SSC GD Constable Exam: Number System Syllabus Summary

Overview:
The Number System is a foundational topic in the Mathematics section of the SSC GD Constable Exam, carrying approximately 4–6 questions (8–12 marks out of 160 total marks) in the Computer-Based Examination (CBE). The syllabus focuses on basic arithmetic operations, number properties, and calculations at a 10th-grade level. Questions test conceptual understanding, quick calculations, and application of formulas. The exam includes 80 questions (2 marks each, 0.50 negative marking per wrong answer) to be completed in 60 minutes.

Key Topics in Number System:

1. Types of Numbers: Natural numbers, whole numbers, integers, rational and irrational numbers, prime and composite numbers.
2. Divisibility Rules: Rules for divisibility by 2, 3, 4, 5, 6, 8, 9, 10, and 11.
3. Factors and Multiples: Finding factors, multiples, HCF (Highest Common Factor), and LCM (Lowest Common Multiple).
4. Fractions and Decimals: Operations on fractions, decimal conversions, and recurring decimals.
5. Simplification: Simplifying numerical expressions using BODMAS (Bracket, Order, Division/Multiplication, Addition/Subtraction).
6. Number Series: Identifying patterns in number sequences.
7. Unit Digit and Remainder Theorems: Finding unit digits of large powers and remainders using modular arithmetic.
8. Basic Arithmetic Properties: Commutative, associative, and distributive properties.

Important Formula and Theorems:

1. Divisibility Rules:
   - Divisible by 2: Last digit is even (0, 2, 4, 6, 8).
   - Divisible by 3: Sum of digits is divisible by 3.
   - Divisible by 4: Last two digits form a number divisible by 4.

- Divisible by 5: Last digit is 0 or 5.
- Divisible by 6: Number is divisible by both 2 and 3.
- Divisible by 8: Last three digits form a number divisible by 8.
- Divisible by 9: Sum of digits is divisible by 9.
- Divisible by 10: Last digit is 0.
- Divisible by 11: Difference between sum of alternate digits is 0 or divisible by 11.

2. HCF and LCM:
- HCF(a, b) = Greatest number dividing both a and b (use Euclidean algorithm: HCF(a, b) = HCF(b, a mod b)).
- LCM(a, b) = (a × b) / HCF(a, b).
- For fractions: HCF of numerators / LCM of denominators (for addition/subtraction).

3. Fractions and Decimals:
- Fraction: a/b, where a is numerator, b is denominator (b ≠ 0).
- Converting fraction to decimal: Divide numerator by denominator.
- Recurring decimal to fraction: For 0.xyxy... (repeating block of length n), fraction = xy / (10^n - 1).
  Example: 0.333... = 3 / (10^1 - 1) = 3/9 = 1/3.

4. BODMAS Rule:
- Order of operations: Bracket, Order (exponents), Division/Multiplication (left to right), Addition/Subtraction (left to right).

5. Unit Digit Theorem:
- Unit digit of a^n depends on the unit digit of a and the cyclicity of powers:
  - Unit digit 0, 1, 5, 6: Always remains 0, 1, 5, 6.
  - Unit digit 2: Cyclicity 4 (2, 4, 8, 6).
  - Unit digit 3: Cyclicity 4 (3, 9, 7, 1).
  - Unit digit 4: Cyclicity 2 (4, 6).
  - Unit digit 7: Cyclicity 4 (7, 9, 3, 1).
  - Unit digit 8: Cyclicity 4 (8, 4, 2, 6).

- Unit digit 9: Cyclicity 2 (9, 1).
- Example: Unit digit of 2^10 = 2^(8+2) = (2^4)^2 × 2^2 = 6^2 × 4 = 6 × 4 = 4.

6. Remainder Theorem:
- For a ÷ b, remainder = a mod b.
- Fermat's Little Theorem (simplified): If p is prime and a is not divisible by p, a^(p-1) ≡ 1 (mod p).
- Example: Remainder of 2^10 ÷ 7 = 2^(6+4) = (2^6)^1 × 2^4 = 1 × 16 ≡ 2 (mod 7).

7. Number Series:
- Arithmetic sequence: a_n = a_1 + (n-1)d, where d is the common difference.
- Geometric sequence: a_n = a_1 × r^(n-1), where r is the common ratio.

8. Properties of Numbers:
- Commutative: a + b = b + a; a × b = b × a.
- Associative: (a + b) + c = a + (b + c); (a × b) × c = a × (b × c).
- Distributive: a × (b + c) = a × b + a × c.
- Prime numbers: Divisible only by 1 and itself (e.g., 2, 3, 5, 7).
- Composite numbers: Have more than two factors (e.g., 4, 6, 8).

Key Points for SSC GD Preparation:

- Focus Areas: Divisibility, HCF/LCM, fractions/decimals, simplification, unit digits, and remainders are frequently tested.
- Question Types: Direct calculations, pattern-based questions, and application of divisibility rules or theorems.
- Difficulty Level: 10th-grade level, requiring quick mental math and formula application.
- Practice Tips: Solve past SSC GD papers, practice simplification using BODMAS, and memorize unit digit cyclicity and divisibility rules for speed.

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