Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

સંદર્ભ: (૧) યુનિવર્સિટી પરિપત્ર ક્રમાંકઃએસ./સાયન્સ/પરિપત્ર/૩૧૦૮૪/૨૦૨૪ તા.૧૯–૧૨–૨૦૨૩
(૨) યુનિવર્સિટી પરિપત્ર ક્રમાંકઃ એસ./સાયન્સ/પરિપત્ર/૯૨૪૮/૨૦૨૪ તા.૨૬–૦૪–૨૦૨૪

–: **પરિપત્ર** :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર B.Sc.Mathematics Sem.-3 & 4નો સુધારેલ Major, Minor, MDC અને SEC નો અભ્યાસક્રમ ગણિતશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૧/૦૫/૨૦૨૪ની સભાના ઠરાવ ક્રમાંક : ૦૨ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક :૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૧૪૦૪/૨૦૨૪
તા.૩૦–૦૫–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

Semester: III

Effective from June-2024

Semester	Level of Course	Paper	Title of the Paper	Hours	Credit
III	200	MH-MJ-301	Numerical Methods-I	02	02
		MHP-MJ-301	Practical based on MH-MJ-301	04	02
		MH-MJ-302	Differential Equations	02	02
		MHP-MJ-302	Practical based on MH-MJ-302	04	02
		MH-MJ-303	Bivariate Calculus	04	04

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B.O.S. Mathematics
DR. M. R. Tailor
21/05/2024

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SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

SEMESTER –III

MATHEMATICS–MH-MJ-301

NUMERICAL METHODS-I*

Effective from June-2024

(Theory 2 Hours /Week-Credit: 2)

Unit I:

Numerical Solutions of Algebraic and Transcendental Equations: Bisection Method, Method of False position, Iteration Method, Newton-Raphson Method.

Unit II:

Forward Differences, Backward Differences, Central Differences, Symbolic relation and separation of symbols, Differences of Polynomials, Newton's Forward and Backward Difference Interpolation Formulae.

The course is covered by the following reference books:

1. S. S. Sastry: Introductory methods of Numerical Analysis,Prentice-Hall of India Pvt. Ltd.; 5th Edition, 2012.
2. M. K. Jain, S. R. K. Iyenger, R. K. Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd, 7th Edition, 2019.
3. Goel, Mittal: Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz: Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner: Numerical Methodsand Analysis, McGraw Hill Book Co., London.
6. P. C. Biswal: Numerical Analysis, Prentice-Hall of India, 2008.
7. H. C. Saxena: Finite Differences and Numerical Analysis, S.Chand and Co., 2005.

*Use of Scientific non – programmable calculator is allowed.

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SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

SEMESTER –III

MATHEMATICS-MHP-MJ-301 (PRACTICAL)

Effective from June-2024

(Practical 4 Hours /Week-Credit:2)

Practical-1	Numerical Solutions of Algebraic and Transcendental Equations: Bisection Method
Practical-2	Numerical Solutions of Algebraic and Transcendental Equations: Method of False-Position
Practical-3	Numerical Solutions of Algebraic and Transcendental Equations: Iteration Method
Practical-4	Numerical Solutions of Algebraic and Transcendental Equations: Newton-Raphson Method
Practical-5	Finite Differences and its applications
Practical-6	Symbolic relation between operators
Practical-7	Newton's forward difference interpolation
Practical-8	Newton's backward difference interpolation

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

SEMESTER –III

MATHEMATICS–MH-MJ-302

DIFFERENTIAL EQUATIONS

Effective from June-2024

(Theory 2 Hours /Week-Credit: 2)

Unit I:

Linear Differential Equations with variable coefficients, Homogeneous Differential Equations, Legendre's Differential Equation, Second order Differential Equations: Solution in terms of known Integral, Solution by method of removal of first order derivatives, Method of Changing Independent Variable.

Unit II:

Formation of Partial Differential Equation, Solution of Partial Differential Equations, Equations solvable by direct integral, Partial Differential Equations of first order, Nonlinear Partial Differential Equations of first order, Some special methods:

$F(p, q) = 0$; $F(z, p, q) = 0$; $F_1(x, p) = F_2(y, q)$; $z = px + qy + F(p, q)$.

