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QUALIFICATION CODE: 07BGIT,07BHRM,07BMAR, 07BBMN, 27BAGA,07BTRM,07BHOR,07BPSM,04CIPM,07BRAR,07BENT	LEVEL: 5
COURSE: INTRODUCTION TO MATHEMATICS (BUSINESS AND MANAGEMENT)	COURSE CODE: ITM111S
DATE: <b>NOVEMBER 2023</b>	SESSION: <b>1</b>
DURATION: <b>3 HOURS</b>	MARKS: <b>100</b>

#### **FIRST OPPORTUNITY EXAMINATION QUESTION PAPER**

**EXAMINER:** Ms A. SAKARIA, Ms K. DAVID, Ms P. NGHISHIDIVALI, Ms Y. NKALLE

**MODERATOR:** Mr I. NDADI

#### **INSTRUCTIONS**

1. Answer ALL the questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. **QUESTION 1** of this question paper entail multiple choice questions with options A to D. Write down the letter corresponding to the best option for each question.
5. **QUESTION 2** indicate whether the given mathematical statements are true (T) or false (F).
6. **QUESTION 3** show clearly all the steps used in the calculations.

#### **PERMISSIBLE MATERIALS:**

1. Non-Programmable Calculator without a cover.

**This paper consists of 4 pages including this front page**

**QUESTION 1 [30 MARKS]**

Write down the letter corresponding to the best option for each question in the answer booklet/sheet provided.

1.1 Factorize the expression:  $xp + xq + py + qy$ . [3]

- A.  $(x+y)(p+q)$    B.  $(x+p)(q+y)$    C.  $(x-y)(p-q)$    D.  $(x-p)(q-y)$

1.2 Tulonga is 3 years older than Tuma, who is 3 years older than Uveni. If their combined Age is 15 years, how old is Uveni? [3]

- A. 15years                      B. 8 years                      C. 2 years                      D. 5 years

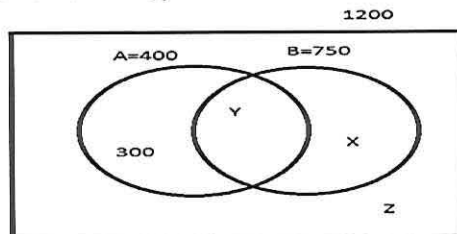
1.3 Simplify  $\left(\frac{1}{8}\right)^{-2} \times \sqrt[4]{256}$  . [3]

- A. 4                                  B. 64                                  C. 256                                  D. 8

1.4 Given sets  $A = \{1, 2, 3, 7, 11\}$ , and  $B = \{3, 5, 7, 11, 12\}$ , find  $(A \cap B)^c$  . [3]

- A.  $(A \cap B)^c = \{1, 2, 5, 12\}$                       B.  $(A \cap B)^c = \{3, 7, 11\}$   
C.  $(A \cap B)^c = \{1, 2, 7, 11\}$                       D.  $(A \cap B)^c = \{3, 5, 12\}$

1.5 The values of  $x, y$  and  $z$  in the Venn diagram below are: [3]



- A.  $x = 750, y = 400$  and  $z = 150$                       B.  $x = 150, y = 650$  and  $z = 100$   
C.  $x = 320, y = 200$  and  $z = 220$                       D.  $x = 650, y = 100$  and  $z = 150$

1.6 There were a certain number of coffee mugs in the shop. Theo bought  $\frac{2}{5}$  of the mugs and Johr bought  $\frac{1}{5}$ . Now there are 150 mugs left in the shop. How many coffee Mugs did Theo buy? [3]

- A. 150                      B. 375                      C. 225                      D. 75

1.7 The factors for the expression  $3x^2 + 14x - 5$  are: [3]

- A.  $(3x+1)(x-5)$     B.  $(3x-1)(x+5)$     C.  $x(2x-3x-5)$     D.  $(x-1)(3x-5)$

1.8 The prime decomposition of 42 is: [3]

- A.  $3 \times 2 \times 5$                       B.  $2 \times 3 \times 7$                       C.  $3 \times 14$                       D.  $2 \times 21$

1.9 The expression  $\frac{3}{4} + \frac{2}{5} \div \frac{2}{5} - \frac{2}{3}$  simplifies to: [3]

- A.  $-4\frac{5}{16}$                       B.  $2\frac{5}{24}$                       C.  $2\frac{5}{12}$                       D.  $1\frac{1}{12}$

1.10 Determine the sum of the series  $\sum_{n=1}^5 (2n+3)$ . [3]

- A. 45                      B. 90                      C. 49                      D. 47

### **QUESTION 2 [10 MARKS]**

Indicate whether the given mathematical statements are true (T) or false (F)

2.1 The expression  $\ln e\sqrt{x^3}$  simplifies to  $x^{\frac{3}{2}}$ . [2]

2.2 The expression  $16p^4 - 81q^8$  can be factorised fully as  $4p^2 - 9q^4$ . [2]

2.3  $(\log a)(\log b)$  is equal to  $\log(a+b)$ . [2]

2.4 The discriminant of the equation  $2x^2 - 4x + 9 = 0$  is negative. [2]

2.5 If A is a  $2 \times 3$  matrix and B is a  $3 \times 2$  matrix, then we can calculate  $AB$ . [2]

### **QUESTION 3 [60 MARKS] (Clearly show all your work)**

3.1 Expand and simplify  $8(3h-4) - 5(h-2)$ . [4]

3.2 Solve the following pair of simultaneous equations using Cramer's rule.

$$x = \frac{5+3y}{2} \text{ and } 7y = 4x - 11 \quad [6]$$

3.3 After a price decrease of 8.5%, a television set costs N\$2640.00. What was the price before the decrease? [4]

- 3.4 A factory requires 42 machines to produce a given number of articles in 63 days. How many machines would be required to produce the same number of articles in 54 days? [4]
- 3.5 Let  $A = \begin{pmatrix} -2 & 3 \\ -2 & 0 \end{pmatrix}$ , find:
- 3.5.1  $A^2$  [4]
- 3.5.2 Calculate  $A^{-1}$  (The inverse of A). [6]
- 3.6 Find the numerical values of the letters in the Matrices,  

$$-2 \begin{pmatrix} p & -4 \\ -1 & q \end{pmatrix} - 2 \begin{pmatrix} r & -s \\ 3 & 5 \end{pmatrix} = \begin{pmatrix} s & 2 \\ r & 5 \end{pmatrix}$$
 [7]
- 3.7 The progression 39; 34; 29; 24... is given.
- 3.7.1 Identify the common difference. [2]
- 3.7.2 What is the 9<sup>th</sup> term of the progression? [3]
- 3.7.3 Find the sum of the 1<sup>st</sup> 20 terms of the progression. [4]
- 3.7.4 What term of the progression above has the value -56? [4]
- 3.8 In a survey of 200 households regarding the ownership of desktop and laptop computers, the following information was obtained:  
 120 households own only desktop computers, 10 households own only laptop computers, and 40 households own neither desktop nor laptop computers.
- a) Draw a Venn diagram and show the information as given above on the Venn diagram. [5]
- b) How many households own both desktop and laptop computers? [3]
- 3.9 Find the simple interest payable on a loan of N\$170000 at 6.75% p.a. at the end of 9 years. [4]

**END OF EXAMINATION QUESTION PAPER**