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**University Examinations 2015/2016**

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF

BACHELOR OF COMMERCE

**SMB 3110: MATHEMATICS FOR BUSINESS**

**DATE: AUGUST 2016 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two***questions.

**QUESTION ONE (30 MARKS)**

1. P and Q and the corresponding universal set U are given by



Show that

1.  (3 marks)
2.  (3 marks)
3. The depreciation function V, of a certain piece of industrial equipment has been found to be described by the function;  where t=time in years, V=book value at time t.
4. What is the annual depreciation rate? (1 mark)
5. What was the purchase cost of the asset? (2 marks)
6. What is the book value after 6 years? (2 marks)
7. Solve for in:

 (3 marks)

1. The demand of a certain product is given by the equation  where is the number of units demanded and is the price per unit.
2. Find the marginal revenue function (4 marks)
3. What is the marginal revenue at  (2 marks)
4. If , find the limit of the function as  (3 marks)
5. Define a transition matrix. (2 marks)
6. The marginal cost function of manufacturing x units of a product is . The total cost of producing 5 items is 500 dollars. Find the total cost function (5 marks)

**QUESTION TWO (20 MARKS)**

1. You are given the following demand and supply functions for a commodity



Find the equilibrium price and quantity (5 marks)

1. Given the matrix , find  (4 marks)
2. A manufacturer can sell x units of a product per week at a price  each. The cost of producing  units is  Determine the number of units the manufacturer should produce to maximize his profit. (6 marks)
3. The cost C of processing an application for a certain task is given as

, where x=number of analysts. Calculate the cost of x=40. (2 marks)

1. Show that the function is continuous at . (3 marks)

**QUESTION THREE (20 MARKS)**

1. The main daily newspapers in a certain town are: The County, The National and the Times. A survey of 120 families in the town found the numbers that read the various newspapers to be as follows:

County 28

County and Time 8

Time 30

County and National 10

National 42

Times and National 5

All the three papers 3

1. Draw a Venn diagram displaying the given data and determine the number of elements in each region. (4 marks)
2. Determine the number of families who did not read any of the three newspapers.

(2 marks)

1. Rahab earns a salary of Sh.14,800 every month. She has an annual increment of Sh.480; determine her
2. Monthly earning during the 15th year of employment. (2 marks)
3. Total earnings after 8 years. (4 marks)
4. Solve the system of linear equations

 (5 marks)

1. Evaluate  (3 marks)

**QUESTION FOUR (20 MARKS**)

1. The cost function of a firm is given by . Find:
2. The average cost; when x=4 (3 marks)
3. The marginal cost, when x=4 (3 marks)
4. Find  in each of the following
5.  (2 marks)
6.  (2 marks)
7.  (2 marks)
8.  (2 marks)
9.  (2 marks)
10. The marginal revenue function of a commodity is given as . Find the total revenue and he corresponding demand function. (4 marks)

**QUESTION FIVE (20 MARKS)**

1. Determine the gradient of the curve at x=3. (3 marks)
2. Determine:
3.  (2 marks)
4.  (3 marks)
5.  (4 marks)
6. Find the inverse of the matrix

, and verify your results. (8 marks)