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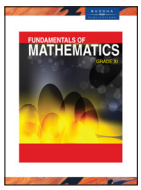
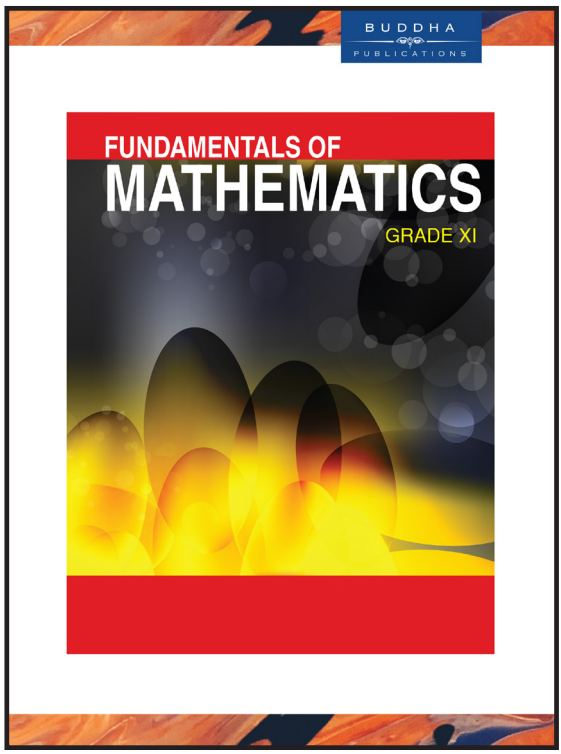


Fundamentals of MATHEMATICS

GRADE XI



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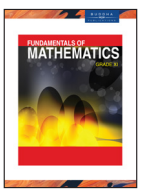

Fundamentals of MATHEMATICS

Edition 2021

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प्रस्तुत विषयमा त्यस प्रकाशनबाट मूल्याङ्कन र स्वीकृतिका लागि तपसिलका पाठ्यसामग्री पेस भएकामा मूल्याङ्कनकर्ताबाट प्राप्त सुझावसहित पाठ्यसामग्री व्यवस्थापन तथा मूल्याङ्कन समितिमा पेस हुँदा उक्त पाठ्यसामग्रीमा यसैसाथ संलग्न निर्देशन तथा मूल्याङ्कनकर्ताबाट प्राप्त सुझावअनुसार परिमार्जन गरी प्रकाशन गर्न स्वीकृति दिन सिफारिस भएअनुसार यस केन्द्रको मिति २०७७/०६/११ गतेको निर्णयानुसार शैक्षिक सत्र २०७७ देखि २०७९ सम्मका लागि पाठ्यसामग्रीका रूपमा स्वीकृति दिइएको छ । संलग्न निर्देशन, सुझाव एवम् विद्यमान सवैधानिक व्यवस्था, ऐन, कानुन, कार्यविधि, निर्देशिका, पाठ्यक्रम विकास केन्द्रबाट विभिन्न समयमा जारी गरिएका निर्देशन लगायतका प्रावधानहरूको पूर्ण परिपालना गर्नुहुन र पूर्ण परिपालना नगरी त्रुटिपूर्ण सामग्री विकास, परिमार्जन, प्रकाशन तथा बिक्री वितरण गरेको पाइएमा, पाठ्यक्रम परिवर्तन भएमा वा यस केन्द्रबाट अन्य निर्णय भएमा यो स्वीकृति जुनसुकै बेला रद्द हुने छ ।

मीनबहादुर थापा
पाठ्यक्रम अधिकृत

पाठ्यसामग्रीको नाम : **Fundamental of Mathematics : Class 11**

निर्देशन :

