

Roll No. : 351998

Total No. of Pages : 4

BCA-105

B.C.A. (First Year) Examination, 2022-23

BASIC MATHEMATICS

Paper- V

Time Allowed : Three Hours

Maximum Marks : 100

Part-A

[Marks : 20]

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

Part-B

[Marks : 50]

Note: Answer any five questions (250 words each), selecting one from each Unit. All questions carry equal marks.

Part-C

[Marks : 30]

Note: Answer any two questions (300 words each). All questions carry equal marks.

Part-A

1. Answer the following questions :

(i) Define the Universal Set.

(ii) Define Symmetric relation.

(iii) Evaluate: $\lim_{x \rightarrow 0} \frac{\sin \alpha x}{\sin \beta x}$

(iv) Find the roots of the equation:

$$x^2 - 4x + 2 = 0$$

(v) Define Straight line.

(vi) Write the condition for the two lines to be perpendicular.

(vii) Define Unit matrix.

(viii) If $y = x^2 \cdot \sin x$, then find dy/dx .

(ix) Write the statement of Leibnitz theorem.

(x) Evaluate $\int \tan^2 x \cdot dx$

Part-B

Unit-I

2. If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, then show that

$$A \times B \neq B \times A.$$

3. A relation R is defined on R as follows: $aRb \Leftrightarrow a - b + 5$ is an irrational number, then show that R is a reflexive relation.

Unit-II

4. Evaluate: $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin x}$
5. Find the value of K for which the equation $2x^2 - 10x + k = 0$, has real and equal roots.

Unit-III

6. Find the equation of the line which passes through the point (3, 4) and the sum of its intercepts on the axes is 14.

7. If $A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$, then find A^{-1} .

Unit-IV

8. If $y = \log \left(x + \sqrt{x^2 + 3} \right)$; then find dy/dx .
9. If $y = \log \left[x + \sqrt{x^2 + 1} \right]$; then show that $(1 + x^2)y_2 + xy_1 = 0$.

Unit-V

10. Evaluate: $\int \log x \cdot dx$

11. Evaluate: $\int \frac{dx}{x^2 - 3x + 2}$

Part-C

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

13. Show that, $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & ; x \neq 0 \\ 2 & ; x = 0 \end{cases}$

is continuous at $x = 0$.

14. Solve the following system of equations by Cramer's rule:

$$x + y + z = 9$$

$$2x + 5y + 7z = 52$$

$$2x + y - z = 0$$

15. Expand $\log(1+x)$ by Maclaurin's theorem.

16. Evaluate: $\int e^{ax} \cdot \sin bxdx$

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