CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

CHUKA, EMBU & THARAKA

EXAMINATION FOR THE AWARD OF DIPLOMA IN BUSINESS MANAGEMENT, DIPLOMA IN PROCUREMENT AND LOGISTICS MANAGEMENT, DIPLOMA IN ACCOUNTING

DIBM 0122: BUSINESS MATHEMATICS II

STREAMS: DIBM, DPLM, DIAC **TIME: 2 HOURS**

DAY/DATE: MONDAY 10/12/2018 **11.30 AM – 1.30 PM**

INSTRUCTIONS:

- **Answer Question One and any other Two**
- **Do not write on the question paper**

QUESTION ONE

(a) Ukulima savings and credit cooperative society provides low cost retail lending services to its members. The loan is to be repaid in equal annual installment of ksh. 2506. The applicable interest charge is 10% per annum and the loan is repayable in 5 years.

Determine

(i) The amount of loan a member can borrow to the nearest whole number [3 marks]

(ii) Prepare a loan amortization schedule that would guide the client on loan repayment. [5 marks]

(b) Given that $A = \begin{bmatrix} -2 & 4 & 5 \\ 6 & -9 & 4 \\ 3 & 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 0 & -3 \\ 4 & 5 & 1 \end{bmatrix}$ find,

(i) AB [3 marks]

(ii) A+B [2 marks]

(c) From past experience, a machine is known to be set up correctly in 90% of occasions. If a machine is set up correctly, then 95% of parts are expected to be good but if a machine is set up incorrectly the probability of good part is 30%. Determine the probability that a machine was set up correctly given that a good part was produced. [5 marks]

(d) Discuss three types of decision making environment [6 marks]

(e) Distinguish the following terms as used in probability theory:

(i) Sample space and sample point [2 marks]
(ii) Sure events and uncertain events [2 marks]
(iii) Independent events and mutually exclusive events [2 marks]

QUESTION TWO

(a) A firm considers production of either product A, B or C to be courses of action while the likely demand for the products as the states of nature. The payoffs for the products (in thousand shillings) are as shown below:

	Product		
Demand	A	B	C
High	2500	-1000	-1250
Moderate	4000	4400	4000
Low	6500	7400	750

Required:

Advise on the best production mix under the following criteria.

(i) Maximax criterion [2 marks]
(ii) Maximin criterion [2 marks]
(iii) Savage principle [3 marks]
(iv) Laplace criterion [2 marks]
(v) Hurwicz criterion ($\propto = 0.75$) [2 marks]

(b) Use Crammers rule to solve

$x + 2y + 3z = 3$
$2x + 4y + 5z = 4$
$3x + 5y + 6z = 8$ [7 marks]

(c) Define the term random experiment as used in probability. [2 marks]

QUESTION THREE

(a) Distinguish between open and closed Leontief models (illustrate where possible) [4 marks]

(b) A three-sector economy consisting of coffee, tea and pyrethrum interacted as shown in the table below in a particular production period.

	Coffee	Tea	Pyrethrum
Coffee	0.4	0.5	0.1
Tea	0.3	0.2	0.2
Pyrethrum	0.1	0.2	0.6

The projected demand for the three sectors are 20 units, 50 units and 30 units for coffee, tea and pyrethrum respectively.

(i) Derive the respective technology matrix [2 marks]

(ii) Determine the number of units each sector should produce to satisfy the projected demand. [8 marks]

(c) Mkopo borrowed invested of ksh 100,000 in a bank whose interest rate was 18% p.a compounded quarterly. Determine the amount owed to the bank after five years. [3 marks]

(d) Given that $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 3 & 1 \\ 4 & 2 & 4 \end{bmatrix}$ find its determinant. [3 marks]

QUESTION FOUR

(a) A basket has 5 oranges, 4 tomatoes and 3 lemons. Two fruits are drawn one after the other without replacement.

Required:

(i) Draw a probability tree representing the experiment [3 marks]

(ii) Determine the probability of picking a lemon on the first draw and an orange on the second draw. [2 marks]

(iii) Determine the probability of drawing a lemon and an orange. [3 marks]

(iv) What is the probability of picking tomatoes on both draws? [2 marks]

(b) A supermarket manager wants to display six brands of a particular product on a shelf. In how many ways can he arrange the brands? [3 marks]

(c) Distinguish the following terms as used in financial mathematics

(i) Annuity and perpetuity [2 marks]
(ii) Compounding and discounting [2 marks]

(d) Given that $\begin{bmatrix} n & 25 \\ 5 & 5n \end{bmatrix}$ is a singular matrix determine the value of n [3 marks]
