

18 Wednesday 10/02/2017

8.00 am

# VECTOR ANALYSIS

8.30

1, 2, 3, 14, 15, 16

9.00

Q:1 Find  $\vec{a} = 3\mathbf{i} + \mathbf{j} - \mathbf{k}$ ,  $\vec{b} = 2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ ,  $\vec{c} = 5\mathbf{i} + 3\mathbf{k}$

9.30

i)  $(2\vec{a} + \vec{b}) \cdot \vec{c}$

10.00 ii)  $(\vec{a} - 2\vec{c}) \cdot (\vec{b} + \vec{c})$

10.30 (i) Sol:-

$$\begin{aligned} \therefore 2\vec{a} + \vec{b} &= 2(3\mathbf{i} + \mathbf{j} - \mathbf{k}) + (2\mathbf{i} - \mathbf{j} + 2\mathbf{k}) \\ &= 6\mathbf{i} + 2\mathbf{j} - 2\mathbf{k} + 2\mathbf{i} - \mathbf{j} + 2\mathbf{k} \\ &= 8\mathbf{i} + \mathbf{j} + 0\mathbf{k} \end{aligned}$$

11.30

$$\begin{aligned} (2\vec{a} + \vec{b}) \cdot \vec{c} &= (8\mathbf{i} + \mathbf{j} + 0\mathbf{k}) \cdot (5\mathbf{i} + 0\mathbf{j} + 3\mathbf{k}) \\ &= 8(5) + (1)(0) + (0)(3) \Rightarrow 40 + 0 + 0 \Rightarrow 40 \end{aligned}$$

11.00

Sol:-

$$\begin{aligned} \text{ii) } \therefore \vec{a} - 2\vec{c} &= (3\mathbf{i} + \mathbf{j} - \mathbf{k}) - 2(5\mathbf{i} + 3\mathbf{k}) \\ &= 3\mathbf{i} + \mathbf{j} - \mathbf{k} - 10\mathbf{i} - 6\mathbf{k} \\ &= -7\mathbf{i} + \mathbf{j} - 7\mathbf{k} \end{aligned}$$

1.00

$$\begin{aligned} \therefore \vec{b} + \vec{c} &= 2\mathbf{i} - \mathbf{j} + 2\mathbf{k} + 5\mathbf{i} + 3\mathbf{k} \\ &= 7\mathbf{i} - \mathbf{j} + 5\mathbf{k} \end{aligned}$$

1.30

Now

$$\begin{aligned} (\vec{a} - 2\vec{c}) \cdot (\vec{b} + \vec{c}) &= (-7\mathbf{i} + \mathbf{j} - 7\mathbf{k}) \cdot (7\mathbf{i} - \mathbf{j} + 5\mathbf{k}) \\ &= (-7)(7) + (1)(-1) + (-7)(5) \\ &= -49 - 1 - 35 \\ &= -85 \end{aligned}$$

2.30

3.00

Q:2 Find  $x$  so that  $\vec{a} = 2\mathbf{i} + 4\mathbf{j} - 7\mathbf{k}$  and  $\vec{b} = 2\mathbf{i} + 6\mathbf{j} + x\mathbf{k}$  are perpendicular

3.30

Sol:-

$$\vec{a} = 2\mathbf{i} + 4\mathbf{j} - 7\mathbf{k}$$

$$\vec{b} = 2\mathbf{i} + 6\mathbf{j} + x\mathbf{k}$$

4.00

According to given condition  $\vec{a} \perp \vec{b}$  then

4.30

$$\vec{a} \cdot \vec{b} = 0$$

5.00

$$\begin{aligned} (2\mathbf{i} + 4\mathbf{j} - 7\mathbf{k}) \cdot (2\mathbf{i} + 6\mathbf{j} + x\mathbf{k}) &= 0 \\ (2)(2) + (4)(6) + (-7)(x) &= 0 \end{aligned}$$

5.00 pm

# Vector Analysis Mathematics For Bsc Chapter

**John Vince**



## **Vector Analysis Mathematics For Bsc Chapter :**

**VECTOR ANALYSIS AND GEOMETRY** B.R. THAKUR, HARI KISHAN, MATHEMATICS GANIT B SC IST YEAR RP RPP UNIFIED

**Antenna Theory and Applications** Hubregt J. Visser, 2012-03-05 This comprehensive text on antenna theory explains the origin of radiation and discusses antenna parameters in depth. This book offers an in-depth coverage of fundamental antenna theory and shows how to apply this in practice. The author discusses electromagnetic radiation and antenna characteristics such as impedance, radiation pattern, polarization, gain, and efficiency. In addition, the book provides readers with the necessary tools for analyzing complex antennas and for designing new ones. Furthermore, a refresher chapter on vector algebra including gradient, divergence, and curl operation is included. Throughout the book, ample examples of employing the derived theory are given, and all chapters are concluded with problems giving the reader the opportunity to test his/her acquired knowledge.

