



UGANDA BUSINESS AND TECHNICAL EXAMINATIONS BOARD

Business and Humanities Certificate Examinations

APRIL-MAY 2022 SERIES

PROGRAMME

NCICT, NCCM, NCBM, CCE

PAPER NAME

BASIC MATHEMATICS

PAPER CODE

NCIT113/NCBM113/CBM1101

YEAR I, SEMESTER I

2½ HOURS

MONDAY, 25TH APRIL, 2022

INSTRUCTIONS TO CANDIDATES

1. *This paper consists of **seven** questions.*
2. *Answer only **five** questions.*
3. *All questions carry equal marks.*
4. *All answers to each question should begin on a fresh page.*
5. ***Do not** write on the question paper.*
6. *All answers and rough work should be done in the official answer booklet provided.*
7. *A non-programmable electronic calculator may be used in this examination.*
8. *Read other instructions on the answer booklet.*

Question One

- (a) Multiply 35_{six} by 23_{six} . (03 marks)
- (b) Convert the following;
- (i) 0.625_{ten} to base two. (04 marks)
- (ii) 101.0101_{two} to decimal numbers. (03 marks)
- (c) Given the function;
- $$f(x) = \begin{cases} 3x - 1 & \text{if } x > 3 \\ x^2 - 2 & \text{if } -2 \leq x \leq 3 \\ 2x + 3 & \text{if } x < -2 \end{cases}$$
- Find;
- (i) $f(2)$. (02 marks)
- (ii) $f(-3)$. (02 marks)
- (d) A function is defined by $f(x) = x^2 + 5$, find $f^{-1}(x)$. Hence find $f^{-1}(9)$. (06 marks)

Question Two

- (a) A rectangular cardboard measures $21cm$ by $16cm$. When strips of equal width are cut off along the sides, the area of the remaining piece is $234cm^2$. Find the width of the strips. (11 marks)
- (b) Solve the following inequalities and represent your answers on a number line.
- (i) $2 - 4x < 11$. (06 marks)
- (ii) $t - 7 > 3$. (03 marks)

Question Three

- (a) Without calculators or tables, express the following as a single logarithm;
- (i) $\frac{3}{2}\log_a x + \log_a(x + 1) - \log_a \sqrt{x}$. (02 marks)
- (ii) $7\log_a 2 - 3\log_a 12 + 5\log_a 3$. (04 marks)
- (b) Solve the following equations;
- (i) $\log_a x + \log_a x^2 + \log_a x^3 + \log_a x^4 = 5$. (06 marks)
- (ii) $2^{2x+1} - 2^{x+1} + 1 = 2^x$. (08 marks)

Question Four

- (a) (i) On the same axes, sketch the graphs of $2x - y = 4$ and $3x + y = 1$; find the point of intersection of the two graphs. (08 marks)
- (ii) Using the axes in 4(a)(i), plot a graph of $y = 4$ and state its point(s) of intersection with the two graphs in 4(a)(i). (03 marks)

- (b) (i) Find the equation of a line passing through points $A(3, 2)$ and $B(5, -1)$. (04 marks)
- (ii) Plot the above line and state the x and y intercepts. (05 marks)

Question Five

- (a) When a rod of length l_0 is heated by a temperature t , its new length l is given by $l = x(1 + \alpha t)$ where α is the coefficient of linear expansion. (05 marks)
- (i) Make α the subject of the formula. (03 marks)
- (ii) Calculate α when $l = 80$, $x = 80$, and $t = 30$.
- (b) The length of a rectangular projector screen is $4m$ shorter than 3 times its width, the width of a rectangular projected image on the screen is $2m$ shorter than the screen's width. The image is $2m$ longer than twice its own width. Find the area of the screen if $44m^2$ of the screen are not covered by the image. (12 marks)

Question Six

- (a) Given the functions $f(x) = 2x - 1$, $g(x) = \frac{1}{x}$ and $h(x) = 1 - x$, find; (04 marks)
- (i) The value of x for which $g(x)$ is undefined. (03 marks)
- (ii) $fg(2)$. (03 marks)
- (iii) $gh(-1)$.
- (b) The function is defined by $f(x) = x^2 - 7x + 9$ and $g(x) = 7 - 4x$, find; (07 marks)
- (i) $f(2)$. (03 marks)
- (ii) the value of x for which $f(x) = g(x)$.
- (iii) $g(-4)$.

Question Seven

- (a) Complete **Table 1** for values of $y = \log_2 x$. Give values of y correct to 2 decimal places. (04 marks)

Table 1

x	0.2	0.4	0.6	0.8	1	2	3	4
y								

- (b) Plot graphs of $y = 2^x$ and $y = \log_2 x$ on the same axes using a scale of 2cm to 1 unit on both axes. (09 marks)

- (c) Express $y = 2^x$ in *log* form, hence find $\log y$ when $x = \frac{1}{2}$. (04 marks)
- (d) Two quantities are connected by the equation; $y = mx + c$. Given that $y = 4$ when $x = 3$ and $y = 2$, when $x = -2$. Find m and c . (03 marks)

END