

BCA-105

B.C.A. I Year Examination, 2017

Paper-V

(Basic Mathematics)

Time : Three Hours

Maximum Marks : 100

PART - A (खण्ड-अ)

[Marks : 20

Answer all questions (50 words each).

All questions carry equal marks.

सभी प्रश्न अनिवार्य हैं। प्रत्येक प्रश्न का उत्तर पचास शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

PART - B (खण्ड-ब)

[Marks : 50

Answer *five* questions (250 words each).

Selecting *one* from each unit. All questions carry equal marks.

प्रत्येक इकाई से एक-एक प्रश्न चुनते हुए, कुल पाँच प्रश्न कीजिए।

प्रत्येक प्रश्न का उत्तर 250 शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

PART - C (खण्ड-स)

[Marks : 30

Answer any *two* questions (300 words each).

All questions carry equal marks.

कोई दो प्रश्न कीजिए। प्रत्येक प्रश्न का उत्तर 300 शब्दों से अधिक न हो।

सभी प्रश्नों के अंक समान हैं।

PART-A

UNIT - I

1. (i) Define subset.
- (ii) Define partial ordered relation.

UNIT - II

- (iii) Find the domain of $\frac{x}{x-5}$.
- (iv) Find value of $\sin(300^\circ)$ and $\tan(150^\circ)$.

UNIT - III

- (v) Find the roots of $7x^2 + x - 8 = 0$.
- (vi) Find the distance between two points P(3, 2) and Q(-2, -3).

UNIT - IV

- (vii) Find derivative of $\left(x - \frac{1}{x}\right)^2$.

(viii) If $y = \log \log x$ find $\frac{dy}{dx}$.

UNIT - V

(ix) Evaluate $\int_0^2 (1+x+x^2) dx$.

(x) Evaluate $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$.

PART-B

UNIT - I

2. If $U = \{x : x \in N, x < 10\}$ and

$$A = \{1, 2, 5, 6\}, B = \{2, 5, 7\}, C = \{1, 3, 5, 7, 9\}$$

then find

(a) $(A - B) \cap (A - C)$

(b) $A \oplus B$

(c) $A' \cap C'$

(d) $(A \cup C) - (B \cup C)$

3. Consider the Z of integers and an integer $m > 1$. We say that x is congruent to y modulo m , written :

$$x \equiv y \pmod{m}$$

if $(x - y)$ is divisible by m .

show that above relation is an equivalence relation.

UNIT - II

4. If $f(x) = \frac{1}{1-x}$ find $f[f\{f(x)\}]$.

5. Check the continuity of the given function at $x = 1$

$$f(x) = \begin{cases} 5x - 4 & 0 < x \leq 1 \\ 4x^2 - 3x & 1 < x < 2 \end{cases}$$

UNIT - III

6. If $A = \begin{bmatrix} 3 & 2 & 1 \\ -5 & 0 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & -5 & -2 \\ 3 & 1 & 8 \end{bmatrix}$ verify that

$$(A+B)^T = A^T + B^T.$$

7. Prove that $\begin{vmatrix} a^2 & bc & c^2 + ac \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4a^2b^2c^2$.

UNIT - IV

8. Differentiate $\sin^2 x$ with respect to $(\log x)^2$.
9. Expand $\sin x$ up to 4 terms using Maclaurin's theorem.

UNIT - V

10. Evaluate $\int \cos^2 \theta d\theta$.

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

PART-C

UNIT - I

12. In a survey of 60 people it was found that

25 read newseek magazine

26 read time

26 read fortune

9 read bath news week and fortune

11 read both news week and time

8 read both time and fortune

3 read all three magazine

Find :

- (i) no of people who read at least one magazine
- (ii) no of people who read none of the magazine
- (iii) no of people who read exactly two magazine
- (iv) no of people who read exactly one magazine

UNIT - II

13. Let F, g, h be functions from N to N so that

$$f(n) = n + 1, \quad g(n) = 2n \text{ and}$$

$$h(n) = 0 \text{ if } n \text{ is even and}$$

$$h(n) = 1 \text{ if } n \text{ is odd}$$

determine (i) $f \circ f$ (ii) $f \circ g$ (iii) $g \circ f$ (iv) $g \circ h$ (v) $f \circ g \circ h$

UNIT - III

14. Find the inverse of the matrix :

$$\begin{bmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{bmatrix}$$

UNIT - IV

15. If $y = e^{a \sin^{-1} x}$, show that

$$(1-x^2)y_2 - xy_1 - a^2y = 0$$

UNIT - V

16. Evaluate $\int_0^a x^4 \sqrt{a^2 - x^2} dx$ using gamma function.