The course is covered by the following reference books:

1. D. A. Murray: An Introductory Course in Differential Equations, Orient Longmans, Bombay, 11th impression, 2003.
2. I. N. Sneddon: Elements of Partial Differential Equations, McGraw HillBook Company.
3. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, NewDelhi.
4. Gorakh Prasad: Differential Equations, Pothishala Pvt. Ltd., Allahabad.
5. M. D. Raisinghania: Differential Equations, S. Chand & Co., New Delhi.
6. Nita H. Shah: Ordinary and Partial Differential Equations: Theory and Applications, PHI Learning Pvt. Ltd, New Delhi.
7. N. P. Bhamore & et al.: Mathematics Paper III–IV, Popular Prakashan,Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

SEMESTER –III

MATHEMATICS-MHP-MJ-302 (PRACTICAL)

Effective from June-2024

(Practical 4 Hours /Week-Credit:2)

Practical-1	Linear Differential Equations with variable coefficients, Homogeneous Differential Equations
Practical-2	Legendre's Differential Equation
Practical-3	Second order Differential Equations: Solution in terms of known Integral, Solution by method of removal of first order derivatives
Practical-4	Second order Differential Equations: Method of Changing Independent Variable
Practical-5	Solution of Partial Differential Equations
Practical-6	Partial Differential Equations of first order
Practical-7	Nonlinear Partial Differential Equations of first order
Practical-8	Some special methods: $F(p, q) = 0$; $F(z, p, q) = 0$; $F_1(x, p) = F_2(y, q)$; $z = px + qy + F(p, q)$

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

SEMESTER –III

MATHEMATICS–MH-MJ-303

BIVARIATE CALCULUS

Effective from June-2024

(Theory: 4 Hours /Week-Credit: 4)

Unit I:

Limits and Continuity of a function of two variables, Partial Differentiation, Total Differential, Composite function, Homogeneous function, Euler's theorem for Homogeneous function.

Unit II:

Taylor's theorem for function of two variables, Maclaurian's expansions in power series, Jacobian, Maxima- Minima for function of two variables: Necessary and sufficient conditions for extreme points.

Unit III:

Multiple Integrals: Change of order of Double integrals, Area, Volume.

Unit IV:

Beta and Gamma functions: Relation between Beta and Gamma functions, Properties, Applications of Beta and Gamma functions.

The course is covered by the following reference books:

1. Shantinarayan, P. K. Mittal: A course of Mathematical Analysis, S. Chand and Co., New Delhi, 2007.
2. T. M. Apostol: Mathematical Analysis, Narosa Publishing House, New Delhi, 2002.
3. S. C. Malik and Savita Arora: Mathematical Analysis, Wiley-Eastern Ltd, New Delhi, 6th Edition, 2021.
4. D. Somasundaram: A First Course in Mathematical Analysis, Narosa Publishing House Pvt Ltd., 2006
5. David V. Widder: Advanced Calculus, PHI Learning Pvt. Ltd, New Delhi, 2nd Edition, 1989.
6. E. Kreyszig: Advanced Engineering Mathematics, 10th Edition, John Wiley, New York, 2011.
7. B. S. Grewal: Higher Engineering Mathematics, 42nd Edition, Khanna Publishers, 2012.
8. N. P. Bhamore & et al.: Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –III

MATHEMATICS–MH-SEC-301

MATHEMATICAL METHODS*

Effective from June-2024

(Theory 2 Hours /Week- Credit: 2)

Unit I:

Notion of finite differences, Finite Difference Operators, Relations between operators, Method of constructing difference tables, Finding the missing terms.

Factorial notation, Expression of polynomials in factorial notation by using finite differences.

Unit II:

Difference equations: Order and degree of a difference equation, Solution of difference equations, Homogeneous difference equations with constant coefficients.

The course is covered by the following reference books:

1. S. S. Sastry: Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 5th Edition, 2012.
2. M. K. Jain, S. R. K. Iyenger, R. K. Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd, 7th Edition, 2019.
3. Goel, Mittal: Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz: Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner: Numerical Methods & Analysis, McGraw Hill Book Co., London.

*Use of Scientific non – programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –III

MATHEMATICS–MH-SEC-302

MATHEMATICS FOR COMPETITIVE EXAMINATIONS*

Effective from June-2024

(Theory 2 Hours /Week- Credit: 2)

Unit I:

HCF and LCM of numbers, Decimal Fractions, Average, Surds and Indices, Problems on Ages, Time and Work, Time and Distance, Permutation and Combination, Percentage, Ratio and Proportion.

