SMB 0101 Algebra and business mathematics

End of Semester one 2015/16 Examination Time: 2h

DATE: 15TH MAY 2015   TIME: 2 HOURS

Section A: Answer ALL Questions [40 Marks]

1. Expand the following   [*5 marks]*
   (a) $(a + b)^8$
   (b) $(2x - 3)^4$

2. Factorize $x^2 + 5x + 6$ *[3 marks]*

3. Solve the simultaneous equation below using the matrix method   [*5 marks]*
   $3a + 2b = 12$
   $4a - b = 5$

4. Simplify $log2 + log6 - log4$ [*3 marks]*

5. Find the values of x and y if $(1 \quad 3)\begin{pmatrix} 2x & 9 \\ 1 & 3y \end{pmatrix}$ = (7 9)   [

                                                                                            [3 marks]

6. Calculate the number of years it takes for sh. 8, 000 to double if invested at 12% compound interest per annum.   *[5 marks]*

   7. Find the value of x that satisfy the equation   [*6 marks]*

   (a) $3^x = 7^{x-1}$
   (b) $Log_3 4 = x$

   (c) Use the formula method to solve $6x^2 - x - 2 = 0$ [*4 marks]*

8. Use systematic elimination to find a solution for the system of linear equations below   [*6 marks]*

       $x - 3y + 2z = 4$
       $2x + y - 3z = 1$
       $-3x + 4y + 5z = 5$

8.   (a) A businessman offers a photocopying machine for either

  (i) A down payment of sh. 5, 000 and 15 monthly installments of sh 1, 050 each **or**

  (ii) A down payment of sh. 7, 500 and 12 monthly installments of sh 1, 050 each

   Which plan is cheaper and by how much?   *[5 marks]*

  (b) Expand $(1+x)^6$ up to the fourth term then use it to estimate $(1.003)^6$ correct to 3 decimal places

                                                                                             [5 marks]

9. Calculate the PAYE payable by Mr. Mwangi on a salary of sh. 50, 000, a medical allowance of 9,000. In addition he is housed by the employer and pays a nominal rent of sh. 3, 000 for the flat and a life insurance policy which he pays at the rate of 1, 600 per month

Income in Kenya pounds per month	Rate %
1 – 484	10
485 – 940	15
941 – 1, 396	20
1397 – 1, 852	25
Excess over 1, 852	30

   Personal relief is sh. 12, 672. p.a. or sh. 1, 056 per month
   Life insurance relief is at sh. 3 per pound (subject to a maximum of sh. 3,000 per month) *[10 marks[*

11. (a) By binomial expansion evaluate (5 + 0.05)4 correct to 4s.f.g.   [*3marks]*

   (b) Simplify without using $\dfrac{\log 16 + \log 256}{\log\left(\frac{1}{16}\right) - \log\left(\frac{1}{64}\right)}$ *[7 marks*]

12.   (a) A boarding school uses 15bags of maize, 8bags of beans, 16bags of maize flour and 4bags of rice in the first term. The prices are sh1200, sh2400, sh1400 and sh1400 respectively. In the second term, the school uses 16bags of maize, 10bags of beans, 18bags of maize flour, 5bags of rice at sh1400,sh2600, sh2600, sh1600 and sh 1500 respectively. In term three, the school uses 12bags of maize, 5bags of beans, 12bags of maize flour and 3bags of rice at sh1800, sh2200, sh2000 and sh1500 respectively. Using a matrix method, find the total cost of the food stuff that year [*5marks]*

(b) A house wife buys a cell phone on hire purchase. She paid a cash deposit of sh. 1000 and then 12 monthly installments of sh. 120. The company charged interest at a rate of 2% compounded monthly. Find the cash price of the new phone and the total interest paid. (Give your answer to the nearest sh. 10)   [*5marks]*