



Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ગણિતશાસ્ત્ર વિષય ચલાવતી સ્નાતક કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૦ થી અમલમાં આવનાર F.Y.B.Sc. Sem-I, II, (Mathematics)નાં અભ્યાસક્રમ અંગે ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૦૫/૧૦/૨૦૧૯ નાં ઠરાવ ક્રમાંક: ૩ અન્વયે નીચે મુજબ ભલામણ કરેલ છે. જે ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા.૩૦/૬/૨૦૨૦ ની સભાના ઠરાવ ક્રમાંક:૩૧ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્દુપરાંત તેનો અમલ કરવો.

ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૦૫/૧૦/૨૦૧૯ નાં ઠરાવ ક્રમાંક: ૩

:: આથી ઠરાવવામાં આવે છે કે, તા.૧૭/૦૯/૨૦૧૯ ના રોજ પેટાસમિતિએ તૈયાર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૦ થી અમલમાં આવનાર F.Y. B.Sc. Mathematics Sem-I અને II નો અભ્યાસક્રમ (Proposed Syllabus) B.O.S.ના ચેરમેનશ્રીને સુપ્રત કરવામાં આવ્યો હતો. તેમાં જરૂરી સુધારા વધારા સાથે તૈયાર કરેલ અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૩૦/૦૬/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંક: ૩૧

:: આથી ઠરાવવામાં આવે છે કે, ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિએ તેની તા.૦૫/૧૦/૨૦૧૯ની સભાના ઠરાવ ક્રમાંક : ૩ અન્વયે ભલામણ કરેલ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૦ થી અમલમાં આવનાર F.Y.B.Sc. Sem-I, II, નો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૫૮૦૮/૨૦૨૦
તા. ૧૫-૦૭-૨૦૨૦

R- B. P. T. 1
16-07-20
ઈ.ચા. કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ગણિતશાસ્ત્ર વિષય ચલાવતી સ્નાતક કોલેજોનાં આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રી.
- ૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારું.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

Semester :I,II

Effective From June-2020

Semester	Paper	Title of the Paper	Hours	Credit	Marks
I	MTH-101	Mathematics-I	3	3	70 (20 Internal + 50 External)
	MTH-102	Mathematics-II	3	3	
II	MTH-201	Mathematics-III	3	3	
	MTH-202	Mathematics-IV	3	3	

Chairman
N. B. Chaudhary

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER –I

MTH-101

MATHEMATICS-I

Effective from June-2020

Marks :70 (20 Internal +50 External)

(3 Hours /Week-Credit :3)

Unit –I

De' Moivre's theorem and its applications, Trigonometric functions for multiple arguments.

Unit-II

Euler's expressions, Evaluation of Indeterminate forms by using Euler's expressions, Hyperbolic functions for real arguments and their inverses.

Unit-III

Exponential, Circular and Hyperbolic functions for complex variables and their identities, Euler's Theorem, Relations between circular and Hyperbolic functions.

Unit-IV

Logarithm of complex quantities, Separations of Logarithmic, Inverse circular and Inverse hyperbolic functions into real and imaginary parts.

The course is covered by the following reference books :

- 1. S. L. Loney: Plane Trigonometry, Part I and II, Mc Millan and Co. London.**
- 2. R. S. Verma, K. S. Shukla: Text book of Trigonometry, Pothishala Pvt. Ltd. Allahabad.**
- 3. E. Kreyszig: Advanced Engineering Mathematics, Wiley India Pvt. Ltd.**
- 4. N.P.Bhamore and et al: College Aadhunik Ganit shastra, Popular Prakashan, Surat.**

M. B. K.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –I

MTH-102

MATHEMATICS-II

Effective from June-2020

Marks :70 (20 Internal +50 External)

(3 Hours /Week-Credit :3)

Unit –I

Successive differentiation, Calculation of n^{th} derivatives of some standard functions (rational functions and powers of sine, cosine functions), Leibnitz theorem and its applications

Unit-II

Rolle's Theorems and its geometrical interpretation, Lagrange's Theorem and its geometrical interpretation, Cauchy theorem, Maclaurin and Taylor series expansions

Unit-III

Curvature and radius of curvature (except Polar form), Increasing and Decreasing functions, Asymptotes, Concavity and Convexity

Unit-IV

Reduction formulae for integration of
 $\sin^n x, \cos^n x, \tan^n x, \cot^n x, \sec^n x, \operatorname{cosec}^n x, \sin^p x \cos^q x, x^m \cos nx, x^m \sin nx.$

The course is covered by the following reference books:

1. Shantinayakan: Differential Calculus, Revised Edition December-2004 , S. Chand and Co. New Delhi.
2. Shantinayakan: Integral Calculus, S. Chand and Co. New Delhi.
3. Gorakhprasad: Differential Calculus, Pothishala Pvt. Ltd. Allahabad.
5. M. R. Spigel: Theory and Problems of Advanced Calculus, Schaum's Publishing Co., New York.
6. N. P. Bhamore and et al: College Aadhunik Ganit shastra, Popular Prakashan, Surat.

(Signature)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER –II

MTH-201

MATHEMATICS-III

Effective from June-2020

Marks :70 (20 Internal +50 External)

(3 Hours /Week-Credit :3)

Unit-I

Different types of matrices, Operations on matrices, Properties of operations of matrices, Elementary row operations,

Unit-II

Row-reduced echelon forms, Inverse of matrix by Row –Reduced Echelon form. Row rank of a matrix, Quadratic forms.

