

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

PATAN-384265

NAAC Accreditation Grade - "B"

FACULTY OF SCIENCE

MATHEMATICS

New Syllabus and Exam Scheme

B.Sc.

Semester – V & VI

With a Semester/ CBCS/Grading Pattern

W.E.F. June -2013

Date : 06-09-2012

Total Page : __27__

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :	v	Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	V
Subject :	MATHEMATICS		
Effective from :	From Academic Year : 2013 - 2014		

Sr.	Paper Code	Name of Paper	Credit
1	CC MATH- 501	Group Theory	3
2	CC MATH-502	Mathematical Analysis - I	3
3	CC MATH- 503	Differential Equations	3
	Any One of the following		
4	CC MATH- 504 A CC MATH- 504 B CC MATH- 504 C	BOOLEAN ALGEBRA Mechanics - I Operations Research-I	3
5	PC-MATH 501-504	PRACTICAL COURSES – MATLAB [PC 501, PC 502, PC503, PC504]	1.5 x 4= 6

**HEMCHANDRACHARYA NORTH GUJARAT
UNIVERSITY, PATAN**

Programme code :	v	Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	VI
Subject :	MATHEMATICS		
Effective from :	From Academic Year : 2013 - 2014		

Sr.	Paper Code	Name of Paper	Credit
1	CC MATH- 601	Abstract Algebra	3
2	CC MATH-602	Mathematical Analysis - II	3
Any One of the following			
3	CC MATH- 603 A CC MATH- 603 B	General Topology Number Theory	3
Any One of the following			
4	CC MATH- 604 A CC MATH- 604 B CC MATH- 604 C	GRAPH THEORY Mechanics II Operations Research-II	3
5	PC-MATH 601-604	PRACTICAL COURSES – MATLAB [PC 601, PC 602, PC603, PC604]	1.5 x 4= 6

Hemchandracharya North Gujarat University. Patan.

B.Sc. Semester: V & VI

Mathematics Syllabus

(Effective from june-2013)

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

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

PATTERN OF EXAMINATION :

They will be four paper for core compulsory and one paper for subject elective theory and six hours/day for two days per batch practical 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
Core course-III	3 hours	70	30
Core course-IV	3 hours	70	30
Subject elective course	2 hours	50
Laboratory course-I	3 hours	50
Laboratory course-II	3 hours	50
Laboratory course-III	3 hours	50
Laboratory course-IV	3 hours	50

N.B.: Essential requirements for the MATLAB Practicals of Mathematical

Subjects as CBCS has a high probability to be operationalised efficiently and effectively for the elevating learners.

- 1. Mathematical Laboratory inbuilt with sufficient number of Computers (as per the students enrollments and the number of practical batches) and MATLAB SOFTWARE with basic requirements for the MATLAB Practicals.**
- 2. Mathematical Laboratory inbuilt with Graphs, Charts, Physical Models(two dimensional as well as three dimensional) & Virtual Models (Higher DDimensional – Computerized)) and basic requirements for the same.**

Hemchandracharya North Gujarat University. Patan.

B. Sc. Programme

Semester-V

Mathematics : CC MATH-501

(Group Theory)

UNIT : 1

Definition of a Group and illustrations, Elementary property of a Group, Equivalent definitions of a Group, Generalized form of Associative Law, Finite Groups and their tables, Definition of a Subgroup and illustrations, Lagranges theorem and its applications.

UNIT : 2

Definition of a Permutation and illustrations, Transpositions and cycle, definition of a Normal subgroup and illustrations, Quotient group, Definition of an isomorphism of a group and its illustrations.

UNIT : 3

Properties of a cycle groups, Isomorphism of cyclic groups, Subgroup of a cycle group, Generator of a cycle group, Definition of a Homomorphism and its illustrations, Kernel of Homomorphism, Cayley's Theorem, Isomorphism of group, Groups of order four and six.

The course is covered by the Book : **I H Sheth, *Abstract Algebra*, Prentice Hall of India (PHI) Publication.** Chapter 6(6.1 to 6.7), Chapter 7(7.1 to 7.3), Chapter 8(8.1 to 8.3), Chapter 9(9.1 to 9.3), Chapter 10(10.1 to 10.2), Chapter 11(11.1 to 11.5), Chapter 12(12.1 to 12.6)

Reference books :

1. I N Herstein, *Topics in Algebra*, Wiley Eastern Ltd.
2. N. Jacobson, *Basic Algebra Vol I & II*, Hindustan Publishing company
3. Shanti Narayan, *A text book of Modern Algebra*, S. Chand & Co.
4. P.B.Bhattacharya, S.K.Jain, S R Nagpal, *Basics Abstract Algebra, (second Edition)*, Cambridge University Press.
5. N.S. Gopalkrishna, *University Algebra*, Wiley Eastern, New Delhi
6. Maclane Saunders and Birkhoff Garrett, *Algebra*, MacMillan, New York.
7. G.F.Simmons, *Introduction to Topology and Modern Analysis*, MacGrawHill Inc., U.S.A.

