in units. The following data relates to 10 employees in the company:

Experience (years)	Productivity (units)
10	30
15	50
5	10
10	25
20	40
15	20
8	10
12	15
10	25
2	10

- (i) Determine the regression equation of productivity on years of experience.
 (ii) Predict the productivity of an employee who has 13 years of experience. (10 marks)

- (b) Using matrix approach, solve the following simultaneous equations:

$$4x - 10y = 14$$

$$2x + 12y = 18$$

(7 marks)

16. (a) The table below shows the productivity of a firm over a period of four years.

Productivity (00's kg)				
Year	Quarter I	Quarter II	Quarter III	Quarter IV
1	20	15	10	40
2	35	30	5	25
3	45	25	30	15
4	50	60	35	50

- (i) Using 3-period moving averages, determine the trend values;
- (ii) Determine the trendline equation;
- (iii) Forecast the productivity of Quarter I in the 5th year.

(10 marks)

(b) Mr. Kato earns Ksh. 360,000 annually. He is offered a choice between a yearly increment of Ksh. 5,000 or an increment of 1.2% annually.

- (i) Calculate the total sum he will earn at the end of 20 years, under each of the options
- (ii) Advise him on the better option.

(7 marks)
