

# PHYSICAL SCIENCES

## PAPER 1

## MAY-JUNE

## MEMO

# 2025

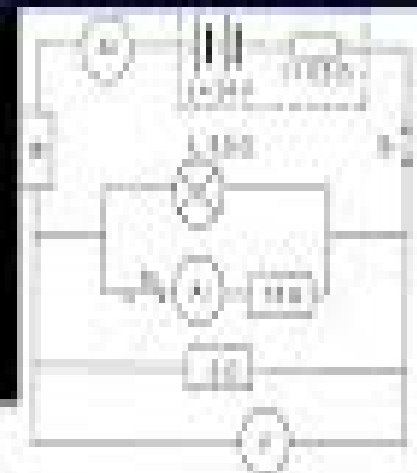


Figure 8 is already drawn and E, the EMF (V) is equal to the voltage across the battery.

1. (1 mark)  
State the meaning implied by voltmeter V.  
Answer: Shows the EMF of the cell when the cell is under open-circuit conditions.



11. (4 marks)  
1.1 Draw a free-body diagram.
- 1.2 Determine the value of the force F, if the beam is horizontal in equilibrium.



basic education

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REPUBLIC OF SOUTH AFRICA

# Physical Science Paper 1 June 2013 Memorandum

**Yicheng Fang**



## **Physical Science Paper 1 June 2013 Memorandum:**

This Changes Everything Naomi Klein, 2014-09-16 The most important book yet from the author of the international bestseller *The Shock Doctrine* a brilliant explanation of why the climate crisis challenges us to abandon the core free market ideology of our time restructure the global economy and remake our political systems In short either we embrace radical change ourselves or radical changes will be visited upon our physical world The status quo is no longer an option In *This Changes Everything* Naomi Klein argues that climate change isn't just another issue to be neatly filed between taxes and health care It's an alarm that calls us to fix an economic system that is already failing us in many ways Klein meticulously builds the case for how massively reducing our greenhouse emissions is our best chance to simultaneously reduce gaping inequalities re-imagine our broken democracies and rebuild our gutted local economies She exposes the ideological desperation of the climate change deniers the messianic delusions of the would-be geoengineers and the tragic defeatism of too many mainstream green initiatives And she demonstrates precisely why the market has not and cannot fix the climate crisis but will instead make things worse with ever more extreme and ecologically damaging extraction methods accompanied by rampant disaster capitalism Klein argues that the changes to our relationship with nature and one another that are required to respond to the climate crisis humanely should not be viewed as grim penance but rather as a kind of gift a catalyst to transform broken economic and cultural priorities and to heal long festering historical wounds And she documents the inspiring movements that have already begun this process communities that are not just refusing to be sites of further fossil fuel extraction but are building the next regeneration based economies right now Can we pull off these changes in time Nothing is certain Nothing except that climate change changes everything And for a very brief time the nature of that change is still up to us

*The Secure and the Dispossessed* Nick Buxton, Ben Hayes, 2015-11-20 While the world's scientists and many of its inhabitants despair at the impact of climate change corporate and military leaders see nothing but opportunities For them melting ice caps mean newly accessible fossil fuels borders to be secured from climate refugees social conflicts to be managed and more failed states in which to intervene They are securing their assets at the expanse of the planet and its inhabitants *The Secure and the Dispossessed* looks at these deadly approaches with a critical eye It also considers the flip side that the legitimacy of the elite is under unprecedented pressure from resistance by communities to resource grabs to those creating new ecological and socially just models for managing our energy food and water Topics covered include geoengineering militarism refugee protection greenwashing and the agricultural crisis among others Adaptation and resilience to a climate changed world is desperately needed but the form it will take will affect all of our futures

Beyond Control James F. Barnett Jr., 2017-03-16 *Beyond Control* reveals the Mississippi as a waterway of change unnaturally confined by ever larger levees and control structures During the great flood of 1973 the current scoured a hole beneath the main structure near Baton Rouge and enlarged a pre-existing football field size crater That night the

Mississippi River nearly changed its course for a shorter and steeper path to the sea. Such a map-changing reconfiguration of the country's largest river would bear national significance as well as disastrous consequences for New Orleans and towns like Morgan City at the mouth of the Atchafalaya River. Since 1973 the US Army Corps of Engineers Control Complex at Old River has kept the Mississippi from jumping out of its historic channel and plunging through the Atchafalaya Basin to the Gulf of Mexico. *Beyond Control* traces the history of this phenomenon beginning with a major channel shift around 3 000 years ago. By the time European colonists began to explore the Lower Mississippi Valley a unique confluence of waterways had formed where the Red River joined the Mississippi and the Atchafalaya River flowed out into the Atchafalaya Basin. A series of human alterations to this potentially volatile web of rivers starting with a bend cutoff in 1831 by Captain Henry Miller Shreve set the forces in motion for the Mississippi's move into the Atchafalaya Basin. Told against the backdrop of the Lower Mississippi River's impending diversion the book's chapters chronicle historic floods rising flood crests a changing strategy for flood protection and competing interests in the management of the Old River outlet. *Beyond Control* is both a history and a close look at an inexorable living process happening now in the twenty first century.