Mathematics: CC MATH-502

Mathematical Analysis-I

Unit-1 **Number System:** The real field to be developed by ordered set approach, Equivalence of this approach and Dedekind's approach, Extended real number system, The complex number system, Euclidean spaces.

Unit-2 **Basic Topology:** Finite, Countable and Uncountable sets, Metric space, Neighborhoods in metric spaces, Limit point of a set, Open, Closed, Bounded, Compact, Perfect, Connected and Convex subsets of metric spaces.

Unit-3 **Sequences and Series:** Convergence sequence, Sub sequences, Cauchy sequences, Upper and lower limits, Special sequences and Series, Series of non negative terms, Roots and Ratio Test

Power Series with Real (Complex) terms, Interval (circle) of convergence and radius of convergence of a power series, Summation by parts, absolute convergence, addition and multiplication of series.

The course is roughly covered by Chapters 1,2,3 (Omit 3.52 to 3.55) of The book entitled "Principles of Mathematical Analysis" by Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.

Reference books:

- (1) "A First Course in Mathematical Analysis" by D. Somasundaram & B. Choudhary, Narosa Publishing House
- (2) "Fundamentals of Mathematical Analysis" by G. Das & S. Pattnayak Tata McGraw Hill Pub.Co
- (3) "Fundamental of Real Analysis" by S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.
- (4) "Principle of Real Analysis" by S.C.Malik , Wiley Eastern Limited New Delhi 1982.
- (5) "bħāḷ iv6y" . Am.Dl.s4ar .yin.g4 inmaR b0R.Amdavad
- (6) "Principle of Mathematical Analysis" by T.M.Apostol

Mathematics : CC MATH-503

[DIFFERENTIAL EQUATIONS]

Unit:1 Formation of Differential Equations, Symbolic Operator, Method of finding C.F., Symbolic Operator $1/f(D)$, Method of finding P.I., Shorter method of finding P.I., To find P.I. when $X=e^{ax}$, where a is constant, To finding P.I. when $X=\cos ax$ or $\sin ax$, To find the value of $1/f(D).x^m$, where m is positive integer, To find the value of $1/f(D).(e^{ax}V)$, where a is constant and V is a function of x . To evaluate $1/f(D).(XV)$, where V is a function of x . (Chapter:4)

Unit:2 Condition of Exactness of the linear differential equations, Solution of non-linear equations which are Exact, Equations of the form $y^{(n)}=f(x)$, Equations of the form $y^{(2)}=f(y)$, Equation do not contain y directly, Equation that do not contain x directly, Equation in which y appears in only two derivatives whose orders differ by two, Equation in which y appears in only two derivatives whose order differ by unity.(Chapter:6)

Unit:3 Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ when an integral included in the C.F. is known, Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ by changing the dependent variable, $y^{(2)}+Py^{(1)}+Qy=R$ by changing the independent variable, Solution by factorization of the Operator, Method of variation of Parameters, Method of Undetermined Co-efficient.(Chapter:7)

The course is covered by “A text book of Differential Equations”, by N.M.Kapoor, Pitamber publication, New Delhi.

REFERENCE BOOKS:

1. Erwin Kreyszing, Advanced Engineering mathematics, By. John Wiley & Sons Inc. New York, 1999.
2. D.A.Murray, Introductory course on Differential Equations, By. Orient Longman,(India), 1967.
3. A.R.Forsyth, A Treatise on Differential Equations, Macmillan and Co.Ltd., London.
4. Ian N. Sneddon, Elements of partial Differential Equations, McGraw-Hill Book Company, 1998.
5. Francis B. Hilderbrand, Advanced Calculus for Application, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6. Jane Cronin, Differential Equations, Marcel Dekkar, 1994.
7. Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Company, 1972.

Mathematics : CC MATH-504 A

BOOLEAN ALGEBRA

UNIT:1 Relations ,Equivalence Relation,Equivalence classes or sets,Partial order Relations,Hasse Diagram,Upper and Lower Bounds,Minimal and Maximal elements ,Binary operations,closure operations,Partially Ordered Set,Totally Ordered Set,Lattices as Posets,Dual Lattice,Meet and Join,Lattice as an algebraic structure,Direct Product Of two Lattices,Lattice Homomorphism,Lattice Isomorphism.

