APTITUDE NOTES (DETAILED EXAM-ORIENTED) — PART 2

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1. NUMBER SYSTEM (DETAILED)

1.1 Types of Numbers

- **Natural numbers:** 1, 2, 3...
- **Whole numbers:** 0, 1, 2, 3...
- **Integers:** -3, -2, -1, 0, 1, 2, 3...
- **Rational numbers:** Numbers that can be expressed as a fraction (p/q)
- **Irrational numbers:** Cannot be expressed as a fraction ($\sqrt{2}$, π)

1.2 Prime Numbers

- A number with only 2 factors: 1 and itself
- Example: 2, 3, 5, 7, 11

1.3 Factors & Multiples

- **Factors:** numbers that divide exactly
- **Multiples:** numbers obtained by multiplying

1.4 LCM & HCF

- **LCM:** least common multiple
- **HCF/GCD:** highest common factor

Shortcut method (Prime factorization): Example: LCM of 12 and 18 - 12 = $2^2 \times 3$ - 18 = 2×3^2 - LCM = $2^2 \times 3^2$ = 36

1.5 Divisibility Rules

- **2:** last digit even
- **3:** sum of digits divisible by 3
- **5:** last digit 0 or 5
- **9:** sum of digits divisible by 9
- **11:** alternate digit difference divisible by 11

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2. PERCENTAGES (DETAILED)

2.1 Percentage Formula

Percentage = (Part / Whole) × 100

2.2 Increase & Decrease

- **Increase %** = (Increase / Original) × 100
- **Decrease %** = (Decrease / Original) × 100

2.3 Shortcut Values

- 10% = divide by 10
- 20% = divide by 5
- 25% = divide by 4
- 50% = divide by 2

2.4 Quick Calculation Method

Example: 15% of 240 - 10% of 240 = 24 - 5% of 240 = 12 - Total = 24 + 12 = 36

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3. RATIO & PROPORTION (DETAILED)

3.1 Ratio Definition

Ratio = a : b (comparison between two values)

3.2 Proportion Definition

a/b = c/d

3.3 Alligation Method

Used in mixture problems.

Example: - 10% solution mixed with 30% solution to make 20%

Alligation chart:

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30%     |     10%
        |     20%
10      |     20
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So ratio = 10 : 20 = 1 : 2

4. AVERAGES (DETAILED)

4.1 Average Formula

Average = Total sum / Number of items

4.2 Weighted Average

Example: Marks in two subjects - Subject A: 60 marks (weight 2) - Subject B: 80 marks (weight 3)

Weighted average = (60×2 + 80×3) / (2+3) = (120 + 240) / 5 = 360/5 = 72

4.3 Missing Value in Average

Example: - Average of 5 numbers = 20 - Total = 20×5 = 100 - If 4 numbers sum to 70, missing number = 30

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5. TIME & WORK (DETAILED)

5.1 Work Rate Formula

Work = Rate × Time

If A can finish work in 20 days, then - Rate of A = 1/20 work per day

5.2 Combined Work

If A and B work together: - Rate = 1/20 + 1/30 = 1/12 - Time = 12 days

5.3 Pipes & Cisterns

- Filling pipe = positive rate
- Emptying pipe = negative rate

Example: - Pipe A fills in 10 hours - Pipe B empties in 20 hours - Combined rate = 1/10 - 1/20 = 1/20 - Time = 20 hours

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6. TIME, SPEED & DISTANCE (DETAILED)

6.1 Basic Formula

Speed = Distance / Time

6.2 Average Speed

Average speed = Total distance / Total time

6.3 Relative Speed

- Same direction: subtract speeds
- Opposite direction: add speeds

Example: - A = 40 km/h, B = 60 km/h - Opposite direction: relative speed = 100 km/h

6.4 Train Crossing Problems

- Time = (Length of train + length of object) / relative speed

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7. SIMPLE & COMPOUND INTEREST (DETAILED)

7.1 Simple Interest Formula

SI = (P × R × T) / 100

7.2 Compound Interest Formula

A = P(1 + r/100)^n CI = A - P

7.3 Yearly Compounding Shortcut

If r = 10%, n = 2 years A = P × (1.1)^2 = P × 1.21

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8. PROFIT & LOSS (DETAILED)

8.1 Profit & Loss Formula

- Profit = SP - CP
- Loss = CP - SP

8.2 Profit %

Profit% = (Profit/CP) × 100

8.3 Discount & Marked Price

Discount% = (Discount / Marked price) × 100

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9. MIXTURE & ALLIGATION (DETAILED)

9.1 Mixing Two Quantities

If two items are mixed: - Quantity ratio depends on difference from mean

Example: - 10% solution mixed with 30% solution to get 20% - Ratio = 20-10 : 30-20 = 10 : 10 = 1 : 1

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10. PROBABILITY (DETAILED)

10.1 Probability Formula

P = favourable outcomes / total outcomes

10.2 Independent Events

P(A and B) = P(A) × P(B)

10.3 Conditional Probability

P(A|B) = P(A and B) / P(B)

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11. PERMUTATION & COMBINATION (DETAILED)

11.1 Permutation (Order matters)

nPr = n! / (n-r)!

11.2 Combination (Order doesn’t matter)

nCr = n! / (r!(n-r)!)

11.3 Key Shortcut

- If asked “arrangements”, use permutation
- If asked “selections”, use combination

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12. LOGICAL REASONING (DETAILED)

12.1 Series & Patterns

- Identify difference pattern

• Identify multiplication or division pattern

12.2 Seating Arrangement

• Use row/column mapping
• Fill fixed positions first

12.3 Blood Relations

• Use family tree diagram

12.4 Direction Sense

• Use compass mapping

12.5 Syllogism

• Use Venn diagrams

12.6 Data Interpretation

• Read graph carefully
• Extract values
• Use ratio/percentage

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13. VERBAL ABILITY (DETAILED)

13.1 Reading Comprehension

• Read questions first
• Find answers in passage
• Avoid assumptions

13.2 Error Spotting

• Check grammar, tense, subject-verb agreement

13.3 Sentence Correction

• Choose correct sentence structure
• Focus on clarity

13.4 Vocabulary

• Understand word meaning in context
• Avoid memorizing alone

END OF PART 2