**Indigenous Peoples' Governance of Land and Protected Territories in the Arctic** Thora Martina Herrmann, Thibault Martin, 2015-12-22 This book addresses critical questions and analyses key issues regarding Indigenous Aboriginal Peoples and governance of land and protected areas in the Arctic. It brings together contributions from scientists indigenous and non indigenous researchers local leaders and members of the policy community that document Indigenous Aboriginal approaches to governance of land and protected areas at the local regional and international level explore new territorial governance models that are emerging as part of the Indigenous Aboriginal governance within Arctic States provinces territories and regions analyse the recognition or lack thereof concerning indigenous rights to self determination in the Arctic and examine how traditional decision making arrangements and practices can be linked with governments in the process of good governance. The book highlights essential lessons learned success stories and remaining issues all of which are useful to address issues of Arctic governance of land and protected areas today and which could also be relevant for future governance arrangements.

Federal Register ,2013-09 **Mechanics of Ice Failure** Ian Jordaan, 2023-03-02 Featuring real world examples and practical methodology this rigorous text explores time dependence in the mechanics of ice. Emphasizing use of full scale data and implementing risk based design methods mechanical theory is combined with design and modelling. Readers will gain understanding of fundamental concepts and modern advances of ice mechanics and ice failure processes analysis of field data and use of probabilistic design methods with applications to the interaction of ships and offshore structures with thick ice features or icebergs. The book highlights the use of viscoelastic theory including nonlinearity with stress and the effects of microstructural change in the mechanics of ice failure and fracture. The methods of design focus on risk analysis with emphasis on rational limit state principles and safety. Full discussion of historical discoveries and modern advances including

Hans Island Molikpak and others support up to date methods and models to make this an ideal resource for designers and researchers Spacecraft Dynamics and Control Enrico Canuto, Carlo Novara, Donato Carlucci, Carlos Perez-Montenegro, Luca Massotti, 2018-03-08 Spacecraft Dynamics and Control The Embedded Model Control Approach provides a uniform and systematic way of approaching space engineering control problems from the standpoint of model based control using state space equations as the key paradigm for simulation design and implementation The book introduces the Embedded Model Control methodology for the design and implementation of attitude and orbit control systems The logic architecture is organized around the embedded model of the spacecraft and its surrounding environment The model is compelled to include disturbance dynamics as a repository of the uncertainty that the control law must reject to meet attitude and orbit requirements within the uncertainty class The source of the real time uncertainty estimation prediction is the model error signal as it encodes the residual discrepancies between spacecraft measurements and model output The embedded model and the uncertainty estimation feedback noise estimator in the book constitute the state predictor feeding the control law Asymptotic pole placement exploiting the asymptotes of closed loop transfer functions is the way to design and tune feedback loops around the embedded model state predictor control law reference generator The design versus the uncertainty class is driven by analytic stability and performance inequalities The method is applied to several attitude and orbit control problems The book begins with an extensive introduction to attitude geometry and algebra and ends with the core themes state space dynamics and Embedded Model Control Fundamentals of orbit attitude and environment dynamics are treated giving emphasis to state space formulation disturbance dynamics state feedback and prediction closed loop stability Sensors and actuators are treated giving emphasis to their dynamics and modelling of measurement errors Numerical tables are included and their data employed for numerical simulations Orbit and attitude control problems of the European GOCE mission are the inspiration of numerical exercises and simulations The suite of the attitude control modes of a GOCE like mission is designed and simulated around the so called mission state predictor Solved and unsolved exercises are included within the text and not separated at the end of chapters for better understanding training and application Simulated results and their graphical plots are developed through MATLAB Simulink code