UNIT:2 Sub-Lattice,Completed Lattice,Bounded Lattice,Distributive

Lattice,Square Free Lattice,Complemented Lattice,Modular Lattice,De Morgan's Law,BooleanAlgebra,Boolean Algebra of Switching Circuits,Sub Boolean Algebra,Homomorphism and Isomorphism of Boolean Algebras,Atoms,Unique representation Theorem,Properties Of Set of Atoms,Stone's representation Theorem.

UNIT:3 Boolean Variables,Boolean Expression,Min term,Maxterm,Representation of Boolean Expression as a sum of Product Canonical Form and as aProduct of Sum Canonical Fofm,Boolean Function Associated With Boolean Expression,Symmetric Boolean Expression,Repesantation of Boolean Functions And Minimization of Boolean Expression:Using Truth Table,Cube array Method,Karnaugh's Method,Circuit Diagrams.

REFERENCE BOOKS:

- 1.An Introduction To Discrete Mathematics -Udayan M.Prajapati, Dr.Ajay S. Gor, Nirav Prakashan
- 2.Discrete Mathematical Structures With Applications to Computer Science by Trembley I.P.AndMahonar R.
- 3.Discrete Mathematical Structures With applications to Computer Science by R.Hamming and E.A.Feigenbaum
- 4.Discrete Mathematical Structures for Computer Science by B.Kolman and R.C.Busy
- 5.The Essence of Discrete Mathematics by Neville Dean

Mathematics: CC MATH-504 B

Mechanics-I

UNIT-1 Method of Plane Statics:

Fundamental for Newtonian Mechanics, Scalar field, Gradient Vector, Equilibrium of a particle and system of particles.

UNIT- 2

Necessary and Sufficient conditions for Equilibrium, Equipollent system of forces. Reduction of general force system. Principles of virtual work and potential energy.

UNIT-3

Mass centre of system of particles, Potential energy, Friction, Flexible Cables.

REFERENCE BOOKS :

1. Synge and Griffith: Principal of Mechanics
2. S.L.Loney : Statics, Macmillan and company, London.
3. R.S.Verma : A Text book on Statics, Pothishala Pvt. Ltd., Allahabad.
4. S.L.Loney : An elementary treatise on the Dynamics of a particle and rigid bodies., Cambridge University press 1956.
- 5 Mechanics : Dr. L.K.Patel.

Mathematics : CC MATH-504 C

OPERATIONS RESEARCH - I

Unit-1. Introduction: Nature and scope of Operations Research.

Linear programming: (a) LP Model and method of solution- Graphical method, Slack-Surplus and unrestricted variables, Simplex Algorithm, Simplex Method.

Unit-2 . Artificial Slack variables, Two phase method, Big-M / Penalty method, Variation in simplex method solution- unbounded, infeasible solutions and concept of degeneracy.

Unit-3. (a) **Duality Theory-**

The essence of duality theory, primal-dual relationships, Duality theorems, Dual simplex method.

(b) Integer Programming- The need of integer solutions, The concept of the Cutting – Plane, Gomory’s Cutting Plane Algorithm, Branch and Bound Method (sums of B & B not to be asked in the exam.)

REFERENCES BOOKS:

- (1) Operations Research , by. J.K.Sharma. Macmillan Publishers India Ltd.
- (2) Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.
- (3) Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Mathematics : PC MATH-501-504

Objectives:

- Understand the MATLAB Desktop, Command window and the Graph Window
 - Be able to do simple and complex calculation using MATLAB
 - Understand the graphics capabilities of MATLAB
 - Be able to carry out mathematical computations using MATLAB Symbolic Toolbox
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PCMAT-501

Introduction to MATLAB

Starting and ending MATLAB session, MATLAB environment, MATLAB help, types of files, search path, some useful MATLAB commands, data types, constant and variables, operators, built-in functions, assignment statement, illustrative programs.

Vectors and Matrices

Scalars and vectors, entering data in matrices, line continuation, matrix subscripts/indices, multi-dimensional matrices and arrays, matrix manipulations, generation of special matrices, useful commands, matrix and array operations, function with array inputs.

PCMAT-502

Polynomials

Entering a polynomial, polynomial evaluation, roots of a polynomial, polynomial operations - addition and subtraction, multiplication, division, formulation of polynomial equation, characteristic polynomial of a matrix, polynomial differentiation, integration, and curve fitting, evaluation of polynomial with matrix arguments.

