



UGANDA BUSINESS AND TECHNICAL EXAMINATIONS BOARD

Business and Humanities Certificate Examinations

NOV-DEC SERIES

PROGRAMME

NCICT, NCCM

PAPER NAME

BASIC MATHEMATICS

PAPER CODE

NCIT113/NCBM113/CBM1101

YEAR I SEMESTER I

2½ HOURS

WEDNESDAY, 11TH DECEMBER, 2019

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) Change the binary number 1101.1 to the equivalent decimal form. (04 marks)
- (b) Write 39_{ten} in binary form. (06 marks)
- (c) Express 492.731_{ten} to into octal form. (06 marks)
- (d) Convert 1705_{ten} to base twelve. (04 marks)

Question Two

- (a) Given that; $\log_{125} x + \log_{125} 5x = \frac{1}{3}$. Find x (05 marks)
- (b) Without using tables of a calculator, simplify; $\frac{1}{2}\log_{10} 16 - 2\log_{10} \frac{a}{5} + \log_{10} a^2$. (05 marks)
- (c) (i) Find the coordinates of the vertex D if points $A(2,3)$, $B(-11,8)$, $C(-4,-5)$ and $D(x,y)$ are vertices of a parallelogram. (03 marks)
- (ii) For the parallelogram ABCD in c(i), find the equations of the diagonals. (07 marks)

Question Three

- (a) Find the inverse functions of the following;
 - (i) $f(x) = 2x + 3$ (03 marks)
 - (ii) $g(x) = \frac{1}{x} - 3$ (04 marks)
- (b) Given the functions $f(x) = 2x$ and $g(x) = 3x + 1$, Find;
 - (i) $g^{-1}(3)$ (03 marks)
 - (ii) $fg(2)$ (02 marks)
 - (iii) Express $gf(x)$ as a single function of x . (02 marks)
- (c) Let $V = \{-2, -1, 0, 1, 2\}$. Let $g: V \rightarrow R$ be defined by $g(x) = x^2 + 1$. Find the range of g by computing the image of each element of V . (06 marks)

Question Four

- (a) Solve the quadratic equation by factorization; $2x^2 + x - 6 = 0$. (05 marks)
- (b) The length of a rectangular pitch is 5m more than the width and the area is $266m^2$. Find the dimensions of the pitch. (05 marks)
- (c) Find the number such that when it is successfully added to 7 and subtract from 17, the product of the two results is 128. (07 marks)
- (d) A triangle has sides of length x , $(x + 2)$, $(x + 3)$ and the perimeter is 11cm. Find the value of x . (03 marks)

Question Five

- (a) Given that y varies jointly with x and with the square root of z and that $y = 2$ when $x = \frac{1}{8}$, and $z = \frac{1}{4}$.
(i) Express y in terms of x and z . (07 marks)
(ii) Find the value of y when $x = \frac{3}{8}$ and $z = \frac{1}{9}$. (03 marks)
- (b) The period T of a simple pendulum varies directly with the square root of the length (L) of the pendulum. If $T = 1.2s$ and $L = 0.36m$. Find T as a function of L and hence find L when $T = 1s$. (10 marks)

Question Six

- (a) Given that; $\log_2 x + 2 \log_4 y = 4$. Show that: $xy = 16$. (10 marks)
- (b) (i) Find the values of p and q if $\log_3 81 = p$ and $\log_q 64 = 2$. (06 marks)
(ii) Simplify; $\log x + \log \frac{1}{x}$ (04 marks)

Question Seven

In a class of 44 students, 17 like computer (C), 19 like Physics (P), 16 like mathematics (M) and 4 students do not like any of the subjects. Given that 2 students like both Computer and mathematics only and that 6 students like both Mathematics and Physics and that 12 like Physics only.

- (a) Represent the information on a Venn diagram. (04 marks)
- (b) Find the number of students who like;
(i) All the three subjects. (03 marks)
(ii) One subject only. (06 marks)
(iii) Two subjects only. (03 marks)
- (c) Find the probability that a student picked at random likes two subjects only. (04 marks)

END