

# Design of Machine Elements I - Video course

## **Module-1**

### **Lecture-1**

#### **Design philosophy**

Design-A decision-making process

Machine design

Design of machine elements

Design principle

### **Lecture-2**

#### **Design Procedure**

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Stochastic design principles

### **Lecture-3**

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Classification and properties

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#### **Engineering Materials**

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## **Module-2**

### **Lecture-5**

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State of stress at point-implications

### **Lecture-6**

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## **Module-3**

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Allowable stress

Factor of safety

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Stress-strain relationship

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#### **Stress concentration factor**

Stress intensity factor

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#### **Design for variable loading**

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Endurance limit

Fatigue strength

### **Lecture-11**

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Modified Goodman diagram

Gerber Line

Soderberg line

### **Lecture-12**

#### **Design for combined fatigue loading**



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## Mechanical Engineering

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# Nptel Electrical Machine Design

**C Cleary**



## **Nptel Electrical Machine Design:**

Dynamics of Machines and Mechanisms, Industrial Research K.R. Balasubramanian, S.P. Sivapirakasam, R.

Anand, 2014-07-15 Selected peer reviewed papers from the 2014 International Mechanical Engineering Congress IMEC 2014

June 13 15 2014 Tamil Nadu India

**Contemporary Developments in Agricultural Cyber-Physical Systems** Karthick,

G.S., 2023-08-01 The cultivation of crops plays a very important role in agriculture However proper maintenance and management are required Lack of such management would lead to crop loss or reduced crop yields Hence the ability to detect and identify diseases on infected crops is a problem of increasing concern Real time disease detection systems do not exist in the current agricultural landscape It requires tremendous amounts of work expertise in plant diseases and excessive processing time Using precision agriculture techniques combined with AI a great deal of work is reduced Contemporary Developments in Agricultural Cyber Physical Systems provides a forum for researchers and practitioners to exchange ideas and achieve progress in cyber physical systems by highlighting agricultural applications advances and research challenges The book features chapters on all aspects pertaining to this multidisciplinary paradigm in particular in its application to sustainable agriculture developments Covering topics such as automation monitoring systems and smart agriculture this premier reference source is an excellent resource for scientists healthcare professionals data analysts computer scientists students and educators of higher education researchers and academicians

Blockchain Technology E. Golden Julie, J. Jesu Vedha Nayahi, Noor Zaman Jhanjhi, 2020-11-09 This book presents a detailed exploration of adaption and implementation as well as a 360 degree view spectrum of blockchain technologies in real world business applications Blockchain is gaining momentum in all sectors This book offers a collection of protocol standards issues security improvements applicability features and types of cryptocurrency in processing and through 5G technology The book covers the evolution of blockchain from fundamental theories to present forms It offers diversified business applications with usable case studies and provides successful implementations in cloud edge computing smart city and IoT The book emphasizes the advances and cutting edge technologies along with the different tools and platforms The primary audience for this book includes industry experts researchers graduates and under graduates practitioners and business managers who are engaged in blockchain and IoT related technologies

**Technologies for Sustainable Healthcare Development** Murugan, Thangavel, W., Jaisingh, P.,

Varalakshmi, 2024-07-26 In contemporary healthcare Industry 5.0 technologies present a paradoxical challenge and opportunity The rapid integration of Cyber Physical Systems Cloud Computing Internet of Things Artificial Intelligence Smart Factories and Cognitive Computing has ushered in unprecedented transformations yet it has concurrently given rise to critical vulnerabilities within healthcare systems As sensitive patient data becomes increasingly digitized the specter of cybersecurity threats looms larger than ever The book titled Technologies for Sustainable Healthcare Development undertakes the crucial task of addressing this pressing concern Focused on Cybersecurity and Data Science Innovations in

Industry 5.0 Technologies for Sustainable Healthcare it serves as an indispensable guide for professionals, researchers, and policymakers aiming to fortify healthcare systems against unauthorized access and cyber threats while unlocking the potential of transformative technologies. The overarching objective of Technologies for Sustainable Healthcare Development is to dissect the challenges posed by the convergence of cybersecurity, data science, and Industry 5.0 in healthcare. This timely publication delves into the evolution of cybersecurity and data science, providing insights into their symbiotic relationship and the implications for healthcare. Through its exploration of cutting-edge research, innovative solutions, and practical applications, the book becomes a beacon for those seeking to navigate the evolving landscape of secure healthcare development. It does not merely dissect problems but endeavors to provide sustainable development strategies contributing to the advancement of robust and efficient healthcare systems.

