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this is a single volume book on electrical machines that teaches the subject precisely and yet with amazing clarity the extent has been kept in control so that

the entire subject can be covered by students within the limited time of the semesters thus they will not have to consult multiple books anymore the discussions of concepts include the modern trends used in industry like efficient transformers efficient induction motors dc drives and the problems related to them

this comprehensive up to date introduction to electrical machines is designed to meet the needs of undergraduate electrical engineering students it presents the essential principles of rotating machines and transformers the emphasis is on the performance though the book also introduces the salient features of electrical machine design the book provides accessible student friendly coverage of dc machines transformers three phase induction motor single phase induction motor fractional horsepower motors and synchronous machines the clear writing style of the book enhanced by illustrative figures and simplified explanations of the fundamentals makes it an ideal text for gaining a thorough understanding of the subject of electrical machines key features include detailed coverage of the construction of electrical machines lucid explanations of the principles of operation of electrical machines methods of testing of electrical machines performance calculations of electrical machines wealth of diverse solved examples in each chapter to illustrate the application of theory to practical problems salient features of design of electrical machines objective type questions to help students prepare for competitive exams

this book is written so that it serves as a text book for b e b tech degree students in general and for the institutions where aicte model curriculum has been adopted topics covered in this book magnetic field and magnetic circuit electromagnetic force and torque d c machines d c machines motoring and generation salient features self contained self explantary and simple to follow text numerous worked out examples well explained theory parts with illustrations exercises objective type question with answers at the end of each chapter

an electrical machine is a device that converts mechanical energy into electrical energy or vice versa major types of electrical machines are generators motors and transformers an electric generator is a type of electrical machine that works on the principle of electromagnetic induction it consists of two main components which are a stator and a rotor generators can be classified as ac generators and dc generators the electric motor converts electrical energy into mechanical energy it can be classified into ac motors and dc motors the transformer is a static electrical device that transfers electric power from one circuit to another circuit some major

applications of electric devices are electric vehicles and battery powered devices such as wheelchairs power tools guided vehicles welding equipment x ray and tomographic systems and computer numerical control cnc machines this book presents the analysis and applications of electrical machines students researchers experts and all associated with the field of electrical engineering will benefit from it

electrical machines primarily covers the basic functionality and the role of electrical machines in their typical applications the effort of applying coordinate transforms is justified by obtaining a more intuitive concise and easy to use model in this textbook mathematics is reduced to a necessary minimum and priority is given to bringing up the system view and explaining the use and external characteristics of machines on their electrical and mechanical ports covering the most relevant concepts relating to machine size torque and power the author explains the losses and secondary effects outlining cases and conditions in which some secondary phenomena are neglected while the goal of developing and using machine mathematical models equivalent circuits and mechanical characteristics persists through the book the focus is kept on physical insight of electromechanical conversion process details such as the slot shape and the disposition of permanent magnets and their effects on the machine parameters and performance are also covered

this book presents the relation of power quantities of the machine as the current voltage power flow power losses and efficiency the purpose of this book is to provide a good understanding of the machine behavior and its drive and it is intended for students both in community colleges and universities

traditionally electrical machines are classi ed into d c commutator brushed machines induction asynchronous machines and synchronous machines these three types of electrical machines are still regarded in many academic curricula as fundamental types despite that d c brushed machines except small machines have been gradually abandoned and pm brushless machines pmbm and switched reluctance machines srm have been in mass p duction and use for at least two decades recently new topologies of high torque density motors high speed motors integrated motor drives and special motors have been developed progress in electric machines technology is stimulated by new materials new areas of applications impact of power electronics need for energy saving and new technological challenges the development of electric machines in the next few years will mostly be stimulated by computer hardware residential and public

applications and transportation systems land sea and air at many universities teaching and research strategy oriented towards el trical machinery is not up to date and has not been changed in some co tries almost since the end of the wwii in spite of many excellent academic research achievements the academia industry collaboration and technology transfer are underestimated or quite often neglected underestimation of the role of industry unfamiliarity with new trends and restraint from technology transfer results with time in lack of external nancial support and drastic cline in the number of students interested in power electrical engineering

