HAND BOOK OF INFORMATION

RELATING TO THE MERIT BASED COURSES

Certificate Course in Vedic Mathematics
and
P G. Diploma in Ancient Indian Mathematics

SESSION 2021-2022

Department of Mathematics & Statistics
HIMACHAL PRADESH UNIVERSITY
SUMMER HILL, SHIMLA – 171 005

Chief Patron:

Prof. Sikander Kumar
Hon'ble Vice Chancellor
H. P. University, Shimla

Patron:

Prof. P. L. Sharma
Chairman,
Department of Mathematics
H. P. University, Shimla

Coordinator:

Dr. Shalini Gupta
Associate Professor,
Department of Mathematics
H. P. University, Shimla

Hon'ble Vice Chancellor's Message

It is a matter of great Pride for Himachal Pradesh University that Centre for Indian Mathematics has been established in Department of Mathematics and Statistics. This Centre has started certificate course in Vedic Mathematics and Post GraduateDiploma in Ancient Indian Mathematics. Himachal Pradesh University is the only University in the neighboring States to start these two courses under the Centre.

In the country also there are very few universities, which are running these two, courses specially Post Graduate Diploma in Ancient Indian Mathematics.

I am delighted to know that students have shown keen interest in these courses. It's a great opportunity for you all to understand the concepts of Vedic Mathematics which are useful in doing quick calculations without any electronic aid. This skill can be useful in different competitive examinations like banking etc.

I expect that students will complete these courses with great enthusiasm and encourage other students to enroll themselves for this diploma and certificate courses.

I congratulate the Chairman and all the Faculty members of the Department to popularize Vedic Mathematics among youngsters by taking the initiative to start these courses.

I wish good luck to the Centre and Department of Mathematics.

My very best wishes.

(Prof. Sikander Kumar)

Chairman's Message

It gives me immense pleasure to say that with the continuous guidance of Hon'ble Vice Chancellor and hardcore efforts of faculty of Mathematics Department, the Centre for Indian Mathematics has been established.

The Centre aims to generate awareness among the younger generations about contributions of Great Indian Mathematicians in the various fields of Mathematics and promote Vedic mathematical study and research in India and abroad.

Keeping in view the aims, the Centre has started two programmes one certificate course in Vedic Mathematics and one Post Graduate Diploma in Ancient Indian Mathematics.

These courses will give the students a great opportunity to understand the values of Vedic knowledge and acknowledge the contributions of Indian mathematicians. The students will gain knowledge about the Vedic- Sutras for long calculations.

The Centre will also organize various activities like seminars, conferences, workshops, e-library etc. to bring forward the extraordinary work done by Indian Mathematicians in the fields such as Astronomy, Astrology, Geometry, Algebra, and Arithmetic etc.

With the efforts of all the faculty members, we will take the Centre to the summit.

Best wishes

Prof. P. L. Sharma
Chairman
Department of Mathematics and Statistics
Himachal Pradesh University, Shimla-05

CONTENTS

INTRODUCTION

यथा शिखा मयूराणां नागानां मणयो यथा ।
तद्वद्वेदाङ्ग शास्त्राणां गणितं मूर्धनि स्थितम् ।।

"Like the crests on the head of peacock, like the gems on the hoods of the cobras, Mathematics is at the top of the Vedāṅga Śāstras"

The above śhloka in Sanskrit shows the importance given to mathematics among all branches of knowledge from Vedic period.

Indian mathematics is one of the oldest and longest-lasting traditions of scientific thought. It emerged in the Indian subcontinent in 1200 BC and lasted until the end of the 18th century. Contributions by Indian mathematicians such as Aryabhata, Brahmagupta, Bhaskara II, and Varāhamihira have been indispensable to modern mathematics and humankind as a whole. Many important mathematical concepts such as the decimal number system, the concept of zero as a number, negative numbers, arithmetic, and algebra originated in India.

These mathematical concepts traveled to the Middle East, China, and Europe and led to further developments that now form the foundations of many areas of mathematics.

