MES's Pillai College of Education and Research(Autonomous), Chembur
Pedagogy of School Subject - Mathematics
Unit Wise Question Bank

Unit 1: Basics of Academic Disciplines
a) Meaning of academic disciplines, Relationship between academic disciplines and Mathematics
b) Classification of academic disciplines: Becher -Biglan typology (pure-hard, pure soft, applied-hard, applied-soft types) with emphasis on nature of knowledge in each type.,
c) Place of Mathematics in the present school curriculum

Long Answer Questions

1	Explain the meaning of academic disciplines and the relationship between academic discipline and Mathematics?
2	Explain the relationship between academic disciplines and Mathematics
3	Explain how mathematics can be be related with other Academic Disciplines
4	Elucidate the concept of academic discipline and relationship between academic disciplines and mathematics.
5	Elaborate the four categories pure-hard, pure-soft, applied-hard, and applied-soft with relevant examples.
6	Illustrate the Academic Disciplines as per Becher-Biglan's typology.
7	"The nature of knowledge differs across academic disciplines." Justify this statement with reference to the Pure-Hard, Pure-Soft, Applied-Hard, and Applied-Soft categories.
8	Elucidate the place of Mathematics in the present school curriculum.
9	"Mathematics has an important place in the school curriculum". Explain with reference to its acceptance as core subject and neglect as difficult subject.
10	"Mathematics should be taught on a compulsory basis to all students as part of general education" Justify this statement with reference to the place of mathematics in the present school curriculum.

Short Answer Questions	
1	Meaning of academic disciplines as a fundamental of Mathematics Education.
2	Any five Characteristics of Pure-hard disciplines with examples.
3	Any five Characteristics of pure-soft disciplines with examples.
4	Any five Characteristics of applied-hard disciplines with examples.
5	Any five Characteristics of applied-soft disciplines with examples.
6	Relationship of Mathematics with any two academic disciplines (Any five points)
7	Relationship of Mathematics with Fine Arts (Any five points)
8	Relationship of Mathematics with Agriculture (Any five points)
9	Place of Mathematics in the present school curriculum. (Any five points)
10	Importance of Mathematics in the present school curriculum. (Any five points)

Unit 2: Introduction to the Teaching of Mathematics **a) Meaning , Nature & scope of Mathematics** **b) Aims and Objectives of teaching Mathematics at Secondary and Higher Secondary Levels (NCF 2009)** **c) Values of teaching Mathematics**	
Long Answer Questions	
1	Explain the meaning, nature, and scope of Mathematics.
2	"Mathematics is essential for understanding and developing all branches of science." Justify this statement based on the nature of Mathematics.
3	Elaborate on the scope of Mathematics
4	Explain the scope of Mathematics with respect to its applications in science, technology, commerce, and everyday life.
5	Elucidate the objectives of teaching Mathematics at Secondary Level
6	Elucidate the objectives of teaching Mathematics at Higher Secondary Level.

7	Elucidate values of teaching Mathematics
8	"Mathematics subjects are value oriented." Justify with reference to any four values of teaching Mathematics.
9	“Everyone uses some mathematics in every form of life. Mathematics has a great Utilitarian Value” Justify with the help of two examples.
10	“Mathematics has both practical and moral values.” Elaborate on these values with examples of how they can be integrated into the teaching of Mathematics.
Short Answer Questions	
1	Nature of Mathematics
2	Scope of Mathematics
3	Aims of teaching Mathematics at Secondary School Level
4	Aims of teaching Mathematics at Higher Secondary School Level
5	Objectives of teaching Mathematics (NCF 2009)
6	Any two Values of teaching Mathematics
7	Disciplinary value of teaching Mathematics with example (Any five points)
8	Intellectual value of teaching Mathematics with example (Any five points)
9	Cultural values of teaching Mathematics with example (Any five points)
10	Social value of teaching Mathematics with example (Any five points)

