# NAMIBIA UNIVERSITY
## OF SCIENCE AND TECHNOLOGY

### FACULTY OF HEALTH AND APPLIED SCIENCES

### DEPARTMENT OF MATHEMATICS AND STATISTICS

| QUALIFICATION: Bachelor of Regional and Rural Development, Bachelor of Communication, Bachelor of Technology Public Management, Bachelor of Supply Chain Management, Bachelor of Office Management and Technology, Bachelor of Natural Resources Management, Bachelor of Emergency Medical Care, Diploma In Vocational and Training, Bachelor of Hospitality Management ||
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| QUALIFICATION CODE: 07BRRD,07BACO,07BPMN, 07BLSM,07BOMT,07BNTC,07BEMC,06DVET,07HMN | LEVEL: 4 |
| COURSE CODE: BMS411S | COURSE NAME: BASIC MATHEMATICS |
| SESSION: NOVEMBER 2019 | PAPER: THEORY |
| DURATION: 3 HOURS | MARKS: 100 |

| FIRST OPPORTUNITY EXAMINATION QUESTION PAPER ||
|---|---|
| EXAMINER(S) | **Mr R Mumbuu**, Mr J Amunyela, Ms Y Nkalle, Mr F Ndinodiva, |
| MODERATOR: | Mrs S Mwewa |

| INSTRUCTIONS |
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| 1. Answer ALL the questions in answer booklet provided. <br> 2. Write clearly and neatly in black/blue ink. <br> 3. Number the answers clearly and note that marks will not be awarded for answers obtained without showing the necessary steps. |

### PERMISSIBLE MATERIALS
1. Non-Programmable Calculator without the cover

**THIS QUESTION PAPER CONSISTS OF 5 PAGES** (Including this front page)

## QUESTION 1[24 MARKS]

**Write down the letter of your best option for each question in the answer booklet provided.**

1.1   Which of the following numbers is a prime number?                                    [2]

   A. 24                  B. 51                  C. 29                  D. 21

1.2   Decompose 2016 into products of its prime factors                                    [2]

   A. $2^4 \times 3^2 \times 5$          B. $2^5 \times 3^2 \times 7$     C. $2^4 \times 65$          D. $32 \times 3^2 \times 7$

1.3   Write 5m:600cm in the simplest form                                                  [2]

   A. 50:60               B.90                   C. 6:5                 D. 5:6

1.4   Factorize $4x^2y + 6x^3 + 2x^2$                                                       [2]

   A. $2x^2(2y + 3x + 1)$              B. $2(2x^2y + 3x^3 + x^2)$

   C. $x^2(4y + 6x + 2)$               D. $2x^2(4y + 6x + 2)$

1.5   The expression $(xy - x^2)^2 - (x^4 - 2x^3y)$ simplifies to:                          [2]

   A. $x^2y^2$          B. $-x^2y^2$                C. $2x^2y^2$          D. 1

1.6   At present a mother is 32 years older than her daughter. Six years ago she was three

   times as old as her daughter was then. What is the present age of the daughter? [2]

   A. 58 years           B. 22 years            C. 32 years            D. 15 years

1.7   Of the 20 students in a class, 17 play soccer and 10 play volley ball. How many

   students play both soccer and volley ball?                                              [2]

   A. 27 Students        B. 7 Students          C. 20 Students         D. 3 Students

1.8   If A= $\{x^2: x$ is an integer and $1 \le x < 4\}$ and B= $\{2x: x$ is an integer and $2 \le x \le 7\}$

   Find $A \cap B$:                                                                         [2]

   A. $A \cap B = \{6\}$          B. $A \cap B = \{6,8\}$         C. $A \cap B = \{4,8\}$          D. $A \cap B = \{4\}$

1.9    If $S = \{1, 2, 3, 4, 5, ..., 10\}$ and $A = \{7,8,9,10\}$, which of the following is true:    [2]

    A. set A is a subset of S

    B. Set S is a subset of A

    C. $\bar{A} = \emptyset$

    D. None of the above

1.10   Given $\begin{pmatrix} 2 & 0 \\ 0 & -3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 10 \\ 3 \end{pmatrix}$, what is the value of $x$ ?    [2]

    A. 10          B. 5          C. -1          D. 2

1.11   Given $A = \begin{pmatrix} 2 & 5 \\ 7 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, and $C = (3 \quad 9)$, which of the following matrix

    multiplication is possible?    (2)

    A. $BA$          B. $AB$          C. $AC$          D. $C^2$

1.12   If the determinant of matrix $A = \begin{pmatrix} 2 & y \\ 5 & 4 \end{pmatrix}$ is 3, find the value of $y$?    [2]

    A. 3          B. -1          C. 1          D. 5

## SECTION B (show all your calculations)

**QUESTION 2 [34 MARKS]**

2.1    Simplify each of the following expressions without using a calculator.

2.1.1    $\left(\frac{2}{5} \div \frac{1}{3}\right) \times 3\frac{1}{2}$    [4]

2.1.2    $5t - 6r - 3t + 8r + 2t + 2r + 4$    [5]

2.1.3    $\sqrt{\left(\frac{4a^4}{9b^6}\right)^5}$    [3]

2.1.4    $x^2 - (x + y)^2 + 2xy + y^2$    [3]

3

2.2     In 1997 the population of Japan was $1.24 \times 10^9$ and in 2002 the population of Japan was $1.28 \times 10^9$. Calculate the percentage increase from 1997 to 2002 to 2 d.p.     [6]

2.3     Solve the following equations

2.3.1   $2(a + 3) = -12$     [3]

2.3.2   $\frac{1}{3}x + \frac{1}{4}x + 6 = 8$     [3]

2.3.3   The sum of three consecutive numbers is 78. Express each of these numbers in terms of $x$ and find the numbers.

2.4     Factorize the following expressions completely
2.4.1   $24xy^2 + 16x^2y$     [3]

2.4.2   $3m + mx - 3n - nx$     [4]


## QUESTION 3 [42 MARKS]

3.1 Among 110 first year students at NUST in the Department of Mathematics and Statistics, 40 take ANOVA(A) ,30 take Basic Mathematics( B), 10 both take both subjects.

3.1.1 Represent this information on Venn a diagram.     [4]

3.1.2 Find the number of students who:

a) do not take ANOVA     [3]

b) take ANOVA or Basic Mathematics     [3]

c) take ANOVA but not Basic Mathematics     [3]

d) take exactly one of the two subjects     [3]

3.2 Given   $\Omega = \{x : x \in N, x < 20\}$

$A = \{x \mid x \in N, x < 10, x \text{ is prime}\}$

$B = \{3, 5, 7, 9, 11, 13, 15\}$

$C = \{x \mid x \in N, 15 < x \leq 17\}$

Find

3.2.1   $A \cup B$     [4]

3.2.2   $\overline{A \cap B}$     [4]

3.3 Given that matrix $A = \begin{pmatrix} 4 & 6 \\ 3 & -6 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 7 \\ -1 & 3 \end{pmatrix}$, $C = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$, $D = (2 \quad 3)$

Find

3.3.1 $AB$ [4]

3.3.2 det $(A)$ [2]

3.3.3 $2A + 3B$ [4]

3.4 For how long should an amount of N$5000 be invested at 5% simple interest p.a. to generate an intrest of N$750? [4]

3.5 Calculate the amount payable on a loan of N$4000 for 3 years at the rate of 12.5 % p.a compounded monthly. [4]

**END OF EXAMINATION QUESTION PAPER**