Indian astronomy also flowered in the 5th–6th century, with Aryabhata, whose Aryabhatiya represented the pinnacle of astronomical knowledge at the time. Later Indian astronomy significantly influenced Muslim astronomy, Chinese astronomy, European astronomy, and others. Other astronomers of the classical era who further elaborated on Aryabhata's work include Brahmagupta, Varahamihira, and Lalla. An identifiable native Indian astronomical tradition remained active throughout the medieval period and into the 16th or 17th century, especially within the Kerala school of astronomy and mathematics.

In addition, Vedic Mathematics, a system of mental maths and heuristics for increased calculative and cognitive abilities developed in India continues to be extremely relevant to the way mathematics is taught to pupils even today.

It is not very hard to see that the Indian tradition of scientific thought was one of the most systematic and sophisticated traditions in the entire world and its contribution to humankind has been extremely valuable.

AIMS OF CENTRE FOR INDIAN MATHEMATICS

The main aims of this centre are :-

a) To generate awareness among the younger generations about contributions of Great Indian Mathematicians in the various fields of Mathematics.

b) To promote vedic mathematical study and research in India and abroad among professionals and amateurs.

c) To bring forward the extraordinary work done by Indian Mathematicians in the fields such as Astronomy, Astrology, Geometry, Algebra, and Arithmetic etc.

d) To help the existing education system become in tune with the values of Vedic knowledge and acknowledge the contributions of Indian mathematicians.

ACTIVITIES/PROGRAMMES

1) To publish a Newsletter showcasing the activities of the center and forecasting the future events.

2) To institute awards in the honour of Indian mathematicians.

3) To publish mathematical magazines and to collect literature by Indian Mathematicians.

4) To celebrate Sri Nivas Ramanujan birthday as National Mathematics Day on December 22nd every year.

5) To initiate certificate course and Diploma in Vedic mathematics, Astronomy, Astrology etc.

6) To organize seminars/workshops on Vedic mathematics.

7) To build mathematical library/e-library.

8) To build mathematical labs.

9) To organize mathematical events / Olympiads.

ADMISSION/ TEACHING/ EXAMINATION/ VACATION SCHEDULE FOR SESSION 2021-2022 :

The dates will be notified later on due to COVID-19

Application Form and Fee:

a) Online application fee for Merit Based Courses will be Rs. 300/- for all categories. The fee deposited will not be refundable under any circumstances.

b) Last date of filling of online admission form will be informed through website.

c) The schedule of interview / admission will be notified later on.

DURATION OF COURSES

PROGRAMMES OF STUDY OFFERED BY CENTRE FOR INDIAN MATHEMATICS

FEE STRUCURE

Sub fee head (for boys and girls both)

Tuition fee	1680/-
Library security fee	300/-
Magazine fee	50/-
Development fee as approved	250/-
Population Education club	120/-

PROGRAMMES OF STUDY	PROGRAMME DURATION	TOTAL CREDITS	STUDENTS IN- TAKE	FEES
Certificate Course in Vedic Mathematics	Six Months	20 Credits	30	Rs. 2500/- for complete course.
Post Graduate Diploma in Ancient Indian Mathematics	One Year	40 Credits	30	Rs. 2500/- per semester.

Admission fee 100/-

MINIMUM ELIGIBILITY CRITERIA FOR ADMISSION IN CERTIFICATE AND POST GRADUATE DIPLOMA PROGRAMMES OF STUDY

PROGRAMME OF STUDY	ELIGIBILITY REQUIREMENT FOR ADMISSION
Certificate Course in Vedic Mathematics	1. A Bachelor degree from a recognized University 2. The Certificate Course / Post Graduate Diploma can also be done concurrently along with any Post Graduate Degree programme in the University.
PG Diploma in Ancient Indian Mathematics	

SELECTION CRITERIA FOR ADMISSIONS

The candidates desirous to seek admission to Certificate Course / Post Graduate Diploma shall be admitted on the basis of merit drawn on the basis of marks/ grades in Bachelors degree. Maximum period of completion of Certificate Course/ Post Graduate Diploma Course will be as per the university rules for Certificates and Diploma Courses.