Unit 3: Essentials of Teaching Mathematics and Curriculum Transaction **a) Maxims of teaching** **From Known to Unknown** **From Simple to Complex** **From Particular to General** **From Concrete to Abstract** **From Whole to Part** **b) Approaches of curriculum construction-Concentric and Topical** **c) Pedagogical Analysis ,Unit Planning &Lesson planning**	
Long Answer Questions	
1	Explain any two maxims of teaching Mathematics
2	“The maxims ‘Known to Unknown’ and ‘Simple to Complex’ play a crucial role in the effective teaching of Mathematics.” Justify this with suitable examples to illustrate their use in teaching mathematics.
3	Elaborate on Concentric and Topical approaches of curriculum construction
4	“Concentric approach fosters continuous learning in Mathematics” Justify this with suitable examples illustrating the concentric approach to curriculum construction.
5	Explain Pedagogical Analysis, Unit Planning &Lesson planning with the help of examples.
6	Explain pedagogical analysis and illustrate on the topic Profit and Loss.
7	Elucidate the need and importance of Lesson Planning with a suitable example
8	Explain the need and importance of Unit planning.
9	Illustrate lesson planning for a topic in Mathematics.
10	"Pedagogical Analysis, Unit Planning, and Lesson Planning are interrelated components of effective curriculum transaction." Justify this statement with suitable examples from Mathematics teaching.
Short Answer Questions	
1	Any two maxims of teaching Mathematics
2	Maxim of teaching Mathematics - From Known to Unknown (Any five points)

3	Maxim of teaching Mathematics - From Simple to Complex (Any five points)
4	Maxim of teaching Mathematics - From Particular to General (Any five points)
5	Maxim of teaching Mathematics - From Concrete to Abstract (Any five points)
6	Maxim of teaching Mathematics - From Whole to Part (Any five points)
7	Difference between Concentric and Topical approaches of curriculum construction (Any five points each)
8	Significance of Pedagogical Analysis in Mathematics (Any five points)
9	Significance of Unit Planning in Mathematics (Any five points)
10	Significance of Lesson Planning in Mathematics (Any five points)

Unit 4: Methods and Techniques of Teaching Mathematics **a) Learner Centered methods ---Inductive Deductive (Teaching Generalizations), Analytical Synthetic (Teaching Proofs)** **b) Activity centered methods—Problem solving, Lecture cum Demonstration** **c) Techniques of teaching Mathematics ---Drill and Review, Assignment in Mathematics**	
Long Answer Questions	
1	Elaborate the two learner centered methods used in teaching mathematics.
2	Elaborate the process and merits of Problem-solving Method in the teaching of Mathematics.
3	"The use of problem-solving methods in mathematics develops logical reasoning in learners," Justify with reference to the procedure and importance of the method.
4	Elaborate the two activity centered methods used in teaching mathematics.
5	Explain the merits and demerits of Analytic Synthetic Method.
6	"The Analytical Method develops reasoning, while the Synthetic Method ensures systematic presentation." Justify this statement with suitable examples.
7	"The problem-solving method develops an inquisitive attitude in the students." Justify with reference to the steps and advantages of the Problem-solving method in Mathematics.

8	Elaborate on the process of Lecture cum Demonstration method of teaching Mathematics.
9	"Drill, Review and Assignments are useful techniques of teaching Mathematics." Justify with the help of their importance.
10	Explain the importance of Drill and Assignment technique in teaching mathematics.
Short Answer Questions	
1	Merits of Inductive - Deductive method in teaching Mathematics
2	Demerits of Inductive - Deductive method in teaching Mathematics
3	Any five Uses of analytic and synthetic method in teaching of Mathematics
4	Any five advantages of the problem-solving method
5	Any five advantages of the Lecture cum Demonstration method
6	Any five Disadvantages of problem-solving method
7	Any five Disadvantages of Lecture cum Demonstration method.
8	Significance of Drill as a technique of teaching Mathematics.(Any five points)
9	Significance of Review as a technique of teaching Mathematics. (Any five points)
10	Significance of Assignment as a technique of teaching Mathematics. (Any five points)

