UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATIONS 2008

B.A.S.S. I / D.COM I

TITLE OF PAPER	:	INTRODUCTORY MATHEMATICS FOR BUSINESS
COURSE NUMBER	:	MS 101 AND IDE MS101
TIME ALLOWED	:	THREE (3) HOURS
INSTRUCTIONS	:	1. THIS PAPER CONSISTS OF SEVEN QUESTIONS.
		2. ANSWER ANY FIVE QUESTIONS
		3. USEFUL FORMULAE ARE LISTED AT THE END OF THE PAPER
SPECIAL REQUIREMENTS	:	NONE

THIS EXAMINATION PAPER SHOULD NOT BE OPENED UNTIL
PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

QUESTION 1

(a) Use long division method to find the quotient and remainder when

$$x^6 + x^4 + x^2 + 1 \quad \text{is divided by} \quad x^2 + x + 1$$

[7 marks]

(b) The polynomial $ax^3 + 3x^2 + bx - 12$ has $x + 3$ as a factor. When the polynomial is divided by $x + 1$ the remainder is -6. Find the values of a and b. [7 marks]

(c) Use the synthetic division method to divide

$$2y^5 + y^4 + 15 - 19y^2 \quad \text{by} \quad y + 3$$ [6 marks]

QUESTION 2

(a) Find all the roots of the following polynomial.

$$x^4 + 4x^3 - 22x^2 - 100x - 75 = 0$$ [8 marks]

(b) Solve each of the following equations for x.

(i) $\log_9 27 = x$ [4 marks]

(ii) $3^{2x-1} = 4^{x+2}$ [4 marks]

(iii) $\log_a(x + 6) - \log_a(x + 2) = \log_a x$ [4 marks]

QUESTION 3

(a) Find the value of a so that $8a + 4$, $6a - 2$ and $2a - 4$ will form an arithmetic progression. [5 marks]

(b) An auditorium has 40 rows with 30 seats in the first row, 33 in the second row, 36 in the third row and so forth. How many seats are in the auditorium? [5 marks]

(c) 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. [5 marks]

(d) Convert the repeating decimal 0.818181 into an equivalent common fraction [5 marks]

QUESTION 4

(a) Given that

$$A = \begin{pmatrix} 1 & 2 \\ 4 & 0 \\ 2 & 1 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 2 & 1 \\ 4 & 3 & 2 \end{pmatrix}$$

    (i) Find the Transpose of A. [4 marks]

    (ii) Evaluate AB [6 marks]

(b) Use Cramer's rule to solve the linear system of equations

$$\begin{aligned} 4x - y + 3z &= -3 \\ 3x + y + z &= 0 \\ 2x - y + 4z &= 0 \end{aligned}$$

[10 marks]

QUESTION 5

(a) How much should you invest now at 10% compounded quarterly to have E8000 towards the purchase of a computer in 5 years? [5 marks]

(b) Suppose that you deposit E2500 on your 25th birthday. What rate r compounded quarterly must your deposit earn in order to grow to one million Emalangeni by your 75th birthday. [5 marks]

(c) Find the 8th term in the expansion of $\left(2x + 3y^2\right)^{10}$ [5 marks]

(d) Find the coefficient of x^6 in the expansion of $(2 + x^2)^8$ [5 marks]

QUESTION 6

(a) Prove the following identities

(i) $(1 - \cos A)(1 + \sec A) = \sin A \tan A$ [5 marks]

(ii) $\tan A + \cot A = 2 \csc 2A$ [5 marks]

(b) Solve the following trigonometric equation, giving **ALL** solutions between 0° and 360°.

$$2 \sin^2 x + 3 \cos x - 3 = 0$$

[6 marks]

(c) Express the product $\sin 60^o \sin 30^o$ as a sum or a difference. [4 marks]

QUESTION 7

(a) Find the equation of a line passing through the intersection of $3x + y = 10$ and $x + 7y = -40$, and is parallel to $3x = 4y$ [4 marks]

(b) Write the equation of a circle with centre (2, -1) and radius $\sqrt{3}$.   [4 marks]

(c) Find the center and radius for the circle whose equation is

$$x^2 + y^2 - 6x + 8y - 11 = 0$$

[4 marks]

(d) Solve the following complex quadratic equation and express your answer as a complex number in the form $x + iy$

$$z^2 + (i - 3)z + 4 = 0$$

[8 marks]

Useful Formulas

1. $\sin^2 \theta + \cos^2 \theta = 1$
2. $\sin(A + B) = \sin A \cos B + \cos A \sin B$
3. $\sin(A - B) = \sin A \cos B - \cos A \sin B$
4. $\cos(A + B) = \cos A \cos B - \sin A \sin B$
5. $\cos(A - B) = \cos A \cos B + \sin A \sin B$
6. $2 \cos A \cos B = \cos(A + B) + \cos(A - B)$
7. $\sin 2A = 2 \sin A \cos A$
8. $\cos 2A = \cos^2 A - \sin^2 A$

Degrees	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	