१. *यस केन्द्रको वेबसाइटबाट डाउनलोड गरी नेपालको आधिकारिक नक्सा र कोभिड १९ सङ्क्रमण रोकथामसम्बन्धी सूचना तथा यस केन्द्रबाट प्रदान गरिएको स्वीकृति पत्रको प्रतिलिपि स्वीकृत पाठ्यसामग्रीको भित्री मुखपृष्ठ (Inner Front Page) मा छपाइ गर्ने । पुस्तकको हरेक पानाको अन्त्य (Footer) मा पाठ्यक्रम विकास केन्द्रबाट स्वीकृत भन्ने व्यहोरा राखी छपाइ गर्ने ।*

२. *पाठ्यसामग्री उपयुक्त फर्म्याटमा छपाइ गर्ने । पाठ्यक्रम विकास केन्द्रबाट प्रकाशित प्रकाशन शैली, २०७६ अनुसार डिजाइन र सम्पादन गर्ने । छपाइ तथा अक्षरको आकार मिलाई तोकिएको रङमा स्पष्ट र शुद्धसँग छाप्ने, छापिएको पाठ्यसामग्री १८ से.मि.×२४ से.मि. साइजको हुनुपर्ने । प्रकाशनपछि तीन प्रति पाठ्यक्रम विकास केन्द्रमा पेस गरेपछि मात्र वितरण गर्ने ।*

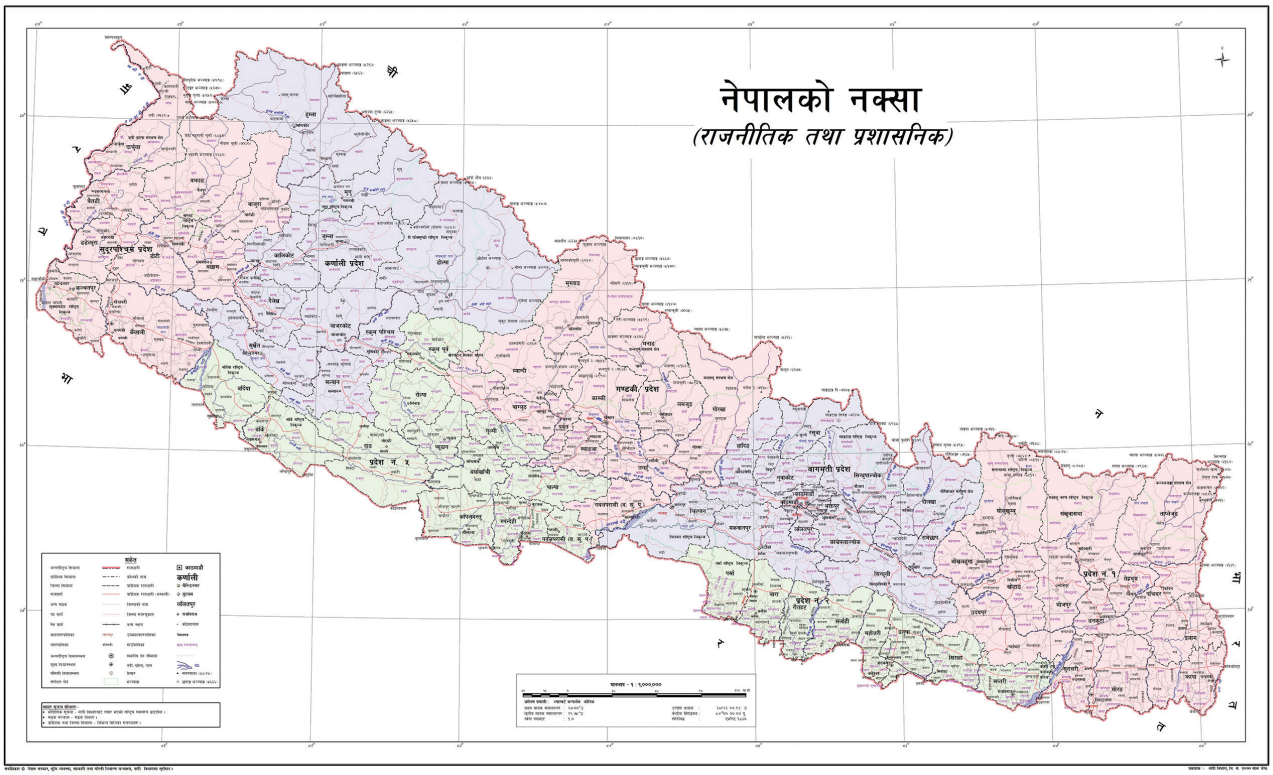
३. *शिक्षा, विज्ञान तथा प्रविधि मन्त्रालयको निर्णयअनुसारको मूल्य कायम गर्ने र मूल्य सर्वाधिकार पृष्ठमा राख्नुपर्ने । प्रतिलिपि अधिकार (Copy right) को सम्बन्धमा लेखक र प्रकाशक स्वयम् जिम्मेवार हुने ।*

