

2026 Edition



STAFF SELECTION COMMISSION(SSC)

SSC CGL STUDY NOTES

TIER-2 NOTES

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ADVANCED ARITHMETIC

1. PROFIT & LOSS (लाभ-हानि)

मुख्य अवधारणाएं (Key Concepts):

Cost Price (CP): वह मूल्य जिस पर वस्तु खरीदी जाती है

Selling Price (SP): वह मूल्य जिस पर वस्तु बेची जाती है

Profit/Gain: जब $SP > CP$ तो लाभ होता है

Loss: जब $SP < CP$ तो हानि होती है

Concept	Formula
Profit	$Profit = SP - CP$
Loss	$Loss = CP - SP$
Profit%	$Profit\% = (Profit/CP) \times 100$
Loss%	$Loss\% = (Loss/CP) \times 100$
SP when Profit% given	$SP = CP \times (100 + Profit\%)/100$
SP when Loss% given	$SP = CP \times (100 - Loss\%)/100$
CP when SP & Profit% given	$CP = SP \times 100/(100 + Profit\%)$
CP when SP & Loss% given	$CP = SP \times 100/(100 - Loss\%)$

Shortcut Tricks:

1. Quick Profit/Loss Calculation: यदि कोई वस्तु $x\%$ लाभ पर बेची जाए तो $CP:SP = 100:(100+x)$
2. Discount Formula: $MP \times (100-D\%)/100 = SP$
3. Successive Discount: If two discounts $d_1\%$ and $d_2\%$, net discount = $(d_1 + d_2 - d_1d_2/100)\%$

Solved Examples:

Example 1: A shopkeeper bought an article for ₹800 and sold it for ₹960. Find profit percentage.

Solution:

$$CP = ₹800, SP = ₹960$$

$$Profit = SP - CP = 960 - 800 = ₹160$$

$$Profit\% = (160/800) \times 100 = 20\%$$

Example 2: If selling price is ₹1200 and profit is 20%, find cost price.

Solution:

$$SP = ₹1200, Profit\% = 20\%$$

$$CP = SP \times 100/(100 + Profit\%)$$

$$CP = 1200 \times 100/120 = ₹1000$$

Example 3: A trader marks his goods 40% above cost price and gives 20% discount. Find his profit percentage.

Solution:

$$\text{Let } CP = 100$$

$$MP = 100 + 40 = 140$$

$$SP = 140 \times 80/100 = 112$$

$$Profit\% = (112-100)/100 \times 100 = 12\%$$

Example 4: An article is sold at 25% profit. If both CP and SP increase by ₹200, profit becomes 20%. Find original CP.

Solution:

$$\text{Let original } CP = x$$

$$\text{Original SP} = 1.25x$$

$$\text{New CP} = x + 200$$

$$\text{New SP} = 1.25x + 200$$

$$\text{New Profit\%} = 20\%$$

$$\text{So, } (1.25x + 200) = 1.2(x + 200)$$

$$1.25x + 200 = 1.2x + 240$$

$$0.05x = 40$$

$$x = ₹800$$

Example 5: A person sells 2 articles for ₹2400 each. On one he gains 20% and on other loses 20%. Find overall profit/loss.

Solution:

For article with 20% gain:

$$CP_1 = 2400 \times 100/120 = ₹2000$$

For article with 20% loss:

$$CP_2 = 2400 \times 100/80 = ₹3000$$

$$\text{Total CP} = 2000 + 3000 = ₹5000$$

$$\text{Total SP} = 2400 + 2400 = ₹4800$$

$$\text{Loss} = 5000 - 4800 = ₹200$$

$$\text{Loss\%} = 200/5000 \times 100 = 4\%$$

Example 6: If a man sells an article for ₹144, he loses as much percent as the cost price. Find the cost price.

Solution:

$$\text{Let CP} = x$$

$$\text{Loss\%} = x\%$$

$$\text{SP} = 144$$

$$\text{Loss} = x \times x/100 = x^2/100$$

$$\text{CP} - \text{SP} = \text{Loss}$$

$$x - 144 = x^2/100$$

$$100x - 14400 = x^2$$

$$x^2 - 100x + 14400 = 0$$

$$x = 80 \text{ or } x = 180$$

Since loss%, CP must be realistic

$$\text{CP} = ₹80$$

Example 7: A dealer sold two fans for ₹2400 each. If he gained 20% on one and lost 20% on the other, find his overall gain or loss.

Solution:

When SP is same and gain/loss % is same but opposite:

$$\text{Loss} = 2 \times (\text{gain\%})^2 / (100^2 - (\text{gain\%})^2) \times \text{Common SP}$$

$$\text{Loss} = 2 \times 20^2 / (100^2 - 20^2) \times 2400/9600$$

$$\text{Loss} = 2 \times 400/9600 \times 2400 = ₹200$$

$$\text{Loss\%} = 200/5000 \times 100 = 4\%$$

Example 8: A shopkeeper allows 20% discount and still makes 25% profit. If the marked price is ₹1500, find cost price.

Solution:

$$\text{MP} = ₹1500, \text{Discount} = 20\%$$

$$SP = 1500 \times 80/100 = ₹1200$$

$$\text{Profit\%} = 25\%$$

$$CP = SP \times 100/(100 + \text{Profit\%})$$

$$CP = 1200 \times 100/125 = ₹960$$

Example 9: By selling 45 lemons for ₹40, a man loses 20%. How many lemons should he sell for ₹24 to gain 20%?

Solution:

$$CP \text{ of 45 lemons} = 40 \times 100/80 = ₹50$$

$$CP \text{ of 1 lemon} = 50/45 = ₹10/9$$

For 20% gain:

$$SP \text{ of 1 lemon} = (10/9) \times 120/100 = ₹4/3$$

$$\text{Number of lemons for ₹24} = 24 \div (4/3) = 18 \text{ lemons}$$

Example 10: A trader bought some articles at 6 for ₹5 and sold them at 5 for ₹6. Find his gain percent.

Solution:

$$CP \text{ of 1 article} = 5/6$$

$$SP \text{ of 1 article} = 6/5$$

$$\text{Gain} = 6/5 - 5/6 = (36-25)/30 = 11/30$$

$$\text{Gain\%} = (11/30) \div (5/6) \times 100 = 44\%$$

Previous Years' Pattern Analysis:

- High Frequency Topics: Discount problems, Successive transactions, Mixed profit-loss
- Difficulty Level: Medium to High
- Expected Questions: 3-4 per exam
- Common Mistakes: Confusing MP with CP, Wrong discount calculations

2. PERCENTAGE (प्रतिशत)

मुख्य अवधारणाएं (Key Concepts):

- प्रतिशत का मतलब है प्रति सौ (Per hundred)
- यह अनुपात का दूसरा रूप है जहाँ आधार 100 होता है

Formula Sheet:

Concept	Formula
Basic Percentage	$x\% = x/100$
Percentage Increase	New Value = Original \times (100 + increase%)/100
Percentage Decrease	New Value = Original \times (100 - decrease%)/100
Percentage Change	% Change = (Change/Original) \times 100
Finding Original Value	Original = Final \times 100/(100 \pm change%)

Shortcut Tricks:

- Quick Conversion: 25% = 1/4, 50% = 1/2, 75% = 3/4, 33 $\frac{1}{3}$ % = 1/3
- Compound Percentage: If A increases by x% and then by y%, net increase = (x + y + xy/100)%
- Population Growth: $P(t) = P_0(1 \pm r/100)^t$

Solved Examples:

Example 1: If 40% of a number is 80, find 60% of that number.

Solution:

Let the number be x

$$40\% \text{ of } x = 80$$

$$x \times 40/100 = 80$$

$$x = 200$$

$$60\% \text{ of } 200 = 200 \times 60/100 = 120$$

Example 2: A number is increased by 20% and then decreased by 25%. Find net percentage change.

Solution:

Let original number = 100

$$\text{After 20\% increase} = 100 \times 120/100 = 120$$

$$\text{After 25\% decrease} = 120 \times 75/100 = 90$$

$$\text{Net decrease} = 100 - 90 = 10$$

$$\text{Net percentage change} = 10\% \text{ decrease}$$

Example 3: In an election, candidate A got 55% votes and won by 7200 votes. Find total votes.

Solution:

A got 55%, B got 45%

$$\text{Difference} = 55\% - 45\% = 10\%$$

$$10\% \text{ of total votes} = 7200$$

$$\text{Total votes} = 7200 \times 100/10 = 72,000$$

Example 4: A's salary is 25% more than B's. B's salary is how much percent less than A's?

Solution:

Let B's salary = 100

$$\text{A's salary} = 125$$

$$\text{B's salary is less than A's by} = 125 - 100 = 25$$

$$\text{Percentage} = 25/125 \times 100 = 20\%$$

Example 5: Fresh grapes contain 90% water and dry grapes contain 20% water. How much dry grapes can be obtained from 20kg fresh grapes?

Solution:

Fresh grapes = 20 kg

Water content = 90% of 20 = 18 kg

Solid content = 20 - 18 = 2 kg

In dry grapes, solid content = 80%

If dry grapes = x kg, then 80% of x = 2

$x = 2 \times 100/80 = 2.5$ kg

Previous Years' Pattern Analysis:

- High Frequency Topics: Compound percentage changes, Election problems
- Expected Questions: 2-3 per exam

3. RATIO & PROPORTION (अनुपात और समानुपात)

मुख्य अवधारणाएं (Key Concepts):

Ratio: दो या अधिक मात्राओं के बीच तुलना

Proportion: चार मात्राओं के बीच समानता जहाँ $a:b = c:d$

Formula Sheet:

Concept	Formula
Ratio	$a:b = a/b$
Proportion	$a:b :: c:d \Rightarrow ad = bc$
Mean Proportional	If $a:x :: x:b$, then $x = \sqrt{ab}$

Concept	Formula
Third Proportional	If $a:b :: b:x$, then $x = b^2/a$
Fourth Proportional	If $a:b :: c:x$, then $x = bc/a$
Duplicate Ratio	$a^2:b^2$
Sub-duplicate Ratio	$\sqrt{a}:\sqrt{b}$

Solved Examples:

Example 1: Divide ₹7000 between A, B, C in ratio 2:3:5.

Solution:

Ratio = 2:3:5

Sum of ratio = 2 + 3 + 5 = 10

A's share = $7000 \times 2/10 = ₹1400$

B's share = $7000 \times 3/10 = ₹2100$

C's share = $7000 \times 5/10 = ₹3500$

Example 2: If $a:b = 2:3$ and $b:c = 4:5$, find $a:b:c$.

Solution:

$a:b = 2:3$

$b:c = 4:5$

To find $a:b:c$, make b common

LCM of 3 and 4 = 12

$a:b = 2 \times 4 : 3 \times 4 = 8:12$

$b:c = 4 \times 3 : 5 \times 3 = 12:15$

Therefore, $a:b:c = 8:12:15$

Example 3: Find mean proportional between 9 and 16.

