-: 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 સારુ.

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	2	2	
		5002-Computer Oriented Numerical Methods – I			
		5003-Fourier Series			
		5004-Computer Programming in FORTRAN 90 and 95-I			
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	2	2	
		6002-Computer Oriented Numerical Methods – II			
		6003-Fourier Transform and its Applications			
		6004-Computer Programming in FORTRAN 90 and 95-II			

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. Shantinarayan : Modern Algebra, S. Chand & Co.
6. Serge Lang : Algebra, Addition Wesley, 1993.
7. Surjeet & Kazi Zameeruddin : Modern Algebra, Vikas Publishing House.

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.

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.

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 + 50external)
(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.

Unit3:
Open ball in 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.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER – V
MTH – 505
(Graph Theory)
Effective from June 2022
Marks : 70 (20 internal + 50external)
(3 Hours / Week - Credits :3)

Unit 1:
Graphs, Various type of graphs, Incidence and Degree, Isolatedand 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.

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 and11.

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.

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.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
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, Agarwaland 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.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
SYLLABUS FOR B.Sc. (MATHEMATICS)
SEMESTER – V
Elective Generic – 5003
(Fourier Series)
Effective from June 2022
Marks : 70 (20 internal + 50external)
(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., NewDelhi.
3. R. R. Goldberg : Method of Real Analysis, Oxford & IBH Pub. Co. Ltd. New Delhi.
4. R. V. Churchil : Fourier series and Boundary value problems, McGraw Hill ISE.
5. Vashishtha and Gupta :Integral Transforms, Krishna Publications, Meerut.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
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.