

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

PATAN-384265

NAAC Accreditation Grade - "B"

FACULTY OF SCIENCE

MATHEMATICS

New Syllabus and Exam Scheme

B.Sc.

Semester - III & IV

With a Semester/ CBCS/Grading Pattern

W.E.F. June -2012

Date : 26-03-2012

Total Page : __13__

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :	—	Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	III
Subject :	MATHEMATICS		
Effective from :	From Academic Year : 2012 - 2013 (FIRST Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC MATH- 301	CALCULUS AND LINEAR ALGEBRA	3
2	CC MATH- 302	NUMERICAL ANALYSIS	3
3	PC- MATH- 301	PRACTICAL COURSE – CALCULUS AND LINEAR ALGEBRA	1.5
4	PC-MATH 302	PRACTICAL COURSE – NUMERICAL ANALYSIS	1.5

**HEMCHANDRACHARYA NORTH GUJARAT
UNIVERSITY, PATAN**

Programme code :	—	Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	IV
Subject :	MATHEMATICS		
Effective from :	From Academic Year : 2012 - 2013 (SECOND Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC MATH- 401	ADVANCED CALCULUS	3
2	CC MATH- 402	ADVANCED LINEAR ALGEBRA	3
3	PC- MATH- 401	PRACTICAL COURSE – ADVANCED CALCULUS	1.5
4	PC-MATH 402	PRACTICAL COURSE – ADVANCED LINEAR ALGEBRA	1.5

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B.Sc. Semester: III & IV

Mathematics Syllabus

(Effective from june-2012)

This syllabus is to be completed by assigning three period of one hour each and two practicals of three hours each per week.

The number of students in a practical batch should not exceed twenty five.

PATTERN OF EXAMINATION :

They will be two paper for core compulsory and one paper for subject elective theory and six hours/day for two days per batch practicals in the university examination. The pattern will be as follow.

Written	Examination	Marks External	Marks Internal
Core course-I	3 hours	70	30
Core course-II	3 hours	70	30
Subject elective course	2 hours	50
Laboratory course-I	3 hours	50
Laboratory course-II	3 hours	50

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B.Sc.

Semester : III

CC –MATH- 3 (301)

Calculus and Linear Algebra

Unit : I : LIMIT , CONTINUITY AND PARTIAL DERIVATIVES

Function of severable variables, their limits and continuity, partial derivatives, Differentiability and differential, Conditions for commutativity of d independent variables in higher ordered derivatives, Derivatives of implicit functions

Unit : II : APPLICATION OF PARTIAL DERIVATIVES

Euler's theorem on homogeneous function, Extrema of function of severable variables, Application of Lagranges method of undetermined multiplies, Tailor and Maclorin's expansion for function of two variables, Tangent line and normal plane to twisted curves, Tangent plane and normal to surfaces.

Unit : III : VECTOR SPACE

Vector spaces, Subspaces, Span of a set, More about subspaces, Linear dependence and Independence, Dimension and Basis.

Unit : IV LINEAR TRANSFORMATION

Definition and examples, Range and kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Consequences of a Rank-nullity theorem, The space $L(U,V)$, Composition of linear maps, Operator equations.

The main book for the course (Unit I and II) is '**Differential Calculus**' by **Shantinayakan, S. Chand , New Delhi**

The main book for the course (Unit III and IV) is '**An Introduction to Linear Algebra**' by **V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi**

Unit : III – Chapter 3 : Topics 3.1 to 3.6

Unit : IV – Chapter 4 : Topics 4.1 to 4.8

Reference Books :

Calculus :

1. Advanced Calculus, D V Widder , Prentice Hall , New Delhi
2. Advanced Calculus Vol : I & II, T M Apostol, Blaisdoll
3. Advanced Calculus, R C Buck, MacMillan
4. Kalan Shashtra Part I , D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati)
5. Kalan Shashtra Part II, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati)

Linear Algebra :

1. Linear Algebra , Ramchandra Rao, P. Bhimasankar, Tata MacGrawHill
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd
3. Linear Algebra, S K Berberion, Oxford University Press
4. Linear Algebra Problem Book, P R Holmos, Cambridge University Press
5. Linera Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut
6. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut
7. Linear Algebra, G Paria, New Central book agency Ltd, Calcutta
8. Surekh Bij Ganit, I H Sheth, University Granth Nirman Board (Gujarati)

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B.Sc.