PCMAT-503

MATLAB Graphics:

Two-dimensional plots, multiple plots, style options, legend command, subplots, specialized two-dimensional plots, three-dimensional plots.

PCMAT-504

Symbolic Processing With MATLAB

Symbolic Expressions and Algebra, Algebraic and Transcendental Equations, Calculus, Symbolic Linear Algebra, ordinary and partial differential equation, Symbolic Tutors.

Text Book:

1. “MATLAB and its Applications in Engineering” Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.

coverage from the Text Book:**PCMAT-501**

Chapter 1: 1.8, Chapter 2: 2.9 Chapter 3: 3.11

PCMAT-502

Chapter 4: 4.13

PCMAT-503

Chapter 6: 6.8

PCMAT-504

Chapter 9: 9.3 only. Additional commands for symbolic toolbox are to be covered from the list given below.

Symbolic Math Toolbox

Functions for Creating and Evaluating Symbolic Expressions	
class	Returns the class of an expression.
digits	Sets the number of decimal digits used to do variable precision arithmetic.
double	Converts an expression to numeric form.
ezplot	Generates a plot of a symbolic expression.
ezplot3	3-D parametric plot
ezpolar	plot a 2-D curve in polar coordinates
findsym	Finds the symbolic variables in a symbolic expression.
numden	Returns the numerator and denominator of an expression.
sym	Creates a symbolic variable.
syms	Creates one or more symbolic variables.
vpa	Sets the number of digits used to evaluate expressions.

Functions for Manipulating Symbolic Expressions	
collect	Collects coefficients of like powers in an expression.
expand	Expands an expression by carrying out jpowers.
factor	Factors an expression.

poly2sym	Converts a polynomial coefficient vector to a symbolic polynomial.
pretty	Displays an expression in a form that resembles typeset mathematics.
simple	Searches for the shortest form of an expression.
simplify	Simplifies an expression using Maple's simplification rules.
subs	Substitutes variables or expressions.
sym2poly	Converts an expression to a polynomial coefficient vector.

Symbolic Calculus Functions

diff	Returns the derivative of an expression.
jacobian	Compute the Jacobian matrix.
Dirac	Dirac delta function (unit impulse).
Heaviside	Heaviside function (unit step).
int	Returns the integral of an expression.
limit	Returns the limit of an expression.
symsum	Returns the symbolic summation of an expression.
taylor	Returns the Taylor series of a function.

Symbolic Linear Algebra Functions

det	Returns the determinant of a matrix.
eig	Returns the eigenvalues (characteristic roots) of a matrix.
inv	Returns the inverse of a matrix.
poly	Returns the characteristic polynomial of a matrix.

Symbolic Tutors

arclen	Find the arclength of the curve.
composefun	compose two functions
dirdifftool	plot or animate directional derivatives
eigtool	interactive matrix eigenvalues
gradtool	plot or animate gradient(s)
linsys	plot a system of 2-D or 3-D linear equations
ratfun	demonstrate the graphing of rational functions
rsums	Riemann sum approximate integration tutor
taylortool	taylor approximation tutor

Assignment: The student should submit the electronic copy of diary file showing the execution/output of Matlab session(s).

B. Sc. Programme

Semester-VI

Mathematics : CC MATH-601

(Abstract Algebra)

UNIT : 1

Definition of a Ring and illustrations, Properties of a Ring, Zero divisors and Integral domain, Characteristic of an Integral Ring, Solution of the equation $ax = b$ in a ring R , Subrings, Ideals,

UNIT : 2

Introduction of Polynomials, Integral Domain $D[x]$, Familiar form of Integral domain $D[x]$, Unique factorization of Polynomials, Solutions of a Polynomial Equation, Eisenstein Criterion for irreducibility.

UNIT : 3

Quotient ring, Homomorphism of rings, Maximal Ideal, Prime Ideal,

The course is covered by the Book : **I H Sheth, *Abstract Algebra*, Prentice Hall of India (PHI) Publication.** Chapter 13(13.1 to 13.4), Chapter 14(14.1 to 14.4), Chapter 15(15.1 to 15.4), Chapter 16(16.1 to 16.3), Chapter 18(18.1 to 18.7), Chapter 19(19.1 to 19.4),

Reference books :

1. I N Herstein, *Topics in Algebra*, Wiley Eastern Ltd.
2. N. Jacobson, *Basic Algebra Vol I & II*, Hindustan Publishing company
3. Shanti Narayan, *A text book of Modern Algebra*, S.Chand & Co.
4. P.B.Bhattacharya, S.K.Jain, S R Nagpal, *Basics Abstract Algebra, (second Edition)*, Cambridge University Press.
5. N.S. Gopalkrishna, *University Algebra*, Wiley Eastern, New Delhi
6. Maclane Saunders and Birkhoff Garrett, *Algebra*, MacMillan, New York.
7. G.F.Simmons, *Introduction to Topology and Modern Analysis*, MacGrawHill Inc., U.S.A.

