## University Examinations 2014/2015

EXAMINATION FOR CERTIFICATE IN BRIDGING MATHEMATICS

### SMB 0101: ALGEBRA AND BUSINESS MATHEMATICS

**DATE: DECEMBER 2014**                                               **TIME: $1\frac{1}{2}$ HOURS**

**INSTRUCTIONS:** *Answer question **one** (**compulsory**) and any other **three** questions*

## QUESTION ONE (30 MARKS)

a)  Factorise the expression $2x^2 - 7xy + 3y^2$                               (2 marks)

b)  Find without using mathematical tables or a calculator, the values of x which satisfy the

   equation; $\log x^3 + \log 5x = 5\log 2 - \log\frac{2}{5}$                        (3 marks)

c)  By correcting each number to one significant figure, approximate the value of 788x0.006.

   Hence calculate the percentage error arising from this approximation        (4 marks)

d)  (i) Expand and simplify $(2 - x)^5$                                    (2 marks)

   (ii) Use the first 4 terms of your result in (i) to find the approximate value of $(1.8)^5$ to 2

       d.p                                                          (3 marks)

e)  Without using a calculator, simplify $\left(27^{\frac{2}{3}}\right)x\left(\frac{81}{16}\right)^{\frac{-1}{4}}$                (3 marks)

f)   Find the compound interest in sh. 21,000 in 5 years at 15%              (3 marks)

g)   A water pump costs Ksh. 21,600 when new.  At the end of first year, its value

   depreciated by 25%.  The depreciation by the second year is 20% and thereafter the rate

   of the depreciation is 15% yearly.  Calculate the exact value of the water pump at the

end of the 4<sup>th</sup> year. (4 marks)

h) The third term of an A.P is 10. The fifth term of the same A.P is -10. Determine the first term and the common difference of the A.P (3 marks)

i) From a group of 5 boys and 6 girls, 5 are to be selected to represent the group in a certain committee. In how many ways can this be done if there must be exactly 2 boys in the committee? (3marks)

## QUESTION TWO (10 MARKS)

a) Simplify the following expressions;

(i)  5a-4b-2$\left[a-(2b+c)\right]$ (2 marks)

(ii)  $\dfrac{4x^2 - y^2}{2x^2 - 7xy + 3y^2}$ (4 marks)

b) Solve for x in the equation  $32^{(x-3)} \div 8^{x-4} = 64 \div 2^x$ (4 marks)

## QUESTION THREE (10 MARKS)

a) Given that log4 =0.6021 and log6=0.7782, evaluate log 0.096 without using mathematical tables or a calculator (4 marks)

b) Find the value of k that makes $kx^2 - 70x + 49$ a perfect square (3 marks)

c) In fourteen years time, a mother will be twice as old as her son. Four years ago, the sum of their ages was 30. Find how old the mother was when son was born (3 marks)

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**QUESTION FOUR (10 MARKS)**

a) A businessman bought two bags of beans at the same price. He found out that one bag was of high quality and the other low quality. He made a profit on the high quality bag by selling at sh. 1040 and a loss on other bag by selling at sh. 880. If the profit was three times the loss, calculate the buying price per bag. (4 marks)

b) After how long will a certain amount of money deposited at 12% p.a and compounded semi-annually take to double itself? (3 marks)

c) Determine the population of a town four years ago if the present population is 800,000 and the annual growth rate is 5% (3 marks)

**QUESTION FIVE (10 MARKS)**

a) The first three consecutive terms of a G.P are $3^{2x+1}$, $9^x$ and 81 respectively. Calculate;

    (i)     The value of x (3 marks)

    (ii)    The common ratio of the series (2 marks)

b) Solve for x in $\frac{6x-4}{3} - \frac{2x-4}{7} = 5$ (2 marks)

c) A tourist converted 918 sterling pounds to ksh at a rate of ksh. 84 per pound. He did not spend the money as intended but later exchanged it for sterling pounds at ksh. 85 per pound. Calculate the amount of money (in sterling pounds) lost during the transaction (3 marks)

**QUESTION SIX (10 MARKS)**

a) Solve the equation $3x^2 - 8x - 11 = 0$ (2 marks)

b) Calculate the rate of commission if a sales person receives sh. 4,000 from sales worth sh. 240,000 (2 marks)

c) An employer earned a basic salary of ksh. 13,120 per month and a house allowance of ksh. 3000per month. He claimed a family relief of ksh. 455 per month. Use the table below to answer the questions that follow

| Total income per month (k£) | Rate in shillings per period |
|---|---|
| 1-325 | 2 |
| 326-650 | 3 |
| 651-975 | 4 |
| 976-1300 | 5 |
| 1301-1625 | 7 |
| over 1625 | 7.50 |

    (i)      Calculate the taxable income in k£.p.m        (2 marks)

    (ii)    Calculate the net tax        (4 marks)