**Key Features:** Covers the mathematical and physical background that is needed to understand electromagnetic radiation and antennas. Discusses the origin of radiation and provides an in-depth explanation of antenna parameters. Explores all the necessary steps in antenna analysis, allowing the reader to understand and analyze new antenna structures. Contains a chapter on vector algebra, which is often a stumbling block for learners in this field. Includes examples and a list of problems at the end of each chapter. Accompanied by a website containing solutions to the problems for instructors and CST modeling files ([www.wiley.com/go/visser\\_antennas](http://www.wiley.com/go/visser_antennas)). This book will serve as an invaluable reference for advanced last year Bsc/Msc students in antenna and RF engineering, wireless communications, electrical engineering, radio engineers, and other professionals needing a reference on antenna theory. It will also be of interest to advanced senior radio engineers, designers, and developers.

**Vector Analysis** Louis Brand, 2012-06-22 This text was designed as a short introductory course to give students the tools of vector algebra and calculus, as well as a brief glimpse into the subject's manifold applications. 1957 edition, 86 figures.

**Concise Vector Analysis** C. J. Eliezer, 2016-01-14 This concise introduction to the methods and techniques of vector analysis is suitable for college undergraduates in mathematics, as well as students of physics and engineering. Rich in exercises and examples, the straightforward presentation focuses on physical ideas rather than mathematical rigor. The treatment begins with a chapter on vectors and vector addition, followed by a chapter on products of vectors. Two succeeding chapters on vector calculus cover a variety of topics, including functions of a vector, line, surface, and volume integrals, the Laplacian operator, and more. The text concludes with a survey of standard applications, including Poisson's central axis, Gauss's theorem, gravitational potential, Green's theorems, and other subjects.

**An Illustrative Guide to Multivariable and Vector Calculus** Stanley J. Miklavcic, 2020-02-17 This textbook focuses on one of the most valuable skills in multivariable and vector calculus: visualization. With over one hundred carefully drawn color images, students who have long struggled picturing, for example, level sets or vector fields will find these abstract concepts rendered with clarity and ingenuity. This illustrative approach to the material covered in standard multivariable and vector

calculus textbooks will serve as a much needed and highly useful companion Emphasizing portability this book is an ideal complement to other references in the area It begins by exploring preliminary ideas such as vector algebra sets and coordinate systems before moving into the core areas of multivariable differentiation and integration and vector calculus Sections on the chain rule for second derivatives implicit functions PDEs and the method of least squares offer additional depth ample illustrations are woven throughout Mastery Checks engage students in material on the spot while longer exercise sets at the end of each chapter reinforce techniques An Illustrative Guide to Multivariable and Vector Calculus will appeal to multivariable and vector calculus students and instructors around the world who seek an accessible visual approach to this subject Higher level students called upon to apply these concepts across science and engineering will also find this a valuable and concise resource

**Vector Analysis** R. K. Pandey,2007 This book play a major role as basic tools in Differential geometry Mechanics Fluid Mathematics The bulk of the book consists of five chapters on Vector Analysis and its applications Each chapter is accompanied by a problem set The problem sets constitute an integral part of the book Solving the problems will expose you to the geometric symbolic and numerical features of multivariable calculus Contents Algebra of Vectors Differentiation of Vectors Gradient Divergence and Curl Vector Integration Application of Vector Integration **A History of Vector Analysis** Michael J. Crowe,1994-01-01 Prize winning study traces the rise of the vector concept from the discovery of complex numbers through the systems of hypercomplex numbers to the final acceptance around 1910 of the modern system of vector analysis

