

1<sup>st</sup> SEM. 2020/21



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**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:** ANSWER ALL QUESTIONS

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**Question 1. (25 points)**

- 1.1 Two speeds are in the ratio 4:7. If the second speed is 140 kilometer per hour, what is the first speed? (5 points)
- 1.2 Factorize  $16a^2 - b^2$  (5 points)
- 1.3 Simplify  $\frac{x^2-x}{x-1}$  (5 points)
- 1.4 Calculate the cost price when Selling price is E400.00 and profit per cent is 60%. (5 points)
- 1.5 Factorize  $36 - \frac{36}{R} + \frac{9}{R^2}$  (5 points)

**Question 2 ( 25 points)**

- 2.1 A man deposited E3500 in a bank and E140 interest was added at the end of the first year. The whole amount was left in the bank 10 years. Find the amount in the bank at the end of 5 years? (5 points)
- 2.2 Express  $\frac{2-p}{2p} - \frac{3-2p}{3p} - \frac{p+2}{6p}$  as a single fraction in the lowest terms. (5 points)
- 2.3 Find the value of p (other than 0) for which  $(2a-b)^2 + pab$  is a perfect square. (5 points)
- 2.4 If  $\frac{2a+b}{2b-a} = 5$ , calculate the value of  $\frac{a}{b}$ ? (5 points)
- 2.5 Simplify  $\frac{3}{x+1} + \frac{2x-1}{(x+1)(x+2)} - \frac{2}{x+2}$  (5 points)

**Question 3 ( 25 points)**

- 3.1 Solve the equation  $\frac{2}{x+1} - \frac{1}{2x-1} = \frac{1}{x}$  giving the answers correct to two decimal places. (5 points)
- 3.2 A quantity of alloy has a mass of 800 kg. It contains steel, brass and bronze in the ratios by mass of 3:4:1 respectively. Find the mass of steel, brass and bronze in the alloy? (5 points)
- 3.3. Find the solution set of system of simultaneous equation. (5 points)
- $$2x + 3y = 18$$
- $$x y = 12$$
- 3.4 . Find the solution set of the following exponential equations.
- a.  $8^{3x} = 64$
- b.  $4^x = 256$  (5 points)

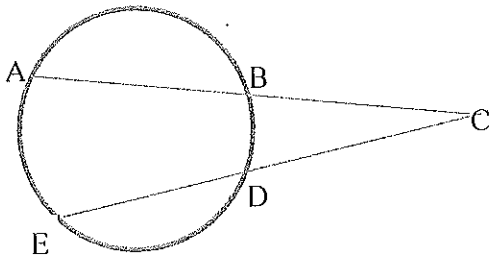
3.5 Find the solution set of logarithmic equation.

(5 points)

$$\log_2^{(x-1)} + \log_2^{x+1} = \log_2^1$$

**Question 4 ( 25 points)**

4.1. In the figure below, Given  $BC = 8$  cm ,  $ED = 7$  cm and  $DC = 9$  cm, calculate AB



4.2 An agricultural engineer stands 100 m from the base of a tower on which an aerial stands. She measures the angles of elevation to the top and bottom of the aerial as  $62^\circ$  and  $60^\circ$ . Find the height of aerial? (5 points)

4.3. Find the first derivative of the following functions.

a.  $y = 2x^8 + 4x - 2$

b.  $R(t) = \frac{1}{\sqrt{t}}$

(5 points)

4.4 Find the maximum values of  $y = 2x^3 - 21x^2 + 72x + 5$  (5 points)

4.5 . Given a matrices  $A = \begin{pmatrix} 3 & 2 \\ 6 & 8 \end{pmatrix}$  and  $B = \begin{pmatrix} -1 & 2 \\ -1 & 2 \end{pmatrix}$

Find a)  $A + B$

b)  $AB$

c)  $|A|$

d)  $A^{-1}$

(5 points)

**END OF PAPER**