MA/MSc - Mathematics

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ગુજરાત યુનિવર્સિટી

ન.એકેડેમિક/બી/૨૦૭૯૯ /૨૦૦૧
ગુજરાત યુનિવર્સિટી કાર્યાલય,
અમદાવાદ-૯ તા.૧૩-૭-૨૦૦૧

પરિપત્ર : ૧૧૫

આથી ગણિતશાસ્ત્ર વિષયનાં યુનિવર્સિટી સંલગ્ન અનુસ્નાતક કેન્દ્રનાં વડાશ્રીઓને અને યુનિવર્સિટી ગણિતશાસ્ત્ર વિભાગનાં વડાશ્રીને જણાવવાનું કે, આ કાર્યાલયનાં પરિપત્રાંક ન.એકેડેમિક/બી/૩૧૩૫૩/૨૦૦૦ તા.૨૩-૬-૨૦૦૦ થી પરિપત્રિત કરેલ અભ્યાસક્રમ ના પરિપત્રનો અમલ હવે જુન-૨૦૦૦ થી કરવાને બદલે જુન-૨૦૦૧ થી કરવાનો રહેશે(અભ્યાસક્રમ - પરિશિષ્ટ તરીકે સામેલ છે)

ખિડાણ:- ઉપર મુજબ

કુલસચિવ.

પ્રતિ,

૧: અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાભવન, ગુજરાત યુનિ.
નવરંગપુરા, અમદાવાદ-૯

: વિભાગીય વડાશ્રી, ગણિતશાસ્ત્ર વિભાગ, ગુજરાત યુનિ.અમદાવાદ-૯

૩: આચાર્યશ્રી, આર.એ.ભવન્સ કોલેજ, નડિયાદ :

૪: આચાર્યશ્રી, જે એન્ડ જે સાયન્સ કોલેજ, નડિયાદ :

૫: પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, ગુજરાત યુનિવ.અમદાવાદ-૯

૬: શ્રીમતી પ્રફુલ્લાબેન દ્વિવેદી ,, ,,

M.A.,M.SC. PART- I MATHEMATICS
INFORCE FROM, JUNE-2000

PAPER-1 : FUNCTIONS OF SEVERAL VARIABLE

Review of Vector Space : Euclidean space, Orthonormal basic; dual and second dual; Norms in the dual; the space L(E.F), Completeness; Compactness; Connectedness.

Continuous Mappings; definition of Differential; Differentiability implies Continuity; Special, cases; functions of class C ; Mappings of Class C; Composition of differentiable Mappings; Higher Differentials; Taylor's theorem for an variables; Maxima and Minima, Examples; Volume of a set.

Brief review of Integration; Integral on an Open set; lterated Integral; Volume of n bell; Interchange of Order of Differentiation with Integration,
Regular Element in L(E,F); Inverse of a Mapping; Implicit Function Theorem, Determinant, Oriented Volume; Change of variables in Intergration; Length and Area.

Manifold; Differentiable Mainiford; Differentiable Functions and Mappings; Partition of Unity; Tangent space; Space of Differentials, Grassman Algebra, Differential Forms; Integral of a form; stokes Theorem; Veriods of 1 forms.

Applications; Gross Product; Gradient, Divergence; Curl; Forms of stokes Theorem; Definition of Harmonic function, Mean value and Maximum Principle; Poisson Integral Formula, Harnache Convergence theorem.

The course is based on the book "Calculus of Several varibales" by casper Goffmann. Harper and Row, New York.

REFERENCES:

J.Calculus in Manifolds, by Michael Spivak.W.A.Benjamin Inc.N.Y.

2. Functions and several varibales, by Wendell H Fleming, Addison-Wesely Publishing Company, Inc.Reading, Massachusetts.

3. Multivariable Calculus, by Lawrence Corwin and Robert H.Szczarba. Marcel Dekker Inc. New York.

4. Advanced Calculus, by H.K.Nickerson, D.C.Spencer, and N.E.Steenrod, Affiliated East and West Press Private Ltd. New Delhi.

