

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

CHUKA, EMBU, THARAKA AND EMBU

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

DIBM 0122: BUSINESS MATHEMATICS II

STREAMS: DIBM YIS2

TIME: 2 HOURS

DAY/DATE: MONDAY 05/08/2019

2.30 PM – 4.30 PM

INSTRUCTIONS:

Answer Question One and any other Two Questions

QUESTION ONE (30 MARKS)

- (a) Explain the meaning of the following probability terms
- | | | |
|-------|-----------------------|-----------|
| (i) | A random experiment | [2 marks] |
| (ii) | Independent events | [2 marks] |
| (iii) | Equally likely events | [2 marks] |
- (b) Akinyi and Melisa purchased rice from two supermarkets P and Q. Akinyi purchased 1000 kg from P and 700 kg from Q. Melisa purchased 400 kg from P and 800 kg from Q. If one kg of rice in P costs ksh. 40 while in Q it costs ksh. 50, use matrix operations find the amount of money spent by each person individually. [4 marks]
- (c) From past experience, a machine is known to be set up correctly in 90% of the occasions. If the machine is set up correctly, there are 95% chances of producing good parts but if the machine is not set up correctly, then the probability of producing good parts is only 30%. What is the probability that the machine was set up correctly given that a good part was obtained? [6 marks]

- (d) (i) A deposit of sh. 20,000 earns interest of 6% p.a compounded monthly for a period of four years. What is the accumulated amount at the end of the holding period?
[4 marks]
- (ii) Juma wants to invest in an insurance policy that requires a deposit of ksh. 10,000 at the end of first year then ksh. 25,000 at the end of second, third and fourth year respectively. The policy provides compound interest rate at 9% p.a. How much will have accumulated at the end of the 4th year?
[4 marks]
- (e) An economy has two industries T1 and T2. The industries have the following technology matrix
 $A = \begin{pmatrix} 0.4 & 0.2 \\ 0.3 & 0.1 \end{pmatrix}$ and $D = \begin{pmatrix} 10 \\ 12 \end{pmatrix}$. Solve for X given the matrix equation $X = (1 - A)^{-1}D$
 [6 marks]

QUESTION TWO (20 MARKS)

- (a) Use matrix algebra to solve the following system of simultaneous equations
 $2x_1 + 3x_2 - 7 = 0$
 $x_1 + 5x_2 - 14 = 0$
 [5 marks]
- (b) Explain the meaning of decision theory and describe the decision-making environments.
 [6 marks]
- (c) The marketing department for the company has worked out payoffs (in sh.000) in terms of yearly net profits for each of its strategies S_1 , S_2 and S_3 under the three states of nature E_1 , E_2 and E_3 with probabilities 0.8, 0.15 and 0.05 respectively.

	Strategies		
States of Nature	S_1	S_2	S_3
E_1	700	500	300
E_2	300	450	300
E_3	150	0	300

Required:

Which strategy should be selected on the basis of

- (i) Maximin [2 marks]
 (ii) Laplace [2 marks]
 (iii) Minimax Regret [2 marks]
 (iv) Expected Monetary Value [3 marks]

QUESTION THREE (20 MARKS)

- (a) Distinguish between a permutation and a combination. [2 marks]

- (b) Consider the letters in the word FATHER.
- (i) Assume that all letters are taken at once, how many permutations are possible? [2 marks]
- (ii) How many arrangements are possible if letter T and H are next to each other? [2 marks]
- (iii) Assume that four letters are taken at once. How many arrangements are possible? [2 marks]
- (c) A credit committee of 11 members is to be constituted from 9 directors, 7 credit officers and the chairman of a SACCO. In how many ways can the committee be formed such that:
- (i) Any of the eligible members can be included [2 marks]
- (ii) The chairman of the SACCO must be included [2 marks]
- (iii) The chairman and 5 directors must be included [2 marks]
- (d) A problem in business mathematics is given to three students A, B and C, whose chances of solving it independently are $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ respectively. Find the probability that:
- (i) At least two of them are able to solve the problem [2 marks]
- (ii) Exactly two of them are able to solve the problem [2 marks]
- (iii) Exactly one of them is able to solve the problem [2 marks]

QUESTION FOUR (20 MARKS)

- (a) Explain the difference between open and closed Leontief model. [2 marks]
- (b) A deposit taking Sacco provides credit services to its members. A member wishes to borrow a loan to be repaid in five equal annual instalments of sh. 4161.23. A section of the loan repayment schedule is provided in the table below:

Year	Beginning Balance	Annual instalment amount	Interest payment	Principal payment	Ending balance
1	??	4161.23	1800	??	12,638.77
2	??	4161.23	??	??	??
3	??	4161.23	??	??	??
4	??	4161.23	??	??	??
5	??	4161.23	??	??	??

Required: Complete the table

[6 marks]

- (c) Radi has an opportunity of investing in two opportunities A and B that are mutually exclusive. The returns of investment plan A is sh. 22,000 at the end of each year for a period of five years while that of B is sh. 20,000 at the start of each year for the similar period of five years. Advise him on the best investment plan given that the prevailing discounting rate over the period is 10% per annum and his objective is to maximize the investment returns. [6 marks]
- (d) Define the following terms as applied in matrix algebra
- (i) Equal matrices [2 marks]
 - (ii) Row matrix [2 marks]
 - (iii) Singular matrix [2 marks]
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