

SCHEME AND SYLLABUS

For

POST GRADUATE DIPLOMA

in

ANCIENT INDIAN MATHEMATICS

SESSION 2024-2025 onwards

Add on course

Offered by

**Department of Mathematics & Statistics
Himachal Pradesh University
Shimla (H.P.)**

Dr. Shaloo

Dr. Anshu

Dr. Anshu

Dr. Shweta

Himachal Pradesh University

POST GRADUATE DIPLOMA IN ANCIENT INDIAN MATHEMATICS

Aims and Objectives

The main aims and objectives of this course are:

- To make the present generations aware about the history of Indian Mathematics and the contributions of great Indian Mathematicians.
- To bring forward the radiant culture of Ancient Indian Mathematics so that this mathematical knowledge from past can benefit the people at large.
- To develop the ability to solve mathematical problems with accuracy and speed with the help of Vedic Mathematics.
- To study the implementation of Vedic Sutras on computers.
- To suggest alternative approaches to solve a particular problem.
- To understand the astrological calculations, charts, dasas and rasis etc. and the ability to analyse these with the principles and concepts of astrology.

Programme Specific Outcomes

At the end of this programme :

- The students will have the knowledge of history of Indian Mathematics and the contributions of great Indian Mathematicians
- The students will be able to apply the knowledge of Indian Mathematics in solving day to day problems in an easier way.
- The students will appreciate the computational power of Vedic Sutras.
- The students will have the fair idea about Ramanujan and his work.
- The students will be able to relate the ancient and modern mathematics.
- The students will appreciate the astrological calculations.

POST GRADUATE DIPLOMA IN ANCIENT INDIAN MATHEMATICS

Post Graduate Diploma in Ancient Indian Mathematics is offered by the University once in an academic session.

Number of Credits: 12

Eligibility: Being Add-On Courses, a student pursuing any degree can simultaneously opt for this Post Graduate Diploma in Ancient Indian Mathematics.

Procedure for Registration and Admission: Admissions to the Post Graduate Diploma in Ancient Indian Mathematics shall be made once a year, in the months of June/July. A student shall register for an Add- On Course offered by submitting a duly filled-in Registration Form. The admission shall be made on the basis of merit of the marks obtained in Graduation.

Attendance: A minimum attendance of 75% in each paper, in each semester, shall be mandatory, failing which the student will not be permitted to write the End-Semester Examination. The rules for relaxation in the requirement shall be in accordance with the University Ordinance.

Fee Structure:

Sub fee heads (For boys and girls)

Sub fee heads	PG Diploma in Ancient Indian Mathematics 1 st semester & 2 nd semester (One year)
Tuition Fee (@ 150/- per month)	1800/-
Admission Fee	100/-
Total	1900/-

Note: The total fee for two semesters will be charged at the time of admission.

Course Structure:**Semester- I**

Course Code	Course Name	Total Credits	Teaching Hours/ week	Examination Scheme		Total Marks
				Internal Assessment (Marks)	End Semester Theory Exam (Marks)	
DIM101	Contribution of Ancient Indian Mathematicians	2	2	20	30	50
DIM102	Computational Power of Vedic Sutras- I	2	2	20	30	50
DIM103	Computational Power of Vedic Sutras- II	2	2	20	30	50
Total		6	6	60	90	150

Semester-II

Course Code	Course Name	Total Credits	Teaching Hours/ week	Examination Scheme		Total Marks
				Internal Assessment (Marks)	End Semester Theory Exam (Marks)	
DIM201	Sixteen Sutras of Vedic Mathematics	2	2	20	30	50
DIM202	Applications of Vedic Mathematics in Computer Science	2	2	20	30	50
DIM203	Indian Approach to Astrological Calculations	2	2	20	30	50
Total		6	6	60	90	150

The minimum pass marks in each Internal Assessment/ End Term Exams shall be 40% of the total marks allotted in each course separately.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM101
Credits= 2	L-2, T-0, P-0
Name of the Course	Contribution of Ancient Indian Mathematicians
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- 1. Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I &II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- 2. Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question paper.

Course Objectives:

The course is designed as an introduction. It is intended to familiarize the student to ancient Indian Mathematicians and stimulate an interest for their contributions in the field of Mathematics.

Section-I

- i) Aryabhata
- ii) Brahmagupta
- iii) Bhāskaracharya I
- iv) Sridharacharya
- v) Narayana Pandita

vi) Madhavacharya

Section-II

- i) Bharati Krishna Tirtha,
- ii) Neelkanth Somayya
- iii) Baudhayana
- iv) Bhāskaracharya II
- v) Mahaveeracharya
- vi) Varahamihir

Recommended Books:

1. V.G. Heroor : The History mathematics and Mathematicians of India.
2. Bharatiya Mathematicians, Sharda Sanskrit Sansthan, Varanasi.

Course Outcomes:

After completing this course, students are expected to have the knowledge of history of Indian Mathematics and the contributions of great Indian Mathematicians.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM102
Credits= 2	L-2, T-0, P-0
Name of the Course	Computational Power of Vedic Sutras- I
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I & II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question paper.