Mathematics : CC MATH-602

Mathematical Analysis-II

- Unit-1** **Limits and Continuity:** Limits and Continuity for a functions from a metric space into another metric space, continuity of a composite function, Structural properties of continuous functions from a metric space in to \mathbb{R}^k , Continuity and Compactness, Continuity and connectedness, Discontinuities, Monotonic function, Discontinuities of a monotonic function, Infinite limits and limits at infinity.
- Differentiation:** Derivatives of a real function, Continuity and differentiability, Structural properties of the class of differentiable functions, Mean value theorems, Continuity of derivatives, L'Hospital rule, Derivatives of higher order, Taylor's theorem.
- Unit-2** **The Riemann – Stieltje's Integral:** Riemann integral and Stieltje's integral, properties of Riemann integral and Stieltje's integral, Integration and Differentiation, Integration of Vector Valued Functions, Rectifiable curves.
- Unit-3** **Sequences and Series of functions:** Sequences of functions, Limit of a Sequence of functions, Uniform convergence, tests for uniform convergence and continuity, Uniform convergence and differentiation.

The course is roughly covered by Chapters - 4,5,6,7 (Omit 5.16 to 5.20 and 7.28 to 7.33) of The book entitled "Principles of Mathematical Analysis" by Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.

Reference books:

- (1) "A First Course in Mathematical Analysis" by D. Somasundaram & B. Choudhary, Narosa Publishing House.
- (2) "Fundamentals of Mathematical Analysis" by G. Das & S. Pattanyak Tata Mcgraw Hill Pub.Co
- (3) "Fundamental of Real Analysis" by S. L. Gupta & Nisha Rani – Vikas Pub. House
Pvt. Ltd. New Delhi-1974.
- (4) "Principle of Real Analysis "by S.C.Malik , Wiley Eastern Limited New Delhi 1982.
- (5) "bħaI iv6y" . Aħ.DI.s4ar .yin.gA inmaR bħDRAMdavad
- (6) "Principle of Mathematical Analysis" by T.M.Apostol

Mathematics : CC MATH-603 A

General TOPOLOGY

Unit-1. Topology and topological spaces, Neighbourhoods, Hausdorff space, Closure of a subset of a topological space.

Unit-2. Interior of a subset of topological space , Boundary of a subset of a topological space, Continuity of a function from topological space to topological space, Homeomorphism between two topological spaces.

Unit-3. Subspace of a topological space, Connectedness of a topological spaces, Some applications of connectedness, Components of a point of connected topological space.

Text-Book: An Introduction to topology, by. Bert Mendelson(third addition)

Ch.No.-3 : 2.1 to 2.4, 3.1, 3.3 , 3.7, 4.2 to 4.15 , 5.1to 5.7 , 5.9 , 6.1 to 6.3 , 6.5 to 6.8

Ch.No.-4 : 2.1 to 2.7 , 4.1 to 4.3 , 5.1 to 5.7

REFERENCE BOOKS:

(1) Introduction to Topology and Modern Analysis, by. "G F Symmons"., New York McGrawHill, 1963

(1) General Topology by Kelly J L , NewYork, Van Nostrand 1955

(3) Elementary Topology by Beckett D W., New York Academic press, 1967

Mathematics : CC MATH-603 B

Number Theory

Unit I:

Some Preliminary Consideration: Well-Ordering Principle, Mathematical Induction, the Binomial Theorem & binomial coefficients.

Divisibility Theory: the division algorithm, divisor, remainder, prime, relatively prime, the greatest common divisor, the Euclidean algorithm (Without proof), the least common multiple, the linear Diophantine equation & its solution.

Unit II:

Prime Numbers: Prime and composite number, the Fundamental Theorem of Arithmetic (without proof), canonical form of a number, the Sieve of Eratosthenes.