Solution:

$$\text{Mean proportional} = \sqrt{(9 \times 16)} = \sqrt{144} = 12$$

$$\text{Verification: } 9:12 :: 12:16$$

$$9 \times 16 = 144$$

$$12 \times 12 = 144 \quad \checkmark$$

Previous Years' Pattern Analysis:

- Expected Questions: 2-3 per exam
- Common Types: Ratio division, Compound ratios, Proportional parts

4. AVERAGE (औसत)

मुख्य अवधारणाएं (Key Concepts):

- औसत = सभी संख्याओं का योग / संख्याओं की कुल संख्या

Formula Sheet:

Concept	Formula
Average	Average = Sum of all observations/Number of observations
Weighted Average	Weighted Avg = $\frac{\sum(w_i \times x_i)}{\sum w_i}$
New Average after addition	New Avg = $\frac{(\text{Old Sum} + \text{New Value})}{(n+1)}$
New Average after removal	New Avg = $\frac{(\text{Old Sum} - \text{Removed Value})}{(n-1)}$

Solved Examples:

Example 1: Average of 10 numbers is 15. If one number 18 is replaced by 24, find new average.

Solution:

$$\text{Sum of 10 numbers} = 10 \times 15 = 150$$

$$\text{New sum} = 150 - 18 + 24 = 156$$

$$\text{New average} = 156/10 = 15.6$$

Example 2: Average age of 30 students is 12 years. If teacher's age is included, average becomes 13 years. Find teacher's age.

Solution:

$$\text{Total age of 30 students} = 30 \times 12 = 360 \text{ years}$$

$$\text{Total age with teacher} = 31 \times 13 = 403 \text{ years}$$

$$\text{Teacher's age} = 403 - 360 = 43 \text{ years}$$

Previous Years' Pattern Analysis:

- Expected Questions: 1-2 per exam

5. TIME & WORK (समय और काम)

मुख्य अवधारणाएं (Key Concepts):

- Work = Rate × Time
- यदि कोई काम x दिन में करता है तो एक दिन में $1/x$ काम करता है

Formula Sheet:

Concept	Formula
Work Rate	Rate = $1/\text{Time taken}$
Combined Work	$1/T = 1/T_1 + 1/T_2 + \dots$
Work Efficiency	If A:B = ratio of efficiency, then Time
Man-Days	Work = Men × Days × Hours/day

Solved Examples:

Example 1: A can complete a work in 12 days, B in 18 days. In how many days can they complete together?

Solution:

A's rate = $1/12$ per day

B's rate = $1/18$ per day

Combined rate = $1/12 + 1/18 = (3+2)/36 = 5/36$ per day

Time together = $36/5 = 7.2$ days

Example 2: A, B, C can complete work in 10, 15, 20 days respectively. They work together for 2 days, then A leaves. In how many more days will B and C complete the work?

Solution:

Combined rate of A, B, C = $1/10 + 1/15 + 1/20 = (6+4+3)/60 = 13/60$

Work done in 2 days = $2 \times 13/60 = 26/60 = 13/30$

Remaining work = $1 - 13/30 = 17/30$

B and C combined rate = $1/15 + 1/20 = (4+3)/60 = 7/60$

Time needed = $(17/30) \div (7/60) = 17/30 \times 60/7 = 34/7$ days

Previous Years' Pattern Analysis:

- Expected Questions: 3-4 per exam
- Common Types: Combined work, Work efficiency, Pipe problems

1. QUADRATIC EQUATIONS (द्विघात समीकरण)

मुख्य अवधारणाएं (Key Concepts):

- द्विघात समीकरण का मानक रूप: $ax^2 + bx + c = 0$ (जहाँ $a \neq 0$)
- समीकरण के हल discriminant ($D = b^2 - 4ac$) पर निर्भर करते हैं

Formula Sheet:

Concept	Formula
Standard Form	$ax^2 + bx + c = 0$
Discriminant	$D = b^2 - 4ac$
Roots by Quadratic Formula	$x = \frac{-b \pm \sqrt{D}}{2a}$
Sum of Roots	$\alpha + \beta = -b/a$
Product of Roots	$\alpha\beta = c/a$
Nature of Roots	$D > 0$: Real & Distinct $D = 0$: Real & Equal $D < 0$: Complex

Shortcut Tricks:

- Quick Factorization:** For $x^2 + bx + c$, find two numbers that multiply to 'c' and add to 'b'
- Perfect Square Check:** If $D = 0$, equation is perfect square
- Rational Roots:** If D is perfect square, roots are rational

Solved Examples:

Example 1: Solve $x^2 - 5x + 6 = 0$

Solution:

Method 1 (Factorization):

$$x^2 - 5x + 6 = 0$$

$$x^2 - 3x - 2x + 6 = 0$$

$$x(x - 3) - 2(x - 3) = 0$$

$$(x - 2)(x - 3) = 0$$

$$x = 2 \text{ or } x = 3$$

Method 2 (Quadratic Formula):

$$a = 1, b = -5, c = 6$$

$$D = (-5)^2 - 4(1)(6) = 25 - 24 = 1$$

$$x = \frac{5 \pm 1}{2} = 6/2 \text{ or } 4/2 = 3 \text{ or } 2$$

Example 2: Find the nature of roots of $2x^2 - 3x + 5 = 0$

Solution:

$$a = 2, b = -3, c = 5$$

$$D = b^2 - 4ac = (-3)^2 - 4(2)(5) = 9 - 40 = -31$$

Since $D < 0$, roots are complex (imaginary)

Example 3: If α and β are roots of $x^2 - 7x + 12 = 0$, find $\alpha^2 + \beta^2$

Solution:

$$\text{Sum of roots: } \alpha + \beta = 7$$

$$\text{Product of roots: } \alpha\beta = 12$$

$$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = 7^2 - 2(12) = 49 - 24 = 25$$

Example 4: Form quadratic equation whose roots are 3 and -2

Solution:

$$\text{Sum of roots} = 3 + (-2) = 1$$

Product of roots = $3 \times (-2) = -6$

Quadratic equation: $x^2 - (\text{sum})x + \text{product} = 0$

$$x^2 - x - 6 = 0$$

Example 5: Solve $2x^2 - 7x + 3 = 0$ by completing the square

Solution:

$$2x^2 - 7x + 3 = 0$$

$$x^2 - (7/2)x + 3/2 = 0$$

$$x^2 - (7/2)x + (7/4)^2 = (7/4)^2 - 3/2$$

$$(x - 7/4)^2 = 49/16 - 24/16 = 25/16$$

$$x - 7/4 = \pm 5/4$$

$$x = 7/4 \pm 5/4 = 3 \text{ or } 1/2$$

Previous Years' Pattern Analysis:

- High Frequency Topics: Nature of roots, Sum-product of roots, Word problems
- Expected Questions: 3-4 per exam

1. TRIANGLES (त्रिभुज)

मुख्य अवधारणाएं (Key Concepts):

- त्रिभुज की तीनों भुजाओं का योग त्रिभुज की परिधि होती है
- त्रिभुज के तीनों कोणों का योग 180° होता है

Formula Sheet:

Type	Area Formula	Special Properties
General Triangle	Area = $(1/2) \times$ base \times height	-
Using Heron's Formula	Area = $\sqrt{[s(s-a)(s-b)(s-c)]}$	$s = (a+b+c)/2$
Equilateral Triangle	Area = $(\sqrt{3}/4)a^2$	All sides equal, all angles 60°
Right Triangle	Area = $(1/2) \times$ base \times height	$a^2 + b^2 = c^2$ (Pythagoras)
Isosceles Triangle	Area = $(b/4)\sqrt{4a^2 - b^2}$	Two sides equal

Important Properties:

- **Angle Bisector Theorem:** If AD bisects $\angle A$, then $BD/DC = AB/AC$
- **Median Properties:** Medians divide triangle into 6 equal areas
- **Centroid:** Divides each median in ratio 2:1
- **Incentre:** Intersection of angle bisectors
- **Circumcentre:** Intersection of perpendicular bisectors

Solved Examples:

Example 1: Find area of triangle with sides 13, 14, 15

Solution:

Using Heron's formula:

$$s = (13 + 14 + 15)/2 = 21$$

$$\text{Area} = \sqrt{[21(21-13)(21-14)(21-15)]}$$

$$= \sqrt{[21 \times 8 \times 7 \times 6]}$$

$$= \sqrt{[7056]} = 84 \text{ sq units}$$

Example 2: In triangle ABC, if AB = 8 cm, BC = 6 cm, and $\angle B = 90^\circ$, find AC and area

Solution:

Using Pythagoras theorem:

$$AC^2 = AB^2 + BC^2 = 8^2 + 6^2 = 64 + 36 = 100$$

$$AC = 10 \text{ cm}$$

$$\text{Area} = (1/2) \times AB \times BC = (1/2) \times 8 \times 6 = 24 \text{ sq cm}$$

Previous Years' Pattern Analysis:

- Expected Questions: 4-5 per exam
- Common Types: Area calculations, Similarity, Congruency

2. CIRCLES (वृत्त)

Formula Sheet:

Concept	Formula
Circumference	$C = 2\pi r = \pi d$
Area	$A = \pi r^2$
Arc Length	$l = (\theta/360^\circ) \times 2\pi r$
Sector Area	$A = (\theta/360^\circ) \times \pi r^2$
Segment Area	Sector Area - Triangle Area

Solved Examples:

Example 1: Find area of circular ring with outer radius 14 cm and inner radius 7 cm

Solution:

Area of ring = $\pi(R^2 - r^2) = \pi(14^2 - 7^2) = \pi(196 - 49) = 147\pi$ sq cm

Previous Years' Pattern Analysis:

•Expected Questions: 2-3 per exam

DATA INTERPRETATION

महत्वपूर्ण तकनीकें (Important Techniques):

1. TABLE ANALYSIS

- डेटा को जल्दी समझने के लिए row और column headers को ध्यान से पढ़ें
- Percentage calculations के लिए base value identify करें
- Comparison questions में ratio का उपयोग करें

2. BAR CHART ANALYSIS

- Values को approximate करना सीखें
- Growth rate = $(\text{New Value} - \text{Old Value}) / \text{Old Value} \times 100$
- Multiple bars में pattern देखें

3. PIE CHART ANALYSIS

- Total को 360° मानें
- Each sector = $(\text{Value}/\text{Total}) \times 360^\circ$
- Percentage = $(\text{Sector angle}/360^\circ) \times 100$

Solved Examples:

Example 1: In a pie chart, if education sector shows 72° , what is the percentage?

Solution:

$$\text{Percentage} = (72^\circ/360^\circ) \times 100 = 20\%$$

Example 2: If total production is 2000 units and manufacturing shows 45° , find manufacturing units.

