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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR FOUR**

**THIRD SEMESTER EXAMINATION**

**SCHOOL OF BUSINESS AND ECONOMICS**

**FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT**

**COURSE CODE: BBM 113**

**COURSE TITLE: INTRODUCTION TO BUSINESS MATHEMATICS I**

**EXAMINATION DURATION: 3 HOURS**

**DATE: 09/08/18 TIME: 09.00-12.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has SIX (6) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other THREE (3) questions from the remaining FIVE (5) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FIVE (5) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Give three reasons why a mathematical approach in business analysis is preferable and more efficient than the literary approach. [**3 marks]**
2. Given that A is the set of odd numbers less than 20, and B is the set of prime numbers less than 20, list the members of
3. A **[1 mark]**
4. B **[1 mark]**
5. AB **[1 mark]**
6. AB **[1 mark]**
7. Evaluate

$\left|\begin{array}{c}1 2 3\\2 1 1\\3 1-2\end{array}\right|$ **[4 marks]**

1. Define a linear function. **[2 marks]**
2. What is the equation of the line joining the point (-3, -3) and has a slope of -2 **[3 marks]**
3. Solve the simultaneous equations by eliminating or substitution.
4. $2x+6y=8$
$2x+8y=20$ **[4 marks]**
5. $4x-3y=4$

$$x+3y=21$$

1. The profit of a company are given by the following equation W=-56000+ 1200Q-4Q2 where Q is the price of the product. Calculate the price at which profit is zero. [**4 marks]**
2. Find the equilibrium price and quantity for the following market model

 **[4 marks]**



**QUESTION TWO**

1. Consider the following sets

A={x: } B=={x: } C={5,8, 9} D={0} Find the following

1. BA iv) C’
2. B’ v) 
3. C’ **[5 marks]**

 **b)** Find the determinant of the following matrix. **[4 Marks]**



c) The Kikomi retail store stocks two types of shirts A and B. These are packed in attractive cardboard boxes. In one week the store can sell a maximum of 400 shirts of type A and a maximum of 300 shirts of type B. The store capacity is however limited to a maximum of 600 of both type combined. Type A shirt fetches of Ksh 20 per unit and Type B a profit of 50 shillings per unit. Formulate a mathematical model for this problem **[6 marks]**

**QUESTION THREE**

a) Given B=  and C= 

 Find:

**(i)** **(ii)  [5 marks]**

1. Solve by graphical method

Maximize z=8x+10y

Subject to: 3x+5y≤500

 4x+2y≤350

 6x+8y≤800

 x≥0, y≥0 **[6 marks]**

1. State four conditions/requirements for a system to be called Markovian process  **[4 marks]**

**QUESTION FOUR**

1. A small town with a population of 10,000 people has three banks A, B and C. It has been established that customers shift from one bank to another each month. The transition probability matrix is

$$p=from \begin{matrix}A\\ B \\C\end{matrix}\begin{matrix}0.6&0.3&0.1\\0.4&0.5&0.1\\0.2&0.1&0.7\end{matrix}$$

Initially the market shares are

A - 30%

B - 40%

C - 30%

Determine the market share after one month. **[4 marks]**

1. A certain commodity has demand and supply functions both of which have been estimated to be linear. When the price P = sh.7500, $q$ the quantity $q$= 1000 units and when the P= sh.4625, the quantity $q$ = 750 units.

Obtain a linear equation from the information given and state, giving reasons, whether it is a supply function or a demand function. **[7 marks]**

1. Briefly explain what is meant by “market equilibrium” **[4 marks]**

**QUESTION FIVE**

1. Solve the following system of equations using matrix inverse. **[4 marks]**



1. Define the term universal set and infinite set **[3 marks]**
2. A group operates a chain of filling station in each of which are employed cashier, attendants and mechanics

 Type of filling station

 

Number of filling station

 

How many various types of staff are employed in Nairobi, Mombasa and Kisumu? **[8 marks]**

**QUESTION SIX**

The Marangi Paint Company produces both interior and exterior paints from two raw materials M1 and M2. The following table provides the basic data for the problem

|  |  |
| --- | --- |
|  | Tons of raw material |
| Production | Exterior Paints Interior Paints  | Maximum daily  |
| Raw material M1 | 6 4 | 24 |
| Raw material M2 | 1 2 | 6 |
| Profit per ton (Kshs 000) | 5 4 |  |

A market survey indicates that the daily demand for interior paints cannot exceed that of exterior paint by more than one ton. Also the maximum daily demand for interior paint is 2 tons. Use simplex method to determine the optimum product mix for interior and exterior paints that maximizes the daily profits  **[15 marks]**