THE COOPERATIVE UNIVERSITY OF KENYA
END OF SEMESTER UNIVERSITY EXAMINATIONS 2018/2019
EXAMINATION FOR THE DEGREES OF BACHELOR OF SCIENCE IN
COMPUTER SCIENCE/BACHELOR OF INFORMATION TECHNOLOGY/
BACHELOR OF BUSINESS INFORMATION TECHNOLOGY AND
BACHELOR OF SCIENCE IN APPLIIED STATISTCS AND
INFORMATION TECHNOLOGY
COURSE CODE: BMAT 1101
UNIT TITLE : BASIC MATHEMATICS
DATE: DECEMBER 2018
TIME: 2 H OURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.

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QUESTION ONE

(a) Solve the following inequalities and graph the solutions on a number line.
   (i) -2x + 5 > 15
   (ii) 17   –   3   x   <   41
   (6 marks)

(b) Using examples, demonstrate the meaning of the following concepts
   (i)   Union of sets
   (ii)   Intersection of sets
   (iii)   Compliment   of   a   set
   (6 marks)

(c) Solve $log_2(x + 1) - log_2(x − 1) = 1$ and
          $\log x + \log(2x − 1) = \log 6$
   (6 marks)

(d) Show that the sum of a geometric series with first term, (a) and common ratio (r) is given by the expression $Sn = \dfrac{a(1-r^n)}{1-r}$

(6 marks)

(e) Give the domain of the functions: $f(x) = \dfrac{1}{x^2-x-6}$ and $f(x) = \dfrac{\sqrt{x-1}}{x^2+4}$

(6 marks)

QUESTION TWO

(a) (i) Differentiate between arithmetic and geometric series. (3 marks)

(ii) Find the 15th term and 20th term of A.P. 31, 35, 39, 43, 47 (5 marks)

(b) The 3rd and 6th terms of a G.P are 5 and -40 respectively. Find the 8th term of this sequence (3 marks)

(c) (i) Determine $A^1 B^1$ and C^1 if U is universal set

U=(1, 2, 3, 4, 5, 6, 7, 8, 9)

A= (4, 5, 6)

B=(2, 4, 6, 8)

C= (1, 4, 7, 8)

(3 marks)

(i) If A =(3, 4, 5, 6, 7) and B=(5, 6, 7, 8, 9) find out A-B and B-A and also present the set operation through Venn diagram. (6 marks)

QUESTION THREE

(a) Define an annuity. (2 marks)

(b) If Ksh.7500 is invested for 4 years at compound interest. At what rate will the money amount to Ksh. 9116.30 (5 marks)

(c) Mr. Peterson wants to evaluate how much he will get in 10years if he invests $10,000 with an investment plan that earns 8% for four years and then earns 4% for the remaining six years. Calculate Mr. Peterson's future value of his investment. (3 marks)

(d)   Stacy wants to put her Ksh. 1,000,0000 in an nvestment pool and would like to get a monthly income out of it. Using an interest rate of 0.5%, how   much   would   she   get   each   month? (5 marks)

(e)   You wish to receive an annuity of $500 a month for 10 years. The monthly interest rate is 1%. What is the present value of the annuity? (5 marks)

QUESTION FOUR -

(a) Solve the system of inequalities by graphing:

$$2x+3y\geq12$$
$$8x-4y>1$$
$$x<4$$

(10 marks)

(b) In a laboratory, the number of bacteria in a culture grows according to where Q_0 denotes the number of bacteria initially present in the culture, k is a constant determined by the strain of bacteria under consideration, and t is the elapsed time measured in hours. Suppose 10,000 bacteria are present initially in the culture and 60,000 present two hours later. How many bacteria will there be in the culture at the end of four hours?

(10 marks)

QUESTION FIVE

(a) Solve the set of simultaneous equations below using elimination method

(i) $3x + 2y = 19$
       $x + y = 8$

(ii) $2x - y = 4$
       $6x - 3y = 3$
       (4 marks)

(b) Differentiate   between   the   domain   and   range   of   a   function. (4 marks)

(c) Work out: If $f(x) = -2x + 9$ and $g(x) = -4x^2 + 5x - 3$, find $(f \circ g)(x)$.
         If $f(x) = x - 3$ and $g(x) = 4x^2 - 3x - 9$, find $(g \circ f)(x)$.

(4marks)

(d) Given the set: A={x | x is an even number between 20 and 40}, B={p| p is a prime number less than 30} and C={t | t is the square of odd numbers between 0 and 10}

    (i) List the given sets.

    (ii) Find $A \cup B \cup C$, $A \cap C$, $A - C$ and $B - A$.

        (8 marks)