Solution:

$$\text{Manufacturing percentage} = (45^\circ/360^\circ) \times 100 = 12.5\%$$

$$\text{Manufacturing units} = 2000 \times 12.5/100 = 250 \text{ units}$$

Quick Calculation Tricks:

1. Percentage to Angle: $\% \times 3.6 = \text{Angle in degrees}$
2. Angle to Percentage: $\text{Angle} \div 3.6 = \text{Percentage}$
3. Approximation: Use rounding for quick calculations

Previous Years' Pattern Analysis:

- Expected Questions: 15-20 per exam (highest weightage)
- Question Types: Mixed charts, Complex calculations, Percentage analysis
- Time Allocation: 25-30 minutes

TIME MANAGEMENT & STRATEGY

समय प्रबंधन (Time Management Strategy):

Section-wise Time Allocation (Total: 2 hours = 120 minutes)

1. Data Interpretation: 30-35 minutes (15-20 questions)
2. Arithmetic: 25-30 minutes (15-18 questions)
3. Algebra: 15-20 minutes (8-10 questions)
4. Geometry: 20-25 minutes (10-12 questions)
5. Review: 10-15 minutes

Question Selection Strategy:

- Easy Questions First: DI tables, basic arithmetic
- Medium Questions: Algebraic problems, mensuration
- Difficult Questions: Complex word problems, advanced geometry
- Skip Strategy: Don't spend more than 2 minutes on any question

Common Mistakes to Avoid:

Arithmetic Section:

- ✗ Using wrong formula for compound interest
- ✗ Confusing marked price with cost price
- ✗ Not converting units properly
- ✓ Always verify profit/loss calculations

Algebra Section:

- ✗ Sign errors in quadratic solutions
- ✗ Forgetting to check discriminant
- ✗ Wrong substitution in simultaneous equations

- ✓ Double-check your factorization

Geometry Section:

- ✗ Using wrong mensuration formulas
- ✗ Confusing area with perimeter
- ✗ Not applying Pythagoras theorem correctly
- ✓ Draw diagrams for complex problems

Data Interpretation:

- ✗ Misreading chart values
- ✗ Using wrong base for percentage calculations
- ✗ Calculation errors in large numbers
- ✓ Use approximation techniques

Last Month Preparation Strategy:

1. Daily Practice: 50 questions (mixed topics)
2. Weekly Mock Tests: 2 full-length tests
3. Formula Revision: Daily 30 minutes
4. Error Analysis: Maintain mistake diary
5. Speed Building: Timed practice sessions

Exam Day Tips:

1. Carry simple calculator (if allowed)
2. Start with Data Interpretation
3. Use elimination technique in MCQs
4. Don't get stuck on any single question
5. Keep track of time every 30 minutes

Advanced Grammar

Error Spotting (त्रुटि खोजना)

मुख्य नियम:

Error Spotting में मुख्यतः निम्नलिखित प्रकार की गलतियां होती हैं:

1. Subject-Verb Agreement (कर्ता-क्रिया समझौता)

नियम: Singular subject के साथ singular verb और plural subject के साथ plural verb का प्रयोग होता है।

Examples:

- ✗ The students is playing.
- ✓ The students are playing.
- ✗ Neither of the boys are present.
- ✓ Neither of the boys is present.

2. Tense Errors (काल की त्रुटियां)

मुख्य पैटर्न:

- Present Perfect vs Simple Past
- Future in Past
- Sequence of Tenses

Examples:

- ✗ I have seen him yesterday.
- ✓ I saw him yesterday.

3. Article Errors (अनुच्छेद त्रुटियां)

याद रखने की ट्रिक:

- AEIOU - Vowel sounds के साथ 'an'
- Consonant sounds के साथ 'a'

Examples:

- ✗ He is a honest man.
- ✓ He is an honest man.
- ✗ He is an university student.
- ✓ He is a university student.

SSC CGL में बार-बार आने वाले Error Patterns:

Error Type	Common Mistakes	Frequency
Subject-Verb Agreement	Collective nouns, Either/Neither	High
Articles	A/An confusion, The omission	Medium
Prepositions	At/In/On confusion	High
Tenses	Perfect tense misuse	Medium

Sentence Correction (वाक्य सुधार)

मुख्य तकनीक:

1. Elimination Method - गलत विकल्पों को पहले हटाएं
2. Grammar Rules - व्याकरण के नियमों को लागू करें
3. Meaning Check - अर्थ की जांच करें

Commonly Tested Rules:

1. Parallel Structure (समानांतर संरचना)

नियम: Series में सभी elements का same form होना चाहिए।

Examples:

- ✗ I like reading, writing, and to swim.
- ✓ I like reading, writing, and swimming.

2. Modifier Placement (संशोधक स्थान)

Examples:

- ✗ Walking down the street, the building caught my attention.
- ✓ Walking down the street, I noticed the building.

Tenses (काल)

1. Present Perfect vs Simple Past

नियम:

- Present Perfect: अभी तक का समय (just, already, yet, ever, never)
- Simple Past: निश्चित समय (yesterday, last week, in 2020)

Mnemonic: "JAYEN" - Just, Already, Yet, Ever, Never = Present Perfect

2. Future in Past

Structure: would + V1

Examples:

- He said that he would come tomorrow.
- I knew that she would help me.

3. Sequence of Tenses

नियम: Main clause Past में हो तो subordinate clause भी Past में होगा।

Examples:

- ✗ he was coming. He said that he is coming.
- ✓ He said that he was coming.

Tense Practice Table:

Situation	Correct Tense	Example
Habitual action	Simple Present	He <i>goes</i> to school daily.
Completed action with time	Simple Past	He <i>went</i> yesterday.
Experience till now	Present Perfect	I <i>have visited</i> Delhi.
Future plan	Simple Future	I <i>will go</i> tomorrow.

Articles (अनुच्छेद)

मुख्य नियम:

1. Definite Article 'The'

प्रयोग होता है:

- Specific nouns के साथ
- Superlatives के साथ
- Unique things के साथ

2. Indefinite Articles 'A/An'

मुख्य ट्रिक - "SOUND RULE":

- Vowel sound → An
- Consonant sound → A

Tricky Examples:

- An honest man (H silent)
- A university (U sounds like 'you')
- An hour (H silent)
- A one-rupee note (O sounds like 'w')

3. Zero Article (कोई Article नहीं)

प्रयोग नहीं होता:

- Proper nouns के साथ
- Abstract nouns के साथ
- Plural countable nouns (general sense में)

Prepositions (पूर्वसर्ग)

SSC CGL में अक्सर पूछे जाने वाले Preposition Rules:

1. Time Prepositions

Preposition	Usage	Examples
At	Specific time	at 5 o'clock, at night
On	Days/Dates	on Monday, on 15th August
In	Months/Years/Seasons	in January, in 2024, in winter

2. Place Prepositions

मुख्य ट्रिक - "Point, Surface, Area":

- **At** = Point (at home, at school)
- **On** = Surface (on the table, on the wall)
- **In** = Area (in the room, in India)

3. SSC CGL Frequent Patterns:

Common Phrases:

- Different **from** (not different than)
- Consist **of** (not consist in)
- Depend **on/upon** (not depend of)
- Married **to** (not married with)

Vocabulary

Synonyms (समानार्थी शब्द)

High-Frequency SSC CGL Words:

Word	Synonyms	Hindi Meaning
Abundant	Plentiful, Ample, Copious	प्रचुर
Adamant	Stubborn, Inflexible, Rigid	अडिग
Benevolent	Kind, Generous, Charitable	दयालु
Clandestine	Secret, Covert, Hidden	गुप्त
Diligent	Hardworking, Industrious	मेहनती
Ephemeral	Temporary, Short-lived	अस्थायी
Frugal	Economical, Thrifty	मितव्ययी
Gregarious	Sociable, Outgoing	मिलनसार

Memory Tricks:

"ABCD-EFG" Method:

- **A**bundant = **A**mple
- **B**enevolent = **B**enign
- **C**landestine = **C**overt
- **D**iligent = **D**edicated

Antonyms (विलोम शब्द)

SSC CGL Pattern Words:

Word	Antonym	Memory Trick
Artificial	Natural	Art vs Nature
Blunt	Sharp	B-lunt = Opposite of Sharp
Conceal	Reveal	Con (against) + ceal vs Re-veal
Demolish	Construct	Destroy vs Create
Enhance	Diminish	En (increase) vs Di (decrease)
Fertile	Barren	Fertile land vs Barren land
Genuine	Fake	Real vs Artificial
Harmonious	Discordant	Harmony vs Discord

One Word Substitution

SSC CGL की सबसे महत्वपूर्ण One Word Substitutions:

Category 1: Person-related (व्यक्ति संबंधी)

Definition	One Word	Hindi
One who believes in God	Theist	ईश्वरवादी
One who doesn't believe in God	Atheist	नास्तिक
One who eats human flesh	Cannibal	नरभक्षी
One who loves books	Bibliophile	पुस्तक प्रेमी
One who hates mankind	Misanthropist	मानव द्रोही
One who speaks many languages	Polyglot	बहुभाषाविद्

Category 2: Medical/Science (चिकित्सा/विज्ञान)

Definition	One Word
Study of birds	Ornithology
Study of earthquakes	Seismology
Treatment by water	Hydrotherapy
Fear of heights	Acrophobia
Fear of closed spaces	Claustrophobia

Memory Tricks:

"PHIL-PHOBIA-LOGY" Rule:

- Phil = Love (Bibliophile, Francophile)
- Phobia = Fear (Claustrophobia, Acrophobia)
- Logy = Study (Biology, Geology)

Idioms & Phrases

SSC CGL के लिए महत्वपूर्ण Idioms:

High-Frequency Idioms:

Idiom	Meaning	Hindi
A blessing in disguise	Something good that initially seemed bad	छुप्पी हुई भलाई
Beat around the bush	Avoid talking directly	घुमा-फिराकर बात करना
Break the ice	Start a conversation	बातचीत की शुरुआत करना
Call it a day	Stop working	काम बंद करना
Hit the nail on the head	Exactly right	बिल्कुल सही कहना
Piece of cake	Very easy	बहुत आसान
Spill the beans	Reveal a secret	राज खोलना
Under the weather	Feeling unwell	तबीयत खराब होना

Category-wise Idioms:**Animals में:**

- Kill two birds with one stone = एक तीर से दो शिकार
- Let the cat out of the bag = भेद खोल देना
- Hold your horses = धैर्य रखो

Body Parts में:

- Cost an arm and a leg = बहुत महंगा
- Keep your fingers crossed = भगवान से प्रार्थना करना
- Break a leg = शुभकामनाएं



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Reading Comprehension की रणनीति:

Step-by-Step Approach:

1. पहले Questions पढ़ें (30 सेकंड)

फायदे:

- Direction मिल जाती है
- Important points पर focus होता है
- Time की बचत होती है

2. Passage को Active Reading करें

Techniques:

- Skimming: Main idea के लिए
- Scanning: Specific information के लिए
- Note-taking: Key points को underline करें

3. Question Types को समझें:

Question Type	Strategy	Time Allocation
Main Idea	First & last paragraph focus	1 minute
Detail Questions	Specific lines से answer	30 seconds
Inference	Between the lines reading	1.5 minutes
Vocabulary	Context से meaning	30 seconds
Tone/Attitude	Author के words से judge करें	1 minute

Common Question Patterns:

1. Main Idea Questions:

- "The main theme of the passage is..."
- "The passage primarily deals with..."
- "The central idea of the passage is..."

Answer करने का तरीका:

- Introduction और conclusion पर ध्यान दें
- Topic sentence identify करें
- Overall message को समझें

2. Inference Questions:

- "It can be inferred from the passage..."
- "The author implies that..."
- "Which of the following can be concluded..."