Theory of Congruence: Definition and basic properties of congruence, Residue class & complete system of residues, special divisibility test, linear congruence, Chinese Remainder Theorem. (without proof)

Unit III:

Fermat's Theorem: Fermat's Factorization method, Fermat's little theorem, Wilson theorem, Euler's theorem: Euler's Phi-function $\phi(n)$ and formula for $\phi(n)$, Euler's theorem (without proof) and only problems on Euler's theorem.

Text Book:

Elementary Number Theory - David M. Burton, Sixth Edition, Universal Book stall, New Delhi.

[(Chapter 1): 1.1 and 1.2 2) 2.1 to 2.4 3) 3.1 and 3.2 4) 4.1 to 4.3 5) 5.2 and 5.3 7) 7.2 and 7.3]

Reference Books:

- 1 An introduction to the Theory of numbers - Niven and Zuckerman, Wiley Eastern Ltd.
- 2 Number Theory - S. G. Telang, Tata Mc Graw-Hill Publishing Company Limited, New Delhi
- 3 Elementary Theory of Numbers - C. Y. Hsiung, Allied Publishers Ltd.-India, ISBN 81-7023-464-6.
- 4 Number Theory - George E. Andrews, Hindustan Publishing Corporation- Delhi.
- 5 Elementary Number Theory - Gareth A. Jones & J. Mary Jones, Springer Verlag, ISBN 81-8128-278-7.
6. Number Theory - J. Hunter, Oliver and Boyd-London.
7. Beginning Number Theory - Neville Robbins, Narosa Pub. House -New Delhi ISBN 978-81-7319-836
- 8 Introduction to the theory of Numbers - G. H. Hardy & E. M. Wright, Oxford Uni. Press
- 9 Higher Algebra - S. Barnard & J. M. Child, Macmillan India Ltd
- 10 Elements of Number Theory - I. M. Vinogradov , Dover Pub INC
- 11 Elementary Number Theory in Nine chapters - James J. Tattersall, Cambridge Uni Press
- 12 A first course in Theory of Numbers - K. C. Chowdhary, Asian Books Pvt Ltd New Delhi
- 13 1001 problems in Classical Number Theory - Jean Marie De Konick Armed Mercier, AMS

Mathematics : CC MATH-604 A

GRAPH THEORY

- UNIT:1 Graphs,Basic Definitions,Undirected Graphs,Mixed Weighted Graphs,Incidence and Degree,Bipartite Graph and Bipartition,Regular and K-regular Graph,Graph Isomorphisms,Sub Graphs,Graph Operations,Walk,Trail,Paths ,Circuits,Connected Graph,Disconnected Graph,Eccentricity,Radius and Diameter,Adjacency Strong ,Weak and Unilateral Components,Eular Graphs,Hamilton Paths,Trees,Binary Trees And m-arrayTree,Spanning Trees.
- UNIT:2 Cut set,Internaly Disjoint Paths, Connectivity and Separability,Planar Graphs and their different Representation,Detection Of Planarity,Geometric and Combinatorial duals,Vector Space Associated With a Graph.Circuit and Cut set Subspaces ,Orthogonal Vectors And spaces.
- UNIT:3 Incidence Matrix,Adjancy Matrix Of a Graph.Path matrix and their reletion ships. Colouring of a Graph,Chromatic Number,Chromatic Partitioning,Covering. Acyclic digraphs and dia cyclizations.

REFERENCE BOOKS:

- 1.An Introduction To Discrete Mathematics -
Udayan M.Prajapati Dr.Ajay S. Gor, Nirav Prakashan
- 2.Graph Theory with Applications toEngineering and Computer Science by Narsing Deo
- 3.Discrete Mathematical Structures With Applications to Computer Science
by Trembley I.P.AndMahonar R.
4. Graph Theory by Harary F.
5. Graph Theory and its applications by B. Harris
- 5.Discrete Mathematical Structures With applications to Computer Science
by R.Hamming and E.A.Feigenbaum
- 4.Discrete Mathematical Structures for Computer Science by B.Kolman and R.C.Busy
- 5.The Essence of Discrete Mathematics by Neville Dean

Mathematics: CC MATH-604 B

Mechanics-II

UNIT-1

Plane Kinematics, Tangential and Normal components of velocity and acceleration, Radial and transverse components. Motion of a rigid body parallel to a plane. Linear momentum and conservation of energy for a particle and for a system of particles. Projectile without resistance.

UNIT-2

Harmonic Oscillators. General motion under central force and Central Orbits, Planetary Orbits. Kepler's laws of motion.

UNIT-3

Moment of inertia. Kinetic energy and angular momentum. Rotation of a rigid body about a fixed axis.

