ᑎAᗰIᗷIA UᑎIᐯEᖇᔕITY
OF SCIEᑎCE AᑎD TECHᑎOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of Technology: Geo-Information Technology, Bachelor of Human Resources Management, Bachelor of Marketing, Bachelor of Transport Management, Bachelor of Business Administration, Bachelor of Agricultural Management, Bachelor of Horticulture	
QUALIFICATION CODE: 07BGIT,07BHRM,07BMAR,07BBAD,27BAGR,07BTRM,07BHOR	**NQF LEVEL:** 5
COURSE NAME: INTRODUCTION TO MATHEMATICS (BUSINESS AND MANAGEMENT)	**COURSE CODE:** ITM111S
DATE: JUNE 2022	**PAPER :** THEORY
DURATION: 3 HOURS	**MARKS: 100**

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Ms A. SAKARIA, Ms K. DAVID, Ms P. NGHISHIDIVALI, Mr N. MAFALE, Mr I. NDADI, Dr J. MWANYEKANGE
MODERATOR:	Mr G. TAPEDZESA

INSTRUCTIONS
1. Answer ALL the questions in the answer sheet.
2. **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.
3. For **QUESTION 2** indicate whether the given mathematical statements are true (**T**) or false (**F**).
4. **QUESTION 3** show clearly all the steps used in the calculations.

PERMISSIBLE MATERIALS
1. Non-programmable calculator without a cover.
THIS QUESTION 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 Evaluate: $\frac{1}{2}\left[\frac{-2(2+3)\times 20}{2}\right]$. [3]

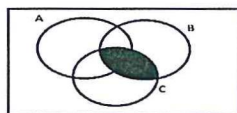   A. $\dfrac{5}{2}$ B. -10 C. -50 D. $\dfrac{18}{5}$

1.2 Find the Lowest Common Multiple (LCM) of the numbers $42, 28$ and 14. [3]

   A. 42 B. 84 C. 7 D. 16464

1.3 Simplify $\dfrac{a^3 b^{\frac{5}{6}}}{a^{\frac{1}{2}} b^{\frac{2}{3}}}$. [3]

   A. $a^{\frac{2}{5}} b^{\frac{1}{4}}$ B. $a^{\frac{2}{3}} b^{\frac{5}{6}}$ C. $a^{\frac{1}{2}} b^{\frac{1}{5}}$ D. $a^{\frac{5}{2}} b^{\frac{1}{6}}$

1.4 What statement does the shaded region represent? [3]

   A. A and B and C B. A or C C. B and C D. A or B and C

1.5 The roots of the quadratic equation are 2 and 3. What is the quadratic equation? [3]

   A. $x^2 + 5x + 6 = 0$ B. $x^2 + 5x - 6 = 0$ C. $x^2 - 5x - 6 = 0$ D. $x^2 - 5x + 6 = 0$

1.6 What is the value of x given that $\left(9^4\right)3 = 3^x$? [3]

   A. 9   B. 8   C. 15   D. 3

1.7 Express the statement "nine more than three times a number" in terms of h. [3]

   A. $3h - 9$ B. $3(h - 9)$ C. $3(h + 9)$ D. $3h + 9$

1.8 Factorize the expression $2ab^2 - abd - 2bc + cd$ [3]

    A. $(2b-d)(ab-c)$ B. $(ab-c)(ab-c)$ C. $(2b-d)(ab+c)$ D. $(2b+d)(ab-c)$

1.9 If $A = \{1,3,5,7,9\}$ and $B = \{2,3,5,7\}$, what is $A \cap B$? [3]

    A. $\{3,5,7\}$ B. $\{2,3,5,7\}$ C. $\{2,3,5,7,9\}$ D. $\{1,2,3,5,7,9\}$

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 number 13.7×10^3 is in standard form. [2]

2.2 The expression $(x-2)(x+2)$ simplifies to $x^2 - 4x - 4$. [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 2×3 matrix and B is a 3×2 matrix, then we can calculate AB. [2]

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

3.1   Tulonga is 8 years older than Tuma, who is 11 years older than Uveni. If their combined age is 60 years, find the age of each person. [6]

3.2   Expand and simplify the expression, $4x(x+y) - 4(x-y)^2$. [5]

3.3   Simplify the expression, $\dfrac{x^2 - 4x - 21}{x^2 - 5x - 14}$. [4]

3.4   Find the value of the letters a, b, c and d given that: [8]

$$\begin{pmatrix} -4a & 2b \\ 4c & 6d \end{pmatrix} - \begin{pmatrix} b & 4 \\ a & 12 \end{pmatrix} = \begin{pmatrix} 22 & 48 \\ -12 & 24 \end{pmatrix}$$

3.5   Let $A = \begin{pmatrix} 6 & -5 \\ -8 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & -7 \\ -11 & 0 \end{pmatrix}$. Find:

3.5.1 AB [4]

3.5.2 $\dfrac{1}{2}A$ [4]

3.6   Find the value of k if the determinant of matrix $\begin{pmatrix} 2k & -6 \\ -3 & 3 \end{pmatrix}$ $is - 6$.   [4]

3.7   John wants to buy a car in 10 years' time. He wants to have $N\$140000$ at the time of purchase. How much should he invest now in a savings account that pays simple interest at a rate of 6 %?   [5]

3.8   Find the sum of the series $3+5+7+...+119$.   [8]

3.9   An AP is given by $k, 4k, 7k,...$ If the 20th term is equal to 16, find the value of k. [5]

3.10 All of 99 different pills contain at least one of the vitamins A and B.

      Forty have vitamin A only, $2x-1$ have vitamin B only, and x have all two vitamins.

      Present the information in a Venn diagram and solve for x.   [7]

END OF EXAMINATION QUESTION PAPER