

ARITHMETIC SYLLABUS

1. Ratios & Proportions I

Arithmetic, Geometric, and Harmonic Ratios. Applications in age-related problems, mixtures, and exchanges using sets or double-entry tables.

2. Ratios & Proportions II

Series of Equivalent Geometric Ratios (SEGR). Discrete and continuous Arithmetic, Geometric, and Harmonic Proportions.

3. Averages

Arithmetic, Geometric, and Harmonic Means. General properties and properties for averages of two numbers. Variation of the Arithmetic Mean. Weighted Average. Average Speed.

4. Proportional Quantities I

Directly and Inversely Proportional Quantities (DP, IP). Graphs. Proportionality function. Applications.

5. Proportional Quantities II

Proportional Distribution. Partnership Rule. Toothed wheels, gears, or common axis.

6. Percentage Rule

Operations, Percentage variation. Successive discounts and increases. Commercial applications.

7. Mixture Rule

Profit or loss relation to price. Alcoholic mixtures, proof degrees. Alloys, carats.

8. Interest Rule

Simple, compound, and continuous interest. Calculation of interest on the debtor balance. Capitalization or amortization annuities.

9. Discount Rule

Commercial and rational discount. Equivalent bills. Bill exchange. Common due date. Installment purchases.

10. Statistics I

Types of variables. Statistical tables. Statistical graphs.



11. Statistics II

Measures of Central Tendency. Position Measures.

12. Statistics III

Dispersion Measures.

13. Propositional Logic

Logical statements. Propositional variables. Logical connectives, operations. Truth tables. Algebra of propositions. Logic circuits.

14. Set Theory I

Set determination. Venn and Lewis diagrams. Set operations. Power set. Cardinality.

15. Set Theory II

Applications. Quantifiers. Algebra of sets.

16. Combinatorics I

Counting principles. Linear, circular, and repeated permutation.

17. Combinatorics II

Combination, simple and with repetition. Figure counting. Pascal's Triangle.

18. Probability I

Experiment, sample space. Classical definition (Laplace's Rule).

19. Probability II

Conditional Probability. Bayes' Theorem. Independent events. Probability function.

20. Numeration I

Base and digit. Polynomial decomposition. Base conversion. Palindromic numbers. Numeral correction.

21. Numeration II

Successive bases. Special base changes. Final digits. Maximum numeral. Interval between numerals. Block decomposition. Applications.

22. Fundamental Operations

Addition. Subtraction. Arithmetic complement. Days of the week problems. Multiplication. Division, by defect and excess.



23. **Sequences**

Arithmetic sequence. n th term. Number of terms. Digit counting. Quadratic sequence.

24. **Series**

Sum of the first natural numbers. Telescoping property. Notable series.

25. **Divisibility I**

Multiple operator. Principles. Newton's Binomial applied. Properties.

26. **Divisibility II**

Gaussians. Diophantine equations. Divisibility criteria.

27. **Positive Integer Classification I**

Types of divisors. Coprime numbers (PESI). Canonical decomposition. Number of divisors.

28. **Positive Integer Classification II**

Canonical decomposition of factorial. Sum, sum of inverses, and product of divisors. Euler's function. Euler's Theorem. Wilson's Theorem.

29. **GCD & LCM**

Method to obtain GCD and LCM. General properties and for 2 numbers - Euclidean Algorithm.

30. **Exponentiation & Radicals**

Perfect powers and roots. Radical remainder. Manual method to obtain the root. Inclusion/exclusion criteria for perfect squares or cubes.

31. **Rational Numbers**

Fractions: Types and operations. GCD, LCM of fractions. Decimal: exact, pure periodic, and mixed periodic. Generating fraction. Decimal numbers.

