

Content - cum - Methodology - Mathematics

Objectives :-

To help the pupil teacher

- 1) To understand the nature, importance and scope of Mathematics.
- 2) To understand the curriculum and syllabus of Mathematics at secondary level.
- 3) To understand the general and instructional objectives of teaching Mathematics.
- 4) To develop adequate skills in using various Methods and techniques of teaching Mathematics.
- 5) To develop adequate skills in preparing year plan, unit plan lesson plan, question items and unit test in Mathematics.
- 6) To develop adequate skills in preparing audio-visual aids and improvised aids useful in Mathematics.
- 7) To organise co-curricular activities in Mathematics.
- 8) To correlate Mathematics with life with other school subjects and within branches in Mathematics.
- 9) To understand Algebraic and Geometric core content in Mathematics.
- 10) To develop Mathematical outlook.
- 11) To appreciate the contribution of Mathematics in human life.

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CONTENT CUM - METHODOLOGY

MATHEMATICS.

B.Ed. (General and Physical)

Area A : Nature, Importance and Place of the subject.

1) Nature, Importance and Place of Mathematics.

(1.1) Nature of Mathematics.

- a) Mathematics as a structured knowledge i.e. Abstract forms, structures, patterns generalisations, Axioms.
- b) Mathematics as a way of thinking.
- c) Mathematics as a special language.

(1.2) Importance of Mathematics.

- a) Scope of Mathematics in School curriculum.
- b) Values of teaching Mathematics.
 - i) Practical (ii) Disciplinary (iii) Cultural

- c) Correlation within branches, with other school subjects, with life.

(1.3)

- a) Place of Mathematics in School curriculum.
- b) Nature of syllabus in Mathematics cyclic, topic, concentric.
- c) Critical study of text books and syllabus in Maharashtra State (Mathematics).

2) Objectives of teaching Mathematics.

- (2.1) objectives of teaching Mathematics (General)
- (2.2) Instructional objectives with specifications as per Bloom's Taxonomy and Evaluation workshop (1965).

Area B. Methods and Techniques of teaching subject (core content in unit 6 is to be used)

3) Methods and techniques of teaching Mathematics.

(3.1) Methods of teaching Mathematics.

- a) Inductive - Deductive Method.
- b) Analytic - Synthetic Method.
- c) Heuristic Method.
- d) Experimental Method.
(Specially for practical Geometry)

(3.2) Techniques of teaching Mathematics.

- a) Question - Answer
- b) Problem - solving
- c) Programmed Learning
- d) Concept attainment Model
- e) Inquiry training Model.

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4) Facilities and equipment for teaching of Mathematics.

- (4.1) Mathematics club
- (4.2) Audio-visual aids and improvised aids useful in Mathematics.
- (4.3) Reference Books, Teacher's Handbooks

5) Mathematics teacher-His attitude outlook, Creativity and Nature.

6) Core content of Mathematics.

(6.1) a) Set Theory (Std. VIII)

Concept of a set, empty set, single for finite and infinite set, subset, Union and Intersection of sets, Venn Diagrams .

(b) Set of Nos. and properties (std. IX) N, W, I, Q, R and graphs on number line properties - Closure, commutative, Associative and distributive.

(6.2) Equations (Std. X)

- a) Linear equations
- b) Quadratic equations
- c) Simultaneous equations & Graphs.

(6.3) Polynomials (Std. X)

- a) Algebraic expressions.
- b) L.C.M. & H.C.F.
- c) Factorization
- d) Rational Expressions.

(6.4) a) Ratio, proportion and variation (Std. XI)

b) Partnership, percentage (Std. X)

(6.5) Sequence and series (Std. XI)

Concept and sum of in terms of Arithmetic and Geometric sequences and series.

