UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATIONS 2011

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 $5x^3 - 6x^2 - 2$ is divided by $x + 3$. **[6]**

   (b) When the polynomial $x^3 + ax^2 + bx - 32$ is divided by $x + 3$ the remainder is -35. Given that $x + 4$ is a factor find a and b. **[6]**

   (c) Find all the roots of the polynomial $x^4 + 5x^3 + 5x^2 - 5x - 6$. **[8]**

Question 2

2. (a) A student wants to buy a new computer after 3 years that will cost $E8000$. If he only has $E5000$ available to deposit now, what interest rate is required for it to increase to $E8000$ in 3 years if the interest is compounded monthly. **[5]**

   (b) How long will it take an ivestment to double with 10% interest compounded continuously. **[5]**

   (c) Solve for x in each of the following equations

   (i) $27^{4x} = 9^{4x+1}$. **[4]**

   (ii) $\log_3(2x - 1) = -\log_3 x + \log_3(4x - 3)$. **[6]**

Question 3

3. (a) Prove that

   (i) $\tan\theta + \cot\theta = \sec\theta \csc\theta$. **[5]**

   (ii) $\dfrac{1}{1 - \cos\theta} + \dfrac{1}{1 + \cos\theta} = 2\csc^2\theta$. **[5]**

   (b) Solve the trigonometric equation

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

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

   (c) Without using calculators find the exact value of $\cos 75$. **[4]**

Question 4

4. (a) Find the $6th$ term in the expansion of $(2x + 3y^2)^{10}$. **[5]**

(b) Write out the first four terms in the expansion of $(1 + x)^{-1/3}$. **[5]**

(c) Use Cramer's rule to solve the system

$$\begin{aligned} 2x - y + 2z &= 2 \\ x + 10y - 3z &= 5 \\ -x + y + z &= -3 \end{aligned}$$

[10]

Question 5

5. (a) Find the first three terms of an arithmetic progression whose $9th$ term is 16 and $40th$ term is 47. **[5]**

(b) Find the $16th$ term of the geometric progression

$$4, 12, 36, 108, ...$$

[5]

(c) If the $9th$ term of a geometric progression is 729 and the $6th$ term is 27 find the first three terms of the geometric progression. **[5]**

(d) Convert the repeating decimal 0.27272727... into and equivalent common fraction. **[5]**

Question 6

6. (a) Given that

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

i. Find the transpose of B. **[4]**

ii. Evaluate BA. **[6]**

(b) Prove by mathematical induction that the following formula

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

is valid for all positive integers. **[10]**

Question 7

7. (a) Find the centre and radius of the circle

$$x^2+y^2-10x+8y+5=0$$

[5]

(b) Find the equation of a line passing through the intersection of $2x+y=5$ and $3x+4y=10$ and is parallel to $3x=13y$. **[5]**

(c) Find the equation of the circle with centre $(-2,-1)$ and radius $\sqrt{5}$. **[4]**

(d) Solve the following complex quadratic equation

$$z^2+2iz+8=0.$$

Express your answer as a complex number in the form $x+iy$. **[6]**

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. $\cos(A+B)=\cos A\cos B-\cos A\cos B$
5. $\cos(A-B)=\cos A\cos B+\cos A\cos B$
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	$\sqrt{3}$	