UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATIONS 2010

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 PROVIDED AT THE END OF THE QUESTION PAPER.
SPECIAL REQUIREMENTS	:	NONE

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

QUESTION 1

1. (a) Use synthetic division to find the quotient and remainder when $-x^4 + 5x^3 - 4x^2$ is divided by $x + 2$. [5 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. [6 marks]

   (c) Find all the real roots of the polynomial

$$x^3 + 12x^2 - 55x - 150 = 0$$

[9 marks]

QUESTION 2

2. (a) Sipho wants to buy a new computer in three years' time that will cost E5000.

      (i) How much should he deposit now, at 6% interest compounded annually to give the required E5000 in three years? [3 marks]

      (ii) If he only has E4000 available to deposit now, what annual interest rate is required for it to increase to E5000 in three years? [4 marks]

   (b) Find the annual interest rate required to treble a certain amount if the interest is compounded monthly for 10 years. [4 marks]

   (c) How many years will be needed for E5000 to increase to E25000 at 5% interest compounded continously? [5 marks]

   (d) Solve the following equation

$$\log(y + 2) = \log(y - 7) + \log 4$$

[4 marks]

QUESTION 3

3. (a) Prove the trigonometric identity

$$\frac{1}{1-\sin A}+\frac{1}{1+\sin A}=\frac{2}{\cos^2 A}$$

[4 marks]

(b) Solve the trigonometric equation $2\cos^2 x - \sin x - 1 = 0$ giving all solutions between 0^o and 360^o. [6 marks]

(c) Convert the decimal 1.27272727 into a common fraction [5 marks]

(d) If the third term of a geometric progression is 12 and the sixth term is $\frac{-32}{9}$, write the first six terms of the series. [5 marks]

QUESTION 4

4. (a) Find the constant term (i.e the term without x) in the expansion of

$$\left(2x^3+\frac{1}{2x^2}\right)^{20}$$

[8 marks]

(b) Expand the binomial $(2x+3y)^5$ [5 marks]

(c) Use mathematical induction to prove that the formula

$$\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\frac{1}{3\cdot 4}+\ldots+\frac{1}{n\cdot(n+1)}=\frac{n}{n+1}$$

[7 marks]

QUESTION 5

5. (a) Calculate $A^T B$ if the matrices A and B be given by

$$A = \begin{pmatrix} 1 & 2 \\ 4 & -6 \\ 7 & 5 \end{pmatrix} \quad , \quad B = \begin{pmatrix} 1 & -9 \\ 2 & 7 \\ -3 & 3 \end{pmatrix}$$

[6 marks]

(b) use Cramer's rule to solve the system

$$\begin{aligned} 2x + y - z &= 2 \\ x - y + z &= 7 \\ 2x + 2y + z &= 4 \end{aligned}$$

[14 marks]

QUESTION 6

6. (a) Find the equation of s straight line passing through the intersection of $3x - y = 9$ and $x + 2y = -4$, perpendicular to $3 = 4y + 8x$ [6 marks]

(b) Find the centre and radius of a circle defined by the equation

$$x^2 + y^2 + 6x - 4y - 3 = 0$$

[7 marks]

(c) Find the equation of a circle that passes through the point (2,6) and has centre (-1,2). [7 marks]

QUESTION 7

7. (a) Express the following expressions in the complex form $a + bi$

(i)	$(2-3i)(3+4i)$	[4 marks]
(ii)	$\dfrac{9-2i}{4+3i}$	[4 marks]
(iii)	$\sqrt{2}(\cos 135 + i \sin 135)$	[4 marks]

(b) Solve the quadratic equation

$$z^2 - 3z + 3 - i = 0$$

[8 marks]

END OF EXAMINATION

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^o	30^o	45^o	60^o	90^o
$\sin\theta$	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	$\sqrt{3}$	