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2913/204
QUANTITATIVE TECHNIQUES
November 2018
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN SUPPLY CHAIN MANAGEMENT
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN INFORMATION SCIENCE
DIPLOMA IN ENTREPRENEURSHIP
DIPLOMA IN HUMAN RESOURCE MANAGEMENT

MODULE II

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.
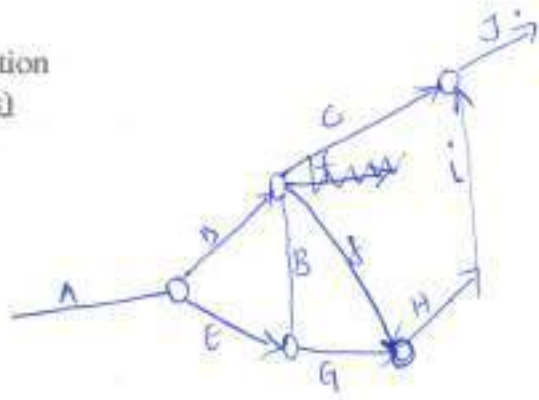*Candidates should answer the questions in English.*

This paper consists of 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.

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1. (a) Explain **four** limitations of quantitative techniques in business decision making.

(8 marks)

(b) Ujezi Limited is constructing a dam whose activities and estimated time durations are as follows:

Activity	Preceding Activities	Time Duration (Months)
A	-	2
B	-	5
C	-	4
D	A	3
E	A	8
F	D	2
G	B, E	5
H	F, G	7
I	C	5
J	H, I	2

(i) draw a network diagram for the project;

(ii) identify the critical path;

(iii) determine the projet duration. (12 marks)

2. (a) The following data relates to the production of a product for nine months during the year 2015:

Month	Units produced	Total cost (Ksh)
January	2	25,600
February	1	19,800
March	5	45,200
April	6	50,000
May	8	64,800
June	4	36,600
July	3	31,600
August	4	38,400
September	6	50,400

(i) using the least squares method, determine the regression Y on X;

(ii) using the equation in (i) above, estimate the total costs that will be incurred during the month of October 2015, if 7 units are produced. (10 marks)

(b) Muthiru Limited requires 50,000 units of material CX per month for the manufacture of its products. The unit purchase price of the material is Ksh 200 per unit and the ordering costs are Ksh 1,500 per order. The holding costs are 25% of the purchase price. Calculate the:

$a = \dfrac{\overline{Y} - bx}{n}$

$b = \dfrac{n\Sigma xy - \Sigma f\Sigma y}{n\Sigma_i^2 - (\Sigma x)^2}$

(i) Economic Order Quantity (EOQ); $= \sqrt{\dfrac{2d\sigma}{n}}$ $\dfrac{25}{100}$

(ii) number of orders per year;

$y = a + bx$

(iii) total costs associated with the inventory. (10 marks)

3. (a) Explain **five factors that** may be considered by a manufacturing company when setting their maximum stock level for a given raw material. —lead time (10 marks)
—storage duration.

(b) The following data shows the advertising costs and the corresponding sales revenue for Tride Enterprises for a period of 9 months.

Advertising costs (Ksh '000') (X)	Sales Revenue (Ksh '000') (Y)
1	9
2	8
3	10
4	12
5	11
6	13
7	14
8	16
9	15

$R = \dfrac{n\Sigma xy - \Sigma x\Sigma y}{n\Sigma x^2 - (\Sigma x)^2 \ast n\Sigma y^2 - (\Sigma y)^2}$

(i) calculate Pearson's correlation coefficient;

(ii) interpret the results in (i) above. (10 marks)

4. (a) Differentiate between each of the following terms as used in test of hypothesis:

(i) one tailed test and two-tailed test;

(ii) a statistic and a parameter. (8 marks)

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(b) The following data shows the price and quantities of three commodities A, B and C for the years 2013 and 2016:

Commodity	2013		2016	
	Price (Ksh)	Quantity (Units)	Price (Ksh)	Quantity (Units)
A	40	500	100	400
B	30	100	80	20
C	20	60	40	20

(i) Calculate:

(I) Laspeyre's quantity index;

(II) Paasches quantity index;

(III) Fisher's ideal quantity index.

(ii) Interpret the results in (III) above. (12 marks)

5. (a) Explain the meaning of each of the following terms as used in network analysis:

(i) dummy activity;

(ii) total float;

(iii) independent float;

(iv) crashing;

(v) dangling activity. (10 marks)

(b) Ufundi Enterprises makes furniture for sale. The cost of making 8 tables and 5 chairs is Ksh 14,000. The cost of making 3 tables and 7 chairs is Ksh 7,300.

(i) Using matrices, determine the cost of making:

(I) one table;
(II) one chair.

(ii) Ufundi Enterprises expects to make a profit of 30% and 40% on each table and chair respectively, determine the selling price for:

(I) one table;
(II) one chair. (10 marks)

6. (a) Uzalendo Enterprises manufactures and sells products MZ. The average revenue (AR) and total cost (TC) functions are as follows:

$$AR = 200 - 8Q$$
$$TC = Q^2 - 16Q$$

Where Q is the level of output in units. Determine the:

(i) total revenue function;
(ii) output level that maximizes profits;
(iii) output level that maximises revenue. (10 marks)

(b) Musau deposited Ksh 300,000 in a commercial bank for a duration of 3 years. All deposits with the bank are compounded at an interest rate of 12% per annum.

(i) Calculate the total interest earned by Musau at the end of 3 years if compounding is done;

(I) annually;
(II) semi-annually.

(ii) Calculate the difference in interest earned between (I) and (II) above. (10 marks)

7. (a) Explain the meaning of each of the following terms as used in probability theory:

(i) mutually exclusive events;
(ii) dependent events;
(iii) random experiment;
(iv) independent events. (8 marks)

(b) Upendo Limited manufactures two products A and B. Each unit of product A requires 10 kg of raw material P and 20 kg of raw material Q. Each unit of product B requires 30 kg of raw material P and 15 kg of raw material Q. The firm should produce at least 150 units and 210 units of products A and B respectively. The supplies of raw material Q sells a minimum of 10 units. The cost per unit of raw materials P and Q is Ksh 20 and Ksh 80 respectively.

(i) Formulate a linear programming problem;

(ii) Using the graphical method, determine the quantities of products A and B to produce in order to minimize costs. (12 marks)

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