5. Advanced Calculus, by R.C.Buck. McGrawhill Kogahusha Ltd. Tokyo.

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PAPER - II

T O P O L O G Y

Topological spaces, basis for a topology, the order topology the Product topology on X x Y, the subspace topology.

Closed sets and limit Points, Continuous functions. the product topology, themetric topology.

Thequotient topology, connected spaces, connected sets in the real live, componets and path components, Local connectioness.

Compact spaces, compact sets in the Real live, limit point compactness, local compactness.

Countability axioms, the separation axioms, the Urysohn lemma, the urjsohn Metrization thus, Partitions of unity.

The Course may be covered from Chapters 2,3, and 4 of the book.

"Topology" a firkst course- by James R Munkreys. PHI P.L.(1984)

REFERENCE BOOKS:

1. "General Topology" Sribatsa Nanda, Macmillan India Ltd.1990. and Sudarson Nanda.

2. "General Topology" Stephen Willard. Addison Wesley Pub.Comp.(1970).

3. "Aspects of Topology" C.O.Christenson and W.L.Voxman- Marcel Dekker (1977).

4. Topology" James Dughndji. PHI Pvt.Ltd.(1975)

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Paper III COMPLEX ANALYSIS

* REVISION :

Definitions and notations, Algebric propetties, Polar Co.ordinates and Euler's formula, Products and quotients in exponetial form.

* CONTINUOUS AND DIFFERENTIABLE COMPLEX FUNCTIONS :

Continuous complex functions, differentiable complex functions. Cauchy Riemann eq equations, Analytic functions, Reflection Principle, Harmonic functions of two variables, Elementary functions.

* INTEGRALS :

Contours, Contours Integrals, Antiderivatives, Cauchy - Goursat thecrem, Simply connccted domain, Cauchy Integral formula, Derivatives of Analytic functions. Residues. Residue theorem, Types of isolated singluar points, Residues at poles, Zero and Poles of order m, Behaviour of f near removable and essential singular points, Residue Theorem. Types of isolated singularity, Zeros and poles of order m. Liouville's theorem and the fundamental theorem of Algebra, Maximum moduli of functions.

* SERIES :

Convergence of sequences and series, Taylor series, Laurent series, Absolute and Uniform convergence of power series,

* APPLICATIONS OF RESIDEES :

Evaluation of improper integrals, Improper intergrals involving sines and cosines. Definite integrals involving sines and cosines, Indented paths, Integration along a branch cut, Argument Principle, Rouche's theorem.

* MAPPING BY ELEMENTARY FUNCTIONS :

Bilinear transformations.

The cpurse is roughly covered by :

* COMPLEX VARIABLES AND APPLICATIONS (SIXTH EDITION)

by James Ward Brown and R. V. Churchill, McGraw-hills. Ine.

Chapters 1, 2, 3, 4, 5, 6, 7 (omit 66), 8 (omit 73-78)

REFERENCE BOOKS :

* INTRODUCTION TO FUNCTIONS OF COMPLEX VARIABLES

by Curtiss John Hamilton, Marcel Dekkar Inc., New York.

* COMPLEX ANALYSIS

by Lan Stcwart and David Tall, Cambridge University Press

* COMPLEX ANALYSIS

by J. C. Duccan.

Paper--4

DIFFERENTIAL EQUATIONS

Ordinary Differential Equations:

Power series solutions, Gauss's Hypergeometric function.

Properties of the following special functions.

(i) Hermite Polynomilas.

(ii) Chebysher Polynomials.

(iii) Legendre Polynomials.

(iv) Bessel functions.

Picard's the ocem on existance and uniqueness f solution of the initial value problem $y' = f(x,y)$ $y(x_o) = Y_o$

Partial differential equations:

First order p.d.e., classifications of integrals, linear eqns. of first order. Pfaffian diff.eqns. compatible systems, Charpit's method, Jacobi's meth d, non linear first order p.d.e.