Unit 5: Learning Resources **a) Mathematic Laboratory & Mathematic club (objectives, significance)** **b) Textbook – Characteristics and Critical analysis** **c) Digital Resources for Teaching Mathematics- Geogebra & Virtual Manipulative (Meaning, Application, Advantages and Limitations)**	
Long Answer Questions	
1	Explain the objectives and significance of Mathematic Laboratory
2	Explain the objectives and significance of Mathematic club
3	"Mathematics learning becomes more meaningful when students are actively involved in mathematical activities." Justify this statement with reference to the significance of a

	Mathematics Laboratory.
4	“Mathematics Club activities help students develop interest and confidence in learning Mathematics” Justify this statement with reference to the significance of a Mathematics Club.
5	Illustrate characteristics of a good Mathematics textbook.
6	“A textbook should be carefully checked and assessed before it is selected for teaching." Justify this statement with reference to the critical analysis of a Mathematics textbook.
7	Elaborate on critical analysis of **any one** Mathematics textbook from Std 6 to 9.
8	Explain the Meaning, Application, Advantages and Limitations of Geogebra in teaching Mathematics.
9	Explain the Meaning, Application, Advantages and Limitations of Virtual Manipulative in teaching Mathematics.
10	“Learning Mathematics becomes effective with the use of digital resources”. Justify with reference to the meaning and advantages of Geogebra.
Short Answer Questions	
1	Significance of Mathematics Laboratory (Any five points)
2	Significance of Mathematics Club (Any five points)
3	Objectives of Mathematics Laboratory (Any five points)
4	Objectives of Mathematics Club (Any five points)
5	Characteristics of a good Mathematics text book. (Any five points)
6	Advantages and Limitations of any one digital resource for teaching Mathematics (Five points each)
7	Advantages of Geogebra (Any five points)
8	Application of Geogebra (Any five points)
9	Application of Virtual Manipulative (Any five points)
10	Advantages of Virtual Manipulative (Any five points)

Unit 6: Professional Development of Teacher **a) Competencies of Mathematics teacher** **b) Need and Avenues of Continuous Professional Development** **c) Contribution of mathematicians- Aryabhatta, Ramaujan, Euclid, Phythagoras**	
Long Answer Questions	
1	Elaborate on the competencies needed for the professional development of mathematics teachers.
2	“A Mathematics teacher uses multiple teaching methods to address the needs of diverse learners.” Explain this with reference to teacher competencies.
3	Explain the need for the continuous professional development of mathematics teachers.
4	Elaborate on avenues for the continuous professional development of mathematics teachers.
5	“Seminars and workshops can be effective in professional growth of teachers” Justify with respect to the avenues of continuous professional development of a teacher.
6	Explain the need of Continuous Professional Development (CPD) among mathematics teachers.
7	“Continuous Professional Development is the need of the hour” Explain in the light of the need of Continuous professional development among mathematics teachers.
8	"A Mathematics teacher needs continuous professional growth." Justify with respect to need and avenues of professional growth.
9	Explain the contribution of any two Mathematicians
10	"The contributions of mathematicians continue to influence modern Mathematics teaching and learning." Justify this statement with reference to Aryabhatta and Pythagoras.
Short Answer Questions	
1	Competencies of Mathematics teacher
2	Pedagogical competency of a Mathematics teacher. (Any five points)

3	Need for the continuous professional development of mathematics teachers. (Any five points)
4	Any two Avenues for the continuous professional development of mathematics teachers (Five points each)
5	Role of workshops and seminars in the professional development of teachers.
6	Contribution of any one mathematician
7	Contribution of Ramanujan
8	Contribution of Euclid
9	Contribution of Aryabhatta
10	Contribution of Pythagoras