**Vector Calculus** Paul C. Matthews,2000-01-14 Vector calculus is the fundamental language of mathematical physics It provides a way to describe physical quantities in three dimensional space and the way in which these quantities vary Many topics in the physical sciences can be analysed mathematically using the techniques of vector calculus These topics include fluid dynamics solid mechanics and electromagnetism all of which involve a description of vector and scalar quantities in three dimensions This book assumes no previous knowledge of vectors However it is assumed that the reader has a knowledge of basic calculus including differentiation integration and partial differentiation Some knowledge of linear algebra is also required particularly the concepts of matrices and determinants The book is designed to be self contained so that it is suitable for a programme of individual study Each of the eight chapters introduces a new topic and to facilitate understanding of the material frequent reference is made to physical applications The physical nature of the subject is clarified with over sixty diagrams which provide an important aid to the comprehension of the new concepts Following the introduction of each new topic worked examples are provided It is essential that these are studied carefully so that a full understanding is developed before moving ahead Like much of mathematics each section of the book is built on the foundations laid in the earlier sections and chapters

Math Tools Georg Glaeser,2017-09-13 In this book topics such as algebra trigonometry calculus and statistics are brought to life through over 500 applications ranging from biology physics and chemistry to astronomy geography and music With over 600 illustrations emphasizing the beauty of

mathematics Math Tools complements more theoretical textbooks on the market bringing the subject closer to the reader and providing a useful reference to students By highlighting the ubiquity of mathematics in practical fields the book will appeal not only to students and teachers but to anyone with a keen interest in mathematics and its applications

**COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES** Rakesh Kumar,Kamlendra Kumar,2018-01-30

The book introduces subject techniques to approximate mathematical procedures solutions of problems that arise in science and engineering It handles carefully a detailed elucidation of errors in numerical analysis It aims to fully cater to the needs of students of the courses BSc MSc mathematics and physics BSc computer science BTech all courses in engineering and MCA

**Vector Analysis from Scratch** David Smith,2021-07-24 Vector analysis is a very useful and a powerful tool for physicists and engineers alike It has applications in multiple fields Although it is not a particularly difficult subject to learn students often lack a proper understanding of the concepts on a deeper level This restricts its usage to a mere mathematical tool That s where this book hope to be different We don t want this subject to be treated just as a mathematical tool We hope to go beyond it Therefore the emphasis is to provide physical interpretation to the various concepts in the subject with the help of illustrative figures and intuitive reasoning Having said that we have given adequate importance to the mathematical aspect of the subject as well 100 solved examples given in the book will give the reader a definite edge when it comes to problem solving For beginners this book will provide a concise introduction to the world of vectors in a unique way The various concepts of the subject are arranged logically and explained in a simple reader friendly language so that they can learn with minimum effort in quick time For experts this book will a great refresher The first 2 chapters focus on the basics of vectors In chapters 3 to 5 we dig into vector calculus Chapter 6 is all about vectors in different coordinate systems and finally chapter 7 focuses on the applications of vectors in various fields like engineering mechanics electromagnetism fluid mechanics etc Which Degree? ,1997 *Vector Analysis Versus Vector Calculus* Antonio Galbis,Manuel

Maestre,2012-03-29 The aim of this book is to facilitate the use of Stokes Theorem in applications The text takes a differential geometric point of view and provides for the student a bridge between pure and applied mathematics by carefully building a formal rigorous development of the topic and following this through to concrete applications in two and three variables Key topics include vectors and vector fields line integrals regular k surfaces flux of a vector field orientation of a surface differential forms Stokes theorem and divergence theorem This book is intended for upper undergraduate students who have completed a standard introduction to differential and integral calculus for functions of several variables The book can also be useful to engineering and physics students who know how to handle the theorems of Green Stokes and Gauss but would like to explore the topic further *Vector Analysis for Mathematicians, Scientists and Engineers* S.

Simons,2014-05-15 Vector Analysis for Mathematicians Scientists and Engineers Second Edition provides an understanding of the methods of vector algebra and calculus to the extent that the student will readily follow those works which make use of

them and further will be able to employ them himself in his own branch of science New concepts and methods introduced are illustrated by examples drawn from fields with which the student is familiar and a large number of both worked and unworked exercises are provided The book begins with an introduction to vectors covering their representation addition geometrical applications and components Separate chapters discuss the products of vectors the products of three or four vectors the differentiation of vectors gradient divergence and curl line surface and volume integrals theorems of vector integration and orthogonal curvilinear coordinates The final chapter presents an application of vector analysis Answers to odd numbered exercises are provided as the end of the book

