Differential Calculus By Das And Mukherjee

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This book is a high-level introduction to vector calculus based solidly on differential forms. Informal but sophisticated, it is geometrically and physically intuitive yet mathematically rigorous. It offers remarkably diverse applications, physical and mathematical, and provides a firm foundation for further studies.

The Book Is Intended To Serve As A Text In Analysis By The Honours And Post-Graduate Students Of The Various Universities. Professional Or Those Preparing For Competitive Examinations Will Also Find This Book Useful.The Book Discusses The Theory From Its Very Beginning. The Foundations Have Been Laid Very Carefully And The Treatment Is Rigorous And On Modem Lines. It Opens With A Brief Outline Of The Essential Properties Of Rational Numbers And Using Dedekinds Cut, The Properties Of Real Numbers Are Established. This Foundation Supports The Subsequent Chapters: Topological Frame Work Real Sequences And Series, Continuity Differentiation, Functions Of Several Variables, Elementary And Implicit Functions, Riemann And Riemann-Stieltjes Integrals, Lebesgue Integrals, Surface, Double And Triple Integrals Are Discussed In Detail. Uniform Convergence, Power Series, Fourier Series, Improper Integrals Have Been Presented In As Simple And Lucid Manner As Possible And Fairly Large Number Solved Examples To Illustrate Various Types Have Been Introduced.As Per Need, In The Present Set Up, A Chapter On Metric Spaces Discussing Completeness, Compactness And Connectedness Of The Spaces Has Been Added. Finally Two Appendices Discussing Beta-Gamma Functions, And Cantors Theory Of Real Numbers Add Glory To The Contents Of The Book. Reprint of the original, first published in 1869.

When a new extraordinary and outstanding theory is stated, it has to face criticism and skeptism, because it is beyond the usual concept. The fractional calculus though not new, was not discussed or developed for a long time, particularly for lack of its application to real life problems. It is extraordinary because it does not deal with ‘ordinary’ differential calculus. It is outstanding because it can now be applied to situations where existing theories fail to give satisfactory results. In this book not only mathematical abstractions are discussed in a lucid manner, with physical mathematical and geometrical explanations, but also several practical applications are given particularly for system identification, description and then efficient controls. The normal physical laws like, transport theory, electrodynamics, equation of motions, elasticity, viscosity, and several others of are based on ‘ordinary’ calculus. In this book these physical laws are generalized in fractional calculus

contexts; taking, heterogeneity effect in transport background, the space having traps or islands, irregular distribution of charges, non-ideal spring with mass connected to a pointless-mass ball, material behaving with viscous as well as elastic properties, system relaxation with and without memory, physics of random delay in computer network; and several others; mapping the reality of nature closely. The concept of fractional and complex order differentiation and integration are elaborated mathematically, physically and geometrically with examples. The practical utility of local fractional differentiation for enhancing the character of singularity at phase transition or characterizing the irregularity measure of response function is deliberated. Practical results of viscoelastic experiments, fractional order controls experiments, design of fractional controller and practical circuit synthesis for fractional order elements are elaborated in this book. The book also maps theory of classical integer order differential equations to fractional calculus contexts, and deals in details with conflicting and demanding initialization issues, required in classical techniques. The book presents a modern approach to solve the ‘solvable’ system of fractional and other differential equations, linear, non-linear; without perturbation or transformations, but by applying physical principle of action-and-opposite-reaction, giving ‘approximately exact’ series solutions. Historically, Sir Isaac Newton and Gottfried Wihelm Leibniz independently discovered calculus in the middle of the 17th century. In recognition to this remarkable discovery, J.von Neumann remarked, “...the calculus was the first achievement of modern mathematics and it is difficult to overestimate its importance. I think it defines more equivocally than anything else the inception of modern mathematical analysis which is logical development, still constitute the greatest technical advance in exact thinking.” This XXI century has thus started to ‘think-exactly’ for advancement in science & technology by growing application of fractional calculus, and this century has started speaking the language which nature understands the best.