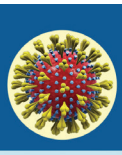
४. *विषयवस्तुको प्रस्तुतीकरण, उदाहरण, अभ्यास, चित्राङ्कनलगायतका कार्य गर्दा समावेशीकरणमा ध्यान दिने । राष्ट्र, राष्ट्रियता, कुनै पनि धर्म, लिङ्ग, जातजाति, संस्कृति, समुदायमा आक्षेप लाग्ने, कुनै समूहका लागि अप्रिय लाग्ने र अपाङ्तामैत्री नहुने शब्द, वाक्यांशहरू समावेश गरिएका भए हटाउने ।*

५. *पाठ्यक्रमको सक्षमता, उद्देश्य एवम् विषयवस्तुको क्षेत्र र क्रमअनुसार सामग्रीमा सुधार गरी प्रकाशन गर्ने । पाठ्यक्रममा उल्लेख भएका तर पाठ्यसामग्रीमा छुट हुन गएका विषयवस्तुहरू समावेश गर्ने । मिति २०७७०४।१५ मा प्रकाशित पाठ्यसामग्री मूल्याङ्कनसम्बन्धी सूचनाअनुसार मूल्याङ्कनका लागि सामग्री पेस गर्दा अपनाउनुपर्ने विधि र सर्त तथा सोही सूचनाबमोजिम पाठ्यसामग्री स्वीकृति सम्बन्धमा लेखक तथा प्रकाशकसँग गरिएको अनुरोधको पूर्ण पालना गर्ने ।*

६. *प्रत्येक एकाइको अन्त्यमा एक दुई वाक्यमा उत्तर आउने अति छोटो, छोटो र लामो उत्तर आउने गरी तीनै प्रकारका प्रश्नहरू र विषयवस्तुको प्रकृति मिल्ने एकाइहरूमा प्रशस्त साङ्ख्यिकीय समस्या र प्रश्नहरू समावेश गर्ने । विषयवस्तुको प्रकृतिअनुसार ज्ञान र बोध, प्रयोग, विश्लेषण, मूल्याङ्कन, सिर्जनशीलता तहका प्रश्नहरू समावेश गर्ने । अभ्याससँगै एकाइसँग सम्बन्धित विषयमा पाठ्यक्रममा निर्देश गरिएअनुसारका प्रयोगात्मक, परियोजना कार्य र सामुदायिक कार्यका नमुना क्रियाकलापहरू उल्लेख गर्ने ।*

७. *चित्र, तालिका, चार्ट, ग्राफ स्पष्ट पार्ने । क्षत, च्भबा ल्गदभच क्थकतभ र ऋबअिगक मा छुटेका विषयवस्तु समावेश गर्ने । पुस्तक Portrait Form मा छाप्ने ।*





कोरोना भाइरस रोग (कोभिड-१९)

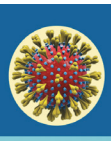
हाल विश्वभरी फैलिरहेका नयाँ कोरोना भाइरसको संक्रमणबाट लागेको रोगलाई विश्व स्वास्थ्य संगठनले "कोभिड १९" को नाम दिएको छ र यसलाई विश्वव्यापी महामारीको रुपमा घोषणा गरिसकिएको छ ।