SYLLABUS

CERTIFICATE COURSE IN VEDIC MATHEMATICS

SCHEME (CREDITS-20)

Course Code	Name of the Course	Credits	Teaching Hours	Examination Scheme		Total Marks
				Internal Assessment	End Term Theory Exam	
CVM101	Vedic Arithmetic	5	5	20 Marks	80	100
CVM102	Vedic Algebra	5	5	20 Marks	80	100
CVM103	Vedic Geometry	5	5	20 Marks	80	100
Total		15	15	60 Marks	2400	300

Course Code	Course Name	Total Credits	Teaching Hours/ week	Examination Scheme		Total Marks
				Project	Presentation	
CVM104	Project and Project Presentation	5	3	30	70	100

The minimum marks in each Internal Assessment/ Theory Exams/ Project/ Project Presentation shall be 35% of the total marks allotted in each course individually.

SYLLABUS

Course Code: CVM101

Course Name: Vedic Arithmetic

Maximum Marks: 100
External Examination: 80
Internal Examination: 20
Max. Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:

The main objectives of the course are

1. To understand the concept multiplication of two or three digits numbers.
2. To comprehend the easy steps of division by two and three digit divisors.
3. To check the divisibility by two or three digit numbers without actual division.
4. To distinguish between squaring numbers ending in 5 and numbers near 50.
5. To apply reverse squaring to find square roots of numbers.
6. To identify cube and cube roots.
7. To acknowledge the contributions of Indian Mathematicians in Vedic Arithmetic.

UNIT-I

Multiplication

- **i)** Ekadhikenpurven method (multiplication of two numbers of two digits)
- **ii)** Eknuenpurven method (multiplication of two numbers of three digits)
- **iii)** Urdhavatriagbhyam method (multiplication of two numbers of three digits)
- **iv)** Nikhilam Navtashcharamam Dashtaha (multiplication of two numbers of three digits)
- **v)** Combined Operations

UNIT-II

Division

- **i)** Nikhilam Navtashcharamam Dasthaha (two digit divisor)
- **ii)** Paravartya Yojyet method (three digits divisor)

Divisibility

- **i)** Ekadhikenpurven method (two digits divisor)
- **ii)** Eknuenpurven method (three digits divisor)

UNIT-III

LCM and HCF, Power and Root

LCM and HCF

Power (i) square (two digit numbers) **(ii)** Cube (two digit numbers).

Root (i) square root (four digit numbers) **(ii)** cube root (six digit numbers)

UNIT-IV

Contributions of Indian Mathematician (in light of arithmetic)

- **(i)** Aryabhatt
- **(ii)** Brahamgupt
- **(iii)** Mahaveeracharya
- **(iv)** Bharti Krishan Tritha

Course Outcomes:

At the end of the course the students will be able to:

1. Multiply two or three digits numbers.
2. Compute the division by two and three digit divisors.
3. Check the divisibility by two or three digit numbers without actual division.
4. Evaluate square, cubes, square roots and cube roots of larger numbers within no time.
5. **(v)**

Suggested Readings:

1. Vedic Mathematics, Motilal Banarsi Das, New Delhi.
2. Vedic Ganita: Vihangam Drishti –I, Siksha Sanskriti Uthana Nyasa, New Delhi.
3. Vedic Ganita Praneta, Siksha Uthana Nyasa, New Delhi.
4. Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New Delhi.
5. Leelavati, Chokhanbba Vidya Bhavan, Varanasi.
6. Bharatiya Mathematicians, Sharda Sanskrit Sansthan, Varanasi.

Course Code: CVM102

Course Name: Vedic Algebra

Maximum Marks: 100
External Examination: 80
Internal Examination: 20
Max. Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:

The main objectives of the course are:

1. To understand the concept multiplication of quadratic expressions of single variable.
2. To comprehend the easy steps of division of linear expressions of single variable.
3. To factorise the quadratic expressions of single variable.
4. To find the Solution of Linear Simultaneous Equations.
5. To acknowledge the contributions of Indian Mathematicians in Vedic Algebra.