### **A Brief History of Mechanical Engineering**

Uday Shanker Dixit, Manjuri Hazarika, J. Paulo Davim, 2016-08-13. What is mechanical engineering? What does a mechanical engineer do? How did mechanical engineering change through the ages? What is the future of mechanical engineering? This book answers these questions in a lucid manner. It also provides a brief chronological history of landmark events and answers questions such as: When was the steam engine invented? Where was the first CNC machine developed? When did the era of additive manufacturing start? When did the marriage of mechanical and electronics give birth to the discipline of mechatronics? This book informs and creates interest in mechanical engineering in the general public and particularly in students. It also helps to sensitize the engineering fraternity about the historical aspects of engineering. At the same time, it provides a common sense knowledge of mechanical engineering in a handy manner.

### **Shaping the Future of Automation With Cloud-Enhanced Robotics**

Gatti, Rathishchandra Ramachandra, Singh, Chandra, 2024-04-26. In a world where automation is quickly becoming a standard, a significant challenge arises: the need for robots to overcome their inherent limitations in processing power and storage. This bottleneck restricts their potential for innovation and collaboration, hindering the realization of true autonomous capabilities. The burgeoning field of Cloud Robotics promises a revolutionary solution by seamlessly integrating robots with cloud-based technologies. This integration empowers robots to offload computation tasks, tap into vast data resources, and engage in real-time collaboration with their mechanical counterparts. Existing literature often falls short of providing a holistic understanding of the complex interplay between robotics and cloud computing. Researchers, academics, and industry professionals find themselves grappling with fragmented insights, hindering their ability to harness the full potential of cloud-enhanced robotics. The lack of a centralized resource leaves a void, impeding progress and innovation in this groundbreaking field. Without a roadmap to navigate the challenges and opportunities presented by cloud robotics, stakeholders risk being left behind in an era where interdisciplinary collaboration is paramount. Enter *Shaping the Future of Automation With Cloud-Enhanced Robotics*, a beacon of knowledge designed specifically for academics, researchers, and industry professionals seeking to unlock the transformative power of cloud robotics. From fundamental principles to advanced applications, each

chapter meticulously unravels the intricacies of cloud infrastructure communication protocols data management human robot interaction and more By addressing challenges and proposing solutions this book not only disseminates recent advancements but also equips readers with actionable insights Real world examples and case studies illuminate the practical applications and benefits of cloud enhanced robotics making it an indispensable guide for professionals aiming to implement these innovations in their operations

*Novel AI Applications for Advancing Earth Sciences* Yadav, Sudesh, Yadav, Satya Prakash, Raj, Pethuru, Tiwari, Prabhakar, Albuquerque, Victor Hugo C. de, 2023-12-29 The Earth Sciences industry faces a new challenge the need for accurate efficient and reliable methods to monitor and predict geological phenomena and environmental changes As climate change earthquakes and other natural disasters become more frequent and severe the necessity for advanced tools and techniques is paramount Traditional methods often fall short in providing the precision and speed required to address these critical issues Geologists and earth scientists who are grappling with the urgent problem of utilizing artificial intelligence AI to revolutionize their field will find the solution within the pages of *Novel AI Applications for Advancing Earth Sciences* This book offers the research community concepts expanding upon the fusion of AI technology with earth sciences By leveraging advanced AI tools such as convolutional neural networks support vector machines artificial neural networks and the potential of remote sensing satellites this book transforms the identification of geological features geological mapping soil classification and gas detection Scientists can now predict earthquakes and assess the probability of climate change with unprecedented accuracy Additionally the book explains how the optimization of algorithms for specific tasks substantially reduces the time complexity of earth observations leading to an unprecedented leap in accuracy and efficiency