Unit II:

Mensuration, Trigonometry: Area, Volume, Surface areas, Heights and Distances.

The course is covered by the following reference books:

1. R. S. Aggrawal: Quantitative Aptitude, S. Chand Co., 2022.
2. Mamta Patel: Text book for Competitive Examinations, Victor Publications, Surat.
3. Arun Sharma, Madhukar Kumar Bhagat, Abhijit Guha: General Studies for Civil Services Preliminary Examination; GS Paper-TI, McGraw Hill Edu-India Pvt. Ltd., Chennai, 2019.
4. R. S. Aggrawal: Arithmetic, Subjective and Objective for Competitive Examinations, S. Chand, April 2017.
5. Disha Experts: Speedy Arithmetic for all Competitive Exams, Disha Pub. Inc., 2021.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –III

MATHEMATICS–MH-SEC-303

FUNDAMENTALS OF VEDIC MATHEMATICS-III

Effective from June-2024

(Theory 2 Hours /Week- Credit: 2)

Unit I:

General Multiplication-Using BAR numbers, Solution of Equations:

- Transpose and apply
- Simultaneous Equations
- Quadratic Equations
- One in ratio the other one zero
- Mergers
- SAMUCCAYA – as a common factor, as the product of independent terms, as the sum of the denominator, as a combination or total and the other types

Unit II:

Solution of Equations

- The ultimate and twice the PENULTIMATE
- Only the last term
- Summation of series
- Factorization

The course is covered by the following reference books:

1. Kenneth R. Williams: Foreword by L. M. Singhvi, Formerly High Commissioner for India in the U. K. Motilal Banarsidass Publishers Private Limited. Delhi, 2005
2. Vandana Singhal: Vedic Mathematics for all ages-A beginner's guide, Motilal Banarsidass Publishers, 2014.
3. Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaja: Vedic Mathematics, Motilal Banarsidass Publishers, 2015.
4. S. K. Kapoor: Vedic Mathematics Course @2006. Lotus Press, Darya Ganj, NewDelhi-110002, ISBN 81-8382-047-6.
5. S. K. Kapoor: The Teaching of Vedic Mathematics @ 2006. Lotus Press, Darya Ganj, New Delhi-110002.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –III

MATHEMATICS–MH-MDC-301

GROUP OF SYMMETRIES

Effective from June-2024

(Theory 4 Hours /Week-Credit: 4)

Unit I:

Definition of a group and its elementary properties, Examples of group, Abelian groups, Cyclic groups, Order of a group, Order of an element of a group, Group multiplication tables, Subgroup, Condition that a subset is a subgroup, Examples of subgroup.

Unit II:

Basic concept of symmetry, Symmetry elements and symmetry operations in a space, Identity symmetry operation. Symmetry planes and reflection symmetry, Inversion centre and inversion symmetry, Rotation axes and rotation symmetry, Improper axes and improper rotation symmetry, Product of symmetry operations.

Unit III:

Formation of groups of symmetries (in space) of the following Plane figures (regarded as rigid objects): An isosceles triangle, An equilateral triangle, A rectangle, Asquare. Formation of groups of symmetries of the following Chemical Molecules (Configuration of atoms): H_2O, H_2O_2, Trans- N_2–F_2, NH_3, PCl_3, $CHCl_3$.

Unit IV:

Concept of isomorphism of groups, Isomorphism of multiplicative group with the group of symmetries of an isosceles triangle, Isomorphism of multiplicative group with the group of symmetries of a rectangle, Isomorphism of group of symmetries of a rectangle with the group of symmetries of H_2O, H_2O_2, Trans-N_2–F_2, Isomorphism of group of symmetries of an equilateral triangle with the group of symmetries of NH_3, PCl_3, $CHCl_3$.

The course is covered by the following reference books:

1. F. A. Cotton: Chemical application of group theory, Wiley Inter Science, Wiley Eastern Ltd., New Delhi.
2. G. Davidson: Intro. Group Theory for Chemists, Applied Science Publisher.
3. I. N. Herstein: Topics in Algebra, Wiley Eastern Ltd., New Delhi.
4. Joseph A. Gallian: Contemporary Abstract Algebra, CRC Press, 10th Ed.
5. P. R. Bhattacharya, S. K. Jain and S. R. Nagpaul: Basic Abstract Algebra, Cambridge University Press, Indian Ed., 1997.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –III

MATHEMATICS–MH-MDC-302

APPLICATIONS OF CALCULUS IN COMMERCE AND ECONOMICS

Effective from June-2024

(Theory 4 Hours /Week-Credit: 4)

Unit I:

Introduction to Fixed cost, Variable cost, Cost function, Revenue function, Demand function, Profit function, Break even analysis etc. Graphs relating these functions, formulation of such functions.

