

Mathematics

Code No. 211

Introduction

Mathematics is the study of numbers, counting, and measuring, but that is only the beginning. Mathematics involves the study of number patterns and relationships, too. It is also a way to communicate ideas, and perhaps more than anything, it is a way of reasoning that is unique to human beings. Mathematics plays a vital role in the modernization of this civilization. It is everywhere and affects the everyday lives of people. Although it is abstract and theoretical knowledge, it emerges from the real world. It is also a way to communicate and analyze ideas, a tool for organizing and interpreting data and above all, perhaps, a method of logical reasoning unique to man. Mathematics is a necessary part of other sciences. Its use in today's world has assumed great importance, since without its application higher technology cannot be mastered and harnessed for increasing production of goods and services and promoting human welfare. Over the centuries there has been spectacular progress in the development of Mathematics as a branch of knowledge. Mathematics education is concerned with the acquisition, understanding and application of skills. Mathematical literacy is of central importance in providing the learner with the necessary skills to live a full life as a child and later as an adult.

Rationale

Mathematics is an important discipline of learning at the secondary stage. It helps the learners in acquiring decision-making ability through its applications to real life both in familiar and unfamiliar situations. It predominantly contributes to the development of precision, rational and analytical thinking, reasoning and scientific temper. Mathematics helps the learner to understand and solve the day to day life problems faced by them. It also helps them to acquire the skill of representing data in the form of tables/graphs and to draw conclusions from the same. One of the basic aims of teaching Mathematics at the Secondary stage is to inculcate the skill of quantification of experiences around the learner. The idea is to allow the learner to realize how and why Mathematics is all around us.

The present curriculum in Mathematics includes the appreciation of the historical development of mathematical knowledge with special reference to the contribution of Indian mathematicians particularly in the introduction of zero and the decimal system of numeration in the international form (popularly known as Hindu – Arabic numerals). Greater emphasis has been given on applications of various concepts so that learner can construct their own knowledge and relate mathematics to their life experiences.

Objectives

After completing this course, learner will be able to:

- describe basic concepts, facts, principles, terms, symbols and processes of Mathematics;
- convert the word problems in to the mathematical forms and solve them;

- explain different ways of processing the given data and help them in arriving at conclusions;
- express the skills of quantification of experiences around them and make linkage with their life;
- solve wide variety of mathematical problems in daily life and reflect in different context of learning;
- relate mathematical knowledge and skills to solve variety problems and develop positive attitude towards Mathematics and its application;
- interpret tabular/graphical representation of the quantitative data ; and
- articulate logically and use the quantitative data to find many results;

Scope and job opportunity

This field has a large number of opportunities for employment in different profession, some of these are: Engineering, Architecture, Statisticians, Banking, Econometrics and other professions involves Measurement and Calculation.

Eligibility conditions

Age: 14 years

Qualification: Ability to read and write

Medium of instruction: Hindi, English, Urdu, Marathi, Telugu, Gujarati, Malayalam, Tamil and Odia medium.

Duration of the course: 1 Year

Weightage

Theory: 85 Marks

Practical: 15 Marks

Tutor Marked Assignment (TMA): 20% Marks of the theory

Scheme of studies: 240 hours for the theory and 60 hours practical work, TMA (self paced)

Scheme of evaluation

Mode of evaluation	Duration	Weightage
Tutor Marked Assignment (TMA)	Self Paced	20% of Theory
Public/Final Examination	Theory- 2 Hours 30 Minutes	85 Marks
	Practical- 3 Hours	15 Marks