*Across Space and Time* Arianna Traviglia, 2025-10-01 This volume presents a selection of the best papers presented at the forty first annual Conference on Computer Applications and Quantitative Methods in Archaeology The theme for the conference was Across Space and Time and the papers explore a multitude of topics related to that concept including databases the semantic Web geographical information systems data collection and management and more **Overcoming Barriers to Deployment of Plug-in Electric Vehicles** National Research Council, Transportation Research Board, Division on Engineering and Physical Sciences, Board on Energy and Environmental Systems, Committee on Overcoming Barriers to Electric-Vehicle Deployment, 2015-06-26 In the past few years interest in plug in electric vehicles PEVs has grown Advances

in battery and other technologies new federal standards for carbon dioxide emissions and fuel economy state zero emission vehicle requirements and the current administration's goal of putting millions of alternative fuel vehicles on the road have all highlighted PEVs as a transportation alternative Consumers are also beginning to recognize the advantages of PEVs over conventional vehicles such as lower operating costs smoother operation and better acceleration the ability to fuel up at home and zero tailpipe emissions when the vehicle operates solely on its battery There are however barriers to PEV deployment including the vehicle cost the short all electric driving range the long battery charging time uncertainties about battery life the few choices of vehicle models and the need for a charging infrastructure to support PEVs What should industry do to improve the performance of PEVs and make them more attractive to consumers At the request of Congress *Overcoming Barriers to Deployment of Plug in Electric Vehicles* identifies barriers to the introduction of electric vehicles and recommends ways to mitigate these barriers This report examines the characteristics and capabilities of electric vehicle technologies such as cost performance range safety and durability and assesses how these factors might create barriers to widespread deployment *Overcoming Barriers to Deployment of Plug in Electric Vehicles* provides an overview of the current status of PEVs and makes recommendations to spur the industry and increase the attractiveness of this promising technology for consumers Through consideration of consumer behaviors tax incentives business models incentive programs and infrastructure needs this book studies the state of the industry and makes recommendations to further its development and acceptance

Nuclear Science Abstracts , *Spectral and High Order Methods for Partial Differential Equations - ICOSAHOM 2012* Mejdi Azaïez,Henda El Fekih,Jan S. Hesthaven,2013-11-19 The book contains a selection of high quality papers chosen among the best presentations during the International Conference on Spectral and High Order Methods 2012 and provides an overview of the depth and breath of the activities within this important research area The carefully reviewed selection of the papers will provide the reader with a snapshot of state of the art and help initiate new research directions through the extensive bibliography

**Modeling and Simulation Support for System of Systems Engineering Applications** Larry B. Rainey,Andreas Tolk,2015-01-05 a much needed handbook with contributions from well chosen practitioners A primary accomplishment is to provide guidance for those involved in modeling and simulation in support of Systems of Systems development more particularly guidance that draws on well conceived academic research to define concepts and terms that identifies primary challenges for developers and that suggests fruitful approaches grounded in theory and successful examples Paul Davis The RAND Corporation *Modeling and Simulation Support for System of Systems Engineering Applications* provides a comprehensive overview of the underlying theory methods and solutions in modeling and simulation support for system of systems engineering Highlighting plentiful multidisciplinary applications of modeling and simulation the book uniquely addresses the criteria and challenges found within the field Beginning with a foundation of concepts terms and categories a theoretical and generalized approach to system of systems engineering is introduced and

real world applications via case studies and examples are presented A unified approach is maintained in an effort to understand the complexity of a single system as well as the context among other proximate systems In addition the book features Cutting edge coverage of modeling and simulation within the field of system of systems including transportation system health management space mission analysis systems engineering methodology and energy State of the art advances within multiple domains to instantiate theoretic insights applicable methods and lessons learned from real world applications of modeling and simulation The challenges of system of systems engineering using a systematic and holistic approach Key concepts terms and activities to provide a comprehensive unified and concise representation of the field A collection of chapters written by over 40 recognized international experts from academia government and industry A research agenda derived from the contribution of experts that guides scholars and researchers towards open questions Modeling and Simulation Support for System of Systems Engineering Applications is an ideal reference and resource for academics and practitioners in operations research engineering statistics mathematics modeling and simulation and computer science The book is also an excellent course book for graduate and PhD level courses in modeling and simulation engineering and computer science

The Science of Armour Materials Ian Crouch, 2016-09-21 The Science of Armour Materials comprehensively covers the range of armor materials from steels and light alloys through glasses and ceramics to fibers textiles and protective apparel The book also discusses aspects of analytical and numerical modeling as well as laboratory based high strain rate testing and ballistic testing methodologies Each chapter is written from an international perspective including reviews of the current global literature and incorporates case studies that focus upon real life applications research outcomes and lessons learned The threat spectrum is restricted to small arms ammunition high velocity fragments and stab and spike attacks as well as blast loadings Features input from an editor who is an expert in his field Dr Ian Crouch the author of over 80 publications in his field with three patents to his name Provides systematic and comprehensive coverage of armor materials modeling and testing Offers a cross disciplinary approach that brings together expertise in materials science and defense engineering Discusses aspects of analytical and numerical modeling as well as laboratory based high strain rate testing and ballistic testing methodologies