Unit-III

Trace of matrix and its properties, Solution of homogeneous system of linear equations using row – reduced echelon forms.

Unit-IV

Characteristic equation of a matrix, Method to find Characteristic equation using determinant and minors of a matrix, Eigen values and Eigen vectors of a matrix, Cayley-Hamilton theorem and its application to find an inverse of a matrix, Method of diagonalization.

The course is covered by the following reference books:

- 1. Krishnamurthy, Mainra and Arora: An Introduction to linear Algebra, Affiliated West Press Pvt. Ltd., New Delhi.**
- 2. Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India (P) Ltd., 2009.**
- 3. B.S.Vasta and Suchi Vasta: Theory of Matrices; 4rd Edition -2014, New Age International (P) Ltd. Publishers, New Delhi.**
- 4. Shantinayakan: Text book of Matrices, S. Chand and Co., New Delhi.**
- 5. H. K. Dass, H. C. Saxena, M. D. Raisinghania: Simplified course in Matrices, S. Chand and Co., New Delhi.**
- 6. N.P.Bhamore and et al: College Aadhunik Ganit shastra, Popular Prakashan, Surat.**

VEER NARMAD SOUTH GUJARAT UNIVERSITY,SURAT

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER –II

MTH-202

MATHEMATICS-IV

Effective from June-2020

Marks :70 (20 Internal +50 External)

(3 Hours /Week-Credit :3)

Unit-I

Curve Tracing : Equation of the form $y = f(x)$, Equation of the form $y^2 = f(x)$, Parametric equations,

Unit-II

Application of Integral calculus: Length of a curve, Intrinsic equation (except polar coordinates).

Unit:III

Bernoulli's equation, Exact differential equation, Differential equations of first order and higher degree : Solvable for x, y, p and Lagrange's equation, Clairaut's equation.

Unit-IV

Linear Differential Equations with constant coefficients: Complimentary functions, Particular Integral, General Solution, Method for finding Particular Integral specially for $e^{ax}, \sin ax, \cos ax$, polynomial in terms of $x, e^{ax}V$ and xV , where V is a function of x .

The course is covered by the following reference books:

1. Shantinayakan : Differential calculus ,4th edition -2001, Shyamlal Charitable Trust, Ram nagar New Delhi, S. Chand and Company LTD.
2. Shantinayakan: Integral Calculus, Revised Edition-2009, S.Chand and Co., New Delhi.
3. Gorakhprasad: Integral Calculus, Pothishala Pvt.Ltd., Allahabad.
4. D.A.Murray: Differential Equations, Tata Mc Graw Hills.
5. Frank Ayres: Theory and problems on Differential Equations, Mc Graw Hill Book Co., New York.
6. N.P.Bhamore and et al: College Aadhunik Ganit shastra, Popular Prakashan, Surat.



Re-Accredited by NAAC with 'A' Grade

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની ગણિતશાસ્ત્ર વિષય ચલાવતી સંલગ્ન સ્નાતક આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ : ૨૦૨૧-૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III & IV, Mathematics વિષયનો અભ્યાસક્રમ અંગે ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા. ૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક:૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા. ૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૧૫ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા.૨૫-૨૬/૦૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક: ૨૫ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્દુપરાંત તેનો અમલ કરવો.

ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા. ૧૪/૦૬/૨૦૨૧ની સભાનાં ભલામણ ક્રમાંક:૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ : ૨૦૨૧-૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III & IV ગણિતશાસ્ત્ર વિષયનો અભ્યાસક્રમ જે પેટાસમિતિએ બનાવ્યો હતો તે સર્વાનુમતે મંજૂર કરવામાં આવ્યો, જે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા. ૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૧૯

:: આથી ઠરાવવામાં આવે છે કે, ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા. ૧૪/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક:૨અન્વયે મંજૂર કરેલ શૈક્ષણિક વર્ષ : ૨૦૨૧-૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III, &IV, Mathematics વિષયનો અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.


એકેડેમિક કાઉન્સિલની તા.૨૫-૨૬/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક: ૧૫

:: આથી ઠરાવવામાં આવે છે કે, ગણિતશાસ્ત્ર વિષયની અભ્યાસસમિતિએ તેની તા. ૧૪/૦૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે ભલામણ કરેલ અને વિજ્ઞાન વિદ્યાશાખાએ તેની તા. ૧૭/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક : ૧૯ અન્વયે સ્વીકારેલ શૈક્ષણિક વર્ષ : ૨૦૨૧-૨૨ થી અમલમાં આવનાર S.Y.B.Sc. Sem-III & IV Mathematics વિષયનો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૯૨૨૬/૨૧

તા.૦૧-૦૭-૨૦૨૧


ઈ.ચા. કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની ગણિતશાસ્ત્ર વિષય ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ.
- 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)
Semester: III, IV
Effective from June 2021

B. Sc.	Paper	Name of the Paper	Hours	Credit	Marks
Semester III	MTH-301	Mathematics-V	3	3	70 (20 Internal + 50 External)
	MTH-302	Mathematics-VI	3	3	
	MTH-303	Mathematics-VII	3	3	
	EG-3001	Mathematical Methods	2	2	
	EG-3002	Group of Symmetries – I	2	2	
Semester IV	MTH-401	Mathematics-VIII	3	3	
	MTH-402	Mathematics-IX	3	3	
	MTH-403	Mathematics-X	3	3	
	EG-4001	Mathematical Modeling	2	2	
	EG-4002	Group of Symmetries – II	2	2	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER - III
MTH-301
(Mathematics-V)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week – Credits: 3)

Unit I:

Limits and Continuity of a function of two variables, Partial Differentiation, Total Differential, Composite function, Homogeneous functions.