Pass criteria: 33% marks

Course content

S. No.	Module/Topics	Duration (in hours)	Module Approach/Description	Weightage (marks)
1.	Module-IAlgebra <ol style="list-style-type: none"> 1. Number System 2. Exponents and Radicals 3. Algebraic expressions and Polynomials 4. Special Products and factorization 5. Linear Equations 6. Quadratic Equations 7. Arithmetic Progressions 	55	<p>Algebra is generalized form of arithmetic. It may be recalled that the study of numbers begin with natural numbers without which we would not be able to count. The system of natural numbers is extended to rational number system. To be able to measure all lengths in terms of a given unit, the rational numbers have to be extended to real numbers. The concept of exponents and radicals would facilitate simplification of repeated multiplication.</p> <p>Algebraic expressions and polynomials would be introduced with the help of four fundamental operations on unknowns. Equating two algebraic expressions or polynomials leads to equations. The study of linear and quadratic equations would be taken up to solve problems of daily life. Arithmetic Progression is a special type of number pattern. The learners would be studying arithmetic progressions in details through day-to-day life examples.</p>	20
2.	Module-IICommercial Mathematics <ol style="list-style-type: none"> 8. Percentage and its Applications 9. Instalment Buying 	25	<p>The learners would be acquainted with applications of percentage to compound interest in the form of rate of growth (appreciation) and depreciation (decay) in detail. The Concept of Percentage, Computations involving percentage.</p>	08

			Applications of percentage to: profit and loss, simple interest, discount (single discount only), and compound interest. Buying under instalment plan. Calculation of interest under instalment plan has been discussed in this module.	
3.	Module-III Geometry 10. Lines and Angles 11. Congruence of Triangles 12. Concurrent Lines 13. Quadrilaterals 14. Similarity of Triangles 15. Circles 16. Angles in a circle and Cyclic Quadrilaterals 17. Secants, Tangents and their Properties 18. Constructions 19. Co-ordinate Geometry	75	To satisfy the learner's curiosity and to enhance knowledge about the above things, the lessons on Lines and Angles, congruent and similar triangles and circles will be introduced. Some of the important results dealing with above concepts would be verified experimentally while a few would be proved logically. Different types of quadrilaterals would also be introduced under the lessons on Quadrilaterals. The learners would also be given practice to construct some geometrical figures using geometrical instruments. In order to strengthen knowledge of graphing linear equations, the basic concept of coordinate geometry has been introduced.	25
4.	Module-IV Mensuration 20. Perimeter and Area of Plane Figures 21. Surface Area and Volume of Solid Figures	25	In this module the learners would be familiar with rectilinear figures. Perimeter and area of a square, rectangle, triangle, trapezium, quadrilateral, parallelogram and rhombus. Area of a triangle using Hero's formula. Area of rectangular paths. Non rectilinear figures: Circumference and area of a circle. Area and perimeter of a sector. Area of circular paths. Surface area and volume of a cube, cuboid, cylinder, cone, sphere and hemisphere.	10

5.	Module-V Trigonometry 22. Introduction to Trigonometry 23. Trigonometric Ratios of some Special Angles	25	<p>In astronomy one often encounters the problems of predicting the position and path of various heavenly bodies, which in turn requires the way of finding the remaining sides and angles of a triangle provided some of its sides and angles are known. The solutions of these problems has also numerous applications to engineering and geographical surveys, navigation etc. An attempt has been made in this module to solve these problems. It is done by using ratios of the sides of a right triangle with respect to its acute angle called trigonometric ratios. The module will enable the learners to find other trigonometric ratios provided one of them is known. It also enables the learners to establish well known identities and to solve problems based on trigonometric ratios and identities.</p> <p>The learners would be acquainted with measurement of accessible lengths and heights. The learners will be able to distinguish between angles of elevation and depression and use trigonometric ratios for solving simple real life problems based on heights and distances.</p>	10
6.	Module-VI Statistics 24. Data and their Representations 25. Measures of Central Tendency 26. Introduction to Probability	35	<p>To make the learners acquainted with the methods of recording, presentation of data, condensing and culling out relevant information from the given data in the lesson on Data and their Representation. Sometimes it is required to describe data arithmetically like average age</p>	12

			<p>of a group median score of a group or modal collar size of a group. To be able to do this, the learners would be introduced to the lesson on Measures of Central Tendency. They would also be taught characteristics and limitation of these measures. The learners would be introduced to the study of elementary probability as measure of uncertainty, through games of chance- tossing a coin, throwing a die, drawing a card at random from a well shuffled pack etc.</p>	
7.	Practicals	60	<p>As activities make the learning more effective; Laboratory manual is also provided with 30 mathematical activities from Algebra, Geometry and Mensuration module. It is expected that learners would perform these activities at their study centres, which will make learning of mathematical concepts more interesting and, a fun.</p>	15