# Mathematics & Statistics

## Commerce Part 1



Y
(a, f(a))
$y = f(x)$
(b, f(b))

0    a                b    X



Y

$f'(x_0)$
$y = f(x)$
$f'(x_1)$

0    $x_0$              $x_1$    X
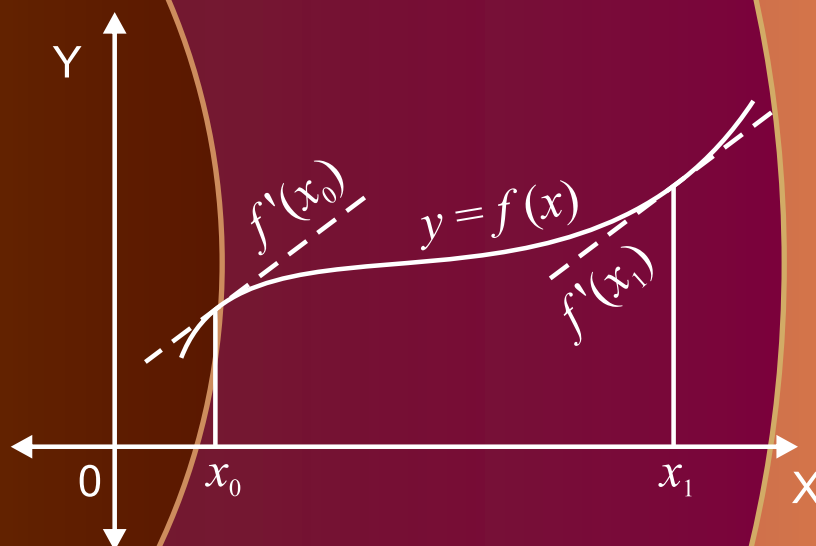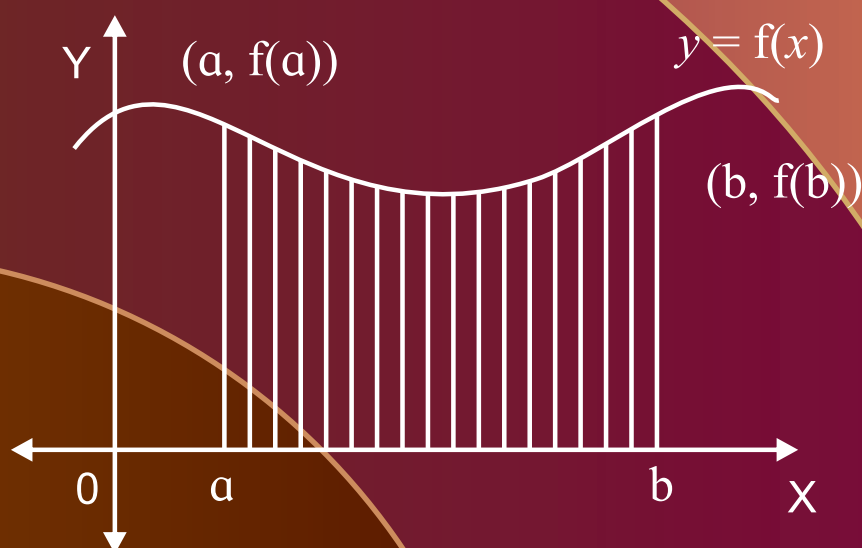
# The Constitution of India
## Chapter IV A

## Fundamental Duties

**ARTICLE 51A**

**Fundamental Duties- It shall be the duty of every citizen of India–**

(a)   to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b)   to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c)   to uphold and protect the sovereignty, unity and integrity of India;

(d)   to defend the country and render national service when called upon to do so;

(e)   to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities, to renounce practices derogatory to the dignity of women;

(f)   to value and preserve the rich heritage of our composite culture;

(g)   to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures;

(h)   to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i)   to safeguard public property and to abjure violence;

(j)   to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;

(k)   who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

# Mathematics and Statistics

# (Commerce)

# Part - I

## STANDARD TWELVE

**Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune - 411 004**

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# The Constitution of India

## Preamble

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

## NATIONAL ANTHEM

Jana-gana-mana-adhināyaka jaya hē
        Bhārata-bhāgya-vidhātā,

Panjāba-Sindhu-Gujarāta-Marāthā
        Drāvida-Utkala-Banga

Vindhya-Himāchala-Yamunā-Gangā
        uchchala-jaladhi-taranga

Tava subha nāmē jāgē, tava subha āsisa māgē,
        gāhē tava jaya-gāthā,

Jana-gana-mangala-dāyaka jaya hē
        Bhārata-bhāgya-vidhātā,

Jaya hē, Jaya hē, Jaya hē,
        Jaya jaya jaya, jaya hē.

## PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage. I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders respect, and treat everyone with courtesy.

To my country and my people, I pledge my devotion. In their well-being and prosperity alone lies my happiness.

# PREFACE

Dear Students,

Welcome to Standard XII, an important milestone in your student life.

Standard XII or Higher Secondary Certificate opens the doors of higher education. After successfully completing the higher secondary education, you can pursue higher education for acquiring knowledge and qualification. Alternatively, you can pursue other career paths like joining the workforce. Either way, you will find that mathematics education helps you every day. Learning mathematics enables you to think logically, constistently, and rationally. The curriculum for Standard XII Commerce Mathematics and Statistics has been designed and developed keeping both of these possibilities in mind.

The curriculum of Mathematics and Statistics for Standard XII Commerce is divided in two parts. Part I deals with more theoretical topics like Mathematical Logic, Differentiation and Integration. Part II deals with application oriented topics in finance and management. Random Variables and Probability Distributions are introduced so that you will understand how uncertainty can be handled with the help of probability distributions.

The new text books have three types of exercises for focused and comprehensive practice. First, there are exercises on every important topic. Second, there are comprehensive exercises at end of all chapters. Third, every chapter includes activities that students must attempt after discussion with classmates and teachers. Textbooks cannot provide all the information that the student can find useful. Additional information has been provided on the E-balbharati website (www.ebalbharati.in).

We are living in the age of the Internet. You can make use of the modern technology with help of the Q.R. code given on the title page. The Q.R. code will take you to websites that provide additional useful information. Your learning will be fruitful if you balance between reading the text books and solving exercises. Solving more problems will make you more confident and efficient.

The text books are prepared by a subject committee and a study group. The Bureau is grateful to the members of the subject committee, study group and review committee for sparing their valuable time while preparing these text books. The books are reviewed by experienced teachers and eminent scholars. The Bureau would like to thank all of them for their valuable contribution in the form of creative writing, constructive cristicism and useful suggestions for making the text books valuable.

The Bureau wishes and hopes that students find the text book useful in their studies. Students, all the best wishes for happy learning and well deserved success.

**(Vivek Gosavi)**
**Director**
Maharashtra State Bureau of Textbook
Production and Curriculum Research, Pune.

**Pune**
**Date : 21 February 2020**
**Bharatiya Saur: 2 Phalguna 1941**

# Competency statement

| Sr. No. | Area/Topic | Competency statements |
|---|---|---|
| 1 | Mathematical Logic | The student will be able to<br>• identify statement in logic and its truth value<br>• use connectives to combine two or more logical statements<br>• identify tautology, contradiction and contingency by constructing a truth table<br>• examine logical equivalence of statement patterns<br>• find the dual of a statement pattern<br>• form the negation of a statement pattern |
| 2 | Matrices | • identify the order of a matrix<br>• identify types of matrices<br>• perform fundamental matrix operations after verifying conformity<br>• perform elementary transformation on rows and columns of a matrix<br>• find the inverse of a matrix using elementary transformations and adjoint method<br>• verify the conditions for a matrix to be Invertible<br>• use matrix algebra to solve a system of linear equations |
| 3 | Differentiation | • state standard formulae of differenciation<br>• state and use the chain rule of differenciation<br>• find derivatives using logarithms<br>• find derivatives of implicit functions<br>• find derivatives of parametric functions<br>• understand the notion of higher order derivatives and find second order derivatives |
| 4 | Applications of Derivatives | • determine whether a function is increasing or decreasing<br>• apply differenciation in Economics<br>• find maximum and minimum values of a function<br>• solve optimization problems in Commerce and Economics |

| | | |
|---|---|---|
| 5 | Integration | • understand the relationship between differenciation and integration<br>• use standard formulae of integration<br>• use fundamental rules of integration<br>• use the method of substitution for integration<br>• identify integrals of special types<br>• find integrals using integration by parts<br>• use important formulae of integration<br>• use partial fraction in integration |
| 6 | Definite Integration | • understand the relationship between indefinite and definite integrals<br>• remember fundamental theorems of integral calculus<br>• remember properties of definite integrals and use them in solving problems |
| 7 | Application of Definite Integration | • find area bounded by specified lines and curves. |
| 8 | Differential Equation and Applications | • identify order and degree of a differential equation<br>• form a differential equation<br>• solve a differential equation<br>• use variables separable and substitution methods to solve first order and first degree differential equations<br>• solve homogeneous and linear differential equations<br>• use differential equations to solve problems on growth and decay of populations and assets |

# INDEX