Course Objectives:

The main objective of this course is to make students appreciate the amazing computational power of Vedic Sutras and help them to develop skill for doing faster and accurate calculations.

Section-I

- Vinculum:** Introduction, Conversion, Application, Addition and Subtraction, Beejank,
- Multiplication: Introduction** -Vertically and Crosswise, Base number/sub base number, Sum and difference of Products
- Division:** Introduction –Nikhilam, Paravartya Yojayet, Flag Digit (Vertically and Crosswise), Mixed Operations

- iv) **Indices:** Introduction -Meru Prastar, Square, Cube, Fourth and Fifth Power, Mixed Operations
- v) **Roots:** Introduction -up to Fifth Root (Vilokanam), Square root and Cube root, Mixed Operations
- vi) **Divisibility:** Introduction -Osculator (vestanam)
- vii) **LCM/HCF:** Introduction -different methods
- viii) **Recurring Decimals:** Introduction -Denominator ending with 1, 3, 7, 9
- ix) **Numerical Code (Devnagari script) :** Introduction –Word, Consonant, Letter

Section- II

- i) **Algebra :** Introduction
- ii) **Multiplication (Quadratic and cubic expressions of 1 or 2 variables):** Introduction - Vertically and Crosswise, Sum and difference of Products
- iii) **Division algorithm and application (Expressions of 1 variable and divisor of degree upto 3):** Introduction -Paravartya Yojayet, Mixed Operations
- iv) **Expansion:** Introduction -Meru Prastar -upto fifth Power, Mixed Operations
- v) **Factorisation (Cubic expression) -Remainder Theorem, use of Differentiation,LCM/HCF**
- vi) Partial Fractions, Anurupye sunyamanyat (3 elementary methods)
- vii) Solution of Equations, (Quadratic equations /simultaneous equations of 2 or 3 variables)

Recommended Books:

1. Bharatiya Krishna Teerth : Vedic Mathematics (Motilal Banarasidas New Delhi, 2001).
2. V.G. Heroor : The History mathematics and Mathematicians of India.
3. V.G. Unkalkar : Magical world of Mathematics, (Vandana Publishers Bangalore, 2008).
4. Dr. Vyawahare-Chouthaiwale- Borgaonkar: Introduction to Vedic Mathematics.

Course Outcomes:

This course ensures that the students learn and master all the Vedic Sutras and use them for performing faster and accurate calculations.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM103
Credits= 2	L-2, T-0, P-0
Name of the Course	Computational Power of Vedic Sutras- II
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I & II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question paper.

Course Objectives:

The main objective of this course is to make students appreciate the amazing computational power of Vedic Sutras and help them to develop skill for doing faster and accurate calculations.

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Section- I

Geometry Introduction **Concept of Bhaudhayana Number (BN)**

- i) BN of an angle
- ii) Multiplication of a constant in a BN
- iii) BN of complementary angles
- iv) BN of sum and difference ($\alpha \pm \beta$) of an angle
- v) BN of half angle

Trigonometry

- i) Definitions of Trigonometric Ratios
- ii) Trigonometric Identities

Co-ordinate Geometry

- i) Different forms of straight lines
- ii) Vector Products (dot and cross)

Section- II

Complex Numbers - Multiplication, Division and square-root

Calculus Introduction –Differentiation, Integration

Various Number System: (Binary, Quadral, Octal and Hexadecimal Systems) –Introduction, Conversion and Basic operations.

Recommended Books:

1. Bharatiya Krishna Teerth : Vedic Mathematics (Motilal Banarasidas New Delhi, 2001).
2. V.G. Heroor : The History mathematics and Mathematicians of India.
3. V.G. Unkalkar : Magical world of Mathematics, (Vandana Publishers Bangalore, 2008).
4. Dr. Vyawahare-Chouthaiwale- Borgaonkar: Introduction to Vedic Mathematics.

Course Outcomes:

This course ensures that the students learn and master all the Vedic Sutras and use them for performing faster and accurate calculations.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM201
Credits= 2	L-2, T-0, P-0
Name of the Course	Sixteen Sutras of Vedic Mathematics
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- 1. Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I &II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- 2. Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question paper.

Course Objectives:

The main objective of this course is to provide the comprehensive understanding of sixteen sutras/corollaries of Vedic Mathematics.

SECTION-I

- i)** Ekadhikina Purvena
- ii)** Nikhilam Navatashcaramam Dashatah
- iii)** Urdhva-Tiryagbyham
- iv)** Paraavartya Yoja
- v)** Shunyam Saamyasamuccaye
- vi)** (Anurupye) Shunyamanyat

- vii) Sankalana-vyavakalanabhyam
- viii) Puranapurabyham
- ix) Chalana-Kalanabyham
- x) Yaavadunam
- xi) Vyashthisamanstih
- xii) Shesanyankena Charamena

SECTION-II

- i) Sopaantyadvayamantyam
- ii) Ekanyunena Purvena
- iii) Gunitasamuchyah
- iv) Gunakasamuchyah.