**Mathematics B.sc 1st Sem(karnatka Univ) , An Introduction to Vector Analysis** B. Hague,2012-12-06 The principal changes that I have made in preparing this revised edition of the book are the following i Carefully selected worked and unworked examples have been added to six of the chapters These examples have been taken from class and degree examination papers set in this University and I am grateful to the University Court for permission to use them ii Some additional matter on the geometrical application of vectors has been incorporated in Chapter 1 iii Chapters 4 and 5 have been combined into one chapter some material has been rearranged and some further material added iv The chapter on integral theorems now Chapter 5 has been expanded to include an alternative proof of Gauss's theorem a treatment of Green's theorem and a more extended discussion of the classification of vector fields v The only major change made in what are now Chapters 6 and 7 is the deletion of the discussion of the DOW obsolete potential function vi A small part of Chapter 8 on Maxwell's equations has been rewritten to give a fuller account of the use of scalar and vector potentials in electromagnetic theory and the units employed have been changed to the m k s system

**Vector Analysis** Josiah Willard Gibbs, Edwin Bidwell Wilson, 1901 **Vector Analysis for Computer Graphics** John Vince, 2007-05-15 In my last book Geometry for Computer Graphics I employed a mixture of algebra and vector analysis to prove many of the equations used in computer graphics At the time I did not make any distinction between the two methodologies but slowly it dawned upon me that I had had to discover for the first time how to use vector analysis and associated strategies for solving geometric problems I suppose that mathematicians are taught this as part of their formal mathematical training but then I am not a mathematician After some deliberation I decided to write a book that would introduce the beginner to the world of vectors and their application to the geometric problems encountered in computer graphics I accepted the fact that there would be some duplication of formulas between this and my last book however this time I would concentrate on explaining how problems are solved The book contains eleven chapters The first chapter distinguishes between scalar and vector quantities which is reasonably straightforward The second chapter introduces vector representation starting with Cartesian coordinates and concluding with the role of direction cosines in changes in axial systems The third chapter explores how the line equation has a natural vector interpretation and how vector analysis is used to resolve a variety of line related geometric problems Chapter 4 repeats Chapter 3 in the context of the plane

**Vector**

**Analysis** N. Kemmer, 1977-01-20 Vector analysis provides the language that is needed for a precise quantitative statement of the general laws and relationships governing such branches of physics as electromagnetism and fluid dynamics The account of the subject is aimed principally at physicists but the presentation is equally appropriate for engineers The justification for adding to the available textbooks on vector analysis stems from Professor Kemmer's novel presentation of the subject developed through many years of teaching and in relating the mathematics to physical models While maintaining mathematical precision the methodology of presentation relies greatly on the visual geometric aspects of the subject and is supported throughout the text by many beautiful illustrations that are more than just schematic A unification of the whole body of results developed in the book from the simple ideas of differentiation and integration of vector fields to the theory of orthogonal curvilinear coordinates and to the treatment of time dependent integrals over fields is achieved by the introduction from the outset of a method of general parametrisation of curves and surfaces *Applied Vector Analysis, Second Edition* Matiur Rahman, Issac Mulolani, 2008 In engineering and applied science the practical problems that arise are often described using mathematical models In order to interpret these figures and make a judicious decision relating to such problems engineers and scientists need ample knowledge of vector analysis Illustrating the application of vector analysis to physical problems this new edition of *Applied Vector Analysis* expands its coverage of the field to encompass new concepts such as the divergence theorem position vectors and Bernoulli's equation It provides the grounding in vector analysis engineers and scientists require with an emphasis on practical applications This user friendly volume is divided into seven chapters each providing a clear manifestation of theory and its application to real life problems Beginning with a brief historical background of vector calculus the authors introduce the algebra of vectors using a single variable Within this framework the book goes on to discuss the Del operator which plays a significant role in displaying physical problems in mathematical notation Chapter 6 contains important integral theorems such as Green's theorem Stokes theorem and divergence theorem Specific applications of these theorems are described using selected examples in fluid flow electromagnetic theory and the Poynting vector in Chapter 7 The appendices supply important vector formulas at a glance and mathematical explanations to selected examples from within the text One of the most valuable branches of mathematics vector analysis is pertinent to the investigation of physical problems encountered in many disciplines Using real world applications concise explanations of fundamental concepts and extensive examples *Applied Vector Analysis Second Edition* provides a clear cut exposition of the field's practical uses

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