Unit II:

Euler's theorem for Homogeneous functions, Taylor's theorem for functions of two variables, Maclaurian's expansions in power series, Jacobian.

Unit III:

Maxima-Minima for functions of two variables: Necessary and sufficient conditions for extreme points.

Unit IV:

Vector point function, Differentiation of a Vector point function, Gradient, Divergence and Curl and their properties, Line Integral.

The course is covered by the following reference books:

1. Shantinayakan, P. K. Mittal : A course of Mathematical Analysis, S. Chand and Co., New Delhi.
2. Hari Kishan : Vector Algebra and Calculus, Atlantic Pub. & Distributors(P) Ltd., New Delhi.
3. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
4. S. C. Malik : Mathematical Analysis, Wiley-Eastern Ltd, New Delhi.
5. N. P. Bhamore & et el : Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -III
MTH-302
(Mathematics-VI)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:

Error estimation: Errors and their computations, A general error formula.

Unit II:

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

Unit III:

Forward Differences, Backward Differences, Central Differences, Symbolic relation and separation of symbols, Differences of Polynomials.

Unit IV:

Newton's Forward and Backward Formulae, Gauss' 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.
2. M. K. Jain, Iyenger, Jain : Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
3. Goel, Mittal : Numerical Analysis, Pragati Prakashan, Meerut.
4. Kaiser A. Kunz : Numerical Analysis, Mc Graw Hill Book Co., London.
5. James I. Buchanan, Peter R. Turner : Numerical Methods and Analysis, Mc Graw Hill Book Co., London.
6. P. C. Biswal: Numerical Analysis, Prentice-HallofIndia, 2008.
7. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chandand Co., 2005.

* Use of Scientific non – programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -III
MTH-303
(Mathematics-VII)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:

Linear Differential Equations with variable coefficients, Homogeneous Differential Equations, Legendre's Differential Equation.

Unit II:

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 III:

Formation of Partial Differential Equation, Solution of Partial Differential Equations, Equations solvable by direct integral.

Unit IV:

Partial Differential Equations of first order, Nonlinear Partial Differential Equations of first order, Some special methods.

The course is covered by the following reference books :

1. D. A. Murray: An Introductory Course in Differential Equations, Orient Longmans, Bombay.
2. I. N. Sneddon: Elements of Partial Differential Equations, McGraw Hill Book Company.
3. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. Gorakh prasad : Differential Equations, Pothishala Pvt. Ltd., Allahabad.
5. M. D. Rai Singhania : 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 el. : Mathematics Paper III-IV, Popular Prakashan, Surat.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -III
Elective Generic
EG-3001
(Mathematical Methods)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 2)

Unit I:

Notations of finite difference calculus, Operators E , Δ , ∇ , δ , Relations between different operators and their properties, Relation between difference and differential operators, Method of constructing difference tables, Finding the missing terms.

Unit II:

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

Unit III:

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.; 4th Edition.
2. M. K. Jain, Iyenger, Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
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
Elective Generic
EG-3002
(Group of Symmetries-I)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 2)

Unit I:

Definition of a group and its elementary properties, Order of a group, Order of an element of a group, Group multiplication tables, Examples of groups including finite groups and infinite groups, Abelian groups, Cyclic groups.

Unit II:

Subgroup, Condition that a subset is a subgroup, Examples of subgroups, Basic concept of symmetry, Symmetry elements and symmetry operations in a space, Identity symmetry operation.

Unit III:

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.

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.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
MTH-401
(Mathematics-VIII)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:

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

Unit II:

Double and Triple Integrals: Change of order of Double integrals, Area.

Unit III:

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

Unit IV:

Inverse of Laplace Transform: Method of Partial fractions, Properties of inverse Laplace Transform.

The course is covered by the following reference books:

1. David V. Widder : Advanced Calculus, PHI Learning Pvt. Ltd, New Delhi
2. Kreysig: Advanced Engineering Mathematics, John Wiley, New York, 1999.
3. Shantinayakan, P. K. Mittal : A course of Mathematical Analysis, S. Chand and Co., New Delhi.
4. 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
MTH-402
(Mathematics-IX)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:

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

Unit II:

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

Unit III:

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

Unit IV:

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.; 4th Edition.
2. M. K. Jain, Iyenger, Jain: Numerical Methods for Scientific and Engineering Computations, New Age International Ltd.
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 and Analysis, McGraw Hill Book Co., London.

* Use of Scientific non – programmable calculator is permitted.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
MTH-403
(Mathematics-X)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(3 Hours / Week - Credits: 3)

Unit I:

Sets and elements, Operations on sets, Functions, Real-valued functions.

Unit II:

Countable & Uncountable sets, Greatest lower bound and least upper bound.

Unit III:

Sequences of real numbers, Sub-sequences, limit of a sequence, Convergent sequences, Divergent sequences.

Unit IV:

Divisors, Greatest common divisor, Least Common multiple, Prime numbers, Fundamental theorem of Arithmetic, Congruence relation, Equivalence classes.

The course is covered by the following reference books :

1. R. R. Goldberg : Methods of Real Analysis, Oxford & TBH Pub. Co.
2. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 2006.
3. I. H. Sheth : Abstract Algebra, Nirav Prakashan, Ahmedabad.
4. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
5. S. C. Malik : Mathematical Analysis, Wiley-Eastern Ltd, New Delhi.
6. Shantinarayan : Modern Algebra, S. Chand and Co., New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER -IV
Elective Generic
EG-4001
(Mathematical Modeling)*
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits: 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.