UNIT-I

Multiplication (Quadratic Expressions of Single Variable)

- **i)** Urdhavatriagbhyam method
- **ii)** Combined Operations

UNIT-II:

Division and Factorization

- **i)** Division (Divisor: Linear Expression of Single Variable)
- **ii)** Factorization (Quadratic Expression of Single Variable)

UNIT-III

Solution of Linear Simultaneous Equations

UNIT-IV

Contributions of Indian Mathematician (in light of algebra)

- **(i)** Varahmihir
- **(ii)** Bhaaskaracharya
- **(iii)** Neelkanth Somayya
- **(iv)** Bharti Krishan Tritha

Course Outcomes:

At the end of the course the students will be able to:

1. Multiply quadratic expressions of single variable.
2. Divide linear expressions of single variable.

3. Factorise the quadratic expressions of single variable.
4. Find the Solution of Linear Simultaneous Equations.
5. Acknowledge the contributions of Indian Mathematicians in Vedic Algebra.

Suggested Readings:

1. Vedic Ganita: Vihangam Drishti –I, Siksha Sanskriti Uthana Nyasa, New Delhi.
2. Vedic Mathematics, Motilal Banarsi Das, New Delhi.
3. Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New Delhi.
4. Bharatiya Mathematicians, Sharda Sanskrit Sansthan, Varanasi.
5. Vedic Ganita Praneta, Siksha Uthana Nyasa, New Delhi.
6. Beejganitam, Chokhanbba Vidya Bhavan, Varanasi.

Course Code: CVM103

Course Name: Vedic Geometry

Maximum Marks: 100
External Examination: 80
Internal Examination: 20
Max. Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:

The main objectives of the course are:

1. To understand the concept of Bhaudhayana Number (BN), BN of an angle, complementary angles, sum and difference of angles.
2. To comprehend the trigonometric ratios and trigonometric identities.
3. To distinguish the different forms of straight lines.
4. To compute the multiplication, division and square roots of complex numbers.
5. To acknowledge the contributions of Indian Mathematicians in Vedic Geometry.

UNIT-I

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

UNIT-II

Trigonometry

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

Co-ordinate Geometry

- **i)** Different forms of straight lines

UNIT-III

Complex Numbers

Multiplication, Division and Square root

UNIT- IV

Contributions of Indian Mathematician (in the light of Geometry)

- **(i)** Bhaaskaracharya
- **(ii)** Madhavan
- **(iii)** Parmeshvaran
- **(iv)** Bharti Krishan Tritha

(v) Baudhayana

Course Outcomes:

At the end of the course the students will be able to:

1. Recognize Bhaudhayana Number (BN) and will be to evaluate BN of an angle, complementary angles, sum and difference of angles.
2. Apply trigonometric ratios and trigonometric identities in solving various problems.
3. Distinguish the different forms of straight lines.
4. Solve various problems involving the multiplication, division and square roots of complex numbers.
5. Acknowledge the contributions of Indian Mathematicians in Vedic Geometry.

Suggested Readings:

1. Vedic Mathematics, Motilal Banarsi Das, New Delhi.
2. Vedic Ganita: Vihangam Drishti –I, Siksha Sanskriti Uthana Nyasa, New Delhi.
3. Vedic Ganita Praneta, Siksha Uthana Nyasa, New Delhi.
4. Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New Delhi.
5. Beejganitam, Chokhanbba Vidya Bhavan, Varanasi.
6. Bharatiya Mathematicians, Sharda Sanskrit Sansthan, Varanasi.

Course Code: CVM104

Course Name: Project and Project Presentation

Maximum Marks: 100
Project: 70
Project Presentation: 30

Course Objectives:

The main objective of this course is to expose students to manuscript writing on a particular topic and presenting their thoughts in Seminar .

Course Outcome:
Students will be able to develop creative skills in Manuscript writing. They will have in depth knowledge of certain topics, which will be shared with others through seminar.

Project and Project Presentation (70 + 30)

1. **Project (Handwritten/ Typed) on any one of the following topics:**
   - **i)** Ancient Indian works related to ; Leelavati, Sulba Sutra, Ganita Kaumudi etc. or any other ancient indian text
   - **ii)** Contributions of Indian Mathematicians; A Survey.

   The project will be based upon personal observations / research article/ book chapter. article giving some new idea. The project shall be evaluated by the teacher concerned and the marks shall be awarded out of 70 marks.
2. **Project Presentation**
   The candidate shall defend his project in the seminar presentation conducted by the centre, and shall be given marks out of 30 marks.