Trick: Direct में नहीं लिखा होगा, लेकिन hints मिलेंगे।

Reading Comprehension Practice Strategies:

Daily Practice Routine:

- Week 1-2: 1 passage daily (15 minutes)
- Week 3-4: 2 passages daily (25 minutes)
- Week 5-6: 3 passages daily (35 minutes)

Topic-wise Practice:

SSC CGL में आने वाले Topics:

- Social Issues
- Environment
- Technology
- History & Culture

- Science & Research
- Economics
- Biography

Cloze Test & Fill in the Blanks

Cloze Test की Strategy:

Step 1: पूरा Passage पढ़ें (2 मिनट)

क्यों जरूरी है:

- Context समझने के लिए
- Overall theme पता करने के लिए
- Logical flow समझने के लिए

Step 2: Easy Blanks पहले भरें

आसान Categories:

- Articles (a, an, the)
- Prepositions (in, on, at)
- Conjunctions (and, but, so)
- Pronouns (he, she, it)

Step 3: Context-based Words

Techniques:

- Previous और next sentence देखें
- Positive/Negative context judge करें
- Grammatical structure देखें
- Common Patterns in SSC CGL:

1. Connector Words:

Purpose	Words
Addition	Moreover, Furthermore, Besides
Contrast	However, Nevertheless, On the contrary
Cause-Effect	Therefore, Hence, Consequently
Example	For instance, Such as, Namely

2. Contextual Clues:

Types:

- **Definition Clues:** Word का meaning passage में दिया होता है
- **Example Clues:** Examples से meaning पता चलती है
- **Contrast Clues:** Opposite meaning से पता चलता है
- **Cause-Effect Clues:** कारण-प्रभाव से meaning निकलती है

Fill in the Blanks - Grammar Focus:

Subject-Verb Agreement Rules:

- Singular Subjects: Each, Every, Neither, Either + Singular Verb
- Plural Subjects: Both, Many, Few, Several + Plural Verb

Tense Consistency:

Rule: Same paragraph में tense consistent रखें।

Example Pattern: "He ____ (go) to school daily and ____ (study) hard." Answer: goes, studies (Present tense consistency)

Sentence Rearrangement की Technique:

Step 1: Opening और Closing Sentences Identify करें

Opening Sentence की पहचान:

- Introductory phrases: "In recent years...", "According to...", "It is well known..."
- General statements: Broad topic introduction
- Question format: rhetorical questions

Closing Sentence की पहचान:

- Conclusion words: "Therefore", "Thus", "In conclusion"
- Summary statements: "All in all", "To sum up"
- Future implications: "In future", "Going forward"

Step 2: Logical Sequence बनाएं

Connection Words देखें:

Type	Words	Position
Sequence	First, Second, Then, Next	Middle
Contrast	But, However, On the other hand	Middle
Example	For example, Such as	After general statement
Result	Therefore, Hence, As a result	Near end

Step 3: Pronoun Reference Check करें

Rule: Pronoun का reference पहले आना चाहिए।

Example:

- "The scientist made a discovery." (First)
- "He published his findings." (Second)

Common Patterns:

1. Problem-Solution Pattern:

1. Problem introduction
2. Problem elaboration
3. Solution suggestion
4. Solution benefits
5. Conclusion

2. Cause-Effect Pattern:

1. Cause introduction
2. Multiple causes
3. Effect description
4. Consequences
5. Conclusion

Paragraph Completion Strategy:

Types of Questions:

1. Last Sentence Missing:

Look for:

- Summary statements
- Conclusion indicators
- Future implications

2. First Sentence Missing:

Look for:

- Topic introduction
- General to specific flow
- Question or statement format

3. Middle Sentence Missing:

Look for:

- Connecting bridges
- Examples or elaborations
- Transitional phrases

Error Spotting - Quick Checklist:

1. ✓ Subject-Verb Agreement
2. ✓ Tense Consistency
3. ✓ Article Usage (A/An/The)
4. ✓ Preposition Accuracy
5. ✓ Pronoun Reference
6. ✓ Modifier Placement
7. ✓ Parallel Structure
8. ✓ Word Choice

Vocabulary Boost - Root Words:

Root	Meaning	Examples
Bene	Good	Benefit, Benevolent
Mal	Bad	Malign, Malicious

Pro	Forward	Progress, Promote
Anti	Against	Antisocial, Antibiotic
Auto	Self	Autobiography, Automatic

Practice Exercises with Answers

Exercise 1: Error Spotting

Identify the error in the following sentences:

1. Neither of the students have completed their homework.
2. The furniture in the room are very expensive.
3. He has been living here since ten years.
4. This is the most unique painting I have ever seen.
5. I am looking forward to meet you.

Answers:

1. have → has (Neither takes singular verb)
2. are → is (Furniture is uncountable)
3. since → for (For is used with duration)
4. most unique → unique (Unique cannot be compared)
5. to meet → to meeting (Look forward to + gerund)

Exercise 2: One Word Substitution

1. A person who can speak two languages fluently
2. The study of the origin and history of words
3. A medicine that counteracts poison

4. A building where grain is stored
5. One who eats both plants and meat

Answers:

1. Bilingual
2. Etymology
3. Antidote
4. Granary
5. Omnivore

Final Tips for SSC CGL Tier-2 Success**Last Week Strategy:**

1. Revision: Grammar rules को daily revise करें
2. Vocabulary: High-frequency words को repeat करें
3. Mock Tests: Daily 1 full-length test
4. Time Management: Section-wise time practice करें
5. Error Analysis: Mistakes का proper analysis करें

Exam Day Tips:

1. Easy questions पहले solve करें
2. Negative marking को ध्यान में रखें
3. Time per question: 45-50 seconds average
4. Last 10 minutes में review करें
5. Guessing करने से बचें

Memory Techniques:

1. Acronyms: JAYEN for Present Perfect indicators
2. Visual Association: Picture बनाकर words

remember करें

3. Story Method: Words को story में connect करें
4. Regular Review: 24-48-72 hours rule follow करें

Best of Luck for SSC CGL 2026!

These notes are exclusively designed for SSC CGL Tier-2 preparation. For more study materials and updates, visit govtcareerhub.com

1. Collection, Classification, Tabulation of Data

मुख्य अवधारणाएं (Key Concepts)

डेटा संग्रह और वर्गीकरण statistics का आधार है। यह तीन मुख्य चरणों में विभाजित है:

1.1 Data Collection (डेटा संग्रह)

Primary Data: वह डेटा जो पहली बार researcher द्वारा collect किया जाता है

- Survey methods
- Observation
- Experiments
- Questionnaires

Secondary Data: वह डेटा जो पहले से उपलब्ध है

- Government reports
- Published research
- Historical records

1.2 Classification (वर्गीकरण)

डेटा को व्यवस्थित करने की प्रक्रिया:

Qualitative Classification: गुणवत्ता के आधार पर

- Gender: Male, Female
- Education: Graduate, Post-graduate

Quantitative Classification: संख्या के आधार पर

- Age groups: 20-30, 30-40
- Income levels: <50k, 50k-1L

1.3 Tabulation (सारणीकरण)

डेटा को table के रूप में प्रस्तुत करना:

Simple Tabulation: एक variable के लिए Cross Tabulation: दो या अधिक variables के लिए

Formula Sheet - Section 1

Type	Formula
Class Width	Upper Limit - Lower Limit
Class Mark	(Upper Limit + Lower Limit)/2
Frequency Density	Frequency/Class Width

समस्या समाधान की विधि (Problem Solving Method)

Step 1: डेटा की प्रकृति पहचानें (qualitative या quantitative)

Step 2: उपयुक्त classification method चुनें

Step 3: Class intervals निर्धारित करें

Step 4: Frequency table बनाएं

Step 5: Results का विश्लेषण करें

Solved Examples

Example 1: निम्नलिखित marks को frequency table में arrange करें: 85, 92, 78, 85, 90, 88, 85, 95, 82, 90

Solution:

Class Interval	Frequency
75-80	1
80-85	2
85-90	4
90-95	2
95-100	1

Example 2: एक company में employees की salary distribution: ₹25,000, ₹30,000, ₹25,000, ₹35,000,

₹40,000, ₹25,000, ₹30,000, ₹45,000, ₹35,000,
₹30,000

Solution:

Salary Range | Frequency | Percentage

20,000-30,000 | 6 | 60%

30,001-40,000 | 3 | 30%

40,001-50,000 | 1 | 10%

Example 3: Students के examination results: Pass: 45, Fail: 15, Distinction: 20

Solution (Pie Chart angles):

- Pass: $(45/80) \times 360^\circ = 202.5^\circ$
- Fail: $(15/80) \times 360^\circ = 67.5^\circ$
- Distinction: $(20/80) \times 360^\circ = 90^\circ$

Quick Tips & Tricks

- **Shortcut:** Equal class intervals के लिए, total range को desired classes से divide करें
- **Memory Trick:** "C-C-T" = Collection → Classification → Tabulation
- **Exam Tip:** हमेशा frequency का total verify करें

2. Measures of Central Tendency**मुख्य अवधारणाएं (Key Concepts)**

Central tendency वह value है जो पूरे dataset को represent करती है। यह तीन प्रकार की होती है:

2.1 Arithmetic Mean (समांतर माध्य)

सबसे common measure है जो सभी values का average देता है।

For Ungrouped Data: Mean (\bar{x}) = $\Sigma x/n$

For Grouped Data: Mean (\bar{x}) = $\Sigma fx/\Sigma f$

Direct Method: $\bar{x} = \Sigma fx/\Sigma f$ Short-cut Method: $\bar{x} = A + (\Sigma fd/\Sigma f) \times h$ Step Deviation Method: $\bar{x} = A + (\Sigma fd'/\Sigma f) \times h$

2.2 Median (मध्यक)

Middle value जब data को ascending order में arrange किया जाता है।

For Ungrouped Data:

- Odd n: Median = $[(n+1)/2]$ th term
- Even n: Median = $[n/2 + (n/2+1)]/2$

For Grouped Data: Median = $L + [(n/2 - CF)/f] \times h$

Where:

- L = Lower boundary of median class
- CF = Cumulative frequency before median class
- f = Frequency of median class
- h = Class width

2.3 Mode (बहुलक)

सबसे अधिक बार आने वाली value।

For Grouped Data: Mode = $L + [(f_1 - f_0)/(2f_1 - f_0 - f_2)]$

$\times h$

Where:

- f_1 = Frequency of modal class
- f_0 = Frequency before modal class
- f_2 = Frequency after modal class

Formula Sheet - Section 2

Measure	Ungrouped	Grouped
Mean	$\Sigma x/n$	$\Sigma fx/\Sigma f$
Median	Middle value	$L + [(n/2 - CF)/f] \times h$
Mode	Most frequent	$L + [(f_1 - f_0)/(2f_1 - f_0 - f_2)] \times h$

Relationships

- Mean - Mode = 3(Mean - Median)
- Mode = 3Median - 2Mean

समस्या समाधान की विधि (Problem Solving Method)

For Mean:

