SSC GD Constable Exam : Algebra Syllabus Summary

Overview:
The Algebra topic is an essential part of the Mathematics section in the SSC GD Constable Exam, contributing approximately 3–5 questions (6–10 marks out of 160 total marks) in the Computer-Based Examination (CBE). The syllabus focuses on basic algebraic operations, including simplification, solving linear equations, and applying algebraic identities in problem-solving. Questions test computational accuracy, understanding of algebraic concepts, and application at a 10th-grade level. The exam includes 80 questions (2 marks each, 0.50 negative marking per wrong answer) to be completed in 60 minutes.

Key Topics in Algebra:

1. Algebraic Expressions: Simplifying and manipulating polynomials and algebraic terms.
2. Algebraic Identities: Applying standard identities to simplify expressions.
3. Linear Equations: Solving linear equations in one variable and word problems.
4. Factorization: Factoring polynomials using identities or common factors.
5. Simplification: Simplifying algebraic expressions using BODMAS and identities.
6. Word Problems: Real-world applications involving algebraic equations (e.g., age, cost, number problems).
7. Basic Operations: Addition, subtraction, multiplication, and division of algebraic expressions.
8. Quadratic Equations: Basic factorization-based quadratic equations (if included at SSC GD level).

Important Formula and Techniques:

1. Algebraic Identities:
   - $(a + b)^2 = a^2 + b^2 + 2ab$
   - $(a - b)^2 = a^2 + b^2 - 2ab$
   - $a^2 - b^2 = (a + b)(a - b)$

- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
- $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
- $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
- $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- Example: Simplify $(x + 3)^2 = x^2 + 9 + 2 \times x \times 3 = x^2 + 6x + 9$.

2. Linear Equations in One Variable:
- General form: $ax + b = c$
- Solution: $x = (c - b) / a$
- Example: Solve $2x + 5 = 11$: $2x = 11 - 5$, $2x = 6$, $x = 3$.

3. Factorization:
- Common Factor: Factor out the greatest common factor (GCF).
  - Example: $6x^2 + 9x = 3x(2x + 3)$.
- Using Identities: Factorize using $a^2 - b^2$ or other identities.
  - Example: $x^2 - 16 = (x - 4)(x + 4)$.
- Quadratic Polynomial: For $ax^2 + bx + c$, find factors such that their sum = b and product = ac.
  - Example: $x^2 + 5x + 6 = (x + 2)(x + 3)$ (factors 2 and 3: sum = 5, product = 6).

4. Simplification:
- Use BODMAS (Bracket, Order, Division/Multiplication, Addition/Subtraction) and identities.
- Example: Simplify $[(2x + 3)^2 - (2x - 3)^2] / 4x = [4x^2 + 12x + 9 - (4x^2 - 12x + 9)] / 4x = (24x) / 4x = 6$.

5. Word Problem Applications:
- Example (Age): A's age is twice B's, and their sum is 21. Let B's age = x, A's age = 2x. Then, $x + 2x = 21$, $3x = 21$, $x = 7$. So, B = 7 years, A = 14 years.
- Example (Number): The sum of a number and its reciprocal is 10/3. Let number = x, then $x + 1/x = 10/3$. Multiply by x: $x^2 + 1 = (10/3)x$, so $3x^2 - 10x + 3 = 0$. Solve: $(3x - 1)(x - 3) = 0$, $x = 1/3$ or 3.

6. Operations with Algebraic Expressions:
   - Addition/Subtraction: Combine like terms.
     - Example: $(3x^2 + 2x + 5) + (x^2 - 4x + 2) = 4x^2 - 2x + 7$.
   - Multiplication: Distribute terms.
     - Example: $(x + 2)(x + 3) = x^2 + 3x + 2x + 6 = x^2 + 5x + 6$.
   - Division: Factorize and simplify.
     - Example: $(x^2 - 4) / (x - 2) = (x - 2)(x + 2) / (x - 2) = x + 2$ $(x \neq 2)$.

Key Points for SSC GD Preparation:

- Focus Areas: Simplifying expressions using identities, solving linear equations, factorization, and word problems (e.g., age, number problems) are frequently tested.
- Question Types: Direct simplification (e.g., $(x + 2)^2$), solving linear equations, factorization, and word problems (e.g., sum of numbers).
- Difficulty Level: 10th-grade level, requiring accurate formula application and quick algebraic manipulation.
- Practice Tips: Memorize algebraic identities, practice solving linear equations, factorize polynomials, and solve word problems from past SSC GD papers to improve speed and accuracy.