Semester : III

CC – MATH – 4 (302)

NUMERICAL ANALYSIS

Unit-1: **Finite Differences table and theory of interpolation:**

Ascending and Descending differences , Symbolic operators, Difference of polynomial, Factorial polynomials, Gregory-Newton's forward and backward interpolation formula.

Unit-2: **Divided Differences:**

Newton's divide difference interpolation formula, Lagrange's interpolation formula for equal and unequal intervals.

Unit-3: **Central Differences Interpolation Formula:**

Gauss forward and backward interpolation formula, Sterling interpolation formula, Bessel's interpolation formula.

Unit-4: **Numerical Differentiation and Integration:**

Taylor's method, Picard's method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

Reference books:

1. **Numerical Analysis** Kunz McGraw Hill
2. **Numerical Analysis** R. Gupta AnmolPub.Pvt.Ltd, New Delhi.
3. **Numerical Analysis** P.N.ChatterjiRajson'sPrakashanmandir, Meerut.
4. **Methods in Numerical Analysis** K.W.NelsonMac-Millan
5. **Numerical Methods** Dr.V.N.VedomurthyVikas Publishing House Pvt. Ltd.

Dr.N.Ch.S.N.lyenger

6. **Numerical Methods in Engineering and Science**, Dr.B.S.Grewalkhanna Publishers.

7. **Numerical Analysis and Computational Procedures**, S.A.Mollah, New Central Book Agency, Calcutta.

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B.Sc.
Semester: III**

PC –301 : Practicals on Caculus and Linear Algebra

1. Application of Limit and Continuity (Two Practicals)
2. Application of Partial Derivatives (Two Practicals)
3. Application of Lagranges' method of undermined multiplies
4. Application of Euler's theorem
5. Application of Tailor's and Maclaurin theorems.
6. Applications of Vector Space
7. Applications of Subspaces
8. Geometrical meaning of Basis
9. To Expand linearly independent set upto a basis of a vector space
10. Verification on Dimension theorem
11. Verifications on Linear transformation
12. Verifications on Rank-Nullity theorem
13. To find the inverse of a Linear transformations
14. To find composition of linear maps

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B.Sc.

Semester: III

PC – 302 : Practicals on Numerical Analysis

Unit-1:

- (1) Application of Gregory-Newton forward formula.
- (2) Application of Gregory-Newton backward formula.
- (3) Application of Factorial polynomials.

Unit-2:

- (1) Applications of Newton's divided difference formula.
- (2) Application of Lagrange's interpolation formula for equal intervals.
- (3) Application of Lagrange's interpolation formula for unequal intervals.

Unit-3:

- (1) Application of Gauss forward interpolation formula.
- (2) Application of Gauss backward interpolation formula.
- (3) Application of Sterling interpolation formula.

Unit-4:

- (1) Application of Taylor's method.
- (2) Application of Picard's method.
- (3) Application of Trapezoidal rule.
- (4) Application of Simpson's $1/3$ rule.
- (5) Application of Simpson $3/8$ rule.

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B.Sc.

Semester : IV

CC – MATH – (401)

Advanced Calculus

UNIT-1 CURVATURE & RADIUS OF CURVATURE

Curvature of Plane curve, Radius of curvature of plane curve, Singular point for plane curve

Point of inflexion for plane curve

UNIT-2 IMPROPER INTEGRAL

Beta function and Gamma function, Convergence of Beta function and Gamma function

Relation between them, Its Simple properties and applications, Several forms of Beta function

UNIT-3 MULTIPLE INTEGRAL

Double Integral, Integral on non rectangle regions, transformation to polar co-ordinate

Change order of integration, Triple integration, transformation to polar and cylindrical co-ordinate