Unit II:

Non-linear growth and decay models, Model of Logistic law of population, Spread of technological innovation, Spread of infectious diseases.

Unit III:

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.
2. Kreysig: Advanced Engineering Mathematics, John Wiley, New York, 1999.
3. J. K. Sharma: OR Theory & Applications, Mac Milian India Ltd., 1998.
4. G. Hadley: Linear Programming, Narosa Publishing House, New Delhi, 1995.
5. G. Paria : Linear Programming, Transportation, Assignment, Game, Books & Allied Pvt. Ltd. Calcutta.

* Use of Scientific non – programmable calculator is allowed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B. Sc. (MATHEMATICS)
SEMESTER - IV
Elective Generic
EG-4002
(Group of Symmetries-II)
Effective from June 2021
Marks:70 (20 internal + 50 external)
(2 Hours / Week - Credits : 2)

Unit I:

Formation of groups of symmetries (in space) of the following Plane figures (regarded as rigid objects):

1. An isosceles triangle (cyclic group C_2 of order 2)
2. An equilateral triangle (the group S_3 of order 6)
3. A rectangle (the group V_4)
4. A square (the group D_4)

Unit II:

Formation of groups of symmetries of the following Chemical Molecules (Configuration of atoms).

1. H_2O (the group V_4)
2. H_2O_2
3. Trans- $N_2 - F_2$ (the group V_4)
4. NH_3 , PCl_3 , $CHCl_3$ (the group S_3)

Unit III:

Concept of isomorphism of groups, Isomorphism of multiplicative group with the group C_2 of the symmetries of an isosceles triangle, Isomorphism of multiplicative group with the group V_4 of the symmetries of a rectangle, Isomorphism of group V_4 of the symmetries of a rectangle with the group of symmetries of H_2O , Isomorphism of group S_3 of the 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, 2006.



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VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ગણિતશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર ટી.વાય.બી.એસસી સેમેસ્ટર -૫ અને સેમેસ્ટર-૬ ના નવા અભ્યાસક્રમ ગણિતશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા.૧૨/૪/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૨૭ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

ગણિતશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૦૨૩ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. સેમેસ્ટર - ૫ અને ૬, ગણિતશાસ્ત્ર વિષયનો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમમાં જરૂરી સુધારા-વધારા સાથે સર્વાનુમતે મંજૂર કરી જૂન ૨૦૨૨થી અમલમાં આવે તે રીતે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.


એકેડેમિક કાઉન્સિલની તા.૨૧/૦૪/૨૦૨૨ની ઠરાવ ક્રમાંક: ૨૭

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર ટી.વાય. બી.એસસી સેમે. -૫ અને સેમે. -૬ ના નવા અભ્યાસક્રમ ગણિતશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક:૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં ડીનશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી ટી.વાય. બી.એસસી. સેમે. -૫ અને સેમે. -૬ ના નવો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./ગણિતશાસ્ત્ર/પરિપત્ર/૭૭૭૫/૨૦૨૨

તા.૨૦-૦૪-૨૦૨૨


ઈ.ચા. કુલસચિવ

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન ગણિતશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ.

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)
Semester: V, VI
Effective from June 2022

Semester	Paper	Name of the Paper	Hours	Credit	Marks
V	MTH-501	Group Theory	3	3	Total marks 70 (50 External +20 Internal)
	MTH-502	Linear Algebra – I	3	3	
	MTH-503	Real Analysis – I	3	3	
	MTH-504	Real Analysis – II	3	3	
	MTH-505	Graph Theory	3	3	
	MTH-506	Number Theory – I	3	3	
	E.G.	5001-Operations Research – I 5002-Computer Oriented Numerical Methods – I 5003-Fourier Series 5004-Computer Programming in FORTRAN 90 and 95-I	2	2	
VI	MTH-601	Ring Theory	3	3	Total marks 70 (50 External +20 Internal)
	MTH-602	Linear Algebra – II	3	3	
	MTH-603	Real Analysis – III	3	3	
	MTH-604	Real Analysis – IV	3	3	
	MTH-605	Discrete Mathematics	3	3	
	MTH-606	Number Theory – II	3	3	
	E.G.	6001-Operations Research – II 6002-Computer Oriented Numerical Methods – II 6003-Fourier Transform and its Applications 6004-Computer Programming in FORTRAN 90 and 95-II	2	2	

(M) Tailor
 Chairman
 DR. M. R. Tailor

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc.(MATHEMATICS)

SEMESTER –V

MTH – 501

(Group Theory)

Effective from June 2022

Marks:70 (20 internal+50external)

(3 Hours / Week - Credits :3)

Unit 1:

Definition of a Group, Examples of Group, elementary properties of a Group, Finite Groups. Subgroups, Cyclic Groups, Order of an element.

Unit 2:

Cosets, Congruence Relation in Group Lagrange's theorem, Euler's theorem, Fermat's theorem, Counting principle.

Unit 3:

Normal subgroups & Quotient groups, Homomorphism, Isomorphism, Isomorphic groups, Fundamental theorem of homomorphism, Automorphisms, Cayley's theorem.

Unit 4:

Permutation Groups, Orbit & Cycles, Even permutation, Odd permutation, Alternating Group.

