NATIONAL EDUCATION POLICY-2020

Skill Enhancement Course

in

Vedic Mathematics

Sridev Suman Uttarakhand University

Badshahi Thaul (Tehri Garhwal) Uttarakhand -249199

(State University of Uttarakhand)

2023

Skill Enhancement Course

in

"Vedic Mathematics"

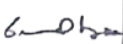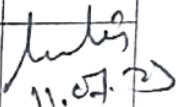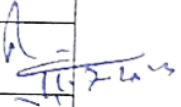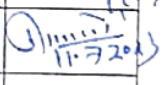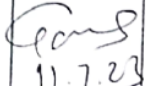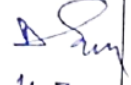# Curriculum Design Committee

S. No.	Name & Designation	
1.	Prof. N.K. Joshi Vice-Chancellor, Sridev Suman Uttarakhand University, Badshahi Thaul, Tehri Garhwal, Uttarakhand	**Chairman**
2.	Prof. Manmohan Singh Chauhan Vice-Chancellor, Kumaon University, Nainital, Uttarakhand	**Member**
3.	Prof. O.P.S. Negi Vice-Chancellor, Uttarakhand Open University	**Member**
4.	Prof. Jagat Singh Bisht, Vice-Chancellor, Soban Singh Jeena University, Almora	**Member**
5.	Prof Surekha Dangwal Vice-Chancellor, Doon University, Dehradun	**Member**
6.	Prof. M.S.M. Rawat Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	**Member**
7.	Prof. K.D. Purohit Advisor Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	**Member**

Sridev Suman Uttarakhand University
Badshahi Thaul, Tehri Garhwal (Uttarakhand)

Department of Mathematics

Members of Board of Studies

S.N.	Name	Designation	Department	Board of Studies	Signature
1.	Prof. G. K. Dhingra	Dean Faculty of Science Pt. L.M.S. Campus Sridev Suman Uttarakhand University Rishikesh	Faculty of Science	Chairman	
2.	Director	Uttarakhand Science Education and Research Council	USERC	Member	11.07.23
3.	Prof. K.S. Rawat	Professor and Head Department of Mathematics H.N.B. Garhwal Central University S.R.T. Campus, Tehri Garhwal, Uttarakhand	Mathematics	Member (External Expert)	11.07.23
4.	Prof. Pushpa Negi	Principal Govt. P.G.College New Tehri	Higher Education	Member	
5.	Prof. Pankaj Pant	Principal, Govt. P.G.College Nagnath Pokhari	Higher Education	Member	11.7.23
4.	Prof. Kuldeep Singh Negi	Principal, Govt. P.G. College, Khanpur(Haridwar)	Higher Education	Member	11.7.2023
5.	Prof. Anita Tomar	Professor & Head, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	
6.	Prof. Dipa Sharma	Professor Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	
7.	Dr. Gaurav Varshney	Associate Professor, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	11.7.23
8	Dr. Dhirendra Singh	Assistant Professor, Department of Mathematics Pt. L.M.S. Campus, Sridev Suman Uttarakhand University Rishikesh	Mathematics	Member	11.7.23

Syllabus Preparation Committee

S.No.	Name	Designation	Affiliation
1.	Prof. Anita Tomar	Professor and Head	Department of Mathematics Pt. L. M. S. Campus, Sridev Suman Uttarakhand University Campus, Rishikesh
2.	Dr. Gaurav Varshney	Associate Professor	Department of Mathematics Pt. L. M. S. Campus, Sridev Suman Uttarakhand University Campus, Rishikesh
3.	Dr. Deepak Singh	Assistant Professor	Department of Mathematics B.L.J. Govt. (P.G.) College Purola, Uttarkashi

Course Description

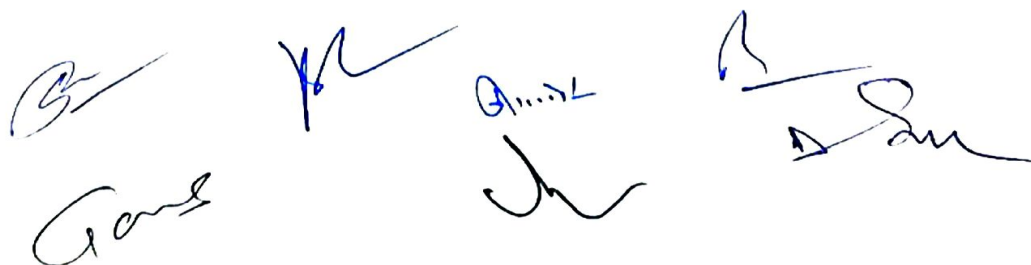| S.No.	Course Code	Course	Semester	Credit
1.	VM01	Vedic Arithmetic-I	First	3
2.	VM02	Vedic Arithmetic-II	Second	3
3.	VM03	Vedic Algebra-I	Third	3
4.	VM04	Vedic Algebra-II	Fourth	3

Vedic Mathematics is a super-fast way of calculation. There are just 16 Sutras or Word Formulae which solve all known mathematical problems in the branches of Arithmetic, Algebra, Geometry, and Calculus. They are easy to understand, easy to apply, and easy to remember.

