B.Ed. Two Year Programme

P.1.3 : Mathematics

Maximum Marks: 100

UNIT 1: Introduction to Mathematical Thinking

(i) Mathematics as study of creating, discerning and generalising patterns: Identifying and analysing abstract patterns, patterns of shapes, patterns of motion, patterns of repeating chance, numerical patterns.

(ii) Understanding Mathematics as a humanly created subject: Creating Mathematical structures: idea of axioms, postulates and proofs, what is a proof? Different methods of proofs: direct proof, indirect proof, counter examples, proof by induction.

(iii) Socio-cultural, economic and political factors in the development of mathematics. Everyday mathematics, multicultural mathematics; its use in decision making, at the workplace, etc.

(iv) Societal beliefs related to ‘knowing’ and ‘doing’ mathematics. Critically challenging the sociological beliefs related to mathematical abilities, mathematics confined to arithmetic.

Readings and resources


MESE -001(2003). Teaching and Learning Mathematics. IGNOU series


UNIT 2: Learning Mathematics

(i) Developmental progression in the learning of mathematical concepts- Piaget, Skemp, Bruner and Vygotsky; Fischbein on intuitive thinking

(ii) Processes of dealing with abstractions, particularisation and generalisation. Studying algorithms; what works and how?

(iii) Focus on mathematical processes- Problem solving, problem-posing, patterning, reasoning, abstraction and generalisation; argumentation and justification

(iv) Sociocultural perspectives in mathematics learning- Situated learning; social construction of knowledge; social interaction and community of practice

(v) Historical evolution of concepts –understanding how concepts evolved, power-play in legitimising concepts

Readings


UNIT 3: How Should we Teach Mathematics?

(i) Culture of learning- Creating dynamic classroom environments; sharing and exploring ideas, encouraging diverse and innovative procedures, using multiple ways to solve problems, making conjectures, seeking generalisations; respecting diverse capabilities; use of context; metacognition

(ii) Role of Communication in classroom- Math talk; building a community of mathematicians in classrooms; constructing mathematical ideas by providing scope for exploration, explanation and evaluation of children’s work

(iii) Use of resources, activities, story-telling and technology in initiating mathematical thinking.

(iv) Notions related to mathematical ‘ability’; promoting growth mindset, depth versus speed; math anxiety

(v) Teacher’s beliefs and knowledge about the nature of mathematics and mathematical learning, teachers’agency in school math reform.
Readings and resources


UNIT 4: Mathematics for Equity and Social Justice

(i) Why teach ‘mathematics to all’? – Concerns and challenges

(ii) Issues of gender, class and culture in mathematics learning and achievement - Expectations, attitudes and stereotypes; access to higher mathematics; interrogating the notion of ‘achievement gap’; construction of learners’ identity in a mathematics classroom

(iii) Addressing the concerns of societal as well as mathematical equity

Readings:


Rousseau, C.,&Tate,W. (2003). No time like the present: Reflecting on equity in school mathematics. Theory Into Practice, 42(3).


Engagement with the Field
An understanding of the relationship between the discipline and a selection of school curriculum will be enhanced through observations and projects to address the following issues: What knowledge is valued? How is mathematics experienced in school settings and how are learner identities constructed? How do communities shape knowledge production and, there, what counts as useful mathematical knowledge? How might scholars and teachers
work with community-based knowledge makers to develop collaborative knowledge resources?

**Assignments/Projects**

1. Analysis of books, folk games, and other resource materials
2. Observation of children doing everyday math, playing folk games; community numeracy practices
3. Classroom observations and analysis of mathematics classrooms
4. Use and setting up of a mathematics lab
5. Development of manipulatives, games, low-cost activity materials