(6.6) a) Indices - Laws and examples (Std. X)

b) Logarithms - Laws and examples (Std. XI)

(6.7) Geometrical concepts. (Std. VIII)

a) Point, line, Segment, ray, angle plane, parallel lines, triangle, quadrilateral polygon, circle, betweenness, congruency of Δ

b) Types of angles.

c) Types of triangles.

d) Types of quadrilateral.

(6.8) Theorems.

a) Theorems on triangles.

1) Pythagorus Theorem (Std. X)

2) Adjacent angles to the base of isosceles Δ are congruent (Std. IX)

3) Converse of Theorem (2) (Std. IX)

4) The sum of the lengths of the two sides of a Δ is always greater than the length of the third side. (Std. IX)

b) Theorems on Circles (Std. X)

1) The segment joining the centre of a circle and a midpoint of a chord is perpendicular to the chord of a circle.

2) Converse of Theorem (2)

3) Opposite angles of a cyclic

quadrilateral are supplementary angles.

6.8) (c) Theorems on similarity (Std.X)

- (1) The area of two triangles are proportional to the product of base and corresponding height.
- (2) If a line parallel to one side of a \triangle bisects to two different points of another two sides then that line bisects in proportion.

6.9) Solid figures and mensuration problems on areas & Volumes
(Std.X)

6.10) Geometric constructions (only std.X)

6.11) Trigonometry (Std.X)

- a) Six trigonometric ratios
- b) Problems on height and distance
- c) Trigonometric ratios for angles 30° , 45° , 60°
- d) Simple identities.

6.12) Plane Co-ordinate Geometry (Std. X & XI)

- a) Cartesian Co-ordinate system.
- b) Distance formula
- c) Section formula
- d) concept of a locus

Note : While teaching methods core content in unit 6 is to be used in Discussion

Area C: Planning for teaching Evaluation in Mathematics.

7) Planning and Evaluation.

7.1) Planning, year plan, unit plan and daily lesson plan.

7.2) Tools of Evaluation - written tests unit tests, achievement test tests diagnostic tests in Mathematics.

7.3) Remedial teaching in Mathematics.

7.4) Oral work in Mathematics.

Area D : Practical work for Internal Assessment (Any two)

- 1) Preparation of unit plan and unit test.
- 2) Preparation of an achievement test (100 marks.) with a blue print.
- 3) Review of one Mathematics text book (any from std.V to XII)

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BOOKS RECOMMENDED

- १] गणिताचे अध्यापन - व. पां. देशमुख
मॉडर्न बुक डेपो प्रकाशन, पुणे ३०.
- २] गणित कोरे शिकवावे - ल. रा. गद्रे
ठोकळ प्रकाशन, पुणे-२
- ३] गणित अध्यापन पध्दती - ह. ना. जगताप
नूतन प्रकाशन, पुणे-३०
- ४] गणित अध्ययन आणि अध्यापन - वापट, कुलकर्णी
व्हीनस प्रकाशन, पुणे-३०
- ५] अध्यापनाची प्रतिमाने - वासंती फडके
नूतन प्रकाशन, पुणे-३०
- ६] महाराष्ट्र शासनाची मंजूर पाठ्यपुस्तके [V to XII)
- 7) The teaching of Mathematics in the New Education - N.K. Aiyangar.
The Universal Book and stationary Co. 16, Netaji Subhash Marg, P.B.1092, Delhi-6.
- 8) The teaching of Mathematics - K.B. Sidhu.
Sterling Publishers (P) Ltd. 3640, Norigate, Delhi-6
- 9) Teaching of Modern Mathematics - Dr.S. Packiam
Doaba House, 1688, Naisarak, Delhi-110 006.
- 10) Teaching of Mathematics - Chadha & Agrawal
Dhampat. Rai & Sons, Jullundar and Delhi.
- 11) Mathematics Education - G.V. Bhimasankaram
Book field centre Research wing, P.B.7228, Bombay-400 071
- 12) Content - cum - Methodology of teaching Mathematics-
NCERT Publication.

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