कोरोना भाइरस श्वासप्रश्वासको माध्यमबाट सर्ने रोग हो । यो संक्रमित व्यक्तिले खोक्दा वा हाछ्युँ गर्दा नाक वा मुखबाट निस्कने छिट्टाको माध्यमबाट एक व्यक्तिबाट अर्को व्यक्तिमा सर्दछ ।

कोरोना भाइरस रोगको मुख्य लक्षणहरू

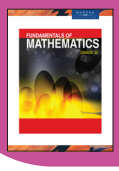
यस्ता लक्षणहरु देखा परेमा नजिकको तोकिएको स्वास्थ्य केन्द्रमा सम्पर्क गर्ने ।

यस रोगको संक्रमणको जोखिमबाट बच्नको लागि निम्न उपायहरू अपनाउनुपर्छ ।



कोरोना भाइरस रोगबाट बच्ने उपायहरू

ज्वरो आएमा, खोकि लागेमा वा श्वास फेर्न गाह्रो भएमा नजिकको तोकिएको स्वास्थ्य केन्द्रमा सम्पर्क गर्ने



PREFACE

This book "**Fundamentals of Mathematics**" has been prepared in accordance with the syllabus prescribed by Curriculum Development Centre (CDC) under the Ministry of Education, Science and Technology, Nepal for grade XI.

The book has been written keeping in mind the following objectives:

- To create an interest for Mathematics in those students who show a promise for higher study in Mathematics,
- To create confidence in others for equipping themselves with the Mathematics needed for the areas in natural and social sciences.

These objectives were achieved by focusing on

- presentation of materials,
- motivation and development of concepts,
- logical reasoning with rigor and precision,
- problems sets.

To make the book effective from practical as well as theoretical point of view, an attempt has been made to provide a thorough explanation of many mathematical terms for their proper use. One of the main features of this book is the attention given to motivating the concepts under discussion. The authors have tried to make clear the intuitive meaning of what is taking place and diagrams are provided, whenever it seems feasible to help the reader develop skill in using his/her imagination to visualize new concepts. We have avoided use of "or" in the sense of equivalence and use of "log" in the sense of natural logarithm.

Neglecting rigor and precision in logical reasoning, Mathematics is not really a serious affair and its aim may get out of sight. Therefore, the book provides every logical reasoning with rigor and precision.

The book is full of worked out examples presented in a very systematic way, sometimes they motivate the concept.

The success of any text book depends upon the strength of its problems sets. We have devoted an extraordinary amount of effort to organizing the problems for this text. The problems are graded and divided into groups arranging problems in each group to the level of difficulty as far as possible, in order that the student can have sufficient practice.

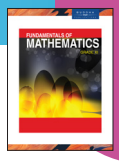
Considerable amount of graphing techniques have been included, because the authors are convinced that the only way to understand the nature and behaviour of functions is to have graphs of standard functions in mind.

We expect comments and suggestions for the improvement of the book.

We would like to thank Mr. Nabaraj Bajgain of Buddha Publications Pvt. Ltd. for encouragement and publication of the book. We would also like to express our appreciation to Mr. Dipendra Shrestha and Ms. Rajani Shrestha for typing and layout.

Every effort has been made to find and correct errors in this book. Experience leads us to believe, however, that the occasional mistake will have slipped through. The authors assume responsibility of all errors. Any suggestions for correction of errors and for further improvement will be highly appreciated.

