2903/204 2922/204
2906/204 2925/204
QUANTITATIVE TECHNIQUES
July 2016
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN SUPPLIES CHAIN MANAGEMENT
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN PROJECT MANAGEMENT
DIPLOMA IN MARITIME TRANSPORT LOGISTICS

QUANTITATIVE TECHNIQUES

3 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of SEVEN questions.
*Answer any **FIVE** questions in the answer booklet provided.*
All questions carry equal marks.
Candidates should answer the questions in English.

This paper consists of 4 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) The total cost function of a firm is given by $C = \frac{1}{3}x^3 + 5x^2 + 28x + 10$ where x is the level output. A tax of Ksh 2 per unit of output is imposed and adds to the total cost of the product. The market demand function is given by $P = 2530 - 5x$ where P is the price per unit of output in Kenya shillings.

Determine the:

(i) total revenue function;
(ii) total cost function;
(iii) profit function;
(iv) profit maximising output level;
(v) maximum profit.

(12 marks)

(b) Explain the **four** components of a time series. (8 marks)

2. (a) Explain **five** applications of quantitative methods in business decision making. (10 marks)

(b) Paul invested different amounts at a simple interest rate of 8%, $8\frac{3}{4}$% and 9% per annum. He invested a total of Ksh 40,000 and earns Ksh 3,455 per annum. He has invested Ksh 4,000 more at 9% per annum than at 8% per annum. Using matrices, determine the amount invested at each rate. (10 marks)

3. (a) A person would prefer a shilling today as opposed to a shilling in the future. Explain **five** reasons for this preference. (10 marks)

(b) The following data shows the number of seat reservations in an airline and the average customer's incomes for a period of 7 years.

Year	Number of seat reservations	Average customer's incomes (Ksh 000's)
1	100	250
2	115	255
3	120	258
4	130	267
5	145	270
6	152	272
7	155	273

(i) Determine the Pearson's Correlation Coefficient.

(ii) Interpret the results in (i) above.

(10 marks)

4. (a) The following information relates to a project to be undertaken by a company.

Activities	Preceding Activities	Duration (weeks)
A	-	9
B	-	
C	A	12
D	A	7
E	B	6
F	B	10
G	C, D	4
H	D, E	8
I	G, H, F	6

(i) Draw a network diagram to represent the information above.

(ii) Determine the:

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

(10 marks)

(b) Explain the reasons why inventories may accumulate in an organization. (10 marks)

5. (a) The data below shows prices and quantities of three commodities for the years 2014 and 2015.

Commodities	2014 Prices	2014 Quantities	2015 Prices	2015 Quantities
A	40	200	50	100
B	120	500	150	200
C	100	200	80	240

Determine:

(i) Laspeyre's price index;
(ii) Paasche's price index;
(iii) Fisher's ideal price index.

(8 marks)

(b) An employee may use either his personal car or public transport or travel on foot to his work place. The probability of using the three modes of transport is 0.2, 0.4 and 0.2 respectively. The probability of being late for work using the three modes of transport is 0.1, 0.7 and 0.5 respectively.

(i) Present the information using a tree diagram.

(ii) Determine the probability that the employee will not be late for work.

(12 marks)

6. (a) Explain **five** requirements of a linear programming model. (10 marks)

(b) A government office claims that it serves its customers within an average time of 10 minutes on annual. A sample of 625 customers was taken and found to have an average service time of 12.5 minutes, with a standard deviation of 3.5 minutes.
Test this claim at 5% level of significance. (10 marks)

7. (a) Distinguish between each of the following terms as used in network analysis.

(i) Event and activity;
(ii) Succeeding activity and preceding activity;
(iii) Total float and free float;
(iv) A loop and a dangling activity.

(8 marks)

(b) The annual demand for batteries by a car dealer is 2,400. Each battery costs Ksh 2,000 and the annual holding cost is 30% of the batteries value. It costs approximately Ksh 200 to place an order. The dealer currently orders 200 batteries per month.

(i) Determine the Economic Order Quantity (EOQ);
(ii) Determine the number of orders that will be made using the EOQ;
(iii) Advice the dealer whether to adopt the EOQ or not.

(12 marks)

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