Unit II:

Differentiation of Polynomial functions, Product rule, Quotient rule, Higher order derivative. Concept of Increasing and Decreasing functions using first derivative, Concept of Maxima and Minima using second derivative test, Definite integration of polynomial functions.

Unit III:

Application of differential calculus: Marginal Cost function and its interpretation, Marginal Revenue function and its interpretation, Maximizing Profit function and Minimizing the Cost function.

Unit IV:

Application of Integral calculus in Economics and Commerce.

The course is covered by the following reference books:

1. Laurence D Hoffman & Gerald L Bradley: Calculus for Business, Economicsand the Social and Life Sciences, McGraw Hill (10^{th} Edition)
2. Akihito Asano: An Introduction to Mathematics for Economics, CambridgeUniversity Press.
3. Howard Anton, Irl Bivens & Stephens Davis: Calculus, Willey, 10^{th} Edition.
4. Rhonda Huetten mueller: Business Calculus, McGraw-Hill Publishing, 2006

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MAJOR

Semester: IV

Effective from June-2024

Semester	Level of Course	Paper	Title of the Paper	Hours	Credit
IV	200	MH-MJ-401	Numerical Methods-II	02	02
		MHP-MJ-401	Practical based on MH-MJ-401	04	02
		MH-MJ-402	Laplace Transforms: Theory and Applications	02	02
		MHP-MJ-402	Practical based on MH-MJ-402	04	02
		MH-MJ-403	Number Theory – I	04	04

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MH-MJ-401

NUMERICAL METHODS –II

Effective from June-2024

(Theory: 2 Hours / Week - Credits: 2)

Unit I:

Finite difference with unequal interval, Lagrange's Interpolation Formula, Divided Differences, Newton's General Interpolation Formula.

Numerical Differentiation: 1st and 2nd order derivatives based on Newton's forward and backward difference interpolation formulae.

Unit II:

Numerical Integration: General Integration formula, Trapezoidal Rule, Simpson's 1/3-Rule, Simpson's 3/8-Rule.

Solution of Ordinary Differential Equations by Taylor's series method, Picard's approximation method, Euler's method.

The course is covered by the following reference books:

1. S. S. Sastry: Introductory methods of Numerical Analysis, Prentice-Hall of India Pvt. Ltd.; 5th Edition, 2012.
2. M. K. Jain, S. R. K. Iyenger, R. K. Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd, 7th Edition, 2019.
3. Goel, Mittal: Numerical Analysis, Pragati Prakashan, Meerut, 23rd Edition, 2019.
4. Kaiser A. Kunz: Numerical Analysis, McGraw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner: Numerical Methods and Analysis, McGraw Hill Book Co., London.
6. P. C. Biswal: Numerical Analysis, Prentice-Hall of India, 2008.
7. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chand and Co., 2005.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MHP-MJ-401 (Practical)

Effective from June-2024

(Practical-4 Hours/Week-Credit:2)

Practical-1	Lagrange's Interpolation Formula
Practical-2	Newton's Divided Difference Interpolation Formula
Practical-3	1st and 2nd order derivatives based on Newton's forward difference interpolation formula
Practical-4	1st and 2nd order derivatives based on Newton's backward difference interpolation formula
Practical-5	Numerical Integration: Trapezoidal Rule
Practical-6	Numerical Integration: Simpson's 1/3-Rule, Simpson's 3/8-Rule
Practical-7	Solution of Ordinary Differential Equations by Taylor's series method
Practical-8	Solution of Ordinary Differential Equations by Picard's approximation method and Euler's method

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MH-MJ-402

LAPLACE TRANSFORMS: THEORY AND APPLICATIONS

Effective from June-2024

(Theory: 2 Hours / Week - Credits: 2)

Unit I:

Laplace Transforms: Laplace Transforms of elementary functions, Properties of Laplace Transforms, Differentiation and Integration of Laplace Transforms, Laplace Transforms of derivatives and integrals.

