

COURSE CODE: MBA 805

TITLE: QUANTITATIVE TECHNIQUE

DURATION:

INSTRUCTIONS

1. This paper contains six (6) questions.
2. Answer any 4 questions.
3. Write all answers in the booklet provided.

1(a) Define the following terms; (2mks)

- Revenue function
- (ii) A singular matrix

(b) Given a matrix H , find H^T and H^{-1} . (4mks).

(c) Consider the following universal set T and its subsets C , D and E

$$T = \{0, 2, 4, 6, 8, 10, 12\}, C = \{4, 8\}, D = \{10, 2, 0\}, E = \{0\}. \text{ Find}$$

- $D \cap E$
- $C \cap D \cap E$ (4mks)

(d) What is the probability of obtaining a total of 9 points in a single throw with two dice? (4mks)

(e) Outline 4 components of a time series analysis in business decision making. (4mks)

2(a) What is meant by a diagonal matrix. (1mk)

(b) Using Cramer's Rule, find the value of z in the following systems of equations. (3mks)

$$2x + y + z = 1$$

$$x - y + 4z = 0$$

$$x + 2y - 2z = 3$$

(c) Given that $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, show that $A^{-1}A = I$. (4mks)

(d) In analysing switching by business class customers between airlines, the following data has been obtained by British Airways (BA).

		Next flight	
		BA	Competitor
Last flight	BA	0.85	0.15
	Competitors	0.10	0.90

Currently BA has 30% of the market.

Required

(i) What will be the expected market share for BA after another 3 flights?

(ii) What would be the long run prediction for the expected market share for BA and their competitors?

(7mks)

3. (a) If $A=\{3,4,6\}$, $B= \{5,8,9\}$ and $C= \{2,9,7\}$, show that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$. (4mks)

(b) When are sets said to be disjoint. (2mks)

c) A survey of 600 students showed that 310 listened to the radio for news, 370 watched TV while 120 listened and watched both radio and TV for news.

Required:

- How many students listened to the radio but did not watch TV? (3mks)
- How many students used exactly one device? (3mks)
- How many students did not either listen to radio or watch TV? (3mks)

4 (a) what is a time series? (2mks)

(b) Name any three methods used in measuring the secular trend. (3mks)

(c) Below are the figures of production of a sugar factory

YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PRODUCTION (In thousand tonnes)	815	885	775	781	841	765	810	820	845	780

Compute the moving average for three years and plot the data on a graph. (10mks)

5 (a) Define and give an example of a composite function (1mks)

(b) Find the derivatives of the following functions: (4mks)

(i) y^2

(ii) $y =$

(c) Integrate the following function with respect to X (2mks)

$$8x^3 - 3x^2 + 8x$$

(d) Digital Ltd. Manufactures and sells floppy disks at Nairobi Industrial Area.

The average total cost (ATC) and Average Revenue (AR) (in thousands of shillings)

of producing x floppy disks are given by the following functions:

$$ATC = \frac{1}{2}x^2 - \frac{5}{2}x + 50 + \frac{500}{x} \quad \text{and} \quad AR = 800 - 2x^2$$

Where: x is the number of floppy disks produced

Required:

i) The profit function (3 marks)

ii) The number of floppy disks required to maximize profit (3 marks)

iii) The maximum profit (2mks)

6(a) Define the following terms (2mks)

• Mutually exclusive events

(ii) Independent events

(b) A product is assembled from three components X, Y and Z. The probability of these components being defective is 0.01, 0.02 and 0.05 respectively. What is the probability that assembled product will not be defective? (4mks)

(c) An advertising agency is going to decide which of the three advertising methods to use for a certain product. The probability that they will choose T.V is 0.6, the probability that they will choose magazines is 0.25 and that the probability they will choose newspapers is 0.15. The probabilities of achieving a high coverage ratio with the three methods are 0.80, 0.50 and 0.40 respectively. After

making the choice, the agency determines that they did in fact, achieve a high coverage ratio. Given this information, what is the probability that the agency chose: (9mks)

(i) T.V?

(ii) Magazines?

Newspapers?