University of Swaziland

Final Examination, December 2017

B.A.S.S I

Title of Paper : Elementary Quantitative Techniques I

Course Number : MAT101

<u>**Time Allowed</u>** : Three (3) Hours</u>

Instructions

- 1. This paper consists of TWO sections.
 - a. SECTION A(COMPULSORY): 40 MARKS Answer ALL QUESTIONS.
 - b. SECTION B: 60 MARKS Answer ANY THREE questions.
 Submit solutions to ONLY THREE questions in Section B.

2. Show all your working.

3. Start each question on a fresh page.

4. Non programmable calculators may be used (unless otherwise stated).

5. Leave all non exact answers correct to 3 decimal places unless told otherwise.

6. A formula sheet is provided on the last page.

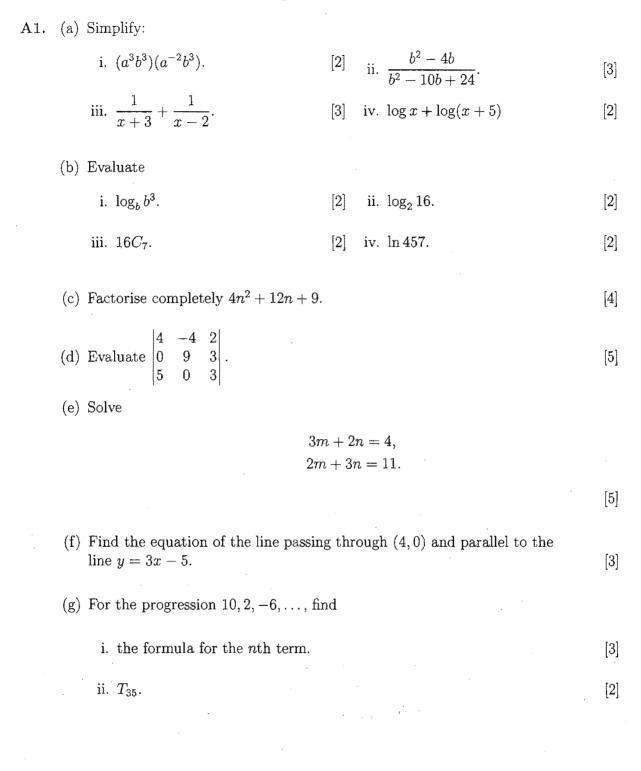
7. Special requirements: None.

This paper should not be opened until permission has been given by the invigilator.

SECTION A

Answer ALL questions from Section A.

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SECTION B

Answer any THREE questions from section B.

B2. A parent sets up a fund for their son by making monthly deposits. If he deposits E100, E105, E110 at the end of the first, second, and third months, respectively, (the amounts increasing by E5 every month), find

(a) the instalment after 1 year.	[8]
(b) the time when the instalment will reach $E500$.	[6]
(c) the total deposited after 2 years.	[6]

B3. Use Cramer's rule to solve the following linear system of equations.

[20]

[6]

2

B4. (a) Given the expression $(2x + y)^{18}$, Find

i. the first 4 terms.[8]ii. the 14th term .[3]iii. the middle term.[3]

(b) Solve
$$\log_3(x+3) + \log_3(x+3) = 3$$
.

- B5. (a) Find the equation of the line parallel to the line 6x 2y = 1 and passes through the point (3, 4). [6]
 - (b) Find the amount at the end of 5 years on an original principal of E5000 at 6% if the interest is

i.	simple interest.	[4]
ii.	compounded semiannually.	[5]
iii.	compounded continuously.	[5]

B6. (a) A sum of E16,000 is invested for 5 years at 8% compound interest which is paid contin- uously. The total value is subsequently given by

$$V(t) = 16000e^{0.08t}$$

where t is the number of years after the initial investment. Find

i. the total amount after 5 years. [2]

ii. how long it takes for the total amount to be double the initial investment? [6]

(b) Solve

- i. $7^{x-3} = 1.$ [4] ii. $e^{1-x} = \frac{1}{2}.$ [4]
- iii. $\ln(4x + 17) = 0.$ [4]

END OF EXAMINATION

Formula Sheet

1. 1994. 1. 1995 - 1996 - 1976 - 1976.

Arithmetic Progressions:

$$T_n = T_1 + (n-1)d, \quad S_n = \frac{n}{2}[T_1 + T_n], \quad S_n = \frac{n}{2}[2T_1 + (n-1)d].$$

Geometric Progressions:

$$T_n = T_1 r^{n-1}, \quad S_n = \frac{T_1(1-r^n)}{1-r}.$$

Binomial Theorem:

$$(a+b)^n = a^n + nC_1a^{n-1}b + nC_2a^{n-2}b^2 + nC_3a^{n-3}b^3 + \dots + b^n.$$

rth term of $(a+b)^n = nC_{r-1}a^{n-r+1}b^{r-1}.$

Matrices:

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

logarithms and Exponential Functions:

$$\begin{split} \log_b x &= y \Leftrightarrow x = b^y.\\ \log_b(AB) &= \log_b A + \log_b B.\\ \log_b \left(\frac{A}{B}\right) &= \log_b A - \log_b B.\\ \log_b A^n &= n \log_b A. \end{split}$$

The Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Simple Interest:

$$A = P(1 + rn)$$

Compound Interest:

$$A = P(1+r)^n$$
, $A = P(1+r/s)^{ns}$

Continuous Compound Interest:

 $A = Pe^{rn}$