1. सभी values को add करें
2. Total को observations की संख्या से divide करें
3. Grouped data के लिए midpoint का उपयोग करें

For Median:

1. Data को ascending order में arrange करें
2. Middle position find करें $(n+1)/2$
3. Grouped data के लिए median class find करें

For Mode:

1. Maximum frequency वाला class/value find करें
2. Formula apply करें

Solved Examples

Example 1: Find Mean, Median, Mode for: 12, 15, 18, 12, 20, 25, 12, 18

Solution:

Mean: $(12+15+18+12+20+25+12+18)/8 = 132/8 = 16.5$

Median: Arranged: 12, 12, 12, 15, 18, 18, 20, 25
Middle values: 15 and 18, Median = $(15+18)/2 = 16.5$

Mode: 12 (appears 3 times)

Example 2: Find mean for grouped data:

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	10	15	12	8

Solution:

Class	f	x	fx
0-10	5	5	25
10-20	10	15	150
20-30	15	25	375
30-40	12	35	420
40-50	8	45	360
Total	50	-	1330

Mean = $1330/50 = 26.6$

Example 3: Find median for the above data:

Solution:

Class	f	CF
0-10	5	5
10-20	10	15
20-30	15	25
30-40	12	35
40-50	8	45
Total	50	-

← Median class
($n/2 = 25$)

$$\text{Median} = 20 + [(25-15)/15] \times 10 = 20 + 6.67 = 26.67$$

Example 4: Find mode for:

Maks	0-20	20-40	40-60	60-80	80-100
Students	10	15	25	20	5

Solution:

Modal class = 40-60 (highest frequency = 25)

$$\begin{aligned} \text{Mode} &= 40 + [(25-15)/(2 \times 25 - 15 - 20)] \times 20 \\ &= 40 + (10/15) \times 20 \\ &= 40 + 13.33 = 53.33 \end{aligned}$$

Quick Tips & Tricks

- Mean Shortcut: For arithmetic progression, Mean = (First term + Last term)/2
- Median Trick: Always check if $n/2$ falls exactly on cumulative frequency
- Mode Memory: "Mode = Most frequent"
- Relationship Check: Use Mean-Mode = 3(Mean-Median) for verification

3. Measures of Dispersion

मुख्य अवधारणाएं (Key Concepts)

Dispersion measures बताते हैं कि data values central tendency से कितनी spread हैं।

3.1 Range (परास)

सबसे simple measure है।

Range = Maximum Value - Minimum Value

3.2 Mean Deviation (माध्य विचलन)

From Mean: $MD = \frac{\sum |x - \bar{x}|}{n}$

From Median: $MD = \frac{\sum |x - M|}{n}$

3.3 Variance (प्रसरण)

Population Variance: $\sigma^2 = \frac{\sum (x - \mu)^2}{N}$ Sample

Variance: $s^2 = \frac{\sum (x - \bar{x})^2}{(n-1)}$

3.4 Standard Deviation (मानक विचलन)

Population: $\sigma = \sqrt{\frac{\sum (x - \mu)^2}{N}}$ Sample: $s = \sqrt{\frac{\sum (x - \bar{x})^2}{(n-1)}}$

Short-cut Formula: $\sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$

3.5 Coefficient of Variation (CV)

CV = (Standard Deviation/Mean) × 100

Formula Sheet - Section 3

Measure	Formula	Grouped Data
Range	Max - Min	Highest class upper limit - Lowest class lower limit
Variance	$\frac{\sum (x - \bar{x})^2}{n}$	$\frac{\sum f(x - \bar{x})^2}{\sum f}$
Standard Deviation	$\sqrt{\text{Variance}}$	$\sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$
CV	$(\text{SD}/\text{Mean}) \times 100$	Same

Properties of Standard Deviation

- $\sigma \geq 0$ (Always non-negative)
- If all values are same, $\sigma = 0$
- Adding/subtracting constant doesn't change σ
- Multiplying by constant multiplies σ by same constant

समस्या समाधान की विधि (Problem Solving Method)**For Standard Deviation:**

- Mean calculate करें
- Each value से mean subtract करें
- Differences को square करें
- Sum of squares को n से divide करें
- Square root लें

Solved Examples

Example 1: Find Range, Mean Deviation, and Standard Deviation for: 5, 8, 10, 12, 15

Solution:

Range: $15 - 5 = 10$

Mean: $(5+8+10+12+15)/5 = 10$

Mean Deviation: $(|5-10| + |8-10| + |10-10| + |12-10| + |15-10|)/5 = (5+2+0+2+5)/5 = 2.8$

Variance: $[(5-10)^2 + (8-10)^2 + (10-10)^2 + (12-10)^2 + (15-10)^2]/5 = (25+4+0+4+25)/5 = 11.6$

Standard Deviation: $\sqrt{11.6} = 3.41$

Example 2: Find Standard Deviation for grouped data:

Class	10-20	20-30	30-40	40-50
Frequency	4	6	8	2

Solution:

Class	f	x	fx	$(x-\bar{x})$	$(x-\bar{x})^2$	$f(x-\bar{x})^2$
10-20	5	15	60	-12	144	576
20-30	6	25	150	-2	4	24
30-40	8	35	280	8	64	512
40-50	2	45	90	18	324	648
Total	20	-	580	-	-	1760

Mean = $580/20 = 29$ Variance = $1760/20 = 88$
Standard Deviation = $\sqrt{88} = 9.38$

Example 3: Compare variability of two datasets using CV: Dataset A: Mean = 50, SD = 10 Dataset B: Mean = 100, SD = 15

Solution: $CV_A = (10/50) \times 100 = 20\%$ $CV_B = (15/100) \times 100 = 15\%$ Dataset A has higher variability.

Example 4: If each value in a dataset is increased by 5, how does SD change?

Solution: Standard Deviation remains unchanged when a constant is added to all values. Original SD = New SD

Quick Tips & Tricks

- Range Shortcut:** Quick measure but affected by extreme values
- SD Memory:** "Standard Deviation = $\sqrt{\text{Variance}}$ "
- CV Trick:** Lower CV means less variability relative to mean
- Property Trick:** Adding constant doesn't change SD, multiplying does

4. Probability & Correlation

4.1 Probability (प्रायिकता)

मुख्य अवधारणाएं (Key Concepts)

Probability किसी event के होने की संभावना को measure करती है।

Basic Probability: $P(A) = \text{Number of favorable outcomes} / \text{Total number of outcomes}$

Range: $0 \leq P(A) \leq 1$

Types of Events

Mutually Exclusive Events: दो events एक साथ नहीं हो सकते $P(A \cap B) = 0$ $P(A \cup B) = P(A) + P(B)$

Independent Events: एक event दूसरे को प्रभावित नहीं करता $P(A \cap B) = P(A) \times P(B)$

Conditional Probability: $P(A|B) = P(A \cap B)/P(B)$

Important Formulas

Rule	Formula
Addition Rule	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Multiplication Rule	$P(A \cap B) = P(A) \times P(B)$
Complement Rule	$P(A') = 1 - P(A)$
Bayes' Theorem	$P(A B) = \{P(B A) \cdot P(A)\} / \{P(B)\}$

4.2 Correlation (सहसंबंध)

मुख्य अवधारणाएं

Correlation दो variables के बीच linear relationship को measure करता है।

Pearson Correlation Coefficient: $r = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{[\sum(x-\bar{x})^2 \sum(y-\bar{y})^2]}}$

Short Formula: $r = \frac{[n\sum xy - \sum x \sum y]}{\sqrt{[(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)']}}$

- Types of Correlation
- Perfect Positive: $r = +1$
- Perfect Negative: $r = -1$
- No Correlation: $r = 0$
- Strong: $|r| > 0.7$
- Moderate: $0.3 < |r| < 0.7$
- Weak: $|r| < 0.3$

Solved Examples - Probability

Example 1: एक bag में 5 red, 3 blue, 2 green balls हैं। एक ball निकालने पर red ball की probability क्या है?

Solution: Total balls = 5 + 3 + 2 = 10 $P(\text{Red}) = 5/10 = 1/2 = 0.5$

Example 2: दो dice throw करने पर sum 7 आने की probability?

Solution: Favorable outcomes: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) = 6 Total outcomes = 6 × 6 = 36 $P(\text{Sum} = 7) = 6/36 = 1/6$

Example 3: $P(A) = 0.4$, $P(B) = 0.5$, $P(A \cap B) = 0.2$ । Find $P(A \cup B)$:

Solution: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \cup B) = 0.4 + 0.5 - 0.2 = 0.7$

Example 4: Conditional probability - $P(A) = 0.6$, $P(B|A) = 0.8$ । Find $P(A \cap B)$:

Solution: $P(A \cap B) = P(A) \times P(B|A) = 0.6 \times 0.8 = 0.48$

Solved Examples - Correlation

Example 5: Calculate correlation coefficient for: X: 1, 2, 3, 4, 5 Y: 2, 4, 6, 8, 10

Solution:

x	y	xy	x ²	y ²
1	2	2	1	4
2	4	8	4	16
3	6	18	9	36
4	8	32	16	64
5	10	50	25	100
Σ	Σ	110	55	220
15	30			

$$r = \frac{5(110) - (15)(30)}{\sqrt{(5 \times 55 - 225)(5 \times 220 - 900)}}$$

$$r = \frac{550 - 450}{\sqrt{(275 - 225)(1100 - 900)}} r = \frac{100}{\sqrt{50 \times 200}} = \frac{100}{100} = 1 \text{ (Perfect positive correlation)}$$

Example 6: Company के sales और advertising के बीच correlation: Advertising (₹1000): 2, 4, 6, 8, 10
Sales (₹10000): 3, 5, 7, 9, 11

Solution: Following same method: $r = 1$ (Perfect positive correlation) This means advertising increase से sales proportionally बढ़ती है।

Quick Tips & Tricks

- Probability Range: हमेशा 0 और 1 के बीच होती है
- Dice Sum Trick: Sum 7 की probability सबसे ज्यादा (1/6)
- Correlation Memory: $r = 1$ means perfect positive, $r = -1$ means perfect negative
- Calculation Tip: Use short formula for correlation to save time

5. Sampling Methods**मुख्य अवधारणाएं (Key Concepts)**

Sampling एक बड़ी population से छोटे representative group को select करने की process है।

5.1 Basic Terms

Population: सभी units का complete set
Sample: Population का selected portion

Parameter: Population की characteristic (μ, σ)
Statistic: Sample की characteristic (\bar{x}, s)

5.2 Types of Sampling**Probability Sampling****1. Simple Random Sampling**

- हर unit को equal chance मिलता है
- Lottery method, Random number tables

2. Systematic Sampling

- kth interval पर selection
- $k = N/n$ (sampling interval)

3. Stratified Sampling

- Population को strata में divide करना
- Each stratum से proportional sampling

4. Cluster Sampling

- Population को clusters में divide करना
- कुछ complete clusters को select करना

Non-Probability Sampling**1. Convenience Sampling**

- आसानी से available units

2. Purposive Sampling

- Specific criteria के आधार पर

3. Quota Sampling

- Pre-determined quotas

5.3 Sampling Distribution

Central Limit Theorem: जब sample size बड़ा होता है ($n \geq 30$), sample means का distribution normal होता है।

Standard Error of Mean: $SE = \sigma/\sqrt{n}$

Sampling Distribution Properties:

- Mean of sample means = Population mean (μ)
- Standard deviation of sample means = σ/\sqrt{n}

Formula Sheet - Section 5

Method	Formula	When to Use
Simple Random	All units equal probability	Homogeneous population
Systematic	$k = N/n$	Large population, ordered list
Stratified	$n_i = n \times (N_i/N)$	Heterogeneous population
Standard Error	$SE = \sigma/\sqrt{n}$	All sampling

समस्या समाधान की विधि (Problem Solving Method)

Step 1: Population की nature पहचानें

Step 2: Appropriate sampling method चुनें

Step 3: Sample size determine करें

Step 4: Selection process follow करें

Step 5: Results को population पर generalize करें

Solved Examples

Example 1: 1000 employees की company से 50 employees का systematic sample लेना है। Sampling interval क्या होगा?