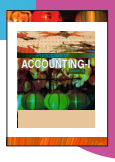
Authors



SYLLABUS

Content Area	Contents	LH
1 Algebra	**1.1 Logic and Set**: introduction of Logic, statements, logical connectives, truth tables, basic laws of logic, theorems based on set operations.	32 hrs
	1.2 Real numbers: field axioms, order axioms, interval, absolute value, geometric representation of real numbers.	
	1.3 Function: Review, domain & range of a function, Inverse function, composite function, functions of special type, algebraic (linear, quadratic & cubic), Trigonometric, exponential, logarithmic)	
	1.4 Curve sketching: odd and even functions, periodicity of a function, symmetry (about origin, x-and y-axis), monotonicity of a function, sketching graphs of polynomials and some rational functions $\left(\frac{a}{x}, \frac{x^2-a^2}{x-a}, \frac{a}{x+a}, ax^2+bx+c, ax^3\right)$, Trigonometric, exponential, logarithmic function (simple cases only)	
	1.5 Sequence and series: arithmetic, geometric, harmonic sequences and series and their properties A.M, G.M, H.M and their relations, sum of infinite geometric series.	
	1.6 Matrices and determinants: Transpose of a matrix and its properties, Adjoint, Inverse matrix, Determinant of a square matrix, Properties of determinants (without proof)	
	1.7 Complex number: definition imaginary unit, algebra of complex numbers, geometric representation, absolute value (Modulus) and conjugate of a complex numbers and their properties, square root of a complex number, polar form of complex numbers.	
2 Trigonometry	2.1 Properties of a triangle (Sine law, Cosine law, tangent law, Projection laws, Half angle laws).	8 hrs
	2.2 Solution of triangle(simple cases)	
3 Analytic Geometry	**3.1 Straight Line**: length of perpendicular from a given point to a given line. Bisectors of the angles between two straight lines.	14 hrs
	Pair of straight lines: General equation of second degree in x and y, condition for representing a pair of lines. Homogenous second-degree equation in x and y. angle between pair of lines. Bisectors of the angles between pair of lines.	
	3.2 Circle: Condition of tangency of a line at a point to the circle, Tangent and normal to a circle.	
	3.3 Conic section: Standard equation of parabola, equations of tangent and normal to a parabola at a given point.	

4 Vectors	**4.1 Vectors:** collinear and non collinear vectors, coplanar and noncoplanar vectors, linear combination of vectors,	8 hrs
	4.2 Product of vectors: scalar product of two vectors, angle between two vectors, geometric interpretation of scalar product, properties of scalar product, condition of perpendicularity.	
5 Statistics & Probability	**5.1 Measure of Dispersion:** introduction, standard deviation), variance, coefficient of variation, Skewness (Karl Pearson and Bowley)	10 hrs
	5.2 Probability: independent cases, mathematical and empirical definition of probability, two basic laws of probability(without proof).	
6 Calculus	**6.1 Limits and continuity**: limits of a function, indeterminate forms. algebraic properties of limits (without proof), Basic theorems on limits of algebraic, trigonometric, exponential and logarithmic functions, continuity of a function, types of discontinuity, graphs of discontinuous function.	32 hrs
	6.2 Derivatives: derivative of a function, derivatives of algebraic, trigonometric, exponential and logarithmic functions by definition (simple forms), rules of differentiation. derivatives of parametric and implicit functions, higher order derivatives, geometric interpretation of derivative, monotonicity of a function, interval of monotonicity, extreme of a function, concavity, points of inflection, derivative as rate of measure.	
	6.3 Anti-derivatives: anti-derivative. integration using basic integrals, integration by substitution and by parts methods, the definite integral, the definite integral as an area under the given curve, area between two curves.	
7 Computational Methods	**7.1 Linear programming Problems**: linear programming problems(LPP), solution of LPP by simplex method (two variables)	10 hrs
	7.2 Numerical computation Characteristics of numerical computation, accuracy, rate of convergence, numerical stability, efficiency	
8 Mechanics Or Mathematics for Economics and Finance	**8.1 Statics:** Forces and resultant forces, parallelogram law of forces, composition and resolution of forces, Resultant of coplanar forces acting on a point, Triangle law of forces and Lami's theorem.	12 hrs
	8.2 Dynamics: Motion of particle in a straight line, Motion with uniform acceleration, motion under the gravity, motion down a smooth inclined plane. The concepts and theorem restated and formulated as application of calculus	
	8.3 Mathematics for economics and finance: Mathematical Models and Functions, Demand and supply, Cost, Revenue, and profit functions, Elasticity of demand, supply and income, Budget and Cost Constraints, Equilibrium and break even	



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