MACHAKOS UNIVERSITY

University Examinations 2020/2021 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR SPECIAL /SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF ARTS

APP 102: QUANTITATIVE TECHNIQUES FOR POLICY MAKERS

DATE: 25/3/2021   **TIME: 2.00-4.00 PM**

INSTRUCTIONS TO CANDIDATES

*Answer Question **ONE** which is compulsory and any other **TWO** Questions*

QUESTION ONE 30 MARKS (COMPULSORY)

a)   Solve $\frac{5x}{6} - \frac{2x-1}{3} = \frac{4}{5}$ (5 marks)

b)   Find a number such that 3 more than one half of the number is two thirds the number

                                                                                            (5 marks)

c)   Solve for x in $x^2 - 9x + 4 = 0$ (4 marks)

d)   Compute the value of the following limit $\lim_{x \to 2}(3x^2 + 5x - 9)$ (5 marks)

e)   Use the definition of derivatives to differentiate $f(x) = x^2$ (5 marks)

f)   Find a_6 for an arithmetic sequence where $a_1 = 3x - 1$ and $d = 2x + 6$ (6 marks)

QUESTION TWO (20 MARKS)

a)   Find the equation for the line that has a slope of $\frac{2}{3}$ and passes through (6,2)   (4 marks)

b)   Evaluate the indefinite integral defined by $\int(2x^2 4x + 3)dx$ (4 marks)

c)   The fourth term of a geometric progression is 27 and the seventh term is 729. Find

      i.   The first term   (4 marks)

      ii.   The common difference   (4 marks)

d)   Evaluate $\frac{\log 125 - \log 25}{\log 25 + \log 5}$ (4 marks)

QUESTION THREE (20 MARKS)

    a) A rectangular field has an area of 75 m². The width of the field is 3 m longer than the length of the rectangle. What are the dimensions of the field?   (8 marks)

    b) Differentiate $f(t) = \frac{3t+9}{2-t}$ with respect to t   (6 marks)

    c) Determine the points where the function below is not continuous

$$h(t) = \frac{4t+10}{t^2-2t-15}$$
    (6 marks)

QUESTION FOUR (20 MARKS)

a) The first term of an arithmetic sequence is equal to 6 and the common difference is equal to 3.

    i. Find the formula of the nth term   (3 marks)

    ii. Find the 50th term   (3 marks)

b) Given that the fourth and the eight terms of the arithmetic sequence are a_4=93 and a_8=65

    i. Find the common differences d and the first term a   (4 marks)

    ii. Find the nth term   (2 marks)

c) Find S_{10} for 250, 100, 40, 16,….   (4 marks)

d) Find the 9th term of the sequence

    1, $\sqrt{2}$, 2, …….   (4 marks)

QUESTION FIVE (20 MARKS)

a) Use simplex method to maximize $z = 3x_1 + 2x_2$ subject to the following;

    $-x_1 + 2x_2 \leq 4$

    $3x_1 + 2x_2 \leq 14$

    $x_1 - x_2 \leq 3$

    $x_1, x_2 \geq 0$ (14 marks)

b) Evaluate the indefinite integral defined by $\int (x^4 + 3x + 1)dx$ (6 marks)