Corollary:

- i) Anurupyena
- ii) Sisyate Sesasamjnah
- iii) Adyamadyenantyamantyaena
- iv) Kevalaih Saptakam Gunyat
- v) Vestanam, Yavadunam Tavadunam
- vi) Yavadunam Tavadunikritya Varga Yojayet
- vii) Antyayordashake'pi

Corollary:

- i) Antyayoreva
- ii) Samuccayagunitah
- iii) Lopanasthapanabhyam
- iv) Vilokanam
- v) Gunitasamuccayah Samuccayagunitah
- vi) Dhvajanka
- vii) Dwandwa Yoga
- viii) Adyam Antyam Madhyam

Recommended Books:

1. Bharatiya Krishna Teerth : Vedic Mathematics (Motilal Banarasidas New Delhi, 2001).
2. V.G. Heroor : The History mathematics and Mathematicians of India.

Course Outcomes:

After the completion of this course, the students will have the fair knowledge of sixteen sutras of Vedic Mathematics and will be able to use them in various arithmetic, algebraic and geometric mathematical problems.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM202
Credits= 2	L-2, T-0, P-0
Name of the Course	Applications of Vedic Mathematics in Computer Science
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I & II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question.

Course Objectives:

This course is an attempt to study the applications of Vedic Mathematics in number system, fuzzy models, cryptography, VLSI implementation, discrete Fourier transform and digital signal processing.

SECTION -I

Number System, Conversion ((Binary, Quadral, Octal and Hexadecimal Systems) and Basic Operations. Vedic Mathematics in Fuzzy Models; Views of students about the use of Vedic Mathematics in their curriculum, Teachers views on Vedic Mathematics and its overall influence

on the Students Community, Views of Educationalists about Vedic Mathematics and Views of the Public about Vedic Mathematics

SECTION-II

Vedic Mathematics in Cryptography; Implementation of RSA Cryptosystem Using Ancient Indian Vedic mathematics and Analysis of cryptographic algorithms based on Vedic mathematics. Vedic Mathematics in Miscellaneous Application: VLSI implementation, Discrete Fourier Transform and digital signal processing

Suggested Reading;

1. W. B. Vasantha Kandasamy Florentin Smarandache, “Vedic Mathematics - ‘Vedic’ Or ‘Mathematics’: A Fuzzy & Neutrosophic Analysis”

Course Outcomes:

After completing this course, the students will have an introduction to the wide-ranging applications of Vedic Mathematics.

Himachal Pradesh University
Post Graduate Diploma in Ancient Indian Mathematics

Course Code	DIM203
Credits= 2	L-2, T-0, P-0
Name of the Course	Indian Approach to Astrological Calculations
Number of hours required for this course	30 hrs.
Continuous Comprehensive Assessment: Based on Minor Tests(2), Class tests, Assignments, Quiz, Seminar and Attendance (Marks Attendance: 5 marks to be given as per the regulations)	Max. Marks: 20
Tutorials : Solving Problems and exercises	1 Credit per 15 hours
Semester Term End Examination	Max Marks: 30 Maximum Time: 1 1/2 hrs.
Lectures to be Delivered (One Hour Each)	30

Instructions

- Instructions for paper setter:** The question paper will consist of three Sections A, B & C of 30 marks and examiner shall set 5 questions from both the sections (I & II) of the syllabus in total. Each question shall carry 10 marks. Section C will be Compulsory and have 7 short answer type questions from both the sections (I & II). Section A will have two questions from section I and Section B will have two questions from section II of the syllabus respectively.
- Instructions for Candidates:** Candidates are required to attempt 3 questions in all. Section C is Compulsory from which students shall have to attempt 5 questions. They are required to attempt one question from each of the Section A and B of the question.

Course Objectives:

The main objective of this course is to develop a comprehensive understanding of astrological principles and how these principles are used to analyse charts. This course will help the students to appreciate different dasa systems and their use in timing of events.

SECTION-I

Chart Analysis:

Basic Concepts, Rasis, Planets, Upagrahas, Special Lagnas, Divisional Charts, Houses, Karakas, Arudha Padas, Aspects and Argalas, Yogas and Ashtakavarga. Interpreting Charts, Topics Related to Longevity, Strength of Planets and Rasis.

SECTION-II

Dasa Analysis:

Vimsottari Dasa, Ashtottari Dasa, Narayana Dasa and Lagna Kendradi Rasi Dasa.

Sudasa, Drigdasa, Niryaana Shoola Dasa, Shoola Dasa and Kalachakra Dasa.

Recommended Books :

1. P. V.R. Narasimha Rao: Vedic Astrology An Integrated Approach, Sagar Publication.
2. Bepin Behari: Fundamentals of Vedic Astrology, VEDIC ASTROLOGER'S HANDBOOK I, Lotus Publication.

Course Outcomes:

After completion of this course, the students will be able to understand planets, rasis, arudha etc. They will be able to interpret chart using the astrological concepts and principles.