this book presents a comprehensive exposition of the theory performance and analysis of electric machines transformers alongwith other machines including ac and dc synchronous 3 phase and single phase induction commutator special machines and solid state control have all been explained in a simple and friendly style a balance between the mathematical and the qualitative aspects has been kept throughout the book a large variety of solved examples are included to illustrate the basic concepts and techniques unsolved problems and objective questions have also been presented at the end of each chapter the third edition also includes wide band transformers phase groups of 3 phase transformers synchronous reactor and synchronous frequency changer speed control of 3 phase induction motor operation of 3 phase induction motor with unbalanced supply voltages additional solved and unsolved problems all these features make this book an ideal text for undergraduate electrical electronics and computer engineering students upsc and amie candidates would also find the book extremely useful

in one complete volume this essential reference presents an in depth overview of the theoretical principles and techniques of electrical machine design this timely new edition offers up to date theory and guidelines for the design of electrical machines taking into account recent advances in permanent magnet machines as well as synchronous reluctance machines new coverage includes brand new material on the ecological impact of the motors covering the eco design principles of rotating electrical machines an expanded section on the design of permanent magnet synchronous machines now reporting on the design of tooth coil high torque permanent magnet machines and their properties large updates and new material on synchronous reluctance machines air gap inductance losses in and resistivity of permanent magnets pm operating point of loaded pm circuit pm machine design and minimizing the losses in electrical machines end of chapter exercises and new direct design examples with methods and solutions to real

design problems a supplementary website hosts two machine design examples created with mathcad rotor surface magnet permanent magnet machine and squirrel cage induction machine calculations also a matlab code for optimizing the design of an induction motor is provided outlining a step by step sequence of machine design this book enables electrical machine designers to design rotating electrical machines with a thorough treatment of all existing and emerging technologies in the field it is a useful manual for professionals working in the diagnosis of electrical machines and drives a rigorous introduction to the theoretical principles and techniques makes the book invaluable to senior electrical engineering students postgraduates researchers and university lecturers involved in electrical drives technology and electromechanical energy conversion

for over 15 years principles of electrical machines is an ideal text for students who look to gain a current and clear understanding of the subject as all theories and concepts are explained with lucidity and clarity succinctly divided in 14 chapters the book delves into important concepts of the subject which include armature reaction and commutation single phase motors three phase induction motors synchronous motors transformers and alternators with the help of numerous figures and supporting chapter end questions for retention

this book covers a brief history of electricity fundamentals of electrostatic and electromagnetic fields torque generation magnetic circuits and detailed performance analysis of transformers and rotating machines it also discusses the concept of generalised machine which can emulate the dynamic and steady state performance of dc and ac machines to serve the specific applications of drive systems in industries many new types of motors are developed in the last few decades a separate chapter on special machines is included in this book so that the students should be made aware of these new developments the book covers the syllabi of many universities in india for a course in electrical machines therefore this book would serve the needs of the undergraduate students of electrical engineering

this popular easy to read book offers a comprehensive yet unique treatment of electrical machines and their historical development electrical machines and their applications third edition covers an in depth analysis of machines augmented with ample examples which makes it suitable for both those who are new to electric machines and for those who want to deepen their knowledge of electric machines this book provides a thorough discussion of electrical machines it starts by reviewing the basics of concepts needed to fully understand the machines e g

three phase circuits and fundamentals of energy conversion and continues to discuss transformers induction machines synchronous machines dc machines and other special machines and their dynamics this natural progression creates a unifying theme and helps the reader appreciate how the same physical laws of energy conversion govern the operation and dynamics of different machine types the text is sprinkled with ample examples to further solidify the discussed concepts several well placed appendices make the book self contained and even easier to follow this book is part of a series on power system topics originally authored by the late turan gönen the book has been edited by ali mehrizi sani to bring it up to date while maintaining its original charm both new and seasoned readers for gönen s books will find this new edition a much awaited update to the second edition

