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**University Examinations 2014/2015**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION

**HBC 2110: MANAGEMENT MATHEMATICS**

**DATE: DECEMBER 2014 TIME: 2HOURS**

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

**QUESTION ONE (30 MARKS)**

1. Define the following and give example
2. A set (1 mark)
3. Union of two sets (2 marks)
4. Intersection of two sets (2 marks)
5. for the quadratic function , determine
6. concavity (1 mark)
7. y- intercept (1 mark)
8. the coordinates of the vertex (2 marks)
9. The resale value V (stated in ksh) of a certain type of industrial equipment has been found to behave according to the function V=100,000e-0.1t, where t-years since original purchase.
10. What was the original value of the piece of equipment (2 marks)
11. What is the expected resale value after 5 years (2 marks)
12. A man buys premium bonds every year. In the first year, he buys sh. 2000 worth of bonds. If every year he increases his annual investment in bonds by sh. 600, how long will he take for his total investment in bonds to be sh. 37000 (4 marks)
13. Find the points of discontinuity of the function f(x)= and explain why they are points of discontinuity. (3 marks)
14. A bag contains sh.5 coins and sh.10. There are 14 coins in total and their value is sh.105. Find the number of each type of coin (3 marks)
15. A teenager plans to deposit $50 in a savings account at the end of each quarter for the next 6 years. Interest is earned at a rate of 8 percent per year compounded quarterly. What should her account balance be 6 years from now? How much interest will she earn? (4 marks)
16. A company receives $45 for each unit of output sold. It has a variable cost of $25 per item and a fixed cost of $1600. What is its profit if it sells 200 items? (3 marks)

**QUESTION TWO (20 MARKS)**

1. The main daily newspapers in Meru town are: The County, The National and the Times. The management of one of the dailies is concerned about the low sale volume of their paper. In a recent survey of 120 families in Meru town, the numbers that read the various newspapers were found to be as follows:

County 28

County and Times 8

Times 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. Solve the inequality (3 marks)
2. Solve the quadratic equation (3 marks)
3. A company manufacturers two products, A and B. Each unit of A requires 3 labour hours and each unit of B requires 5 labour hours. Daily manufacturing capacity is 150 labour hours.
4. If x units of product A and y units of product B are manufactured each day and all labour hours are to be used, determine the linear equation that requires the use of 150 labour hours per day. (2 marks)
5. How many units of A can be made each day if 21 units of B are manufactured each day? (2 marks)
6. How many units of A can be made each week if 12 units of B are manufactured each day? (Assume a 5 day work week) (3 marks)
7. List down all the subsets of the set (1 mark)

**QUESTION THREE (20 MARKS)**

1. Rahab earns a salary of sh. 14800 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. Sketch the graph of the exponential function, for -3 (4 marks)
5. Solve by elimination method the system of linear equations (5 marks)

2x+y+4z=12

x+2y+2z=9

3x-3y-2z=1

1. A newly created state welfare agency is attempting to determine the number of analysts to hire to process welfare applications. Efficiency experts estimate that the average cost C in dollars of processing an application is a function of the number of analysts x. Specifically, the cost function is . Given this logarithmic function;
2. Determine the average cost per application if 20 analysts are used (3 marks)
3. Use a calculator to solve the equation (2 marks)

**QUESTION FOUR (20 MARKS)**

1. A credit union has issued a 3 year loan of $ 5,000. Simple interest is charged at a rate of 10% per year. The principal plus interest is to be repaid at the end of the third year. Compute the interest for the 3 year period. What amount will be repaid at the end of the third year? (4 marks)
2. A publishing company plans to replace a piece of equipment at an expected cost of 65000 dollars in 10 years. The company establishes a sinking fund with annual payments. The fund draws 7% interest compounded annually. Calculate the periodic payments

(5 marks)

1. At the stock market, a certain share with a value of sh. 38.50 depreciated at the rate of 5% every six months for 2 years. Thereafter, it depreciated at the rate of 3% p.a after every three months for the next 3 years. Calculate the value of the share after the 5 years.

(5 marks)

1. Evaluate the given limits
2.  (3 marks)
3.  (3 marks)

**QUESTION FIVE (20 MARKS)**

1. (i) Briefly explain the concept of time value of money and outline its importance in investment (4 marks)

(ii) Distinguish between an ordinary annuity and an annuity due (2 marks)

1. An investment earns interest of 7% per year, compounded annually. If $5,000 is invested at the end of each year, to what sum will the investment have grown at the time of the tenth deposit? (4 marks)
2. (i) State the necessary conditions for a function to be continuous, at the number a

(3 marks)

 (ii) Use the conditions in C(i) above and the properties of limits to show that the function

 =is continuous at a=4 (3 marks)

1. If f(x) =2x+1 and g(x)= , find
2. (1 mark)
3. (1 mark)
4. (2 marks)