

UNIVERSITY OF SWAZILAND

FINAL EXAMINATIONS 2010/2011

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 the synthetic division method to divide

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

[5 marks]

- (b) Find all the roots of the polynomial

$$x^4 - x^3 - 19x^2 + 49x - 30 = 0$$

[10 marks]

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

$$x^2 - 6x + y^2 + 10y + 25 = 0$$

[5 marks]

QUESTION 2

2. (a) i. A E1,000 investment is made in a trust fund at an annual percentage rate of 12%, compounded continuously. How long will it take the investment to reach E2,000?

[5 marks]

- ii. Sipho invested E 7000 in her savings account for 4 years. When he withdrew it, she now had E 8208.05. What was the interest rate on the account if the interest was compounded quarterly?

[5 marks]

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

i. $4^{2x-3} = 64$

[5 marks]

ii. $\log_2(x - 1) + \log_2(x - 2) = \log_2(2x - 4)$

[5 marks]

QUESTION 3

3. (a) i. Prove the following identity

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

[5 marks]

- ii. Solve the following trigonometric equations giving all solutions between 0° and 360°

$$2 \cos^2 x - \sin x - 1 = 0$$

[5 marks]

- (b) Find an equation of the line parallel to the line $y + 2x = 3$ and passing through the point (1,3)

[4 marks]

- (c) Find the equation of a straight line passing through the intersection of $3x - y = 9$ and $x + 2y = -4$, parallel to $3 = 4y + 8x$

[6 marks]

QUESTION 4

4. (a) Expand $(2x + y^2)^6$ and simplify term by term.

[8 marks]

- (b) Find the middle term of $\left(\frac{1}{x} - x^2\right)^{12}$

[4 marks]

- (c) By using the formula for the r th term of a general binomial expansion, find the term involving x^{14} in the expansion of $\left(\frac{2}{x} - x^2\right)^{10}$

[8 marks]

QUESTION 5

5. (a) Use mathematical induction to prove that the following formula is valid for all positive integers.

$$1 + 5 + 5^2 + \dots + 5^{n-1} = \frac{1}{4}(5^n - 1)$$

[10 marks]

- (b) Express the complex number $z = -1 + i\sqrt{3}$ in *mod-arg (polar) form*

[5 marks]

- (c) Express the complex number $z = 2(\cos 315 + i \sin 315)$ in rectangular form ($z = x + iy$)

[5 marks]

QUESTION 6

6. (a) Find the sum of the following series

$$-21, -9, 3, \dots, 219$$

[7 marks]

- (b) Convert the repeating decimal $1.021212121\dots$ into an equivalent common fraction.

[7 marks]

- (c) The 4th term of a geometric progression is 1 and the 8th term is $\frac{1}{256}$.
Find the 10th term.

[6 marks]

QUESTION 7

7. (a) If the matrices A and B be given by

$$A = \begin{pmatrix} -1 & 3 & -4 \\ 0 & 2 & 0 \\ 2 & -3 & 5 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 5 \\ 1 & 3 \\ 3 & 1 \end{pmatrix}$$

calculate the following

i. $|A|$

[2 marks]

ii. $A^T B$

[4 marks]

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

$$x + y + z = 2$$

[14 marks]

$$4x + 5y - 3z = -15$$

$$5x - 3y + 4z = 23$$

END OF EXAMINATION