a self contained comprehensive and unified treatment of electrical machines including consideration of their control characteristics in both conventional and semiconductor switched circuits this new edition has been expanded and updated to include material which reflects current thinking and practice all references have been updated to conform to the latest national bs and international iec recommendations and a new appendix has been added which deals more fully with the theory of permanent magnets recognising the growing importance of permanent magnet machines the text is so arranged that selections can be made from it to give a short course for non specialists while the book as a whole will prepare students for more advanced studies in power systems control systems electrical machine design and general industrial applications includes numerous worked examples and tutorial problems with answers

the step by step presentation allows readers to fully understand each topic before moving on to the next

this book includes my lecture notes for electrical machines course the book is divided to different learning parts part 1 apply basic physical concepts to explain the operation and solve problems related to electrical machines part 2 explain the principles underlying the performance of three phase electrical machines part 3 analyse operate and test three phase induction machines part 4 investigate the performance design operation and testing of the three phase synchronous machine part1 apply basic physical concepts to explain the operation and solve problems related to electrical machines describe the construction of simple magnetic circuits both with and without an air gap explain the basic laws which govern the electrical machine operation such as faraday s law ampere biot savart s

law and lenz s law apply faraday s law of electromagnetic induction ampere biot savart s law and lenz s law to solve for induced voltage and currents in relation to simple magnetic circuits with movable parts illustrate the principle of the electromechanical energy conversion in magnetic circuits with movable parts part 2 explain the principles underlying the performance of three phase electrical machines compare and contrast concentric and distributed windings in three phase electrical machines identify the advantages of distributed windings applied to three phase machines explain how the pulsating and rotating magnetic fields are produced in distributed windings calculate the synchronous speed of a machine based on its number of poles and frequency of the supply describe the process of torque production in multi phase machines part 3 analyse operate and test three phase induction machines calculate the slip of an induction machine given the operating and synchronous speeds calculate and compare between different torques of a three phase induction machine such as the locked rotor or starting torque pull up torque breakdown torque full load torque or braking torque develop and manipulate the equivalent circuit model for the three phase induction machine analyse and test experimentally the torque speed and current speed characteristics of induction machines and discuss the effects of varying such motor parameters as rotor resistance supply voltage and supply frequency on motor torque speed characteristics perform no load and blocked rotor tests in order to determine the equivalent circuit parameters of an induction machine explore various techniques to start an induction motor identify the applications of the three phase induction machines in industry and utility classify the insulations implemented in electrical machines windings and identify the factors affecting them part4 investigate the performance design operation and testing of the three phase synchronous machine describe the construction of three phase synchronous machines particularly the rotor stator windings and the rotor saliency develop and manipulate an equivalent circuit model for the three phase synchronous machine sketch the phasor diagram of a non salient poles synchronous machine operating at various modes operation such as no load operation motor operation and generator operation investigate the influence of the rotor saliency on machine performance perform open and short circuit tests in order to determine the equivalent circuit parameters of a synchronous machine identify the applications of the three phase synchronous machines in industry and utility list and explain the conditions of parallel operation of a group of synchronous generators evaluate the performance of the synchronous condenser and describe the power flow control between a synchronous condenser and the utility in both modes over and under excited explain the principles of controlling

the output voltage and frequency of a synchronous generator

this comprehensive text examines existing and emerging electrical drive technologies the authors clearly define the most basic electrical drive concepts and go on to explain the most important details while maintaining a solid connection to the theory and design of the associated electrical machines also including links to a number of industrial applications the authors take their investigation of electrical drives beyond theory to examine a number of practical aspects of electrical drive control and application key features provides a comprehensive summary of all aspects of controlled speed electrical drive technology including control and operation handling of electrical drives is solidly linked to the theory and design of the associated electrical machines added insight into problems and functions are illustrated with clearly understandable figures offers an understanding of the main phenomena associated with electrical machine drives considers the problem of bearing currents and voltage stresses of an electrical drive includes up to date theory and design guidelines taking into account the most recent advances this book s rigorous coverage of theoretical principles and techniques makes for an excellent introduction to controlled speed electrical drive technologies for electrical engineering msc or phd students studying electrical drives it also serves as an excellent reference for practicing electrical engineers looking to carry out design analyses and development of controlled speed electrical drives

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