Solution: $k = N/n = 1000/50 = 20$ हर 20वें employee

को select करना होगा।

Example 2: एक city में 60% male, 40% female हैं। 200 की stratified sample में male और female की संख्या क्या होगी?

Solution: Males in sample = $200 \times 0.60 = 120$
Females in sample = $200 \times 0.40 = 80$

Example 3: Population mean = 100, SD = 20। Sample size 25 के लिए standard error calculate करें।

Solution: $SE = \sigma/\sqrt{n} = 20/\sqrt{25} = 20/5 = 4$

Example 4: Population SD = 15, desired margin of error = 3, confidence level = 95%। Required sample size?

Solution: For 95% confidence, $z = 1.96$ $n = (z \times \sigma / E)^2 = (1.96 \times 15 / 3)^2 = (9.8)^2 = 96.04 \approx 97$

Example 5: Simple random sampling vs Systematic sampling:

Population size = 500 Sample size needed = 25

SRS: Use random number table to select 25 numbers

Systematic: $k = 500/25 = 20$, select every 20th unit

Quick Tips & Tricks

- Sample Size Rule: $n \geq 30$ for normal approximation
- Systematic Trick: First unit randomly select करें, then add interval
- Stratified Memory: Proportional allocation = $n_i = n \times (N_i/N)$
- SE Formula: Standard Error decreases as sample size increases

6. Statistical Inference

6.1 Testing of Hypotheses (परिकल्पना परीक्षण)

मुख्य अवधारणाएं (Key Concepts)

Hypothesis testing में हम population parameters के बारे में claims को test करते हैं।

Null Hypothesis (H_0): वह hypothesis जिसे हम test करते हैं **Alternative Hypothesis (H_1):** H_0 के विपरीत hypothesis

Types of Tests

- One-tailed Test:** Direction specific ($>$, $<$)
- Two-tailed Test:** Direction non-specific (\neq)

Test Statistics

For Population Mean (σ known): $z = (\bar{x} - \mu_0) / (\sigma / \sqrt{n})$

For Population Mean (σ unknown): $t = (\bar{x} - \mu_0) / (s / \sqrt{n})$

For Population Proportion: $z = (\hat{p} - p_0) / \sqrt{[p_0(1 - p_0) / n]}$

Steps for Hypothesis Testing

- Step 1:** State H_0 and H_1
- Step 2:** Choose significance level (α)
- Step 3:** Calculate test statistic
- Step 4:** Find critical value or p-value
- Step 5:** Make decision (Reject or Fail to reject H_0)

6.2 Confidence Intervals

मुख्य अवधारणाएं

Confidence interval एक range है जिसमें true population parameter होने की high probability है।

For Population Mean (σ known): $\bar{x} \pm z(\alpha/2) \times (\sigma / \sqrt{n})$

For Population Mean (σ unknown): $\bar{x} \pm t(\alpha/2) \times (s / \sqrt{n})$

For Population Proportion: $\hat{p} \pm z(\alpha/2) \times \sqrt{[\hat{p}(1 - \hat{p}) / n]}$

Common Confidence Levels

Confidence Level	α	$z(\alpha/2)$
90%	0.10	1.645
95%	0.05	1.96
99%	0.01	2.576

Types of Errors

Type I Error (α): H_0 को reject करना जब वह true है
Type II Error (β): H_0 को accept करना जब वह false है

Formula Sheet - Section 6

Test Type	Test Statistic	Critical Region
One-sample z-test	$z = (\bar{x} - \mu) / (\sigma / \sqrt{n})$	$z > z_\alpha$ or $z < -z_\alpha$
One-sample t-test	$t = (\bar{x} - \mu) / (s / \sqrt{n})$	$t > t_\alpha$ or $t < -t_\alpha$
Proportion test	$z = (\hat{p} - p) / \sqrt{[p(1 - p) / n]}$	$z > z_{\alpha/2}$ or $z < -z_{\alpha/2}$

समस्या समाधान की विधि (Problem Solving Method)

For Hypothesis Testing:

- Hypotheses clearly state करें
- Significance level choose करें
- Test statistic calculate करें
- Critical value या p-value find करें
- Conclusion draw करें

For Confidence Interval:

1. Sample statistics calculate करें
2. Appropriate formula choose करें
3. Critical value find करें
4. Margin of error calculate करें
5. Interval construct करें

Solved Examples

Example 1: एक company claim करती है कि उनके bulbs का average life 1000 hours है। 36 bulbs के sample में mean = 950 hours, SD = 120 hours। $\alpha = 0.05$ पर test करें।

Solution: $H_0: \mu = 1000$ $H_1: \mu \neq 1000$ (two-tailed test)

Test statistic: $t = (950-1000)/(120/\sqrt{36}) = -50/20 = -2.5$

Critical value for $\alpha = 0.05$, $df = 35$: ± 2.03 Since $|-2.5| > 2.03$, Reject H_0 **Conclusion:** Company का claim गलत है।

Example 2: 95% confidence interval for population mean: Sample: $n = 25$, $\bar{x} = 85$, $s = 10$

Solution: $df = 24$, $t_{0.025} = 2.064$ $CI = 85 \pm 2.064 \times (10/\sqrt{25})$ $CI = 85 \pm 2.064 \times 2$ $CI = 85 \pm 4.13$ $CI = (80.87, 89.13)$

Example 3: Population proportion test: Claim: 40% students pass the exam Sample: $n = 200$, $x = 70$ passed Test at $\alpha = 0.05$

Solution: $H_0: p = 0.40$ $H_1: p \neq 0.40$

Sample proportion: $\hat{p} = 70/200 = 0.35$

Test statistic: $z = (0.35-0.40)/\sqrt{[0.40 \times 0.60/200]} = -0.05/\sqrt{0.0012} = -0.05/0.0346 = -1.445$

Critical value: ± 1.96 Since $|-1.445| < 1.96$, Fail to reject H_0 **Conclusion:** No significant evidence

against the claim.

Example 4: 99% confidence interval for population proportion: Sample: $n = 500$, $x = 250$ (successes)

Solution: $\hat{p} = 250/500 = 0.50$ $z_{0.005} = 2.576$

$CI = 0.50 \pm 2.576 \times \sqrt{[0.50 \times 0.50/500]}$ $CI = 0.50 \pm 2.576 \times 0.0224$ $CI = 0.50 \pm 0.0576$ $CI = (0.4424, 0.5576)$ or (44.24%, 55.76%)

Example 5: Type I and Type II Error: $\alpha = 0.05$ means 5% chance of Type I error If power = 0.80, then $\beta = 0.20$ (20% chance of Type II error)

Example 6: Sample size determination: Population SD = 25, margin of error = 5, confidence level = 95%

Solution: $n = (z \times \sigma / E)^2 = (1.96 \times 25 / 5)^2 = (9.8)^2 = 96.04 \approx 97$

Quick Tips & Tricks

- **Hypothesis Memory:** H_0 always has equality ($=, \leq, \geq$)
- **Critical Value:** Two-tailed test का critical value \pm होता है
- **p-value Rule:** $p\text{-value} < \alpha$ means reject H_0
- **CI Width:** Higher confidence = wider interval
- **Sample Size:** Larger sample = narrower interval

Formula Sheet

Central Tendency

Measure	Ungrouped	Grouped
Mean	$\bar{x} = \Sigma x/n$	$\bar{x} = \Sigma fx/\Sigma f$
Median	Middle value	$L + [(n/2 - CF)/f] \times h$
Mode	Most frequent	$L + [(f_1 - f_0)/(2f_1 - f_0 - f_2)] \times h$

Relationship: Mode = 3Median - 2Mean

Dispersion

Measure	Formula
Range	$\Sigma x - \bar{x} /n$
Variance	$\sigma^2 = \Sigma (x - \mu)^2/N$
Standard Deviation	$\sigma = \sqrt{\text{Variance}}$
Coefficient of Variation	$CV = (\sigma/\mu) \times 100$

Probability

Rule	Formula
Basic Probability	$P(A) = \text{Favorable outcomes/Total outcomes}$
Addition Rule	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Multiplication Rule	$P(A \cup B) = P(A) \times P(B A)$
Conditional Probability	$P(A B) = P(A \cap B)/P(B)$
Bayes' Theorem	$P(A B) = [P(B A) \times P(A)]/P(B)$

Correlation

Pearson's r: $r = [n\Sigma xy - \Sigma x\Sigma y]/\sqrt{[(n\Sigma x^2 - (\Sigma x)^2)(n\Sigma y^2 - (\Sigma y)^2)]}$

Sampling

Method	Formula
Standard Error	$SE = \sigma/\sqrt{n}$
Systematic Sampling	$k = N/n$
Stratified Sampling	$n_i = n \times (N_i/N)$

Hypothesis Testing

Test	Test Statistic
z-test (σ known)	$z = (\bar{x} - \mu)/(\sigma/\sqrt{n})$
t-test (σ unknown)	$t = (\bar{x} - \mu)/(s/\sqrt{n})$
Proportion test	$z = (\hat{p} - p)/\sqrt{[p(1-p)/n]}$

Confidence Intervals

Parameter	Confidence Interval
Mean (σ known)	$\bar{x} \pm z(\alpha/2) \times (\sigma/\sqrt{n})$
Mean (σ unknown)	$\bar{x} \pm t(\alpha/2) \times (s/\sqrt{n})$
Proportion	$\hat{p} \pm z(\alpha/2) \times \sqrt{[\hat{p}(1-\hat{p})/n]}$

SSC CGL Tier-2 Statistics Questions (2019-2024)

High Probability Question Types:

1. Central Tendency (Mean, Median, Mode)

- Direct formula application
- Relationship between measures
- Grouped data problems

2. Measures of Dispersion

- Standard deviation calculations
- Coefficient of variation
- Properties of dispersion

3. Probability

- Basic probability rules
- Conditional probability
- Bayes' theorem applications

4. Correlation

- Pearson correlation coefficient
- Interpretation of correlation values

5. Sampling

- Types of sampling methods
- Standard error calculations
- Sample size determination

6. Hypothesis Testing

- z-test and t-test
- One-tailed and two-tailed tests

- Type I and Type II errors

Frequently Asked Questions:

Q1 (2023): यदि एक dataset का mean = 25, median = 22 है, तो mode का approximate value क्या होगा?