6G Security Education and Multidisciplinary Implementation Pandey, Binay Kumar, Pandey, Digvijay, Ahmad, Tanveer, 2024-08-09 The advent of 6G technology introduces significant security challenges that must be addressed to ensure its safe and effective implementation The increased complexity of 6G infrastructure encompassing a vast array of devices and networks expands the potential attack surface making it more vulnerable to cyber threats Privacy concerns are heightened with the massive data flow necessitating stringent protection measures These rapid developments are outpacing current educational frameworks highlighting the need for updated programs to equip cybersecurity professionals with the skills to address these challenges *6G Security Education and Multidisciplinary Implementation* explores the critical intersection of technology security and education It provides insights into the implementation of 6G technologies as well as frameworks for security education Covering topics such as 6G education learning experience and privacy concerns this book is a valuable resource for educators academicians scholars security experts post graduate students pre service teachers industry professionals and researchers

Electrical Machines Dr. Hidaia Mahmood Alassouli, 2020-04-01 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

*Design of Rotating Electrical Machines* Juha Pyrhonen, Tapani

Jokinen, Valeria Hrabovcova, 2013-12-31 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

**Design of Electrical Machines** K. G. Upadhyay, 2011-07      **Design of Electrical Machines (D.C. & A.C.)** V. N. Mittle, 1983      Electrical Machine Design Data Book A. Shanmugasundaram, 2015-11-02 A reference book for designing electrical machines      **Lecture Notes for Electrical Machines Course** Hidaia Alassouli Mahmood, 2021-03-13 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      **A Course in Electrical Machine Design** Mandayam Sumani Tirunarayanan, 1973      *Numerical Modelling and Design of Electrical Machines and Devices* Kay Hameyer, Ronnie Belmans, 1999 A textbook for a graduate or undergraduate course in design engineering Instructors from Katholieke Universiteit Leuven in Belgian overview numerical field computation methods in magnetics emphasizing the use of the finite element method in designing such electromagnetic devices as motors transformers and actuators The topics include computer aided design in magnetics potentials and formulations coupled field problems numerical optimization linear system equation solvers modelling electrostatic and magnetic devices and examples of computed models The text is also suitable as a primer for practicing engineers who want to learn the fundamentals and

apply them immediately to actual design problems Annotation c Book News Inc Portland OR booknews com     **Design of Electrical Machines** V. N. Mittle,Arvind Mittal,2002     **Electrical Machines** Hidaya Mahmoud Al-Assouly,2020-12-23

*Design of Small Electrical Machines* Essam S. Hamdi,1994-11-15 Designing electrical machines requires multi disciplinary skills Engineers must not only be expert in electromagnetic design but also in selecting materials and choosing production techniques Employing a range of examples the author covers various design procedures from specification to performance prediction Featuring Selection and specification of components and materials Production techniques Focus on both the electrical and mechanical construction aspects Introduction to CAD Detailed exploration of thermal design Unified approach to permanent magnet and wound field d c motor design Design of 50 Hz and 400 Hz induction motors Typical designs This timely book highlights the latest advances in design techniques and materials By presenting a self contained and unified treatment it will prove invaluable to both professional engineers and senior students     *Electrical Machine Design V* Rajini,V S Nagarajan, Electrical Machine Design caters to the requirements of undergraduate and postgraduate students of electrical engineering and industry novices The authors have adopted a flow chart based approach to explain the subject This enables an in depth understanding of the design of different types of electrical machines with an appropriate introduction to basic design considerations and the magnetic circuits involved The book aids students to prepare for various competitive exams through objective questions worked out examples and review questions in increasing order of difficulty MATLAB and C programs and Finite Element simulations using Motor Solve featured in the text offers a profound new perspective in understanding of automated design of electrical machines

The Top Books of the Year Nptel Electrical Machine Design The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous captivating novels captivating the hearts of readers worldwide. Lets delve into the realm of top-selling books, exploring the captivating narratives that have enthralled audiences this year. The Must-Read : Colleen Hoover's "It Ends with Us" This heartfelt tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover expertly weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can prevail. Nptel Electrical Machine Design : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids captivating storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Nptel Electrical Machine Design : Delia Owens "Where the Crawdads Sing" This evocative coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, entrancing readers with its evocative prose and mesmerizing setting. These popular novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is an exceptional and suspenseful novel that will keep you speculating until the very end. The novel is a warning tale about the dangers of obsession and the power of evil.

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