



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DIPLOMA IN ENVIRONMENTAL HEALTH

SUPPLEMENTARY EXAMINATION PAPER 2009/2010

TITLE OF PAPER	:	ALGEBRA FOR HEALTH SCIENCES
COURSE TITLE	:	HSM 111
DURATION	:	2 HOURS
MARKS	:	80
INSTRUCTIONS	:	READ QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER ANY FOUR (4) QUESTIONS
	:	EACH QUESTION CARRIES 20 MARKS
	:	WRITE NEATLY & CLEARLY
	:	SHOW ALL YOUR WORKING
	:	NO PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

QUESTION 1

1. (a) Solve each of the following equations for x

i. $2^{2x} = 16$ [4 marks]

ii. $\log(x + 6) = 1$ [4 marks]

iii. $\log_2 8 = x$ [4 marks]

(b) The population of Manzini varies according to the equation

$$P = 120000e^{0.12t}$$

where t is time measures in years. Find the time it will take for the population to reach 300,000. [8 marks]

QUESTION 2

2. (a) Prove the trigonometric identity

$$\frac{\sin x}{1 + \cos x} + \frac{1 + \cos x}{\sin x} = 2 \csc x$$

[4 marks]

(b) Solve the trigonometric equation

$$2 \cos^2 x = 1 - \sin x$$

giving all solutions between 0° and 360° . [6 marks]

(c) The 6th term of an arithmetic series is 11 and the 5th term is 20.

Find the first term and the common difference [5 marks]

(d) Suppose that the 4th and 7th terms of an arithmetic progression are equal to

9 and -15 respectively. Find the sum of the first 10 terms. [5 marks]

QUESTION 3

3. (a) Expand and simplify $(x + 2y)^4$ [8 marks]

- (b) Determine the centre and radius of the circle

$$x^2 + 6x + y^2 + 8y + 9 = 0$$

[8 marks]

- (c) Find an equation of the line parallel to the line $y + 2x = 3$ and passing through the point (2,4) [4 marks]

QUESTION 4

4. (a) Use Cramer's rule to solve the following linear system of equations

$$\begin{aligned} 2x + 3y + z &= 2 \\ -x + 2y + 3z &= -1 \\ -3x - 3y + z &= 0 \end{aligned}$$

[20 marks]

QUESTION 5

5. (a) Use the synthetic division method to divide

$$x^4 - 3x^3 + 2x^2 - 3x + 5 \quad \text{by} \quad x - 2$$

[6 marks]

- (b) Find all the roots of the polynomial

$$x^3 - 6x^2 + 11x - 6 = 0$$

[8 marks]

- (c) Find the first four terms in the expansion of $(1 + x)^{\frac{1}{2}}$. [6 marks]

QUESTION 6

6. (a) If the 8th term of a geometric progression is 243 and the 5th term is 9, find the first three terms of the geometric progression. [7 marks]
- (b) Find the 20th term of the geometric progression 2, 10, 50, 250,.... [6 marks]
- (c) Convert 0.818181 into an equivalent common fraction [7 marks]

QUESTION 7

7. If the matrices A and B be given by

$$A = \begin{pmatrix} 6 & 5 \\ 3 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 3 \\ 3 & 1 \end{pmatrix}$$

calculate the following

- (a) $A + B$ [5 marks]
- (b) AB [5 marks]
- (c) A^T [5 marks]
- (d) $A^T B$ [5 marks]

END OF EXAMINATION
