Tribhuvan University

Faculty of Humanities & Social Sciences

OFFICE OF THE DEAN

2018

Bachelor in Computer Applications — **Full Marks: 60**

Course Title: Mathematics — **Pass Marks: 24**

Code No.: CAMT 104 — **Time: 3 hours**

Semester: 1st

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

Group A

Attempt all the questions. **[10×1=10]**

In this group, there will be 10 objectives questions.

This paper is collected at the time of examination.

Group 'B'

Attempt any SIX questions: **6×5=30**

11. 32 students play basketball and 25 students play volleyball. It is found that 20 students play both the games. Find the number of students playing at least one game. Also, find total number of students if 13 students play none of these games.

12. Let $f: \mathbb{N} \to \mathbb{N}$ be defined by $f(x) = 2x$ for all $x \in \mathbb{N}$ where $\mathbb{N}$ is the set of natural numbers. Show that f is one-one but not onto function.

13. If the three consecutive term of a geometric series be increased by their middle term, then prove that the resulting terms will be in harmonic progression. (H.S.)

14. Find the adjoin of the matrix: $\begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$.

15. Prove that: $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = xyz\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}+1\right)$.

16. Find the equation of parabola with focus $(-1, 2)$ and directrix $x = -5$.

17. Transform $\mathbf{u} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ by $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ and check whether this transformation is linear.

Group 'C'

Attempt any TWO questions: 2×10=20

18. Define permutation and combination. Try to establish relationship between them with the help of formulae. In how many ways can the letters of the word "LOGIC" be a arranged so that:

(i) Vowels may occupy odd position?

(ii) No vowels are together?

19. Define scalar and vector product in three dimensional space with their geometrical interpretation and prove the formula

$\sin(A + B) = \sin A \cos B + \cos A \sin B$ by using vector method.

20. Define the logarithmic function, state its properties and if

$f(x) = \log \frac{1+x}{1-x} (-1 < x < 1)$, show that

$f(a) + f(b) = f\left(\frac{a+b}{1+ab}\right) (|a| < 1, |b| < 1)$.

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2019

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Course Title: Mathematics **Pass Marks: 24**

Code No.: CAMT 104 **Time: 3 hours**

Semester: 1st

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

Group A

Attempt all the questions. **[10×1=10]**

In this group, there will be 10 objectives questions.

This paper is collected at the time of examination.

Group 'B'

Attempt any SIX questions: **6×5=30**

2. In a class of 100 students, 40 students failed in Mathematics, 70 failed in English and 20 failed in both subjects. Find
   a. How many students passed in both subjects?
   b. How many students passed in Mathematics only?
   c. How many students failed in Mathematics only?
3. Find the domain and range of the function $f(x) = \frac{2x+1}{3-x}$.
4. Find the Maclaurin series of the function $f(x) = \sin x$.
5. Prove that $\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$.
6. Find a unit vector perpendicular to the plane containing points P(1, – 1, 0), Q(2, 1, – 1) and R(– 1, 1, 2).
7. In how many ways can be letters of words "Sunday" be arranged? How many of these arrangement begin with S? How many begin with S and don't end with y?
8. If $x + iy = \sqrt{\frac{1+i}{1-i}}$ then show that $x^2 + y^2 = 1$.

Group 'C'

Attempt any TWO questions: **2×10=20**

9. a. Define conic section. Find the coordinates of vertices, eccentricity and foci of the ellipse $9x^2 + 4y^2 - 18x - 16y - 11 = 0$. [1+5]

b. If $T : \mathbb{R}^2 \to \mathbb{R}^3$ defined by $T(x_1, x_2) = (x_1 + x_2, x_2, x_1)$ be the linear transformation, then find matrix associated with linear map T. [4]

10. a Define irrational number: Prove that $\sqrt{2}$ is an irrational number . [1+4]

b. If functions $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = 2x + 1$ and $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = x^2 - 2$. Find the formulae for composite functions fog and gof and also verify that $fog \neq gof$. [4 + 1]

11. a. If arithmetic mean, geometric mean and harmonic mean between two unequal positive numbers are A, G, H respectively, then prove that $A > G > H$. [4]

b. What is the relation between permutation and combination of n objects taken r at a time? A committee of 5 is to be constituted from 6 boys and 5 girls. In how many ways can this be done so as to include at least a boy and a girl? [1+5]

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Tribhuvan University

Faculty of Humanities & Social Sciences

OFFICE OF THE DEAN

2020

Bachelor in Computer Applications **Full Marks: 60**

Course Title: Mathematics **Pass Marks: 24**

Code No.: CAMT 104 **Time: 3 hours**

Semester: 1st

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

Group A

Attempt all the questions. **[10×1=10]**

In this group, there will be 10 objectives questions.

This paper is collected at the time of examination.

Group 'B'

Attempt any SIX questions: **6×5=30**

2. Out of 500 people 285 like tea, 195 like coffee, 115 like lemon juice, 45 like tea and coffee, 70 like tea and juice, 50 like juice and coffee. If 50 do not like any drinks.
   (i) How many of people like all three drinks?
   (ii) How many people like only one drink?

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

4. If H is the harmonic mean between a and b then prove that $\frac{1}{H-a} + \frac{1}{H-b} = \frac{1}{a} + \frac{1}{b}$.

5. Define singular and non-singular matrix. Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 & -1 \\ 2 & 1 & 1 \\ 3 & -5 & 8 \end{bmatrix}$.

6. Find the focus, vertex, equation of axis, equation of directrix and length of Latus rectum of ellipse. $4x^2 + 9y^2 = 36$.

7. If θ is the angle between two unit vectors $\vec{a}$ and $\vec{b}$, then show that $\frac{1}{2}\left|\vec{a} - \vec{b}\right| = \sin\frac{\theta}{2}$.

8. How many numbers of at least three different digits can be formed by using the digits 1, 2, 3, 4, 5, 6?

Group 'C'

Attempt any TWO questions: $2 \times 10 = 20$

9. Prove by vector method: $\cos(A + B) = \cos A \cdot \cos B - \sin A \cdot \sin B$
10. Find the equation of circle passing through the points (1, 2), (3, 1) and (– 3, – 1).
11. Let $f : \Re \to \Re$ and $g : \Re \to \Re$ be defined by $f(x) = 2x + 3$ and $g(x) = x^2 - 1$ respectively then find,
    (i) $f \circ f$ (ii) $f^{-1} \circ g$
    (iii) $g \circ f$ (iv) $f \circ (f \circ g)$

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Tribhuvan University

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2021

Bachelor in Computer Applications — **Full Marks: 60**

Course Title: Mathematics — **Pass Marks: 24**

Code No.: CAMT 104 — **Time: 3 hours**

Semester: 1st

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

Group A

Attempt all the questions. [10×1=10]

In this group, there will be 10 objectives questions.

This paper is collected at the time of examination.

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 $f : R \to R$ 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 reds and 4 blue balls be drawn?

   b. Find the volume of the parallelepiped whose concurrent edges are represented by the vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $-3\vec{i} + 4\vec{j} - 5\vec{k}$ 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 $f\left(\frac{2ab}{1+a^2b^2}\right) = 2f(ab)$ where $|ab| < 1$.

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