Mathematics — Ganita Manjari

Chapter 4 Test 5

Exploring Algebraic Identities

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

General Instructions

1. All 13 questions are compulsory. Choose one option in A; show working in B–D.
2. Use suitable identities and show the main steps. Calculators are not allowed.
3. In rational expressions, state all restrictions from the original denominator.

SECTION A

(5 questions × 1 mark = 5 marks)

1. Which factorisation equals $9m^2 - \frac{n^2}{25}$?

(A) $(3m - \frac{n}{5})(3m + \frac{n}{5})$

(B) $(9m - \frac{n}{5})(m + \frac{n}{5})$

(C) $(3m - \frac{n}{25})^2$

(D) $(3m + \frac{n}{5})^2$

2. The coefficient of a^2b in $(a - b)^3$ is:

(A) 3 (B) −1

(C) 1 (D) −3

3. If $a + b + c = 6$ and $ab + bc + ca = 11$, then $a^2 + b^2 + c^2$ equals:

(A) 25 (B) 14

(C) 58 (D) 36

4. Which expression is non-negative for all real a and b?

(A) $a - b$ (B) ab

(C) $(a - b)^2$ (D) $a^2 - b^2$

5. Which splitting of the middle term helps factor $6x^2 - x - 2$?

(A) $-x = 3x - 4x$ (B) $-x = 2x - 3x$

(C) $-x = 5x - 6x$ (D) $-x = x - 2x$

SECTION B

(4 questions × 2 marks = 8 marks)

6. Expand the following:

$$(-3m + 4k - l)^2.$$

7. Calculate the following using a cube identity:

$$199^3.$$

8. Factor the following:

$$3a^2 + 4ab + \frac{4}{3}b^2.$$

9. A student claims $(a + b)^2 \geq a^2 + b^2$ for all real a and b. Give a counterexample and state the exact condition for the claim to hold.

SECTION C

(3 questions × 3 marks = 9 marks)

10. Simplify the following and retain the original restriction:

$$\frac{p^4 - 16}{p^2 - 4p + 4}.$$

11. Show that $a - b$ is a factor of $a^4 - b^4$. Use that factorisation to calculate:

$$81^4 - 79^4.$$

12. Find all possible values of the non-zero number x satisfying:

$$x + \frac{1}{x} = \frac{10}{3}.$$

SECTION D

(1 application question × 3 marks = 3 marks)

13. A cuboid has volume $3ps^2 - 15ps + 12p$ cubic units, with $p > 0$ and $s > 4$. Find three possible edge lengths. Find its volume when $p = 2$ and $s = 6$.