KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

FACULTY OF EDUCATIONAL STUDIES

COLLEGES OF EDUCATION
FOUR-YEAR BACHELOR OF EDUCATION (JHS)

MID SEMESTER EXAMINATION – MAY 2023

Index Number of Candidate: | | | | | | | | | | |

COURSE CODE: MATH 151

COURSE TITLE: Learning, Teaching and Applying Number and Algebra

Time Allowed: 40 Minutes

Year: One

INSTRUCTIONS:

This paper consists of THREE Sections.

Answer all questions in the answer booklet provided

1. SECTION A: has twenty (20) Multiple Choice Items. Each stem is followed by four options lettered A to D. Read each question carefully and write the letter of the option that corresponds to the correct or best answer on page one (1) of the answer booklet.
2. SECTION B: has questions which require short answers. You must answer all the questions in the booklet.
3. SECTION C: has three Essay Questions. You are required to answer only TWO in the answer booklet.
4. Ensure that your index number is correctly written on every page of the answer booklet provided.
5. DO NOT WRITE YOUR NAME ANYWHERE IN THE BOOKLET

You are NOT to start work or turn to the next page until you are told to do so.

Section A

(20 marks)

Answer all the questions in this section

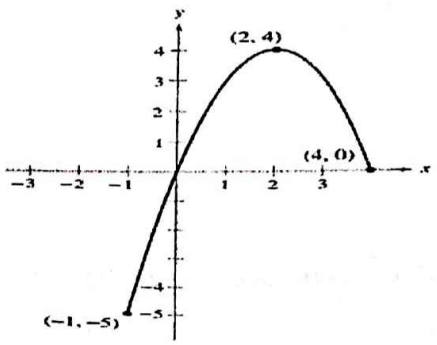
For question 1 to 20, each stem is followed by four options lettered A to D. Read each question carefully and write the letter that corresponds to the correct or best answer in the answer booklet.

1. Two functions are defined on the set of real numbers by $f(x)=3x+4$ and $g(x)=x-1$. Find the composite function $g \circ f$.
   A. $3(x+1)$
   B. $3x+1$
   C. $2x-4$
   D. $3x^2-1$

2. Add 54_8 and 67_8 giving your answer in base eight.
   A. 111
   B. 121
   C. 123
   D. 143

3. A set $A = \{U_1, U_2, U_3, U_4 \ldots\}$, if $U_1 = 2$, $U_{n+1} = U_n + 3$, where n = 1, 2, 3 …
   What is the value of U_4.
   A. 5
   B. 8
   C. 11
   D. 14

The graph of the function f(x) is shown below. Use it to answer questions 4 and 5



4. What is the equation of the function?
   A. $f(x) = x^2 - 4$
   B. $f(x) = 4 - x^2$
   C. $f(x) = x^2 - 4x + 3$
   D. $f(x) = x^2 - 2$

5. What is the domain of f?
   A. [1, 4]
   B. [-1 , 4]
   C. (1, 4)
   D. (-1, 4)

6. In a survey involving 70 students on their favourite sports, 52 indicated football and 48 indicated hockey as favourite. It was observed that 12 students indicated football only as their favourite. How many students chose neither football nor hockey as favourites?

   A. 88
   B. 36
   C. 18
   D. 10

7. Subtract $3x + 7$ from $x^2 + 4x + 5$
   A. $x^2 + x - 12$
   B. $x^2 + x - 2$
   C. $-x^2 - x + 2$
   D. $-x^2 - x + 12$

8. Evaluate $\left(1\frac{2}{3} - \frac{4}{5}\right) \div \left(\frac{3}{5} + \frac{3}{4}\right)$
   A. $\frac{53}{82}$
   B. $\frac{51}{82}$
   C. $\frac{52}{81}$
   D. $\frac{50}{81}$

9. Correct 5178.3426 to two decimal places
   A. 5178.00
   B. 5178.30
   C. 5178.34
   D. 5178.35

10. Fractions which represent the same number but have different names are termed as.....
    A. Equal
    B. Mixed
    C. Equivalent
    D. Proper

