SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)
Syllabus with effect from the Academic Year 2021-2022

Bachelor of Education (B.Ed. General)
Semester-I

Course Code	UE01GBED53	Title of the Course	CPS-2 : Pedagogy of Mathematics
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1.	The student-teachers recall the evolution, meaning and nature of Mathematics and explain its importance in school curriculum.
	2.	The student-teachers establish relationship between the aims and values of teaching Mathematics and recognize them, and describe its domains by classification.
	3.	The student-teachers distinguish between general and specific objectives of teaching Mathematics (according to Bloom's Taxonomy), and produce Statements/Specifications of objectives in behavioural terms.
	4.	The student-teachers formulate and demonstrate the plan of effective Mathematics lessons incorporating appropriate questions, examples, explanations and tasks.
	5.	The student-teachers apply various methods and approaches of teaching Mathematics in classroom situations at the upper primary and secondary level.
	6.	The student-teachers clarify the different techniques of teaching Mathematics and examine its effectiveness by using them in the teaching-learning process.
	7.	The student-teachers analyze and explain various concepts/content in Mathematics included in the standard 8 curriculum.

Course Content

Unit	Description	Weightage* (%)

1.	**Foundations of Teaching Mathematics**
	A. Meaning, Nature and Importance of Mathematics
	  1. Concept and Nature of Mathematics
	  2. Need and Importance of Mathematics at Primary and Secondary level in present Scenario
	B. Aims and Domains of Teaching Mathematics
	  1. Aims/Values : Utilitarian (Practical), Disciplinarian, Cultural, Moral and Social
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	2. Domains : Cognitive, Psychomotor and Affective
	C. Objectives of Teaching Mathematics
	   1. General Objectives : Knowledge, Understanding, Application, Skill, Interest, Attitude and Appreciation
	   2. Specific Objectives and Learning Outcomes : Formulation and Statement of Objectives in behavioural terms (according to Bloom's Taxonomy)
	D. Self Learning
	   1. History of Mathematics with special emphases on the Teaching of Mathematics, and Historical Value of Mathematics
	   2. Contribution of Mathematicians : Aryabhatta, Bhaskaracharya, Srinivasa Ramanujan, Shakuntala Devi, Euclid, Pythagoras, Blaise Pascal	

2.	**Instructional Design and Methods of Teaching Mathematics**
	A. Planning of Teaching Mathematics
	   1. Lesson Planning : Concept, Steps, Importance and Format of Lesson Plan; Principles for Good Lesson Planning
	   2. Unit Planning : Concept, Steps, Importance and Format of Lesson Plan; Difference between Lesson Planning and Unit Planning
	B. Methods of Teaching Mathematics
	   1. Learner Centered Method : Inductive - Deductive, Analytic - Synthetic
	   2. Activity Centered Method : Laboratory, Project, Problem-Solving, Demonstration
	C. Approaches and Techniques of Teaching Mathematics
	   1. Approaches : Constructivist and Discovery Approach
	   2. Modern Techniques : Brainstorming, Quiz, Seminar, Discussion, Drill and Review, Assignment
	D. Self Learning
	   1. Models of Teaching Mathematics : Concept Attainment Model and Mastery Learning Model
	   2. Vedic Mathematics : Concept, Advantages, Various tricks of fast Calculations (Multiplication, Division)
		35

3.	**Mathematics Content** Standard-8 Mathematics Textbook : Published by Gujarat State Board of School Textbooks, Gandhinagar.	30

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Teaching-Learning Methodology	Question-Answer, Collaborative and Co-operative Learning, Inquiry Based Learning, Problem Solving Activities, Presentations by Students, Discussion Panel/Experts, Debate, Brainstorming, Case study, Think Pair Share, Jigsaw, Workshops, Project Based Learning, Flipped Classroom Strategies, Blended Learning Designs, Concept Mapping

