

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN BUSINESS MATHEMATICS II

DIBM 0122: BUSINESS MATHEMATICS II

STREAMS: DIBM Y1S2

TIME: 2 HOURS

DAY/DATE: FRIDAY 8/12/2017

11.30 A.M - 1.30 P.M.

INSTRUCTIONS:

- Answer Question ONE (Compulsory) and any other TWO questions.

QUESTION ONE

(a) Briefly explain the following terms giving examples where applicable

- (i) Identity matrix [2 Marks]
- (ii) Time value of money [2 Marks]
- (iii) Mutually exclusive events [2 Marks]
- (iv) Disjoint sets [2 Marks]
- (v) Ordinary annuity [2 Marks]

(b) A family enters a saving plan whereby they will invest \$1000 at the end of each year for 5 years. The annuity will pay 7% interest compounded annually. Find the value of the annuity at the end of the 5 years. [3 Marks]

(c) Through observation, it has been determined that the probability for a given number of people waiting in line at a particular checkout register of a supermarket is as shown in the table below: -

Number waiting in line	0	1	2	3	4 or more
Probability	0.10	0.15	0.20	0.24	0.31

Find the probability of

- (i) At most 2 people in line. [2 Marks]
 - (ii) At least 2 people in line [2 Marks]
- (d) Given the following sets A and B such that $A = [1, 3, 5]$ and $B = [3, 4, 5, 6]$, using Venn diagrams represent $A \cup B$. [3 Marks]

(e) Given matrix $P = \begin{bmatrix} 4 & 1 & 9 \\ 8 & 4 & 8 \\ -2 & -1 & -5 \end{bmatrix}$

Find

- (i) The dimension of matrix P [2 Marks]
- (ii) The transpose of matrix P [2 Marks]
- (iii) The determinant of Matrix P [4 Marks]

(f) Given matrix $A = \begin{bmatrix} 3 & 4x \\ 2.1 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 9 \\ 2.1 & 7 \end{bmatrix}$

Where $A=B$. Find the value of X. [2 Marks]

QUESTION TWO

(a) The following table summarizes the graduating class of a Midwestern University.

	Arts and Sciences (A)	Education (E)	Business (B)	Total
Male (M)	342	424	682	1448
Female (F)	324	102	144	570
Total	666	526	826	2018

A student is selected at random from the graduating class. Find the probability that the student: -

- (i) Is male [2 Marks]
- (ii) Is receiving an Arts and Science degree [2 Marks]
- (iii) Is a female receiving a business degree [2 Marks]
- (iv) Is a female, given that the student is receiving an education degree [2 Marks]
- (v) Is receiving an Arts and Sciences degree, given that the student is male. [2 Marks]

(b) Given $A = \begin{bmatrix} 3 & 1 & 4 \\ 2 & 0 & 2 \\ 1 & 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 5 \\ 8 & 4 & 8 \\ 2 & 5 & 4 \end{bmatrix}$

Find

- (i) $A+B$ [2 Marks]
- (ii) $2A$ [2 Marks]
- (iii) $A-B$ [2 Marks]
- (iv) AB [4 Marks]

QUESTION THREE

- (a) An economy is based on three sectors: - Manufacturing,(M), transportation (T) and services (S). the input-output matrix is: -

$$\begin{matrix} & \begin{matrix} M & T & S \end{matrix} \\ \begin{matrix} M \\ T \\ S \end{matrix} & \begin{bmatrix} 0.4 & 0.1 & 0 \\ 0.1 & 0.3 & 0.4 \\ 0.2 & 0.1 & 0.2 \end{bmatrix} \end{matrix}$$

Find the production needed to satisfy a consumer demand of $\begin{bmatrix} 25\ 000 \\ 10\ 000 \\ 18\ 000 \end{bmatrix}$ [10 Marks]

- (b) Find the present value of an annuity with periodic payment of \$2000, semiannually for a period of 10 years at an interest rate of 6% compounded semiannually. [5 Marks]

- (c) Use Cramers method to solve the following system of linear equation [5 Marks]

$$\begin{aligned} X_1 + 3X_2 &= 5 \\ 2X_1 + X_2 &= 10 \end{aligned}$$

QUESTION FOUR

- (a) An entrepreneur is considering setting up an ice-cream shop at University Shopping Centre. One morning she visits the wholesaler and decides whether to buy large, medium or small quantity ice creams. Her profits depend on the number of people visiting the shopping centre and this is determined by the weather condition. The data below gives the profit/loss for different weather conditions in Kenya shilling.

	Good Weather	Average Weather	Poor Weather
Large quantity	Profit = 10,000	Profit = 4,000	Loss = 2,000
Medium quantity	Profit = 7,000	Profit = 6,000	Profit = 2,000
Small quantity	Profit = 4,000	Profit = 1,000	Profit = 4,000

Given that the probability for good weather is 0.2, the probability for average weather is 0.5 and for poor weather is 0.3. Based on the above information, which quantity should she buy?

[10 Marks]

- (b) Using the matrix inverse method, solve the following simultaneous equations. [10 Marks]

$$\begin{aligned} \text{(i)} \quad x + 2y + 3z &= -1 \\ \text{(ii)} \quad 2x - 3y + 4z &= 2 \\ \text{(iii)} \quad 3x - 5y + 6z &= -3 \end{aligned}$$

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