The syllabus is covered by the following reference books:

1. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd. New Delhi, Ed. 2016.
2. I. H. Sheth : Abstract Algebra, Nirav Prakashan, Ahmedabad.
3. N. S. Gopal Krishnan : University Algebra, Wiley Eastern Ltd.
4. P. R. Bhattacharya, S. K. Jain and S. R. Nagpaul : Basic Abstract Algebra, Cambridge University Press, Indian Edition, 1997.
5. Shantinayakan : Modern Algebra, S. Chand & Co.
6. Serge Lang : Algebra, Addition Wesley, 1993.
7. Surjeet & Kazi Zameeruddin : Modern Algebra, Vikas Publishing House.

17/01/22

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)**

SEMESTER – V

MTH –502

(Linear Algebra – I)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Definition and examples of Vector space, Subspace, Necessary and sufficient condition for a subspace, Illustrations.

Unit 2:

Span of a set, union and intersection of subspaces, Sum and Direct sum of subspaces.

Unit 3:

Linearly dependent and independent vectors, Verification of Linear dependence or independence.

Unit 4:

Dimension and Basis of a vector space, Extension of a linearly independent set to a basis, Dimension of sum.

The syllabus is covered by the following reference books:

1. V. Krishnamurthy, V. P. Mainra & J. L. Arora : An Introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd., New Delhi. Ed. 2018.
2. I. H. Sheth : Linear Algebra, NiravPrakashan.
3. S. Kumaresan : Linear Algebra, Prentice Hall of India, 2000.
4. Serge Lang : Linear Algebra, Addition-Wesley Pub. Co. (Student Ed.).
5. Balakrishnan : Linear Algebra, Tata-McGraw Hill Ed.

18/01/22

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

MTH – 503

(Real Analysis – I)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Bounded sequences, Monotone sequences, Operations on convergent sequences.

Unit 2:

Operations on divergent sequences, Concepts of limit superior and inferior, Cauchy sequence.

Unit 3:

Convergence and divergence of series of real numbers, Series with non-negative terms, Alternating series, Conditional and absolute convergence.

Unit 4:

Tests for absolute convergence, Series whose terms form a non-increasing sequence.

The syllabus is covered by the following reference books:

1. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd. New Delhi. Ed. 2019
2. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi.
3. S. C. Malik : Real Analysis, Wiley-Eastern Pub. Co., New Delhi.
4. Walter Rudin : Principles of Mathematical Analysis, McGraw Hill book Company.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

MTH – 504

(Real Analysis – II)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(3 Hours / Week - Credits :3)

Unit 1:

Revision of Limit and Continuity of a function on the real line, Definition & examples of Metric spaces.

Unit 2:

Limit, Convergence and Cauchy sequence in metric space, Equivalent metrics.

Unit 3:

Open ball in \mathbb{R}^1 , Open ball in metric space, Functions continuous on metric spaces.

Unit 4: Open sets, More about open sets.

The syllabus is covered by the following reference books:

5. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd. New Delhi. Ed. 2019
6. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
7. S. Lang : Undergraduate Analysis, Springer-Verlag, New York, 1983.
8. D. Som Sundaram & B. Chaudhari : A first syllabus in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
9. P. K. Jain & S. K. Kaushik : An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
10. E. T. Copson : Metric Spaces, Cambridge University Press, 1968.
11. P. K. Jain & K. Ahmed : Metric Spaces, Narosa Pub. House, New Delhi, 1996.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

MTH – 505

(Graph Theory)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(3 Hours / Week - Credits :3)

Unit 1:

Graphs, Various type of graphs, Incidence and Degree, Isolated and pendent vertices, Subgraphs, Isomorphism between two graphs.

Unit 2:

Operations on graphs, Walks, Paths, Circuits, Connected graphs, Disconnected graphs, Components of graphs.

Unit 3:

Euler graphs, Arbitrary traceable graph, Hamiltonian Graphs, Applications of graphs: Königsberg Bridge Problem, Seating Arrangement Problem, Utility Problem.

Unit 4:

Trees, Properties of trees, Pendent vertices in a tree, Distance between two vertices, Centre, Radius and Diameter of a Tree, Rooted & Binary trees.

The syllabus is covered by the following reference books:

1. Narsingh Deo : Graph Theory with applications to Engineering & Computer Science, Prentice Hall of India Pvt. Ltd., 2019.
2. R. J. Wilson : Introduction to Graph Theory, Academic Press, New York, 1972.
3. E. Harray : Graph Theory, Addison Wesley Pub. Co., 1969.
4. C. Berge : The Theory of Graphs and its Applications, John Wiley & Sons, 1962.

M. K. Jethava

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

MTH – 506

(Number Theory – I)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

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 2:

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 3:

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

Unit 4:

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

The syllabus is covered by the following reference books:

1. David M. Burton : Elementary Number Theory, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 7th Ed., 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.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

Elective Generic – 5001

(Operations Research – I)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(2 Hours / Week - Credits :2)

Unit 1:

Graphical solution of Linear Programming Problem (LPP). Definition of the Dual Problem, General rules for converting any Primal Problem into its dual, the symmetric Dual Problems.

Unit 2:

Basic concept of Basic, Non-basic, Degenerate, Non-degenerate and Basic feasible solutions of LPP, Slack & Surplus variables.

Unit 3:

LPP in the standard matrix form, Slack & Surplus variables, Solution of LPP using Simplex method.

Unit 4:

Solution of LPP using Two Phase Simplex method and Big-M method.

