UNIVERSITY OF ESWATINI

FINAL EXAMINATION PAPER

PROGRAMME: BSc. in Agricultural & Biosystems Engineering Year I
BSc. in Agricultural Economics and Agribusiness
  Management Year I
BSc. in Agricultural Education Year I
BSc. in Agricultural Extension Year I
BSc. in Agronomy Year I
BSc. in Animal Science Year I
BSc. in Animal Science Dairy Year I
BSc. in Food Science, Nutrition and Technology Year I
BSc. in consumer science Year I
BSc. in Consumer sciences Education Year I
BSc. in Horticulture Year I
BSc. in Textiles Apparel Design and Management Year I

COURSE CODE: AEM 101

TITLE OF PAPER: MATHEMATICS

TIME ALLOWED: 2:00 HOURS

INSTRUCTION: 1. ANSWER ALL QUESTIONS

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY
THE CHIEF INVIGILATOR**

Question 1. (25 points)
1.1   Calculate the cost price when:
      a) Selling price is E400.00 and profit per cent is 60%.
      b) Selling price is E780.00 and profit per cent is 10%.

(7 points)

1.2 Factorize $25 - \dfrac{20}{R} + \dfrac{4}{R^2}$ (6 points)

1.3   Find the value of p (other than 0) for which $(3a - b)^2 + pab$ is
    a perfect square.   (6 points)

1.4 If $\dfrac{3a+b}{3b-2a} = 4$, calculate the value of $\dfrac{a}{b}$?   (6 points)

Question 2 (25 points)

2.1.   Simplify $\dfrac{3}{x+1} + \dfrac{2x-1}{(x+1)(x+2)} - \dfrac{2}{x+2}$

(8 points)

2.2. Express $\dfrac{2-p}{2p} - \dfrac{3-2p}{3p} - \dfrac{p+2}{6p}$ as a single fraction in the lowest terms.   (8 points)

2.3 The perimeter of a triangle ABC is 260 mm. The side BC is two-thirds of the length
   Of side AB and also 20 mm longer than the side AC. Find the lengths of the three sides
   of the triangle.   (9 points)

Question 3 (25 points)

3.1 A quantity of alloy has a mass of 600 kg. It contains copper, lead and tin in the ratios

   by mass of 7:3:5.Find the mass of lead .copper and tin in the alloy?   (8 points)

3.2. Find the solution set of system of simultaneous equation.   (8 points)
    3 x + 2y = 16
    x y = 10

3.3 Find the solution set of logarithmic equation.   (9 points)
    $\log_2^{(3x-1)} + \log_2^{x} = 4$

Question 4 (25 points)

4.1. Find the solution set of the following exponential equations.

      a. $8^{3x} = 64$

      b. $4^{x} = 32$

                                                                       (6 points)

4.2. Find the first derivative of the following function.

   a. $y = 7x^{5} + 2x - 9$

   b. $s = \dfrac{1}{\sqrt{t}}$ (6 points)

4.3 Find the maximum and minimum values of $y = x^{3} - 2x^{2} + 2x + 9$ (6 points)

4.4 . An open rectangular tank of height h metres with a square base side x metres is to be constructed so that it has a capacity of 100 cubic metres. prove that the surface area of the four walls and the base will be $\left(\dfrac{400}{x} + x^{2}\right)$ square meters. Find the value of x for this expression to be minimum.

                                                             (7 points)

END OF PAPER