POST GRADUATE DIPLOMA IN ANCIENT INDIAN MATHEMATICS

SCHEME (TOTAL CREDITS-40)

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	5	5	20	80	100
DIM102	Ramanujan and His Notebook	5	5	20	80	100
DIM103	Computational Power of Vedic Sutras	5	5	20	80	100
DIM104	Modern Approach to Ancient Mathematics	5	5	20	80	100
Total		20	20	80	320	400

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/ Corollaries of Vedic Mathematics	5	5	20	80	100
DIM202	Applications of Vedic Mathematics in Computer Science	5	5	20	80	100
DIM203	Indian Approach to Astrological Calculations	5	5	20	80	100
Total		15	15	60	240	300

Course Code	Course Name	Total Credits	Teaching Hours/ week	Examination Scheme		Total Marks
				Project Presentation (Marks)	Project (Marks)	
DIM204	Project and Project Presentation	5	3	70	30	100

The minimum marks to pass in each Internal Assessment/ Theory Exams/ Project/ Project Presentation shall be 35% of the total marks allotted in each course individually.

SYLLABUS

Course Code: DIM101

Course Name: Contributions of Ancient Indian Mathematicians

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

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.

UNIT-I

i) Aryabhata
ii) Brahmagupta
iii) Bhāskaracharya I

UNIT-II

i) Sridharacharya
ii) Narayana Pandita
iii) Madhavacharya

UNIT-III

i) Bharati Krishna Tirtha,
ii) Neelkanth Somayya
iii) Baudhayana

UNIT-IV

i) Bhāskaracharya II
ii) Mahaveeracharya
iii) Varahamihir

Suggested Readings:

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.

Course Code: DIM102

Course Name: Ramanujan and his Notebook

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:

This course is intended to introduce students to the great Indian Mathematician Ramanujan and to familiarize them with the major work done by him.

UNIT-I

Magie Squares, Sums Related to the Harmonie Series or the Inverse Tangent Function

UNIT-II

Combinatorial Analysis and Series Inversions, Iterates of the Exponential Function and an Ingenious Forma1 Technique

UNIT-III

Eulerian Polynomials and Numbers, Bernoulli Numbers and the Riemann Zeta-Function

UNIT-IV

Ramanujan's Theory of Divergent Series, Sums of Powers, Bernoulli Numbers, the Gamma Function, Analogues of the Gamma Function, Infinite Series Identities, Transformations and Evaluations

Suggested Reading:

1. Bruce C. Berndt,"Ramanujan's Notebooks Part 1 ", Springer (1985).

Course Outcomes:

After the completion of the course, the students will have a comprehensive understanding of Ramanujan's life and his findings in the field of mathematics.

Course Code: DIM103

Course Name: Computational Power of Vedic Sutras

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

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.

UNIT-I

i) **Vinculum:** Introduction, Conversion, Application, Addition and Subtraction, Beejank,
ii) **Multiplication: Introduction** -Vertically and Crosswise, Base number/sub base number, Sum and difference of Products
iii) **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

UNIT- 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)

UNIT- III

i) **Geometry** Introduction

ii) **Concept of Baudhayana Triads (BT)**, Application of BT -Trigonometry, Co-ordinate Geometry, (2-D, different cases of Line only) -use of Polar co-ordinates, Complex Numbers, (Multiplication, Division and square-root) -Vector Products (dot and cross),

UNIT- IV

i) **Calculus Introduction –Differentiation, Integration**
ii) **Various Number System: (Binary, Quadral, Octal and Hexadecimal Systems) –** Introduction, Conversion and Basic operations.

Suggested Readings:

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.

Course Code: DIM104

Course Name: Modern Approach to Ancient Mathematics

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:
This course is an attempt to introduce the students about the importance and implementation of Ancient Mathematics in Modern Mathematics.