The syllabus is covered by the following reference books:

1. J. K. Sharma : Operations Research: Theory & Applications, McMillan India Ltd., 1998.
2. Kanti Swaroop, P. K. Gupta & Man Mohan : Operations Research, S. Chand & Sons, New Delhi, 1998.
3. G. Hadley : Linear Programming, Narosa Publishing House, New Delhi, 1995.
4. S. D. Sharma: Operations Research, Kedarnath Ramnath & Co.
5. P. M. Karak : Linear Programming, New Central Book Agency Pvt. Ltd. Calcutta.
6. K. V. Mittal & L. Mohan : Optimization methods in O.R. and System Analysis, New Age International Publications.
7. Goel & Mittal : O.R., Pragati Prakashan, Meerut.

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SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER – V
Elective Generic – 5002
(Computer Oriented Numerical Methods–I)
Effective from June 2022
Marks : 70 (20 internal + 50external)
(2 Hours / Week - Credits :2)

Unit 1:

Flowcharts and symbols, More flowchart in examples.

FORTRAN language, character used in FORTRAN, FORTRAN constants, FORTRAN variable names.

Unit 2:

Type declaration for integer and real, Arithmetic expression (real and integer expressions), Hierarchy of operations in expressions, Examples of Arithmetic expressions.

Unit 3:

Arithmetic statement, Mode of Arithmetic expression, Special function, Examples of use of functions, Program preparation preliminaries.

Unit 4:

Input-Output statement, STOP and END statement, FORTRAN coding form, Simple FORTRAN program, FORTRAN programming examples.

The syllabus is covered by the following reference books:

- 1.V. Rajaraman: Computer Programming in FORTRAN77, PHI.
- 2.V. Rajaraman: Computer Oriented Numerical Methods, PHI.
- 3.Dhaliwal, Agarwal and Gupta: Programming with FORTRAN 77, Wiley Eastern Ltd.
- 4.R. S. Salaria: Computer Oriented Numerical Methods, Khanna Book Pub. Co. Ltd.
5. R. Sirkar: FORTRAN based Algorithms, New Central Book Agency, Calcutta.
- 6.V.Krishnamurthy: FORTRAN based Algorithms, East-West Press, New Delhi.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

Elective Generic – 5003

(Fourier Series)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(2 Hours / Week - Credits :2)

Unit 1:

Definition of Fourier series, Euler's formulae, Evaluation of definite integrals, Conditions for a Fourier expansion.

Unit 2:

Functions having points of discontinuity, Change in intervals, Even and Odd functions.

Unit 3:

Expansion of Even or Odd Periodic functions, Half range series, Typical waveforms.

Unit 4:

Half range series, Typical waveforms, Parseval's formula, Root mean square value, Complex form of Fourier series.

The syllabus is covered by the following reference books:

1. B. S. Grewal : Higher Engineering Mathematics, Khanna Prakashan, New Delhi.
2. S. K. Jain : Fourier series and Fourier Transforms, Swarup and Sons Pub., New Delhi.
3. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd. New Delhi.
4. R. V. Churchill : Fourier series and Boundary value problems, McGraw Hill ISE.
5. Vashishtha and Gupta : Integral Transforms, Krishna Publications, Meerut.

Dr. A. K. Das

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – V

Elective Generic – 5004

(Computer Programming in FORTRAN 90 and 95-I)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(2 Hours / Week - Credits : 2)

Unit 1:

Simple FORTRAN 90 programs-Writing a program, Input statement, Examples of FORTRAN 90 program

Unit 2:

Numeric Constants and Variables-Constants, Scalar Variables, Declaring Variable Names, Implicit Declaration, Named Constants and examples.

Unit 3:

Arithmetic Expressions-Arithmetic Operator and Modes of Expressions, Real Expressions, Integer Expressions, Precedence of operations in expressions, Examples of Arithmetic expressions.

Unit 4:

Assignment Statements-Defining Variables, Some problems Due to Rounding of real numbers, Mixed Mode Expressions, Intrinsic function.

The syllabus is covered by the following reference books:

1. Computer Programming in FORTRAN 90 and 95: V. RAJARAMAN, PHI Learning Private Limited, Seventeenth Printing-March-2015.
2. V. Rajaraman : Computer Programming in FORTRAN 77, PHI.
3. V. Rajaraman : Computer Oriented Numerical Methods, PHI.
4. Dhaliwal, Agarwal and Gupta : Programming with FORTRAN 77, Wiley Eastern Ltd.
5. R. S. Salaria : Computer Oriented Numerical Methods, Khanna Book Pub. Co. Ltd.
6. R. Sirkar : FORTRAN based Algorithms, New Central Book Agency, Calcutta.
7. V. Krishnamurthy : FORTRAN based Algorithms, East-West Press, New Delhi.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 601

(Ring Theory)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(3 Hours / Week - Credits :3)

Unit 1:

Definition of a Ring, Examples of Ring, Integral Domain, Field, Boolean Ring.

Unit 2:

Ring Homomorphism and Isomorphism, Ideals & Quotient rings, Maximal Ideal, Principal Ideal.

Unit 3:

Euclidean rings, Divisibility in commutative ring, GCD of two elements in a ring, Units and Associates in rings.

Unit 4:

Prime element in a Euclidean Ring, Unique factorization theorem in a Euclidean ring.

The syllabus is covered by the following reference books:

1. I. N. Herstein : Topics in Algebra, Wiley Eastern Ltd. New Delhi, 1983.
2. I. H. Sheth : Abstract Algebra, Nirav Prakashan, Ahmedabad.
3. N. S. Gopal Krishnan : University Algebra, Wiley Eastern Ltd.
4. P. R. Bhattacharya, S. K. Jain and S. R. Nagpaul : Basic Abstract Algebra, Cambridge University Press, Indian Edition, 1997.
5. Shantinakaran : Modern Algebra, S. Chand & Co.
6. Serge Lang : Algebra, ed. Addition Wesley, 1993.
7. Surjeet & Kazi Zameeruddin : Modern Algebra, Vikas Publishing House.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 602

(Linear Algebra – II)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Definition and examples of Linear transformation, Range and kernel of a linear transformation.

