
University of Swaziland



Supplementary Examination – July 2010

BASS I

Title of Paper : Elementary Quantitative Techniques I

Course Number : MS011

Time Allowed : Three (3) hours

Instructions :

1. This paper consists of SEVEN questions.
2. Each question is worth 20%.
3. Answer ANY FIVE questions.
4. Show all your working.

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

Question 1

- (a) Two straight lines ℓ_1 and ℓ_2 are defined by the equations

$$y = m_1x + c_1, \text{ and}$$

$$y = m_2x + c_2, \text{ respectively.}$$

State the relationship between m_1 and m_2 if

- i) ℓ_1 is parallel to ℓ_2 ; [3]
 - ii) ℓ_1 is perpendicular to ℓ_2 . [4]
 - iii) ℓ_1 and ℓ_2 are both parallel to the x -axis. [3]
- (b) Find the equation of the straight line that is perpendicular to $-2x + 3y = 5$ and passing through the point $(4, -2)$. [10]

Question 2

- i) The polynomial $P(x) = x^3 + ax^2 + bx - 1$ is divided by $(x - 2)$ and $(x + 1)$. The remainders are 7 and 4 respectively. Find the values of a and b . [6]
 - ii) Use long division to find the quotient and remainder when $P(x) = 3x^4 + 2x^2 - 4$ is divided by $D(x) = x - 1$. [10]
 - iii) Show that $x = -2$ is not a root of the polynomial $P(x) = 3x^4 + 2x^2 - 4$. [4]
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Question 3

A dealer bought x toys for \$27.

- (a) Write down an expression, in terms of x , for the price in dollars, he paid for each toy. [3]
- (b) He proposed to sell each toy at a profit of 50c. Show that his proposed price was $\$ \frac{54+x}{2x}$. [4]
- (c) He found that he was only able to sell 8 toys at this price. Write down an expression in terms of x for
- the total money, in dollar, he received for the 8 toys [3]
 - the number of toys that remained.
- (d) The dealer sold these remaining toys at \$2 each. Write down an expression, in terms of x , of the total money, in dollars, he received for them. [3]
- (e) Given that the dealer received \$30 altogether, form an equation in x and show that it simplifies to

$$x^2 - 21x + 108 = 0. \quad [5]$$

Question 4

- (a) Given that $\log_7 2 = 0.356$ and $\log_7 3 = 0.565$, evaluate the following
- $\log_7 6$ [4]
 - $\log_7 \sqrt{3}$ [4]
- (b) Solve for x , given
- $2^{x+1} = 7$ [5]

ii. $\log_4(x + 17) = 2 \log_4(x - 3)$. [7]

Question 5

(a) Solve the trigonometric equation

$$2 \sin x = 1, \quad \text{for } 0^\circ \leq x < 360^\circ. \quad [5]$$

b. Prove the following identities

i. $(1 + \tan^2 \theta) \cos^2 \theta \equiv 1$ [7]

ii. $\sec \theta - \cos \theta \equiv \sin \theta \tan \theta$. [8]

Question 6

(a) On 01 May 1998, William invested E900 for 4 years at 6% per annum simple interest.

i. Calculate the interest he received on his investment. [4]

ii. He invested another E900 for 3 years at 6% per annum simple interest on 01 May 1999, and then E900 for 2 years at 6% per annum simple interest on 01 May 2000, and a final E900 for 1 years at 6% per annum simple interest on 01 May 2001. William withdrew all his money on 01 May 2002.

Calculate the total sum of money that he withdrew. [8]

(b) Find the balance after 4 years of E5,000 is invested into an account offering 9% interest compounded

i. annually [4]

ii. semi-annually [4]

Question 7

(a) The first 3 terms of an AP are $x + 3$, $2x + 6$ and 8. Find the value of x and the sum of the first 12 terms. [6]

(b) Show that $x + 1$, $x + 3$ and $x + 5$ cannot be three consecutive terms of a GP, whatever the value of x . [4]

(c) Evaluate and leave your answer in the form $a + ib$.

i. $(2 + 3i)^2$ [5]

ii. $\frac{3 - 4i}{5 + 2i}$ [5]