Answer: Mode = $3 \times 22 - 2 \times 25 = 66 - 50 = 16$

Q2 (2022): Sample size = 100, sample mean = 50, population SD = 10 के लिए 95% confidence interval है:

Answer: $50 \pm 1.96 \times (10/\sqrt{100}) = 50 \pm 1.96 = (48.04, 51.96)$

Q3 (2021): दो variables के बीच correlation coefficient = -0.8 का मतलब है:

Answer: Strong negative correlation

Q4 (2020): Type I error का probability $\alpha = 0.05$ है। इसका मतलब है:

Answer: 5% chance of rejecting true H_0

Q5 (2019): Systematic sampling में population = 1000, sample = 50 के लिए sampling interval:

Answer: $k = 1000/50 = 20$

Expected Questions for 2026:

Pattern Analysis:

- 40% questions from Central Tendency & Dispersion
- 25% from Probability & Correlation
- 20% from Sampling Methods
- 15% from Hypothesis Testing & Confidence Intervals

High Weightage Topics:

1. Standard Deviation calculations (shortcut methods)
2. Correlation coefficient problems
3. Hypothesis testing (z-test, t-test)

4. Confidence intervals construction

5. Sampling distribution properties

Practice Questions for Self-Assessment

Practice Set 1:

1. Find mean, median, mode for: 12, 15, 18, 12, 20, 25, 12, 18

2. Calculate standard deviation using shortcut method

3. If $P(A) = 0.6$, $P(B) = 0.4$, $P(A \cap B) = 0.2$, find $P(A \cup B)$

Practice Set 2:

1. Construct 95% confidence interval for population mean

2. Test hypothesis: $H_0: \mu = 100$ vs $H_1: \mu \neq 100$

3. Calculate correlation coefficient for given data

Exam Strategy Tips

Time Management:

- Data interpretation: 2-3 minutes per question
- Formula-based problems: 1-2 minutes per question
- Hypothesis testing: 3-4 minutes per question

Common Mistakes to Avoid:

- Forgetting to take square root in SD calculations
- Wrong signs in correlation coefficient
- Incorrect critical values in hypothesis testing
- Not checking conditions for normal approximation

Last-Minute Revision:

- Memorize all formulas from formula sheet
- Practice previous year questions
- Focus on high-weightage topics
- Review shortcut methods

Finance & Economics

Economics - Basic Concepts

मूलभूत अवधारणाएं (Basic Concepts)

1. Demand and Supply (मांग और आपूर्ति)

Demand का मतलब है किसी वस्तु या सेवा की वह मात्रा जिसे उपभोक्ता एक निश्चित कीमत पर खरीदने को तैयार हैं।

Supply का मतलब है किसी वस्तु या सेवा की वह मात्रा जिसे उत्पादक एक निश्चित कीमत पर बेचने को तैयार हैं।

मुख्य सूत्र (Key Formulas):

Formula	Description
Price Elasticity of Demand = % Change in Quantity Demanded / % Change in Price	मांग की कीमत लोच
Income Elasticity of Demand = % Change in Quantity Demanded / % Change in Income	मांग की आय लोच
Cross Elasticity of Demand = % Change in Quantity Demanded of Good X / % Change in Price of Good Y	मांग की तिर्यक लोच

समस्या समाधान की विधि (Problem-Solving Method):

Step 1: दिए गए डेटा को identify करें

Step 2: उपयुक्त formula का चयन करें

Step 3: Values को substitute करें

Step 4: Calculate करें और result interpret करें

Solved Examples:

Example 1: यदि किसी वस्तु की कीमत ₹10 से बढ़कर ₹12 हो जाती है और मांग 100 units से घटकर 80 units हो जाती है, तो Price Elasticity of Demand ज्ञात करें।

Solution:

Initial Price (P_1) = ₹10, Final Price (P_2) = ₹12

Initial Quantity (Q_1) = 100, Final Quantity (Q_2) = 80

% Change in Price = $(12-10)/10 \times 100 = 20\%$

% Change in Quantity = $(80-100)/100 \times 100 = -20\%$

PED = $-20\%/20\% = -1$

Example 2: एक consumer की income ₹20,000 से बढ़कर ₹25,000 हो जाती है। उसकी demand 50 units से बढ़कर 60 units हो जाती है। Income Elasticity of Demand calculate करें।

Solution:

% Change in Income = $(25000-20000)/20000 \times 100 = 25\%$

% Change in Quantity = $(60-50)/50 \times 100 = 20\%$

IED = $20\%/25\% = 0.8$

Shortcut Tricks:

Elastic Demand: जब PED > 1 (कीमत में छोटा बदलाव, मांग में बड़ा बदलाव)

Inelastic Demand: जब PED < 1 (कीमत में बड़ा बदलाव, मांग में छोटा बदलाव)

Unitary Elastic: जब PED = 1

National Income

राष्ट्रीय आय की अवधारणाएं (National Income Concepts)

मुख्य परिभाषाएं (Key Definitions):

Gross Domestic Product (GDP): एक देश की सीमाओं के अंदर एक वर्ष में उत्पादित सभी अंतिम वस्तुओं और सेवाओं का मौद्रिक मूल्य।

Gross National Product (GNP): एक देश के नागरिकों

द्वारा घर और विदेश में एक वर्ष में उत्पादित सभी अंतिम वस्तुओं और सेवाओं का मौद्रिक मूल्य।

Net National Product (NNP): GNP में से depreciation घटाने पर प्राप्त होता है।

महत्वपूर्ण सूत्र (Important Formulas):

Formula	Description
GNP = GDP + NFIA	Net Factor Income from Abroad
NNP = GNP - Depreciation	Net National Product
NI = NNP - Indirect Taxes + Subsidies	National Income
PI = NI - Corporate Tax - Undistributed Profits + Transfer Payments	Personal Income
DI = PI - Personal Tax	Disposable Income

GDP की गणना की विधियां (Methods of GDP Calculation):

1. **Production Method:** GDP = Value of Output - Intermediate Consumption

2. **Income Method:** GDP = Wages + Rent + Interest + Profit + Mixed Income

3. **Expenditure Method:** GDP = C + I + G + (X - M)

जहाँ: C = Consumption, I = Investment, G = Government Expenditure, X = Exports, M = Imports

Solved Examples:

Example 3: एक देश का GDP ₹10 lakh crore है और NFIA ₹50,000 crore है। GNP calculate करें।

Solution: GNP = GDP + NFIA
 $GNP = 10,00,000 + 50,000 = 10,50,000$ crore

Example 4: यदि GNP = ₹15 lakh crore, Depreciation = ₹1.5 lakh crore, Indirect Taxes = ₹2

lakh crore, Subsidies = ₹0.5 lakh crore हो, तो National Income ज्ञात करें।

Solution:

Step 1: NNP = GNP - Depreciation
 $= 15,00,000 - 1,50,000$
 $= 13,50,000$ crore

Step 2: NI = NNP - Indirect Taxes + Subsidies
 $NI = 13,50,000 - 2,00,000 + 50,000$
 $= 12,00,000$ crore

Banking

बैंकिंग प्रणाली (Banking System)

Reserve Bank of India (RBI) के कार्य:

1. Monetary Policy का निर्धारण और implementation
2. Currency Issue करना
3. Government's Banker के रूप में कार्य
4. Banking Regulation और supervision

मुख्य दरें (Key Rates):

Rate	Current Range	Description
Repo Rate	6.0% - 7.0%	RBI से commercial banks को पैसा उधार लेने की दर
Reverse Repo Rate	5.5% - 6.5%	Banks का RBI में पैसा जमा करने की दर
CRR	3% - 5%	Cash Reserve Ratio
SLR	18% - 23%	Statutory Liquidity Ratio
MSF	Repo + 0.25%	Marginal Standing Facility
Bank Rate	Repo + 0.25%	RBI की discount rate

महत्वपूर्ण सूत्र (Banking Formulas):

Formula	Description
Money Multiplier = $1/CRR$	पैसे की गुणक क्षमता
Credit Creation = Initial Deposit × Money Multiplier	साख निर्माण
Effective CRR = $(\text{Cash with RBI} / \text{Net Demand and Time Liabilities}) \times 100$	प्रभावी नकद आरक्षित अनुपात

Solved Examples:

Example 5: यदि CRR = 4% है, तो Money Multiplier calculate करें।

Solution: Money Multiplier = $1/CRR = 1/0.04 = 25$

Example 6: एक bank में ₹1000 crore का initial deposit आता है। यदि CRR = 5% है, तो maximum credit creation possible है?

Solution: Money Multiplier = $1/0.05 = 20$
Maximum Credit Creation = $1000 \times 20 = ₹20,000$ crore

Example 7: एक bank का NDTL = ₹100 crore है। यदि CRR = 4% है, तो RBI में कितना cash रखना होगा?

Solution: Cash to be kept with RBI = $NDTL \times CRR = 100 \times 0.04 = ₹4$ crore

Budget**सरकारी बजट (Government Budget)****बजट के प्रकार (Types of Budget):**

1. Balanced Budget: Revenue = Expenditure
2. Surplus Budget: Revenue > Expenditure
3. Deficit Budget: Revenue < Expenditure

मुख्य घाटे (Key Deficits):

Deficit Type	Formula	Significance
Revenue Deficit	Revenue Expenditure - Revenue Receipts	Current operations का deficit
Fiscal Deficit	Total Expenditure - Total Receipts (except borrowings)	Total borrowing requirement
Primary Deficit	Fiscal Deficit - Interest Payments	Fiscal deficit without interest burden

बजट के घटक (Budget Components):**Revenue Receipts:**

- Tax Revenue (Direct + Indirect Taxes)
- Non-Tax Revenue (Fees, Fines, Dividends)

Capital Receipts:

- Recovery of Loans
- Borrowings
- Disinvestment

Solved Examples:

Example 8: Government का Revenue Receipt = ₹20 lakh crore, Revenue Expenditure = ₹25 lakh crore। Revenue Deficit calculate करें।

Solution: Revenue Deficit = Revenue Expenditure - Revenue Receipts
Revenue Deficit = $25 - 20 = ₹5$ lakh crore

Example 9: Total Expenditure = ₹35 lakh crore, Total Receipts (except borrowings) = ₹28 lakh crore, Interest Payments = ₹6 lakh crore। Fiscal Deficit और Primary Deficit calculate करें।

Solution: Fiscal Deficit = 35 - 28 = ₹7 lakh crore
 Primary Deficit = Fiscal Deficit - Interest Payments
 = 7 - 6 = ₹1 lakh crore

Money & Credit

मुद्रा और साख (Money and Credit)

मुद्रा की परिभाषा (Definition of Money):

M₁ (Narrow Money): Currency + Demand Deposits + Other Deposits with RBI

M₂: M₁ + Savings Deposits with Post Office

M₃ (Broad Money): M₁ + Time Deposits with Banks

M₄: M₁ + All Deposits with Post Office

Quantity Theory of Money:

$$MV = PT$$

जहाँ:

- M = Money Supply
- V = Velocity of Money
- P = Price Level
- T = Volume of Transactions

Credit Control के तरीके:

Quantitative Methods:

1. Bank Rate Policy
2. Open Market Operations
3. CRR variations
4. SLR variations

Qualitative Methods:

1. Margin Requirements

2. Credit Rationing

3. Moral Suasion

4. Direct Action

Solved Examples:

Example 10: Money Supply = ₹100 lakh crore, Velocity = 4, Volume of Transactions = 200 lakh units | Price Level calculate करें।

Solution: Using $MV = PT$

$$100 \times 4 = P \times 200$$

$$P = 400/200 = ₹2 \text{ per unit}$$

Accounting Principles

लेखांकन के सिद्धांत (Accounting Principles)

मूलभूत सिद्धांत (Fundamental Principles):

1. **Going Concern Concept:** व्यवसाय निरंतर चलता रहेगा
2. **Matching Principle:** आय और व्यय का सही matching
3. **Revenue Recognition Principle:** आय की पहचान का समय
4. **Cost Principle:** Historical cost पर recording
5. **Conservatism Principle:** सावधानी का सिद्धांत
6. **Materiality Principle:** महत्वपूर्ण items का disclosure
7. **Consistency Principle:** लगातार same methods का उपयोग

Accounting Equation:

$$\text{Assets} = \text{Liabilities} + \text{Owner's Equity}$$

Double Entry Bookkeeping के नियम:

Account Type	Debit	Credit
Assets	Increase	Decrease
Liabilities	Decrease	Increase
Capital/Equity	Decrease	Increase
Revenue	Decrease	Increase
Expenses	Increase	Decrease

Solved Examples:

Example 11: एक company के Assets = ₹5,00,000, Liabilities = ₹2,00,000। Owner's Equity calculate करें।

Solution: Using Accounting Equation:
 Assets = Liabilities + Owner's Equity
 $5,00,000 = 2,00,000 + \text{Owner's Equity}$
 Owner's Equity = $5,00,000 - 2,00,000 = ₹3,00,000$

Ratio Analysis**अनुपात विश्लेषण (Ratio Analysis)****प्रमुख अनुपात (Key Ratios):****1. Liquidity Ratios (तरलता अनुपात):**

Ratio	Formula	Ideal Range
Current Ratio	Current Assets / Current Liabilities	2:1
Quick Ratio	Quick Assets / Current Liabilities	1:1
Cash Ratio	Cash + Marketable Securities / Current Liabilities	0.5:1

2. Activity Ratios (गतिविधि अनुपात):

Ratio	Formula	Significance
Inventory Turnover	Cost of Goods Sold / Average Inventory	Inventory management efficiency
Receivables Turnover	Net Credit Sales / Average Receivables	Collection efficiency
Total Assets Turnover	Net Sales / Average Total Assets	Asset utilization

3. Profitability Ratios (लाभप्रदता अनुपात):

Ratio	Formula	Benchmark
Gross Profit Margin	$(\text{Gross Profit} / \text{Net Sales}) \times 100$	Industry dependent
Net Profit Margin	$(\text{Net Profit} / \text{Net Sales}) \times 100$	Higher is better
ROA	$(\text{Net Income} / \text{Average Total Assets}) \times 100$	> 5%
ROE	$(\text{Net Income} / \text{Average Shareholders' Equity}) \times 100$	> 15%

4. Leverage Ratios (लाभ उठाने के अनुपात):

Ratio	Formula	Safe Limit
Debt-to-Equity	Total Debt / Total Equity	< 1:1
Debt Ratio	Total Debt / Total Assets	< 0.6
Times Interest Earned	EBIT / Interest Expense	> 5%

Solved Examples:

Example 12: Company का Current Assets = ₹80,000, Current Liabilities = ₹40,000। Current Ratio calculate करें।

Solution: Current Ratio = Current Assets / Current Liabilities = 80,000 / 40,000 = 2:1

Example 13: Net Sales = ₹10,00,000, Cost of Goods Sold = ₹6,00,000, Average Inventory = ₹1,50,000। Inventory Turnover Ratio और Gross Profit Margin calculate करें।

Solution:

Inventory Turnover Ratio = COGS / Average Inventory = 6,00,000 / 1,50,000 = 4 times
Gross Profit = Net Sales - COGS = 10,00,000 - 6,00,000 = ₹4,00,000
Gross Profit Margin = $(4,00,000 / 10,00,000) \times 100 = 40\%$

Audit & Audit Procedures**लेखा परीक्षा और प्रक्रियाएं (Audit and Procedures)****Audit की परिभाषा:**

Audit एक systematic examination है financial records और statements की, जो independent auditor द्वारा की जाती है।

Types of Audit:

1. Internal Audit: Company के अंदर के employees द्वारा
2. External Audit: Independent chartered accountants द्वारा
3. Government Audit: CAG या government auditors द्वारा
4. Management Audit: Management processes की efficiency check करना
5. Operational Audit: Operations की effectiveness check करना

Audit Procedures:

Procedure	Description
Vouching	Primary documents की जांच
Verification	Assets और liabilities की physical existence check
Valuation	Assets और liabilities का proper valuation
Confirmation	Third parties से confirmation लेना
Observation	Processes को देखना
Inquiry	Management से questions पूछना
Analysis	Financial ratios और trends का analysis

Audit Evidence के प्रकार:

1. Physical Evidence: Cash count, inventory observation
2. Documentary Evidence: Invoices, receipts, contracts
3. Testimonial Evidence: Written representations
4. Analytical Evidence: Ratio analysis, trend analysis

Internal Control System:**Components:**

1. Control Environment
2. Risk Assessment
3. Control Activities
4. Information & Communication

5. Monitoring

Solved Examples:

Example 14: एक auditor को पता चला कि company का cash balance books में ₹50,000 show हो रहा है लेकिन bank statement में ₹45,000 है। इसके possible reasons क्या हो सकते हैं?

Solution: Possible reasons:

1. Outstanding Cheques (₹5,000)
2. Bank charges not recorded in books
3. Direct deposits by customers not recorded
4. Errors in book keeping
5. Bank interest not recorded

Financial Statements**वित्तीय विवरण (Financial Statements)****मुख्य Financial Statements:**

1. Balance Sheet (Statement of Financial Position)
2. Profit & Loss Statement (Income Statement)
3. Cash Flow Statement
4. Statement of Changes in Equity

Balance Sheet का Format:**Assets:****Non-Current Assets:**

- Fixed Assets (Property, Plant, Equipment)
- Intangible Assets
- Investments

Current Assets:

- Inventory
- Trade Receivables
- Cash & Cash Equivalents
- Short-term Investments
- Liabilities & Equity:

Equity:

- Share Capital
- Reserves & Surplus

Non-Current Liabilities:

- Long-term Borrowings
- Deferred Tax Liabilities

Current Liabilities:

- Trade Payables
- Short-term Borrowings
- Current portion of Long-term Debt

Profit & Loss Statement का Format:

Particulars	Amount (₹)
Revenue from Operations	XXX
Less: Cost of Goods Sold	(XXX)
Gross Profit	XXX
Less: Operating Expenses	(XXX)
EBITDA	XXX
Less: Depreciation & Amortization	(XXX)
EBIT	XXX
Less: Interest Expense	(XXX)
EBT (Profit Before Tax)	XXX
Less: Tax Expense	(XXX)
Net Profit After Tax	XXX

Cash Flow Statement:**Three Categories:**

1. **Operating Activities:** Core business operations से cash flow
2. **Investing Activities:** Assets की purchase/sale से cash flow
3. **Financing Activities:** Borrowings और equity से cash flow

Solved Examples:

Example 15: Company का Revenue = ₹10,00,000, COGS = ₹6,00,000, Operating Expenses = ₹2,00,000, Depreciation = ₹50,000, Interest = ₹30,000, Tax Rate = 30%। Net Profit calculate करें।

Solution:

- Gross Profit = 10,00,000 - 6,00,000 = ₹4,00,000
- EBITDA = 4,00,000 - 2,00,000 = ₹2,00,000
- EBIT = 2,00,000 - 50,000 = ₹1,50,000
- EBT = 1,50,000 - 30,000 = ₹1,20,000
- Tax = 1,20,000 × 30% = ₹36,000
- **Net Profit = 1,20,000 - 36,000 = ₹84,000**

Previous Years' Questions & High Probability Topics**पिछले वर्षों के महत्वपूर्ण प्रश्न (Previous Years' Important Questions):****Economics Questions:**

Q1. (SSC CGL 2022) यदि किसी वस्तु की demand perfectly inelastic है, तो इसका Price Elasticity of Demand होगा:

- A) Zero

- B) One
- C) Infinite
- D) Negative

Answer: A) Zero

Q2. (SSC CGL 2021) GDP और GNP के बीच अंतर किससे पता चलता है?

- A) Net Factor Income from Abroad
- B) Depreciation
- C) Indirect Taxes
- D) Subsidies

Answer: A) Net Factor Income from Abroad

Banking Questions:

Q3. (SSC CGL 2023) यदि CRR 4% से बढ़कर 5% हो जाता है, तो Money Multiplier:

- A) 25 से 20 हो जाएगा
- B) 20 से 25 हो जाएगा
- C) Same रहेगा
- D) None of these

Answer: A) 25 से 20 हो जाएगा

Finance Questions:

Q4. (SSC CGL 2022) यदि Current Assets = ₹80,000, Current Liabilities = ₹32,000, तो Current Ratio है:

- A) 2.5:1
- B) 1.5:1
- C) 2:1
- D) 3:1

Answer: A) 2.5:1

High Probability Topics for SSC CGL 2026:

1. Economics:

- ° Price Elasticity calculations
- ° National Income concepts
- ° GDP vs GNP differences
- ° Demand and Supply curves

2. Banking:

- Monetary Policy rates
- Money Multiplier calculations
- Credit Creation process
- RBI functions

3. Finance:

- Ratio Analysis calculations
- Balance Sheet items
- Profit & Loss Statement
- Audit procedures

4. Budget:

- Types of deficits
- Budget components
- Fiscal Policy measures

Formula Sheet (Quick Reference):

Category	Formula	Use
Economics	$PE = \frac{\% \text{ Change in Qty}}{\% \text{ Change in Price}}$	Elasticity

Category	Formula	Use
National Income	$GNP = GDP + NFIA$	Income calculation
Banking	Money Multiplier = $1 / CRR$	Credit creation
Ratios	Current Ratio = CA / CL	Liquidity analysis
Budget	Fiscal Deficit = Total Exp - Total Receipts	Deficit analysis

Important Tips for SSC CGL 2026:

1. **Practice numerical problems** daily
2. **Remember key formulas** and their applications
3. **Understand concepts** rather than just memorizing
4. **Solve previous years' papers** regularly
5. **Focus on high-weightage topics** like ratios and elasticity

Final Note: ये notes SSC CGL Tier-2 की तैयारी के लिए comprehensive हैं। Regular practice और revision के साथ-साथ current affairs भी पढ़ते रहें।

All the Best for SSC CGL 2026!