Objectives:
- To enable the learners to explore the power of Vedic Mathematics.
- To make learners strong in Numerical Mathematics.
- To enable learners to recognize and understand simple techniques of Arithmetic Calculations.
- To train learners to use the ideas of Vedic Mathematics in daily calculations and make those calculations with accuracy and speed.

Course Outcomes: By completing this course, the learner will be able to:
- generate tables of any number.
- perform difficult calculations speedily.
- Learn about Matrices and Determinants, Algebraic equations, partial fractions, data visualization.
- Applications of Vedic arithmetic and Vedic algebra.

Syllabus

VM01		
Course Title: Vedic Arithmetic-I		**Credits:** 3

Course Outcome: Upon completion of the course, students will be able to:
- perform simple arithmetic calculations with speed and accuracy.
- to perform products of large numbers quickly
- develop confidence in calculating square roots and cube roots of integers.

Unit	Contents	No. of Lectures
1	**Multiplication** - Introduction and history of Arithmetic and Number - Contribution of Indian Mathematicians (Aryabhatta, Brahmagupta, Mahaviracharya, Bharati Krishna Tirtha) in the context of Arithmetic. - Ekadhiken Purven Method (Multiplication of Two binary and, Three Digits Numbers) - Eknunen Purven Method (Multiplication of Two Three Digits Numbers) - Urdhvtiaryagbhyam Method (Multiplication of Two Three Digits Numbers) - Mixed Operation	15

2	**Introduction of Division and Divisibility**
	Division
	  • Nikhilam Navtashcharam Method (Division of Two digits Number)
	  • Paravartya Yojyet Method (Division of Three digits Number)
	Divisibility
	  • Ekadhiken Purven Method (Division of Two digits Number)
	  • Eknunen Purven Method (Division of Two digits Number)
	Applications of Division and Divisibility
		10

3	**LCM & HCF:** - Introduction of LCM & HCF - Method to find LCM & HCF - Application of LCM & HCF	10
4	**POWER AND ROOTS:** - Introduction of simple equation - Formation of simple equation - Solutions of simple equations - Solutions of linear equations in two variables - Practical application of linear equations in two variables	10
5	**Project Work:** *It is mandatory for the students to undertake a project assigned by the course instructor.* Some Suggested Project Works are: - Applying Vedic Mathematics Techniques to Financial Calculations - Comparing Vedic Mathematics with other Alternative Methods - Investigating Vedic Mathematics Techniques for Arithmetic	
	Reference Books: 1. Vedic Ganit Nirdeshika Bhag-2, Vidya Bharti Akhil Bhartiya Shiksha Sansthan Kurushetra 2. Vedic Ganit, Motilal Banarsidas, New Delhi 3. Vedic Ganit Vihangam Drishti 1, Shiksha Sanskriti Uthhan Nyas Delhi 4. Lilavati of Bhaskracarya: A Treatise of Mathematics of Vedic Tradition	

VM02		
Course Title: Vedic Arithmetic-II		**Credits: 3**

Course Outcome: Upon completion of the course, students will be able to:
- Perform Addition, Subtraction, and multiplication of large numbers quickly.
- Develop confidence in calculating square roots and cube roots of integers.
- Learn application of arithmetic.

Unit	Contents	No. of Lectures
1	**Unit 1:** • Contribution of Indian Mathematicians (Sridharacharya, Brahmagupta, Mahaviracharya, Srinivas Ramanujan) • Vinakulum number, Introduction, Conversion and Application • Vertically and Crosswise Method - Multiplication of three two- digits numbers • Deviation Method - Multiplication of three or four numbers • Mixed Operations - Addition, Subtraction, Multiplication and Square	15
2	**Unit 2:** • Arithmetic application of binomial by Meru-Prastra • Cube and Higher Powers • Square roots & cube roots by division method	10
3	**Unit 3:** • Introduction & history of decimal system • Recurring decimals • Number Systems • Conversion of bases • Encryption	10
4.	**Unit 4:** • Test of Divisibility • Auxiliary Fraction • Divisibility and Simple Osculators	10
5.	**Project Work:** *It is mandatory for the students to undertake a project assigned by the course instructor.* Some Suggested Project Works are: 1. Investigating Vedic Mathematics Techniques for Geometry 2. Exploring Vedic Mathematics Techniques for Trigonometry 3. Analyzing the Efficiency of Vedic Mathematics Techniques	
	Reference Books: 1. Vedic Ganit Nirdeshika Bhag-2, Vidya Bharti Akhil Bhartiya Shiksha Sansthan Kurushetra 2. Vedic Ganit, Motilal Banarsidas, New Delhi 3. Vedic Ganit Vihangam Drishti 1, Shiksha Sanskriti Uthhan Nyas Delhi 4. Lilavati of Bhaskracarya: A Treatise of Mathematics of Vedic Tradition	

