

TILAK MAHARASHTRA VIDYAPEETH, PUNE
BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)
BACHELOR OF COMPUTER APPLICATION CYBER SECURITY (CS)/
BACHELOR OF SCIENCE (CYBER SECURITY)/
BACHELOR OF SCIENCE/
BCA Data Science and Machine Learning/
BSC Data Science & Artificial Intelligence
EXAMINATION : DECEMBER- 2025
SEMESTER – I
Sub: Mathematics

(BCA142-20/BCA23-102/BSC24-102/BCA-CS142-20/BCAC23-102/BSCC24-102/46425-102/78625-102/79925-102)

Date : 24/12/2025

Total Marks : 60

Time: 10.00am to 12.30pm

Instructions:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labeled diagrams wherever necessary.

Q.1. Solve (Any 4)

(8)

1. If $A = \{a, b, c, d, e\}$ and $B = \{d, e\}$. Find $n(A \cap B)$, $n(A \cup B)$
2. If $f(x) = x^2 - 3x + 2$. Find $f(2) + f(1)$
3. Find the 17th term in the sequence 2,13,24,35,...
4. Solve : $(1100)_2 + (1010)_2 + (1111)_2$
5. Solve: $x^2 - 13x + 12 = 0$
6. Find the number of ways in which a committee of 4 members can be formed from 3 Engineers and 4 doctors, if there is no specific condition for selection.

Q.2. Solve (Any 3)

(9)

1. If $A = \{a, b, c, d, e\}$ and $B = \{d, e, f, g\}$. Find $n(A \cap B) + n(A \cup B)$
2. Find the sum of all the terms in the sequence 3,8,13,18,...,398.
3. Find the value of 'k' if the roots of the quadratic equation $9x^2 - kx + 4 = 0$ are equal.
4. Find the values of t_{10} & S_6 of the sequence 1,5,25,125,...

Q.3. Solve (Any 2)

(8)

1. Find the quadratic equation whose roots are $\frac{1}{2}$ & $\frac{1}{3}$.
2. Solve : $(110000)_2 + (10000)_2 - (1111)_2$

3. Find $|z_1 + z_2|$ & $|z_2 - z_1|$ if $z_1 = 3i - 4$ and $z_2 = 5 + 6i$

Q.4. Solve (Any 3) (15)

- With the help of truth table, show the following results:
(i) $\sim(p \wedge q) \equiv (\sim p) \vee (\sim q)$ (ii) $\sim(p \vee q) \equiv (\sim p) \wedge (\sim q)$
- Solve the equations with the help of Cramer's rule:
 $3x + y - z = 3, 5x - 2y + 4z = 7$ & $x - y - z = -1$
- State the type of the following functions. (Even or Odd)
(i) $f(x) = \frac{x^2 - 11}{3}$ (ii) $f(x) = \frac{x^4 - 11}{2x^2 + 5}$
- There are 12 chairs in first row of an auditorium, 15 in second row, 18 in third row and so on. If there are 24 such rows in all, find the number of chairs in 24th row. Also find the total seating capacity of an auditorium.

Q.5. Solve (Solve any 2) (20)

- If $f(x) = \frac{x+2}{4x-3}$ and $g(x) = \frac{3x+2}{4x-1}$
Find (i) $f \circ g$. (ii) $g \circ f$ (iii) Comment on the results (i) and (ii). (iv) $f \circ g + g \circ f$.
- On a shooting range, the probability that A can shoot the target is $1/3$, that of B is $1/5$ and that of C is $3/7$. Find the probability of the following events if all of them tried independently.
(i) Exactly one of them shoot the target.
(ii) Atleast one of them shoot the target.
(iii) At the most one of them shoot the target.
(iv) nobody shoot the target.
- How many four digit numbers can be formed with the help of the numbers 0,1,2,3,4,5,6,7,8,9 so that the numbers formed are...
(i) greater than 4000
(ii) Less than 8000
if repetition of the digits is not allowed.