2903/204
2906/204
2926/204
QUANTITATIVE TECHNIQUES
July 2018
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN SUPPLY CHAIN MANAGEMENT
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN HUMAN RESOURCE MANAGEMENT

QUANTITATIVE TECHNIQUES

3 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of SEVEN questions.
Answer any FIVE questions in the answer booklet provided.
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
both pages are printed as indicated and that no questions are missing.

1. (a) Explain **four** objectives of time series analysis. (8 marks)

(b) The data below shows the Body Mass Index (BMI) in Kg/m^2 of 15 pregnant mothers and the birth weight of their newborns.

BMI (Kg/m^2) X	Birth-weight (Kg) Y
20	2.7
30	2.9
50	3.4
45	3.0
10	2.2
30	3.1
40	3.3
25	2.3
50	3.5
20	2.5
10	1.5
55	3.8
60	3.7
50	3.1
35	2.8

(i) determine the regression equation Y and X from the data above.

(ii) using the equation obtained in (i) above, estimate the birth weight of a newborn baby whose mother has a BMI of 54 kg/m^2. (12 marks)

2. (a) Explain **five** areas in which quantitative techniques may be used in business decision making. (10 marks)

(b) The following data relates to the unit sales of three items A, B and C, which have different rates of commission:

Week	Unit Sales			Total Commission drawn (Ksh)
	A	B	C	
1	900	1,000	200	8,000
2	1,300	500	400	9,000
3	600	1,000	300	8,500

Using matrices, determine the rate of commission for each item. (10 marks)

3. (a) Explain the costs that may be associated with running out of stock in a firm.

(10 marks)

(b) A company has the following demand and cost functions for a certain commodity:

$$P = 1200 - 4q^2$$
$$C = 200 + 432q$$

Determine the:

(i) quantity that will maximize profit;

(ii) price that will maximize profit;

(iii) maximum profit. (10 marks)

4. (a) A firm produces two types of products: A and B. The products undergo two major processes: cutting and crushing. The profits per unit are Ksh 6 and Ksh 4 for products A and B respectively. Each unit of product A requires 2 minutes for cutting and 3 minutes for crushing whereas each unit of product B requires 2 minutes for cutting and 1 minute for crushing. The available operating time is 120 minutes and 60 minutes for cutting and crushing respectively.

(i) formulate the linear programming problem;

(ii) using graphical method, determine the optimal amounts of products A and B to be produced in order to maximize profit.

(iii) determine the maximum profit. (12 marks)

(b) Distinguish between each of the following terms as used in hypothesis testing:

(i) null hypothesis and alternative hypothesis;

(ii) type I error and type II error;

(iii) one tailed test and two tailed test;

(iv) critical region and acceptance region. (8 marks)

5. (a) Explain **four** applications of the concept of time value of money. (8 marks)

(b) The mean life time of light tubes manufactured by a company were found to be normally distributed with a mean of 10,000 hours and a standard deviation of 1,000 hours. In the month of February 2016 the company produced a total consignment of 100,000 light tubes.

Determine the number of light tubes whose mean life time is:

(i) above 8,000 hours;

(ii) below 12,000 hours;

(iii) between 7,000 and 13,500 hours;

(iv) between 12,000 and 13,000 hours. (12 marks)

6. (a) The following data relates to the usage of a certain material in a manufacturing company:

Normal usage   440 kgs per day
Minimum usage   200 kgs per day
Maximum usage   560 kgs per day
Lead time   10 - 15 days
Economic order quantity   10,000 kgs

Determine the:

(i) re-order level;

(ii) minimum level;

(iii) maximum level. (10 marks)

(b) Explain **five** rules followed when drawing network diagrams. (10 marks)

7.   (a)   The data below shows the expenditure and weights of a group of consumer items for a given period of time in an economy:

Items	Expenditure (Ksh)	Weights
Sugar	5,000	2
Tea	1,500	5
Meat	6,000	3
Maize flour	3,500	9
Fruits	1,000	3

   (i)   calculate the cost of living index;

   (ii)   comment on the results in (i) above.   (8 marks)

   (b)   The information below relates to a project to be undertaken by a company:

Activities	Preceding Activities	Duration (days)
A	-	5
B	A	10
C	A	15
D	A	10
E	A	6
F	D, C, E	8
G	C, D	12
H	G, F	4

   (i)   Present the information above in the form of a network diagram;

   (ii)   Determine the:

        (I)   critical path;
        (II)   project duration.   (12 marks)

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