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Recall the concept and nature of Mathematics, and use the knowledge of Mathematics in day to day life activities.
2.	Explain the need and importance of Mathematics at primary and secondary level in present Scenario.
3.	Compare the aims / values of teaching Mathematics.
4.	Clarify the difference between the domains of teaching Mathematics through examples.
5.	State the general objectives of teaching Mathematics according to Bloom's taxonomy.
6.	Give illustrations of statements/specifications in relation to the expected behaviour-change of general objectives of teaching Mathematics.
7.	Design Mathematics lesson plans by analyzing the steps and principles for lesson planning, and implement them in the classroom.
8.	Differentiate between lesson planning and unit planning in Mathematics.
9.	Compare Inductive-Deductive and Analytic-Synthetic methods of teaching Mathematics, and apply them in the teaching-learning process.
10.	Explain about laboratory, project, problem-solving and demonstration methods of teaching Mathematics and use them judiciously.

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11.	Examine the justification of the application of the Constructivist and Discovery approaches of teaching of Mathematics.
12.	Infer the implications by applying brainstorming, quiz, seminar, discussion, drill-review and assignment techniques of teaching Mathematics according to classroom situations.
13.	Perform pedagogical analysis of various concepts/content in Mathematics included in the standard 8 curriculum.

Suggested References:

Sr. No.	References
1.	Aggarwal, S.M. (2005). *Teaching of Modern Mathematics.* Delhi : Dhanpat Rai and Sons.
2.	Bhanumurthy, I.S. (1992). *Ancient Indian Mathematics.* New Delhi : Wiley Eastern Ltd.
3.	Bloom, B.S. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain.* New York : Longmans Green.
4.	Cooney, T.J. et al. (1975). *Dynamics of Teaching Secondary School Mathematics.* Boston : Houghton Mifflin.
5.	Copeland, R.W. (1979). *How Children Learn Mathematics?* New York : McMillan Pub. Co.
6.	Gronlund, N. E. (1991). *How to Write and Use Instructional Objectives* (4th ed.). New York: Macmillan Publishing Co.
7.	Jagadguru Swami (2000). *Sri Bharti Krisna Tirthji Vedic Mathematics.* Delhi : Moti Lal Banarasi Das Publisher.
8.	James, Anice (2005). *Teaching of Mathematics.* Hyderabad : Neelkamal Publications Pvt. Ltd.
9.	Kapur, S.K. (2005). *Learn and Teach Vedic Mathematics.* Lotus Publication.
10.	Krathwohl, D.R., Bloom, B.S., & Masia, B.B. (1964). *Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook II: Affective domain.* New York : David McKay Co., Inc.
11.	Kulshrestha, A.K. (2012). *Teaching of Mathematics.* Meerut : R. Lal Book Depot.
12.	Merzbach, U.C. & Boyer, C. B. (2011). *A History of Mathematics* (3rd ed.). New York : John Wiley & Sons, Inc.

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13.	Shankaran, V. & Gupta, H.N. (Ed.) (1984). *Content-cum-Methodology of Teaching Mathematics.* New Delhi : NCERT.
14.	કોઠારી, આર.જી. અને અન્યો (1996). *ગણિત અધ્યાપન પદ્ધતિ.* અમદાવાદ : અનડા બુક ડીપો.
15.	પટેલ, એન.આર. અને અન્યો (2005). *ગણિતનું આદર્શ અધ્યાપન.* અમદાવાદ : વારિષેણ પ્રકાશન.
16.	પટેલ, આર.એસ. (2003). *ગણિતનું અધ્યાપન : વિષયવસ્તુ તથા પદ્ધતિ.* અમદાવાદ : નીરવ પ્રકાશન.

On-line resources to be used if available as reference material
On-line Resources
https://ccl.iitgn.ac.in
https://diksha.gov.in
https://sakshat.ac.in
https://swayam.gov.in
https://www.education.com
https://www.kendallhunt.com
https://www.nationalmathtrail.org
https://www.ncert.nic.in
http://www.nctm.org
https://www.themathguru.ca

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