Unit 2:

Rank-Nullity Theorem, Inverse of a linear transformation, Consequences of Rank-Nullity Theorem, Composition of linear transformations.

Unit 3:

Matrix associated with Linear transformations, Linear transformation associated with a matrix, Application of Rank-Nullity Theorem formatrix.

Unit 4:

Inner product spaces, Norm of a vector, Cauchy-Schwarz's inequality, Triangular inequality, Orthogonal vectors, Vector Projection, Gram-Schmidt Orthogonalization Process, Orthonormal Set.

The syllabus is covered by the following reference books:

1. V. Krishnamurthy, V. P. Mainra & J. L. Arora : An Introduction to Linear Algebra, Affiliated East-West Press Pvt. Ltd., New Delhi. Ed. 2018.
2. I. H. Sheth : Linear Algebra, Nirav Prakashan.
3. S. Kumaresan : Linear Algebra, Prentice Hall of India, 2000.
4. Serge Lang : Linear Algebra, Addition-Wesley Pub. Co. (Student Ed.).
5. Balakrishnan : Linear Algebra, Tata-McGraw Hill Ed.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 603

(Real Analysis – III)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Summability of sequences, Addition and subtraction of $(C, 1)$ Summable sequences, $(C, 2)$ Summable sequences, $(C, 1)$ Summability of series.

Unit 2:

Sequences of functions, Pointwise convergence of Sequences of functions, Uniform convergence of Sequences of functions.

Unit 3:

Sets of measure zero, Definition of the Riemann Integral, Algebraic properties of Riemann Integral.

Unit 4:

Non-Algebraic properties of Riemann Integral Fundamental theorems of Integral Calculus, Mean-value Theorems of Integral Calculus.

The syllabus is covered by the following reference books:

1. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd., New Delhi. Ed. 2019
2. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. S. Lang : Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. Louis Leithold : Calculus with analytic Geometry, Harper and Collins Pub. Co.
5. J. B. Thomas and Finney : Calculus with analytic Geometry.
6. E. T. Copson : Metric Spaces, Cambridge University Press, 1968.
7. P. K. Jain & K. Ahmed : Metric Spaces, Narosa Pub. House, New Delhi, 1996.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 604

(Real Analysis – IV)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Limit points, Closure of a set, Closed sets, Homeomorphism of metric spaces, Dense set.

Unit 2:

Connected sets, Bounded sets, Totally bounded sets.

Unit 3:

Complete metric spaces, Contraction mapping, Picard's fixed-point theorem.

Unit 4:

Compact metric spaces, Open covering, Heine-Borel property, Finite Intersection property.

The syllabus is covered by the following referencebooks:

1. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd., New Delhi. Ed. 2019
2. T. M. Apostol : Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. S. Lang : Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. S. C. Malik : Real Analysis, Wiley-Eastern Pub. Co., New Delhi.
5. Walter Rudin : Principles of Mathematical Analysis, McGraw Hill book Company.
6. Copson : Metric Spaces, Cambridge University Press, 1968.
7. P. K. Jain & K. Ahmed : Metric Spaces, Narosa Pub. House, New Delhi, 1996.

M. D. Tailor

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 605

(Discrete Mathematics)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Binary relations, Properties of binary relations, Equivalence relation, Partial ordered relation, Partially ordered sets, Upper bounds, Lower bounds, GLB & LUB of sets, Totally ordered sets, Well ordered sets, Hasse Diagram, Lattices and its properties.

Unit2:

Lattices as Algebraic Systems, Lattice Homomorphism, Different types of lattices.

Unit3:

Boolean Algebra as an algebraic system, Boolean expressions (forms), Sum of Products Canonical form and Product of Sums Canonical forms of Boolean expressions.

Unit 4:

Representation and Minimization of Boolean functions by Karnaugh Map method and Quine- McCluskey Algorithm, AND, OR & NOT gates, Reduction of switching circuit diagram.

The syllabus is covered by the following referencebooks:

1. J. P. Tremblay & R. Manohar: Discrete mathematical Structures with Applications to Computer Science., McGraw Hill Book Co., 54th Reprint, 2019.
2. B. Kolman, R. C. Busby & S. Ross: Discrete Mathematical Structures, Prentice Hall of India Pvt. Ltd., 3rd ed., 2001.
3. Elements of Discrete Mathematics, C. L. Liu, D. P. Mohapatra, Tata McGraw Hill, 2008.
4. Discrete Mathematics with Applications, Thomas Koshy, Academic Press, 2004.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

MTH – 606

(Number Theory – II)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(3 Hours / Week - Credits :3)

Unit 1:

Computation of the solutions of linear congruence, Chinese Remainder Theorem.

Unit 2:

Fermat's little theorem, Pseudo-primes, Wilson's theorem.

Unit 3:

The number of positive divisors and sum of all positive divisors of an integer, Basic properties and Multiplicative nature of these functions, The Möbius Inversion formula, Greatest integer function.

Unit 4:

Introduction of Euler's Phi-function, Multiplicative nature, Euler's Theorem.

The syllabus is covered by the following reference books:

1. David M. Burton : Elementary Number Theory, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 7th Ed., 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.