UNIT-I

Topics in Sri Bharathi Krishna Thirtha's Vedic Mathematics: Some questions of Divisibility, Recurring Decimal, Square, Square Root, Cube and Cube Root

UNIT-II

The Brahmagupta- Bhaskara Equation: Lemma of Brahmagupta, Chakravala Method of Bhaskara, Continued Fractions

UNIT-III

Selected Topics in Geometry: Geometry in Sulba Sutras, The Triangle, The Cyclic Quadrilateral, and the Circle

UNIT-IV

Number Theory: The decimal place value system, Divisibility, G.C.D. and L.C.M., Simple Continued Fractions, The Eular φ function, The Mobius μ- function and Congruences

Suggested Readings:

1. T.S. Bhanu Murthy: A Modern Introduction to Ancient Indian Mathematics, New Age International Publisher.
2. David M. Burton: The History of Mathematics AN INTRODUCTION, Seventh edition.

Course Outcomes :
After the completion of this course, the students will have a fair idea about the different aspects of the ancient mathematics which are applicable in the study of modern mathematics .

Course Code: DIM201

Course Name: Sixteen Sutras/ Corollaries of Vedic Mathematics

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

Course Objectives:

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

UNIT-I

i) Ekadhikina Purvena
ii) Nikhilam Navatashcaramam Dashatah
iii) Urdhva-Tiryagbyham
iv) Paraavartya Yojayet
v) Shunyam Saamyasamuccaye
vi) (Anurupye) Shunyamanyat
vii) Sankalana-vyavakalanabhyam
viii) Puranapuranabyham

UNIT-II

i) Chalana-Kalanabyham
ii) Yaavadunam
iii) Vyashtisamanstih
iv) Shesanyankena Charamena
v) Sopaantyadvayamantyam
vi) Ekanyunena Purvena
vii) Gunitasamuchyah
viii) Gunakasamuchyah.

UNIT-III
Corollary:

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

UNIT-IV
Corollary:

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

Suggested Readings:

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.

Course Code: DIM202

Course Name: Applications of Vedic Mathematics in Computer Science

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

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.

UNIT- I

Number System, Conversion ((Binary, Quadral, Octal and Hexadecimal Systems) and Basic Operations

UNIT- II

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

UNIT- III

Vedic Mathematics in Cryptography; Implementation of RSA Cryptosystem Using Ancient Indian Vedic mathematics and Analysis of cryptographic algorithms based on Vedic mathematics

UNIT- IV

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.

Course Code: DIM203

Course Name: Indian Approach to Astrological Calculations

Maximum Marks: 100
End Semester Theory Examination: 80
Internal Assessment: 20
Time: 3 Hrs.

Note: There shall be nine questions in all. Question No. 1 is compulsory consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

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.

UNIT-I

Chart Analysis:

Basic Concepts, Rasis, Planets, Upagrahas, Special Lagnas, Divisional Charts, Houses, Karakas, Arudha Padas, Aspects and Argalas, Yogas and Ashtakavarga.

UNIT-II

Chart Analysis:

Interpreting Charts, Topics Related to Longevity, Strength of Planets and Rasis.

UNIT-III

Dasa Analysis:

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

UNIT-IV

Dasa Analysis:

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

Suggested Readings :

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.

Course Code: DIM204

Course Name: Project and Project Presentation

Maximum Marks: 100
Project Marks: 70
Project Presentation Marks: 30

Course Objectives:

The main objective of this course is to expose students to manuscript writing on a particular topic and presenting their thoughts in Seminar .

Course Outcome:
Students will be able to develop creative skills in Manuscript writing. They will have in depth knowledge of certain topics which will be shared with others through seminar.

Project and Project Presentation (70 + 30)

3. **Project (Handwritten/ Typed) on any one of the following topics:**
   - **iii)** History of Indian Mathematics from Vedic period to Modern times.
   - **iv)** Ancient Indian works related to ; Leelavati, Sulba Sutra, Ganita Kaumudi etc. or any other ancient indian text.
   - **v)** Contributions of Indian Mathematicians; A Survey.
   - **vi)** Relevance of Vedic Mathematics in Modern Education System.

   The project will be based upon personal observations / research article/ book chapter. article giving some new idea. The project shall be evaluated by the teacher concerned and the marks shall be awarded out of 70 marks.
4. **Project Presentation**
   The candidate shall defend his project in the seminar presentation conducted by the centre, and shall be awarded out of 30 marks.