General motion of a cylinder parallel to a fixed plane. Compound pendulum. Plane impulsive motion. Impulsive force. Principle of linear and angular momentum. Collision of sphere and coefficient of restitution. Examples.

REFERENCE BOOKS :

- (1) Synge and Griffith: Principal of Mechanics
- (2) S.L.Loney : Statics, Macmillan and company, London.
- (3) R.S. Verma : A Text book on Statics, Pothishala Pvt. Ltd., Allahabad.
- (4) S.L.Loney : An elementary treatise on the Dynamics of a particle and rigid bodies., Cambridge University press 1956.
- (5) Mechanics : Dr. L.K. Patel.

Mathematics : CC MATH-604 C

Operations Research II

Unit-1. Network Models- Concept of Networks.

Transportation Problem- Introduction, general method of a T.P., unbounded T.P. NWCM, Least cost method, VAM methods to find the initial solution, Dual of a T.P. and MODI method, degeneracy in a T.P., variations in T.P.- Maximization T.P. and prohibited routes.

Assignment Problem- General model of A.P.(A.P. as a special case of a T.P.) Hungarian Method of solving a A.P., variations in a A.P.- maximization, prohibited assignments.

Unit-2. Sequencing Problem :

Methods of sequencing, Johnson's Algorithm for a two machine problem, three machine problem and M-machine problem, Processing Two jobs through M-machines

Unit-3. Game Theory: Introduction, Two-person zero games, Minimax and Maximax principles, saddle point theorems, mixed strategies, method for solution of 2×2 game, dominance principles, solution of games without saddle points by using dominance and then mixed strategies, graphical method of solving $2 \times m$ and $m \times 2$ game, L.P. solution of games.

REFERENCES BOOKS:

- (1) Operations Research , by. J.K.Sharma. Macmillan Publishers India Ltd.
- (2) Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.
- (3) Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Semester-VI

Mathematics : PC MATH-601-604

Objectives:

- Ensure the student can competently use the MATLAB programming environment
 - Understand the capabilities of MATLAB for solving complex mathematical problems
 - Understand the tools that are essential in solving real-world problems applying appropriate Mathematical concept.
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PCMAT-601

Input-Output Statements in MATLAB

Data input, interactive inputs, reading/storing file data, output commands, formatted input-output functions.

PCMAT-602

Programming Techniques

Loops, Branches control structures, MATLAB programming, function subprograms, types of functions, function handles, errors and warnings, MATLAB debugger.

PCMAT-603

MATLAB Applications:

The content of this unit is to be covered from the list given in Appendix A.

PCMAT-604

Practical using MATLAB programming

List of practical is given in Appendix B.

Text Book:

“MATLAB and its Applications in Engineering” Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.

coverage from the Text Book:

PCMAT-601

Chapter 5: 5.6

PCMAT-602

Chapter 7: 7.3, Chapter 8: 8.9

PCMAT-603

Appendix A: Table A.1:A.8

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Appendix B

Appendix A:

Table A.1

Discrete Math\Number theoretic functions	
factor	Returns Prime factors
factorial	Factorial function
nchoosek	All combinations of N elements taken K at a time
perms	All possible permutations
gcd	Returns the greatest common divisor.
lcm	Returns the least common multiple.
primes	Generate list of prime numbers
isprime	Returns a logical array that is prime numbers.
rat, rats	Returns a rational fraction approximation.
mod	The mod function is useful for congruence relationships. Returns modulus after
rem	Returns remainder after division.

Table A.2

Coordinate System Conversion	
cart2sph	Transform Cartesian to spherical coordinates
cart2pol	Transform Cartesian to polar coordinates
pol2cart	Transform polar to Cartesian coordinates
sph2cart	Transform spherical to Cartesian coordinates

Table A.3

Interpolation Functions	
interp1	Linear and cubic-spline interpolations of a function of one variable.
interp2	Linear interpolation of a function of two variables.
spline	Cubic-spline interpolation.
unmkpp	Computes the coefficients of cubic-spline polynomials.

Table A.4

Numerical Integration Functions	
quad	Numerical integration with adaptive Simpson's rule.
quadl	Numerical integration with adaptive Lobatto quadrature.
trapz	Numerical integration with the trapezoidal rule.
quadv	Vectorized quadrature
dblquad	Numerically evaluate double integral
triplequad	Numerically evaluate triple integral

Table A.5

Numerical Differentiation Functions	
diff(x)	Computes the difference between adjacent elements in the vector x.
polyder	Differentiates a polynomial, a polynomial product, or a polynomial quotient.

