



Tribhuvan University
Faculty of Humanities & Social Sciences
OFFICE OF THE DEAN
2021

Bachelor in Computer Applications
Course Title: Mathematics I
Code No: CAMT 104
Semester: I

Full Marks: 60
Pass Marks: 24
Time: 3 hours

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

Group B

Attempt any SIX questions.

[6×5 = 30]

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

i) Nepali language only

ii) Tharu language only and

iii) both languages

3. If $x - iy = \frac{5-6i}{5+6i}$, prove that $x^2 + y^2 = 1$.

4. Define a function. Show that the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 3x + 5$ is bijective.

5. If A be the A.M. and H be the H.M. between two numbers a and b, show that

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

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

7. Prove that: $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$.

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

Group C

Attempt any TWO questions.

[2×10 = 20]

9. a) 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

$$\vec{i} - 2\vec{j} + 3\vec{k}, -3\vec{i} + 4\vec{j} - 5\vec{k} \text{ and } \vec{i} + 2\vec{j} - 3\vec{k}.$$

10. a) Find the Taylor Series expansion of $f(x) = x^3 - 2x + 4$ 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?

11. Define exponential and Logarithmic function. If $f(x) = \log \frac{1-x}{1+x}$, $(-1 < x < 1)$, show that

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

$$\begin{aligned} f\left(\frac{2ab}{1+a^2b^2}\right) &= \log \frac{1 - \frac{2ab}{1+a^2b^2}}{1 + \frac{2ab}{1+a^2b^2}} \\ &= \log \frac{1+a^2b^2 - 2ab}{1+a^2b^2 + 2ab} \\ &= \log \frac{(1-ab)^2}{(1+ab)^2} \\ &= 2 \log \frac{1-ab}{1+ab} \\ &= 2f(ab) \end{aligned}$$