Unit II:

Inverse Laplace Transforms: Method of Partial fractions, Properties of inverse Laplace Transforms, Applications of Laplace and Inverse Laplace transforms

The course is covered by the following reference books:

1. E. Kreyszig: Advanced Engineering Mathematics, 10th Edition, John Wiley, New York, 2011.
2. Lokenath Debnath, Dambaru Bhatta: Integral Transforms and their applications, 3rd Edition, CRC Press Taylor & Francis Group, 2015.
3. B. S. Grewal: Higher Engineering Mathematics, 42nd Edition, Khanna Publishers, 2012.
4. H. K. Dass: Advanced Engineering Mathematics, S. Chand and Company Pvt. Ltd., 2008.
5. N. P. Bali, Usha Paul, Text book of Engineering Mathematics, 9th Edition, Laxmi Publication (P) Ltd., 2016.
6. N. P. Bhamore & et al: Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MHP-MJ-402 (Practical)

Effective from June-2024

(Practical-4 Hours/Week-Credit:2)

Practical-1	Laplace Transforms of elementary functions
Practical-2	Properties of Laplace Transforms
Practical-3	Differentiation and Integration of Laplace Transforms
Practical-4	Laplace Transforms of Derivatives and Integrals
Practical-5	Inverse Laplace Transforms: Method of Partial fractions
Practical-6	Properties of inverse Laplace Transforms
Practical-7	Applications of Laplace and Inverse Laplace transforms-I
Practical-8	Applications of Laplace and Inverse Laplace transforms-II

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MH-MJ-403

NUMBER THEORY – I

Effective from June-2024

(Theory: 4 Hours / Week - Credits: 4)

Unit I:

Divisibility of integers, the Division Algorithm, Greatest Common Divisor of two integers, the Euclidean algorithm, Relation between Greatest Common Divisor and Least Common Multiple of two integers.

Unit II:

Computation of the solutions of Linear Diophantine Equations in two variables, Primes and Composite numbers, Fundamental Theorem of Arithmetic, Pythagorean theorem for the irrationality of $\sqrt{p}$, for any prime p.

Unit III:

Sieve of Eratosthenes, Infinitude of primes, Upper Bound for the primes, Theory of Congruence.

Unit IV:

Basic Properties of Congruence, Divisibility tests of 9 and 11.

The course is covered by the following reference books:

1. David M. Burton: Elementary Number Theory, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 7th Edition, 2011.
2. S. G. Telang: Number Theory, The Tata McGraw Hill Co. Ltd., New Delhi.
3. I. Niven, S. Zuckerman & L. Montgomery: An Introduction to Theory of Numbers, John Wiley, 1991.
4. George Andrews: Number Theory, The Hindustan Pub. Corporation, New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS) MINOR (ME)

Semester: IV

Effective from June-2024

Semester	Level of Course	Paper	Title of the Paper	Hours	Credit
IV	200	MH-ME-401	Vector Calculus: Theory and Applications	02	02
		MHP-ME-401	Practical based on MH-ME-401	04	02

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MH-ME-401

VECTOR CALCULUS: THEORY AND APPLICATIONS

Effective from June-2024

(Theory: 2 Hours / Week - Credits: 2 Hours)

Unit I:

Elementary concept of vectors, Scalar Product and Vector Product of Vectors, Scalar triple product and Vector triple product, Vector point function, Vector differentiation.

Unit II:

Directional derivatives, Gradient, Divergence, Curl, their properties and applications.

The course is covered by the following reference books:

1. Shantinarayan, P. K. Mittal: A text book of Vector Calculus, 4th Edition, S. Chand and Co., New Delhi, 1987.
2. Hari Kishan: Vector Algebra and Calculus, Atlantic Pub. & Distributors(P) Ltd., New Delhi.
3. E. Kreyszig: Advanced Engineering Mathematics, 10th Edition, John Wiley, New York, 2011.
4. B. S. Grewal: Higher Engineering Mathematics, 42nd Edition, Khanna Publishers, 2012.
5. H. K. Dass: Advanced Engineering Mathematics, S. Chand and Company Pvt. Ltd., 2008.
6. N. P. Bhamore & et al: Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – IV

MATHEMATICS–MHP-ME-401 (Practical)

Effective from June-2024

(Practical-4 Hours/Week-Credit:2)