11. Simplify $\left(\frac{4}{3} \times 2\frac{1}{4}\right) + \left(2\frac{1}{2} \div \frac{5}{6}\right)$
    A. 0
    B. 1
    C. 3
    D. 6

12. Given that set $A = \{x: x = 5, 2x + 3\}$ and $B = \{x: x = 5, x - 7\}$, find the value of x if $A = B$

    A. -10
    B. -5
    C. 5
    D. 10

13. What property of addition does the statement $a + (b + c) = (a + b) + c$ illustrate
    A. Distributive
    B. Commutative
    C. Closure
    D. Associative

14. How many subsets can be formed from the set A = {1, 2, 3, 4, 5}
    A. 32
    B. 25
    C. 15
    D. 10

15. Which of the following is an example of teaching, learning material for teaching integers?
    A. Paper strips
    B. Cuisenaire rods
    C. Charged particles
    D. Algebraic titles

16. Given that $n(P \cup Q) = 39$, $n(P \cap Q) = 9$ and $n(P) = 22$, find $n(Q)$.
    A. 36
    B. 31
    C. 29
    D. 26

17. Find the base n such that $124_n = 52$
    A. 3
    B. 6
    C. 8
    D. 12

18. A man and his daughter together have a mas of 86 kg and the father has a mass of 40 kg more than the daughter. Determine the mass of the father.
    A. 23 kg
    B. 43 kg
    C. 46 kg
    D. 63 kg

19. Find the smallest number which is divisible by 6, 8, and 10.
    A. 24
    B. 40
    C. 60
    D. 120

20. Find the Least Common Multiple (LCM) of the numbers 5, 10 and 12
    A. $2 \times 3 \times 5$
    B. $2 \times 3^2 \times 5$
    C. $2^2 \times 3 \times 5$
    D. $2^2 \times 3^2 \times 5^2$

Section B

(30 marks)

Answer all the questions

For questions 21 – 30, show your working in the answer booklet. Each question carries 3 marks.

21. Using appropriate teaching learning resource, demonstrate that $2\frac{1}{2} = \frac{5}{2}$

22. Two towns A and B have market days. Town A has market days every 2 consecutive days while Town B has market days every 3 consecutive days. On what days will they have the same market day?

23. Solve $8z + 5 = 19 - 4z$ and leave your answer in set notation.

24. The sum of two consecutive odd numbers is 120. What is the product of the numbers?

2. a). Mr. Essel has 2426_8 books on Algebra. He sold 566_8 of books and distributed 1204_8 to his students.

i) Calculate the number of books left. **[5 marks]**

ii) Convert your answer in (i) to base five numeral. **[5 marks]**

b) Mrs. Ngcobo won a mini-grant of $4,000 to buy tablet computers for her classroom. The tablets she would like to buy cost $254.12 each, including tax and delivery. What is the maximum number of tablets Ngcobo can buy. **[5 marks]**

c) Copy and complete the following table for multiplication modulo 11.

$\otimes$	1	5	9	10
1	1	5	9	10
5	5			
9	9			
10	10			

Use the table to;

(i) evaluate $(9 \otimes 5) \otimes (10 \otimes 10)$

(ii) find the truth set of

(α) $10 \otimes m = 2$

(β) $n \otimes n = 4$ **[10 marks]**

3. a). In a survey of a class of 38 students to find out the food they like best among Kenkey, Fufu and Yam, the following results were obtained. Fifteen students said they like Kenkey, 17 like Yam and 3 like neither Kenkey nor Fufu nor Yam.

i) Represent the information on a Venn diagram.

ii) Use your Venn diagram to find the number of students who like all three types of food. **[10 marks]**

b) Solve the inequality $-4 \leq 2(x-2) \leq 6$ and illustrate your answer on a number line. **[5 marks]**

c) (i) Mrs. Eshun prepared a sandwich and decided to put peanut butter or jelly on top. She argued that regardless of whether the jelly is on top or the peanut better is on top, the taste of the sandwich wouldn't change. Do you agree with her? Relate your answer to one of the properties of real numbers. **[5 marks]**

(iii) Amuzu and Dookono Shared Gh₵22,000 in the ratio 7: 9. How much did each get? **[5 marks]**