**TRIBHUVAN UNIVERSITY**

**2022**

**Bachelors in Computer Application** **Full Marks: 60**

**Course Title: Math I** **Pass Marks: 24**

**Code No: CAMT 104**

**Semester: I**

**Candidates are required to answer the questions in their own words as far as possible.**

## Group B

**Attempt any SIX questions. (6*5=30)**

1. In a certain village in Nepal, all the people speak Nepali or Tharu or both languages. If 90% speak Nepali and 20% speak Tharu, how many people speak:

   i) Nepali language only

   ii) Tharu language only

   iii)both languages

2. If $x - ty = \frac{5-6i}{5+6i}$, prove that $x^2 + y^2 = 1$.
3. Define a function. Show that the function f:R→R defined by f(x)=3x+5 is bijective.
4. If A is the A.M. and H is the H.M. between two numbers a and b, show that:

$$\frac{a-A}{a-H} \times \frac{b-A}{b-H} = \frac{A}{H}$$

5. Define matrix**.**

If $A = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -2 & 1 \\ 3 & 2 \end{pmatrix}$, show that: $(AB)^T = B^T A^T$.

6. Prove that**:**

$$\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

7. Find the eccentricity and foci of the ellipse: $25x^2+4y^2=100$.

## Group C

**Attempt any TWO questions. (2*10=20)**

8. A bag contains 8 red balls and 5 blue balls. In how many ways can 3 red balls and 4 blue balls be drawn?

b) Find the volume of the parallelepiped whose concurrent edges are represented by the vectors i→−2j→+3k→, −3i→+4j→−5k→, and i→+2j→−3k→.

9. a) Find the Taylor Series expansion of f(x)=x3−2x+4 at a=2.
   b) In how many ways can the letters of the word 'CALCULUS' be arranged so that the two C's do not come together?

10. Define exponential and logarithmic functions. If f(x)=log⁡f0⁡1−x1+x for −1<x<1, show that:

$$f\left(\frac{2ab}{1+a^2b^2}\right) = 2f(ab) \quad \text{where } |ab| < 1.$$