



**MANGALORE UNIVERSITY**  
**DEPARTMENT OF EDUCATION**  
**M.Ed.**

**MES551 SP: 11 - Theme A /Theme B**

**Theme Based Specialization Course – I**

**Theme A: Pedagogy, Technology and Assessment in Education**

**Pedagogy and Methodology of Teaching Mathematics**

**(Elementary/Secondary and Senior Secondary Education)**

**Objectives / Course Outcome**

On completion of this course students will be able to:

- Appreciate the abstract nature of mathematics
- Distinguish between the roles of pure and applied mathematics
- Develop the skill of solving real-life problems through mathematical modeling as an art
- Develop the skill of using various methods of teaching mathematics
- Develop the an awareness towards the structure of mathematics
- Develop the skill of constructing test items
- Adopt different strategies of evaluation
- Highlight the significance of mathematics laboratory & mathematics club
- Develop the skills required for action research in mathematics
- Develops positive attitude towards profession
- Explores avenues of professional growth

**Mode of Transaction**

Lecture cum discussion, demonstration, group presentations, seminars, debates, assignments, brain storming sessions, peer group discussion, interaction with community, case study, survey and dialogue, Problem Solving.

**Unit 1: Nature, Objectives and Strategies of Teaching Mathematics**

- 1.1 Abstractness of Mathematics ; Distinction between Mathematics and Science; Distinction roles of Pure and Applied Mathematics ; Mathematization; Aesthetic aspect of Mathematics; Historical development of Mathematical concepts with some contributions of Indians and Greek Mathematicians such as Aryabhata, Brahmagupta, Bhaskaracharya, Srinivasa Ramanujan, Euclid, Pythagoras, Euler, Gauss : Teaching of Mathematical Modeling.
- 1.2 Aims and Objectives of teaching Mathematics at various levels of school mathematics; Instructional objectives in teaching mathematics;

- 1.3 Psychological approach in Mathematics Education- Motivation and Transfer of learning in Mathematics classrooms- Contributions of Piaget, Bruner, Gagne, Vygotsky, Ausubel, Richard Suchman and Gardner for Mathematics Education and learning
- 1.4 Methods of teaching Mathematics- Lecture-cum-Demonstration Method, Inductive and Deductive methods, Analytic and Synthetic methods, Heuristic Method ; Problem Solving Skills- stages in problem solving techniques to improve problem solving skills (Polya method); Competence based approach to teaching mathematics; constructivist approach in teaching of Mathematics; Computer based instructions;
- 1.5 Models - Information Processing Models
  - Concept Attainment Model
  - Advance Organizer Model
  - Inquiry Training Model
  - Inductive Thinking Model
  - Cognitive Growth Model

## **Unit 2: Structure of Mathematics**

- 2.1 Undefined Terms and Axioms; Proofs and Verification in Mathematics and distinction between them; Types of Theorems such as Existence and Uniqueness theorems etc.; Types of Proofs- Direct proofs, Indirect proofs, Proof by Contradiction, Proof by Exhaustion, Proof by Mathematical Induction and distinction between Induction and Mathematical Induction; Role of Examples, Counter Examples and Non-examples in Mathematics; Conjectures; Scope and limitations of Intuition in Mathematics; Sets and Venn Diagrams as a representative of Mathematical properties and their relations.

## **Unit 3: Mathematics Curriculum**

- 3.1 Curriculum Development – Approaches and Patterns – Criteria for selection and organization of contents.
- 3.2 New trends in the development and transaction of mathematics curriculum
- 3.3 Differential curricula – Horizontal and Vertical Acceleration-- Enrichment Programmes  
individualized instruction

## **Unit 4: Evaluation and Research in Mathematics**

- 4.1 Concept of Evaluation in Teaching- Learning process (Formative, Summative, Criterion, Diagnostic); Role of Evaluation in Teaching- Learning process; Types of mistakes in Mathematics, their identification and analysis with a purpose of preventing and remedial measures; Types of Test items in Mathematics - Long answer type, Short answer type, Very Short answer type and objective type; Construction of unit test (Blue print, construction of items, administration, scoring & interpretation)
- 4.2 Research in Mathematics education (focusing on Problem-Solving Ability & diagnostic studies);

4.3 Action Research in Mathematics; Use and preparation of teaching aids; Development of Mathematics Laboratory and Organizing Mathematics Club; Ethics of teaching profession; Need for recurrent education; Types of in-service programs; Role of mathematics teacher association;

4.4 Professional growth- participation in seminars/orientation/conference/workshops;

4.5 Professional forums and associations (online & Offline); Journals

Practicum (Any Two):

- Assignment on construction of Test items for a Unit
- Analysis of famous quotations on Mathematics
- Class Test
- Group puzzles activity
- Preparation & use of teaching aids
- Conducting mathematics Olympiads (school level)

References

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