This Book Is Designed To Be Used For Class-Room Teaching For A Course In Differential Calculus At The Undergraduate Level And Also As A Reference Book For Others Who Need The Use Of Differential Calculus. The Book Is Designed In Accordance With The Syllabus In Differential Calculus Prescribed In Most Of The Indian Universities.The Following Are Some Of The Special Features Of This Textbook: * In Addition To The Theoretical Treatment Of The Topics In Differential Calculus, Due Respect Is Given To Application-Oriented Approach Through Various Illustrations And Exercises Drawn From Practical Sciences. * The Graphical And Numerical Approach Provided In The Text Enhances The Appreciation And Understanding Of The Concepts Involved. * A Large Number Of Worked Examples And Exercises, With Answers, Drawn From Various Examination Papers Of Indian And Foreign Universities Are Included. * Biographical Notes And Historical Snippets Have Been Added With A View To Motivating And Inspiring The Students. Brief Life-Sketches And Contributions Of Great Mathematicians Like Sir Isaac Newton And Leibniz Form Part Of The Book. * The Unique And Pioneering Aspect Of The Present Book Is That A Large Number Of Computer Programs And Graphic Printouts For Various Topics Indifferential Calculus Are Included. The Fascinating Potential Of Graphics, For The Understanding Of Calculus, On A Computer Is Well Brought Out Through Computer Programs Which Can Be Readily Worked On An Ibm-Compatible Pc. Further, In Order To Make The Programs Useful To Students And Amateurs Who Have Access Only To The Popular Home-Computers Interesting Programs Which Can Be, Run On The Very Popular Bbc Microcomputer And Sinclair Spectrum Have Also Been Provided.Very Interesting Graphics Of Evolutes Of Famous Curves And Envelopes Of Families Of Curves Along With Their Ready-To-Work Programs Add To The Value Of The Book.

This book is an attempt to make presentation of Elements of Real Analysis more lucid. The book contains examples and exercises meant to help a proper understanding of the text. For B.A., B.Sc. and Honours (Mathematics and Physics), M.A. and M.Sc. (Mathematics) students of various Universities/ Institutions.As per UGC Model Curriculum and for I.A.S. and Various other competitive exams.

As part of their campaign to introduce the continental notation into Great Britain, Babbage and his friends Herschel and Peacock translated and published S. F. Lacroix's Sur le calcul differentiel et integral (1802). Babbage had begun the task of translation while still at Cambridge, but for one reason or another set it aside uncompleted. "A few years later Peacock called on me in Devonshire Street, and stated that both Herschel and himself were convinced that the change from the dots to the d's would not be accomplished until some foreign work of eminence should be translated into English. Peacock then proposed that I should either finish the translation which I had commenced, or that Herschel and himself should complete the remainder of my translation. I suggested that we should toss up which alternative to take. It was determined by lot that we should make a joint translation." Some months after, the translation of the small work of Lacroix was published (Babbage 1864, 39). Part I of Lacroix's work, on differential calculus, was translated by Babbage; Part II, on integral calculus, was translated jointly by Peacock and Herschel. The "Appendix" was written by Herschel, and he and Peacock collaborated on the notes. Acceptance of the new notation was slow at first, but by 1820 the d-notation had triumphed at Cambridge, largely due to the support and influence of William Whewell, the future dean of Trinity College.

Differential CalculusIntegral Calculus for Three Year & Two Year Degree CoursesDifferential and Integral CalculusJohn Wiley & Sons

The classic introduction to the fundamentals of calculus Richard Courant's classic text Differential and Integral Calculus is an essential text for those preparing for a career in physics or applied math. Volume 1 introduces the foundational concepts of "function" and "limit", and offers detailed explanations that illustrate the "why" as well as the "how". Comprehensive coverage of the basics of integrals and differentials includes their applications as well as clearly-defined techniques and essential theorems. Multiple appendices provide supplementary explanation and author notes, as well as solutions and hints for all in-text problems.