Practical-1	Elementary Concept of Vectors
Practical-2	Scalar Product and Vector Product of Vectors
Practical-3	Scalar Triple Product and Vector Triple Product of Vectors
Practical-4	Vector Point Function and Vector Differentiation
Practical-5	Directional Derivatives
Practical-6	Gradient and Divergence
Practical-7	Curl of Vector point Function
Practical-8	Properties of Gradient, Divergence and Curl

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER–IV

MATHEMATICS–MH-SEC-401

MATHEMATICAL MODELLING*

Effective from June-2024

(Theory-2 Hours/Week- Credit:2)

Unit-I:

Mathematical modelling through ordinary differential equation of first order, Linear growth models; Linear decay models, Models for growth of Science and scientists, Non-linear growth and decay models, Model of Logistic law of population, Spread of technological innovation, Spread of infectious diseases.

Unit-II:

Mathematical models of geometrical problems through ordinary differential equation of first order, Simple geometrical problems, Orthogonal trajectories.

The course is covered by the following reference books:

1. J. N. Kapoor: Mathematical Modelling, New Age International Publishers, New Delhi, 2nd Edition, 2012.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley, New York,10th Edition 2023.
3. J. K. Sharma: Operations Research Theory & Applications, Trinity Press, 6th Edition, 2017.
4. G. Hadley: Linear Programming, Narosa Publishing House, New Delhi,1995.

*Use of Scientific non –programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER–IV

MATHEMATICS–MH-SEC-402

QUANTITATIVE APTITUDE & DATA INTERPRETATION*

Effective from June-2024

(Theory-2 Hours/Week- Credit:2)

Unit I:

Whole numbers, Integers, Rational and irrational numbers, Fractions, Square roots and Cube roots, Surds and Indices, Problems on Numbers, Divisibility, Steps of Long Division Method for Finding Square Roots, Basic concepts and Different formulae of Percentage, Profit and Loss, Discount, Simple interest, Ratio and Proportion, Mixture.

Unit II:

Time and Work, Pipes and Cisterns, Basic concepts of Time, Distance and Speed: Relationship among them, Raw and Grouped Data, Bar Graphs, Pi charts, Mean, Median and Mode

The course is covered by the following reference books:

1. R. S. Aggrawal: Quantitative Aptitude, S. Chand Co., 2022.
2. Mamta Patel: Text book for Competitive Examinations, Victor Publications, Surat.
3. Arun Sharma, Madhukar Kumar Bhagat, Abhijit Guha: General Studies for Civil Services Preliminary Examination, GS Paper-II, McGraw Hill Edu (India) Pvt. Ltd., Chennai, 2019.
4. R. S. Aggrawal: Arithmetic, Subjective and Objective for Competitive Examinations. S. Chand, April 2017.
5. Skill Enhancement Compulsory Course-II: Quantitative and Logical Thinking, Odisha State Higher Education Council, Bhubaneswar.

*Use of Scientific non –programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER–IV

MATHEMATICS–MH-SEC-403

FUNDAMENTALS OF VEDIC MATHEMATICS-IV

Effective from June-2024

(Theory: 2 Hours/Week- Credit:2 Hours)

Unit-I:

Squares and Square roots

– Squaring two figure numbers

– General squaring- from left to right

– Number splitting- to simplify squaring calculations

– Algebraic squaring

– Digit sums of squares

– Square roots of perfect squares

– Squaring bigger numbers

Unit-II:

Triple Subtraction

– Equation of a line

– Product of two complex numbers

– Quotient of two complex numbers

– Square roots of complex numbers

The course is covered by the following reference books:

1. Kenneth R. Williams: Foreword by L. M. Singhvi, Formerly High Commissioner for India in the U. K. Motilal Banarsidass Publishers Private Limited. Delhi-2005
2. Vandana Singhal: Vedic Mathematics for all ages-A beginner's guide, Motilal Banarsidass Publishers, 2014.
3. Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaja: Vedic Mathematics, Motilal Banarsidass Publishers, 2015.
4. Kaushal Patel: Vedic Mathematics for all, Notion Press, 2023.
5. S. K. Kapoor: Vedic Mathematics Course, Lotus Press, Darya Ganj, New Delhi, 2006, ISBN81-8382-047-6.
6. S. K. Kapoor: The Teaching of Vedic Mathematics, Lotus Press, Darya Ganj, New Delhi, 2006.