UNIT-4 VECTOR ANALYSIS AND LINE & SURFACE INTEGRAL

Gradient of scalar function, Divergence and Curl of a vector function, Line integral, Surface

Integral, Green's, Stoke's and Gauss's Theorem

The Main Book for the course :

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|-----------------------------|----------------------|----------------------|
| 1. Integral Calculus | Shantinakaran | S. Chand, New |
| Delhi (Course Book) | | |

Reference Books :

1. Advanced Calculus, D V Widder, Prentice Hall, New Delhi
2. Advanced Calculus Vol : I & II, T M Apostol, Blaisdoll
3. Advanced Calculus, R C Buck, MacMillan

4. Kalan Shashtra Part I , D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati)
5. Kalan Shashtra Part II, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati)

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B.Sc.

Semester : IV

CC – MATH – (402)

Advanced Linear Algebra

Unit : I : MATRICES OF A LINEAR TRANSFORMATION

Definition of a Matrix of a linear transformation, Linear Transformation associated with a matrix, the dimension of $L(U,V)$, and its determination, Rank and Nullity of a Matrix, invertibility of system of linear equations.

UNIT : II : LINEAR FUNCTIONAL AND DUALITY

Definition of linear functional and its examples, Definition of Dual space and Dual basis and its examples, Adjoint of a linear operator, its properties and examples

UNIT : III : INNER PRODUCT SPACE

Definition of inner product space, Norm, Orthogonality, Schwarz's & Triangular inequality, Parallelogram law, Orthonormal basis, Gram-Schmidt Orthogonalization Process (Without proof) and its examples.

UNIT : IV : EIGEN VALUES AND EIGEN VECTORS

Eigen values and eigen vectors of a linear transformation, Characteristic polynomial, Cayley – Hamilton theorem, Using C – H theorem find inverse of a matrix, minimal polynomial deductions.

The main book for the course is '**An Introduction to Linear Algebra**' by **V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi**

Reference Books :

1. Linear Algebra , Ramchandra Rao, P. Bhimasankar, Tata MacGrawHill
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd
3. Linear Algebra, S K Berberion, Oxford University Press
4. Linear Algebra Problem Book, P R Holmos, Cambridge University Press
5. Linera Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut

6. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut
7. Linear Algebra, G Paria, New Central book agency Ltd, Calcutta
8. Surekh Bij Ganit, I H Sheth, University Granth Nirman Board (Gujarati)

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B.Sc.

Semester: IV

PC – MATH- 401

Practicals on Advanced Caculus and Linear Algebra

1. Application of double Integration (Two Practicals)
 2. Application of Beta and Gamma functions (Two Practicals)
 3. Application of Green's Theorem
 4. Application of Stokes' theorem
 5. Application of divergence theorems.
 6. Applications of a linear transformation associated with given matrix.
 7. Applications of a matrix associated with linear transformation
 8. Verifications on Rank-Nullity theorem in matrices
 9. Application of solution of system of linear systems
 10. Application of a Dual Space
 11. Application on Gram-Schmidt orthogonalization process
 12. Application of Cayley-Hemilton theorem
 13. Application of Eigen value and Eigen vectors of a linear transformation
 14. Application of minimal polynomial deduction
 15. Application to verify inner product space.
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Hemchandracharya North Gujarat University. Patan.

B.Sc.

Semester: IV

PC – MATH- 402

PRACTICALS ON ADVANCED NUMERICAL ANALYSIS

→Application of solution of an equation by,

(1) Graphical method.

(2) Method of False Position.

(3) Method of Bisection.

(4) Method of Iteration.

(5) Newton Raphson method.

(6) Application of Synthetic division method.

(7) Birge-Vieta method.

(8) Application of Laplace Everett's interpolation formula.

(9) Application of Bessel's interpolation formula.

(10) Application on divided difference formula.

(11) Application on Numerical differentiation.

(12) Application on Numerical Integration.

(13) Application on Euler's method.

(14) Application on solving a system of equations using Gauss-Elimination method.

(15) Application on solving a system of equations using Gauss-Jordan method.

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