Table A.6

ODE Solvers	
ode23	Nonstiff, low-order solver.
ode45	Nonstiff, medium-order solver.
ode113	Nonstiff, variable-order solver.
ode23s	Stiff, low-order.
ode23t	Moderately stiff, trapezoidal rule solver.
ode23b	Stiff, low-order solver.
ode15s	Stiff, variable-order solver.
odeset	Creates integrator options structure for ODE solvers.
deval	Evaluate solution of differential equation problem
bvp4c	Solve boundary value problems for ODEs

Table A.7

Optimization	
fminbnd	Finds minimum of single-variable function.
fzero	Finds zero of single-variable function.
fminsearch	Multidimensional unconstrained nonlinear minimization
lsqnonneg	Linear least squares with nonnegativity constraints
fminunc	Find minimum of unconstrained multivariable function

fmincon	Find minimum of constrained nonlinear multivariable function
linprog	Solve linear programming problems

Table A.8

Statistical Functions	
erf(x)	Computes the error function $erf(x)$.
mean	Calculates the average.
median	Calculates the median.
std	Calculates the standard deviation.
var	Calculates the variance.
corrcoef	Correlation coefficients
cov	Covariance matrix

Appendix B:

1. Numerical Methods Practical (Lab) using MATLAB programming
2. Linear Algebra
3. Graph Theory
4. Calculus
5. Optimization
6. Problems related to programming given in text book.

Assignment: The work should involve programming using MATLAB. The student should submit the electronic copy of .m files or/and diary file showing the execution/output of Matlab session(s).

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

PATAN-384265

FACULTY OF SCIENCE

B.Sc. for Semester – I & VI

With a Semester/ CBCS/Grading Pattern

Subject Elective Courses (Each of 2 Credit)

List of Subject Elective Courses

EC-I : Computer C Language

EC-II: Industrial Mathematics-1

EC-III: Industrial Mathematics-2

EC-IV: Business Mathematics-1

EC-V Business Mathematics-2

(Detailed Syllabus of EC-I to EC-V submitted to the University)

Detailed Syllabus of New Subjective Elective Courses

to be implemented from June-2012

EC-VI : Business Mathematics-3

EC-V : Business Mathematics-4

Date : 06-09-2012

Total Page : __03__

Subject Elective Course : EC-VI

Business Mathematics-3

Unit:1 [Differential Calculus] [only examples]

Definition of differentiation in one variable, Working rules of differentiation, Derivative of x^n , $\log x$, e^x , a^x , trigonometric functions and inverse trigo. Functions, Differentiation of method of substitution and implicit function, parametric equations, Diff. of $f(x)^{g(x)}$.

Unit:2 [Integral Calculus] [only examples]

Indefinite integral: Definition, Working rules of integration, integration of x^n , a^x , e^x , integration of

$$\frac{1}{x^2 \pm a^2}; \frac{1}{\sqrt{x^2 \pm a^2}}; \frac{1}{\sqrt{a^2 - x^2}}; \frac{1}{|x|\sqrt{x^2 - a^2}}$$

integration of trigonometric functions, integration by method of substitution, **Some standard results:** $\int f(x)dx = F(x) + c \Rightarrow$

$$\int f(ax+b)dx = \frac{1}{a}F(ax+b) + c, \int [f(x)]^n \cdot f'(x)dx, \int \frac{f'(x)}{f(x)} dx,$$

$$\int \frac{1}{ax^2 + bx + c} dx, \int \frac{1}{\sqrt{ax^2 + bx + c}} dx.$$

Referance books:

(1) Business Mathematics

by. D.C.Sancheti & V.K.Kapoor, Sultan Chad & Sons Publication, New Delhi.

(2) Business Mathematics

by. B.S.Shah Prakashsan, Ahmedabad.

(3) Any Advance Calculusbooks used in Science Streme .

Subject Elective Course : EC-VII

Business Mathematics-4

Unit:1 Logic: [only examples]

Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements.

Set Theory: [only examples]

Definition and methods of sets, types of sets, Venn diagrams, Operations on sets, De-Morgan's law, Finite and infinite sets.

Unit:2 Permutations and Combinations: [only examples]

Fundamental rules of counting, Definition of Permutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results and examples.

Reference books:

- (1) Business Mathematics. BY. D.C.Sancheti & V.K.Kapoor,
Sultan Chad & Sons Publication, New Delhi.
- (2) Business Mathematics.
by. B.S.Shah Prakashsan, Ahmedabad.