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**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)**

SEMESTER – VI

Elective Generic – 6001

(Operations Research – II)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(2 Hours / Week - Credits :2)

Unit 1:

Transportation problem, methods for finding initial basic feasible solution, Solution of Transportation problem by MODI method, Unbalanced Transportation problem.

Unit 2:

Assignment problems, The Hungarian method, Balanced & Unbalanced Assignment problems.

Unit 3:

Competitive Games, Two-person zero-sum game, Maximin and Minimax principle, Saddle points and the value of the game (based on pure strategies), Mixed strategies,

Unit 4:

Solution of Games with Saddle point, Game without saddle points, Dominance rule, Solution of $m \times 2$ and $2 \times n$ Games using graphical method.

The syllabus is covered by the following reference books:

1. J. K. Sharma : Operations Research: Theory & Applications, McMillan India Ltd., 1998.
2. Kanti Swaroop, P. K. Gupta & Man Mohan : Operations Research, S. Chand & Sons, New Delhi, 1998.
3. G. Hadley : Linear Programming, Narosa Publishing House, New Delhi, 1995.
4. S. D. Sharma: Operations Research, Kedarnath Ramnath & Co.
5. P. M. Karak : Linear Programming, New Central Book Agency Pvt. Ltd. Calcutta.
6. K. V. Mittal & L. Mohan : Optimization methods in O.R. and System Analysis, New Age International Publications.
7. Goel & Mittal : O.R., Pragati Prakashan, Meerut.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

Elective Generic – 6002

(Computer Oriented Numerical Methods–II)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(2 Hours / Week - Credits : 2)

Unit 1:

Control statements, Relational operators, Logical IF statement, Arithmetic IF statement, Block IF statement. Statement labels, GOTO statement, Examples of use of Logical IF statement.

Unit 2:

Nested logical IF statement, Computed GO TO statement, DO statement, Examples of DO statement, Rules to be followed in utilizing DO loops, Subscripted variables.

Unit 3:

Subscripted Expression, Dimension statement, DO type notation for input/output statement, FORMAT specification.

Unit 4:

FORMAT specification for a numerical data, Iterative methods, Numerical integrations and differentiations, Numerical solution of ordinary differential equations.

The syllabus is covered by the following reference books:

- 1.V. Rajaraman: Computer Programming in FORTRAN 77, PHI.
- 2.V. Rajaraman: Computer Oriented Numerical Methods, PHI.
- 3.Dhaliwal, Agarwal and Gupta: Programming with FORTRAN 77, Wiley Eastern Ltd.
- 4.R. S. Salaria: Computer Oriented Numerical Methods, Khanna Book Pub. Co. Ltd.
5. R. Sirkar: FORTRAN based Algorithms, New Central Book Agency, Calcutta.
- 6.V.Krishnamurthy:FORTRAN based Algorithms, East-West Press, New Delhi.

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SÈMESTER – VI

Elective Generic – 6003

(Fourier Transform and Its Applications)

Effective from June 2022

Marks : 70 (20 internal + 50external)

(2 Hours / Week - Credits : 2)

Unit 1:

Integral transforms, Fourier Transforms, Properties of Fourier Transform and its application.

Unit 2:

Convolution, Convolution theorem for Fourier transforms. Examples to use Convolution theorem.

Unit 3:

Parseval's Identity for Fourier transforms, Examples to use Parseval's Identity.

Unit 4:

Relation between Fourier and Laplace Transforms, Fourier transforms of the derivatives of a function, Fourier transform and its applications.

The syllabus is covered by the following reference books:

1. B. S. Grewal : Higher Engineering Mathematics, Khanna Prakashan, New Delhi.
2. S. K. Jain : Fourier series and Fourier Transforms, Swarup and Sons Pub., New Delhi.
3. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd. New Delhi.
4. R. V. Churchill : Fourier series and Boundary value problems, McGraw Hill ISE.
5. Vashishtha and Gupta : Integral Transforms, Krishna Publications, Meerut.

Dr. S. K. Jain

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SYLLABUS FOR B.Sc. (MATHEMATICS)

SEMESTER – VI

Elective Generic – 6004

(Computer Programming in FORTRAN 90 and 95–II)

Effective from June 2022

Marks : 70 (20 internal + 50 external)

(2 Hours / Week - Credits : 2)

Unit 1:

Input-Output Statements, List-Directed Input statements, List-Directed Output statements, Examples of programs.

Unit 2:

Conditional Statements, Relational Operators, The Block IF Construct, Examples of Programs using IF structures.

Unit 3:

The Necessity of loops constructs in a Programming Language, The block DO loops in FORTRAN 90, Examples of Programs.

Unit 4:

Count Controlled DO loops in FORTRAN 90, Rules To be followed in writing DO loops, Examples of programs.

The syllabus is covered by the following reference books:

1. Computer Programming in FORTRAN 90 and 95: V. RAJARAMAN, PHI Learning Private Limited, Seventeenth Printing-March-2015.
2. V. Rajaraman : Computer Programming in FORTRAN 77, PHI.
3. V. Rajaraman : Computer Oriented Numerical Methods, PHI.
4. Dhaliwal, Agarwal and Gupta : Programming with FORTRAN 77, Wiley Eastern Ltd.
5. R. S. Salaria : Computer Oriented Numerical Methods, Khanna Book Pub. Co. Ltd.
6. R. Sirkar : FORTRAN based Algorithms, New Central Book Agency, Calcutta.
7. V. Krishnamurthy : FORTRAN based Algorithms, East-West Press, New Delhi.

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