VM03		
Course Title: Vedic Algebra-I		**Credits:** 3

Course Outcome: Upon completion of the course, students will be able to:
- perform algebraic calculations with speed and accuracy.
- will be able to factorize linear expression.
- to perform division of linear expression.
- solve simple equations.
- able to visualize data.

Unit	Contents	No. of Lectures
1	**Unit 1: Multiplication (Quadratic expression of one variable)** • Introduction and History of Algebra • Contribution of Indian Mathematicians (Varahamihira, Bhaskaracharya, Nilakantha Somayaji, Bharati Krishna Tirtha) in the context of Arithmetic • Addition & subtraction of algebraic expression • Vertically & crosswise method • Mixed Operation • Deviation method	15
2	**Unit 2: Division and Factorization** • Division (Linear Expression in One Variable) • Factorization ((Linear Expression in One Variable)	10
3	**Unit 3: Solution of Equations** • Introduction of simple equation • Formation of simple equation • Solutions of simple equations • Solutions of linear equations in two variables • Linear equations in two variables	10
4	**Unit 4: Applications of Data Visualization** • Visualization of scientific data • Visualization of financial data • Data visualization for machine learning and artificial intelligence • Case studies in data visualization	10
5	**Project Work:** It is mandatory for the students to undertake a project assigned by the course instructor. Some Suggested Project Works are: 1. Exploring the History and Philosophy of Vedic Mathematics 2. Analyzing the Efficiency of Vedic Mathematics Techniques 3. Developing a Curriculum for Teaching Vedic Mathematics	
	Reference Books: 1. Vedic Ganit Nirdeshika Bhag-2, Vidya Bharti Akhil Bhartiya Shiksha Sansthan Kurushetra 2. Vedic Ganit, Motilal Banarsidas, New Delhi 3. Vedic Ganit Vihangam Drishti 1, Shiksha Sanskriti Uthhan Nyas Delhi 4. Lilavati of Bhaskracarya: A Treatise of Mathematics of Vedic Tradition	

VM04		
Course Title: Vedic Algebra-II		**Credits: 3**

Course Outcome: Upon completion of the course, students will be able to:
- learn about Matrices and Determinants.
- learn to find inverse of Matrices.
- learn about partial fractions.
- learn to find the roots of Quadratic Equation and its applications

Unit	Contents	No. of Lectures
1	**Unit 1:** Contribution of Indian Mathematicians (Varahmihir, Dattatreya Ramchandra Kaprekar (1905-1986), Nilakantha Somaiya, C.R.Rao (1900)) • Factorization of Cubic and Biquadratic Polynomials • Relation between roots and coefficients • Remainder Theorem & application • Algebraic application of binomial by Meru-Prastra	15
2	**Unit 2:** • Introduction & history of Matrices and Determinants • Types of Matrices and Determinants • Matrix and Determinants of Third Order • Inverse of Matrix	10
3	**Unit 3:** • Introduction of Partial Fraction • Types of Partial Fraction • Partial Fraction • Types of Partial Fractions and their Solutions	10
4	**Unit 4:** • Quadratic Equation • Roots of Quadratic Equation • Relation between roots and coefficients of Quadratic Equation and Applications	10
5	**Project Work:** *It is mandatory for the students to undertake a project assigned by the course instructor.* Some Suggested Project Works are: 1. Applying Vedic Mathematics Techniques for Solving Algebraic Equations 2. Investigating Vedic Mathematics Techniques for Calculus 3. Investigating the Applications of Vedic Mathematics in Computer Science	
	Reference Books: 1. Vedic Ganit Nirdeshika Bhag-2, Vidya Bharti Akhil Bhartiya Shiksha Sansthan Kurushetra 2. Vedic Ganit, Motilal Banarsidas, New Delhi 3. Vedic Ganit Vihangam Drishti 1, Shiksha Sanskriti Uthhan Nyas Delhi 4. Lilavati of Bhaskracarya: A Treatise of Mathematics of Vedic Tradition	