Second order p.d.e., classffication one dimensional wave eqn. Method of separation of variables, Laplace's eqn. boundary value probles, maximum principle, Dirichlet problems, Neumann problems, Harnakc's thm., Green's function, heat conduction problems, Ruhamel's principle, equipotential surfaces, kelvin's inversion the.

Fourier tranforms and integrals.

Text Books : George F.Simmons : Differential equations with

(1) Applications and historical notes.
Tata McGraw Bi l Pub. Cc.Ltd. New Delhi
1972 TMH Ed.1974. Chapters 5 (Omit appendicees and E.6 (Omit apppendices A & B) and 11.

(2) An elementery course in partial differential equations. by Amarnath T.Narosa Pub. House, 1997. (The Entire Book) Chapter 1,2, Appendix-A-.

Reference :-

(1) I.N.Sneddon Elements of P.d.e. McGraw Hill

(2) H.Weinberger : A First Course in p.d.e. Blaisdall. New York, 1965

(3) P.Garbedian, p.d.e. s end ed.Chelsea New York, 1986.

PAPER V REAL ANALYSIS

Aim:-

The course is designed to develop concepts of Lebesgue measure and Lebesgue integration on R.L. spaces and Fourier series are introduced.

Details:-

Review of convergence for sequences and series, uniform convergence, limsup, liminf, elementary concepts of set. Outer measure, inner measure, measurability, invariance of measure.

Mensurable functions and their properties, convergence in measure.

Lebesgue integral and its properties, passage to limit under integral, Summable(integrable) functions, Square summable functions, relation to Fourier series. Lp spaces.

Monotonic function and differentiability assuming Vital's covering theorem, functions of f nite(bounded) variation absolutely continuous functions, indefinite integrals and fundamental theorem of calculus.

Introduction to Fourier series by Dirichlet problem for unit disc. Poission's theorem, Summability, pointwise convergence of Fourier seires, Riemanian Lebesegue lemma, localization principle, Dini's test, Lipsehitz functions.

The course is roughly covered by :-

(1) "Theory of cuntions of a real variable 'Volume I by I. P. Natanson, Frederic Ungar Publishing Co., New York(1964),

Care:

The notations in this book are not standard; we use standard notations only. Similarly for terminology.
Chapters 1 and 2 are basic. They can be covered quickly
Ch 2, § 5, is amust.
Ch. III: Keep the remark *on page 67 in mind; define 6 - algebras and Borel sets in connection with measurable sets. Drop 7, only statement of Virali'scovering theorem (§ 8) — 9 is included.

Ch. IV : All of it.
Ch. V : All of it.

Ch.VI : Fatou's lemma : F $\lim_n \inf f_n$ (p.140). Drop equi-absolutly contiooous integrals (p.151) Thm. 2,3,4,5,6,7, Include 4

Ch.VII : § 3 can be combined with discussion on Fourier series later. Drop Thm. 5 & 6 of § 3. Drop 5.

Ch.VIII : (Drop § 4, § 5, § 6, § 7, § 8, (9) only § 1,2,3,.

Ch-IX : only § 1, § 2, § 4, (upto Thm 3), § 7.

(2) "Founder series" By Rajendra Bhatia. Hindustan Book A Agency-1993.

Ch. 1 : All of it.

Ch.2 : (Drop § 2,3, 14, 2,3,15, 2,3,16, 2,3,17. 2.3.18 & § 2.4) Go upto § 2.3.13

Reference Books:

1) "Real Analysis" by H.L.Royden (3rd ed) Macmillan Publishing co. New York.(1988)

2) "Measure and Integration" by R.Wheeden and A.Zygmund. Marcel Dekker (1977).

3) "Measure and Integration" by I.K.Rana, Narosa Publishing House. (1997)

4) Introduction to real variable theory" by S.C.Saxena and S.M.Shah. Prentice Hall of India (1980).

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