CHAPTER TEST: POLYNOMIALS (HOTS)

Mathematics | Class IX | (2026/POLY/09/HOTS/001)

Time: 1.5 Hours **Max. Marks: 35**

General Instructions:

- All questions are compulsory.
- Section A contains 8 MCQs of 1 mark each.
- Section B contains 4 Very Short Answer questions of 2 marks each.
- Section C contains 3 Short Answer questions of 3 marks each.
- Section D contains 2 Long Answer/HOTS questions of 5 marks each.
- Use of calculators is not permitted.

Section A: Multiple Choice Questions (1 Mark Each)

1. If $x^{51} + 51$ is divided by $x + 1$, the remainder is:

   (a) 0 (b) 1 (c) 49 (d) 50

2. If $x + y + 2 = 0$, then $x^3 + y^3 + 8$ is equal to:

   (a) $(x + y + 2)^3$ (b) 0 (c) $6xy$ (d) $-6xy$

3. If $p(x) = x + 4$, then $p(x) + p(-x)$ is:

   (a) 8 (b) $2x$ (c) 0 (d) 4

4. The coefficient of x^2 in the expansion of $(x - 2)^3$ is:

   (a) -2 (b) -6 (c) 12 (d) 1

5. If $a + b + c = 0$, then $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$ is:

   (a) 0 (b) 1 (c) -1 (d) 3

6. One of the factors of $(x - 1) - (x^2 - 1)$ is:

   (a) $x + 1$ (b) $x - 1$ (c) $x - 2$ (d) 1

7. If the degree of a polynomial $p(x)$ is n, then the maximum number of zeroes it can have is:

   (a) $n + 1$ (b) $n - 1$ (c) n (d) $2n$

8. The value of $(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a)(x - b)(x - c)$ when $3x = a + b + c$ is:

   (a) $3x$ (b) $a + b + c$ (c) 0 (d) 1

Section B: Very Short Answer Questions (2 Marks Each)

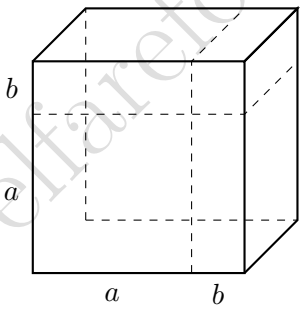
1. If $x^2 - 1$ is a factor of $ax^4 + bx^3 + cx^2 + dx + e$, show that $a + c + e = b + d = 0$.
2. Without actually calculating the cubes, find the value of $(28)^3 + (-15)^3 + (-13)^3$.
3. Factorise: $x^6 - y^6$.
4. Find the value of k if $x - 1$ is a factor of $4x^3 + 3x^2 - 4x + k$.

Section C: Short Answer Questions (3 Marks Each)

1. If $x^2 + \frac{1}{x^2} = 27$, find the value of $x - \frac{1}{x}$.
2. Factorise $x^3 - 6x^2 + 11x - 6$ using the Factor Theorem.
3. Prove that $(a + b)^3 + (b + c)^3 + (c + a)^3 - 3(a + b)(b + c)(c + a) = 2(a^3 + b^3 + c^3 - 3abc)$.

Section D: Long Answer / HOTS Questions (5 Marks Each)

1. **Geometric Interpretation of Identities:** Consider a large cube of side $(a + b)$. It is partitioned into smaller blocks as shown in the algebraic identity $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.



If the volume of the smaller cube a^3 is 64 units and $b = 2$ units, calculate:

(i) The total volume of the large cube.

(ii) The surface area of the rectangular block with volume a^2b.

2. If $x + y + z = 1$, $xy + yz + zx = -1$ and $xyz = -1$, find the value of $x^3 + y^3 + z^3$.

End of Question Paper