Roll No. : ....

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BCA105

B.C.A. Ist Year Examination, 2022

BASIC MATHEMATICS

Paper-V

Time Allowed : 1½ Hours

Maximum Marks : 100

Part–A **[Marks : 30]**

Note :– Answer all questions (**50** words each). All questions carry equal marks.

Part–B **[Marks : 70]**

Note :– Answer any *two* questions (**250** words each). All questions carry equal marks.

Part–A

1. Answer the following questions :
   (i) Define symmetric difference of two sets.
   (ii) Define Cartesian products of two sets.
   (iii) Define equivalence relation.
   (iv) Define one to one function.
   (v) Define limit of function.

(vi) Evaluate :

$$\lim_{x \to a} \frac{x^2 - a^2}{x - a}$$

(vii) Write the formula of the solution of the quadratic equation.

(viii) Define identity matrix.

(ix) Write the statement of Leibnitz theorem.

(x) If $y = \log(\sec x + \tan x)$, then find $\frac{dy}{dx}$.

Part–B

2. In a group of 1000 students, 600 can speak Hindi and 500 can speak English. How many can speak both Hindi and English ?

3. If A = {1, 2, 3, 4}, B = {2, 4, 6, 8}, C = {3, 4, 5, 6}, then prove that :

   (a) $A \cap (B \cap C) = (A \cap B) \cap C$, and

   (b) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

4. Let R be a relation defined on the set N × N as follows :

   $(a, b)\ R\ (c, d) \Rightarrow a + d = b + c;$

   $\forall\ a, b, c, d \in N$

   then show that R is a equivalence relation.

5. If $f(x) \log\left(\frac{1+x}{1-x}\right)$, then find $f\left(\frac{2x}{1+x^2}\right)$.

6. Evaluate :

$$\lim_{x \to 0} \frac{\sin^2\left(\frac{x}{5}\right)}{x^2}$$

7. Test the continuity of the function $f(x)$ at the origin :

$$f(x) = \begin{cases} \frac{|x|}{x} & ; \quad x \neq 0 \\ 1 & \quad x = 0 \end{cases}$$

8. Solve the following equation using quadratic formula, $2x^2 + 5\sqrt{3}x + 6 = 0$.

9. If A(–2, 1), B(2, 3) and C(–2, –4) are three points, then find the angle between BA and BC.