Governance Feminism Janet Halley, Prabha Kotiswaran, Rachel Rebouché, Hila Shamir, 2019-03-26 An interdisciplinary multifaceted look at feminist engagements with governance across the global North and global South Governance Feminism Notes from the Field brings together nineteen chapters from leading feminist scholars and activists to critically describe and assess contemporary feminist engagements with state and state like power Gathering examples from North America South America Europe Asia and the Middle East it complements and expands on the companion volume Governance Feminism An Introduction Its chapters argue that governance feminism GF is institutionally diverse and globally distributed emerging from traditional sites of state power as well as from various forms of governance and operating at the grassroots level in the private sector in civil society and in international relations The book begins by

confronting the key role that crime and punishment play in GFeminist projects Here contributors explore the ideological and political conditions under which this branch of GF became so robust and rethink the carceral turn Other chapters speak to another face of GFeminism feminists finding in mundane and seemingly unspectacular bureaucratic tools leverage to bring about change in policy and governance practices Several contributions highlight the political strategic and ethical challenges that feminists and LGBT activists must negotiate to play on the governmental field The book concludes with a focus on feminist interventions in postcolonial legal and political orders looking at new policy spaces opened up by conflict postconflict and occupation Providing a clear cross cutting critical lens through which to map developments in feminist governance around the world Governance Feminism Notes from the Field makes sense of the costs and benefits of current feminist realities to reimagine feminist futures Contributors Libby Adler Northeastern U Aziza Ahmed Northeastern U Elizabeth Bernstein Barnard College Amy J Cohen Ohio State U Karen Engle U of Texas at Austin Jacob Gersen Harvard U Leigh Goodmark U of Maryland Aeyal Gross Tel Aviv U Aya Gruber U of Colorado Boulder Janet Halley Harvard U Rema Hammami Birzeit U Palestine Vanja Hamzi U of London Isabel Cristina Jaramillo Sierra Prabha Kotiswaran King s College London Maleiha Malik King s College London Vasuki Nesiah New York U Dianne Otto Melbourne Law School Helen Reece Darren Rosenblum Pace U Jeannie Suk Gersen Harvard U Mariana Valverde U of Toronto **Free Market**

**Environmentalism for the Next Generation** T. Anderson, D. Leal, 2015-02-04 This book provides a vision for environmentalism s future based on the success of environmental entrepreneurs around the world The work provides the next generation of environmental market ideas and the chapters are co authored with young scholars and policy analysts who represent the next generation of environmental leaders **Literature 1980, Part 1** Siegfried Böhme, Ute Esser, Professor Dr. Walter Fricke, Inge Heinrich, Wilfried Hofmann, Dietlinde Krahn, Dorothea Rosa, Dr. Lutz D. Schmadel, Gert Zech, 2013-11-11 Astronomy and Astrophysics Abstracts which has appeared in semi annual volumes since 1969 is devoted to the recording summarizing and indexing of astronomical publications throughout the world It is prepared under the auspices of the International Astronomical Union according to a resolution adopted at the 14th General Assembly in 1970 Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of literature in all fields of astronomy and astrophysics Every effort will be made to ensure that the average time interval between the date of receipt of the original literature and publication of the abstracts will not exceed eight months This time interval is near to that achieved by monthly abstracting journals compared to which our system of accumulating abstracts for about six months offers the advantage of greater convenience for the user I 1980 some older Volume 27 contains literature published in 1980 and received before August literature which was received late and which is not recorded in earlier volumes is also included We acknowledge with thanks contributions to this volume by Dr J Bouska Prague who surveyed journals and publications in Czech and supplied us with abstracts in English *Range* David Epstein, 2021-04-27 The 1 New York Times bestseller that has all America talking

with a new afterword on expanding your range as seen on CNN's Fareed Zakaria GPS Morning Joe CBS This Morning and more The most important business and parenting book of the year Forbes Urgent and important an essential read for bosses parents coaches and anyone who cares about improving performance Daniel H Pink Shortlisted for the Financial Times McKinsey Business Book of the Year Award Plenty of experts argue that anyone who wants to develop a skill play an instrument or lead their field should start early focus intensely and rack up as many hours of deliberate practice as possible If you dabble or delay you'll never catch up to the people who got a head start But a closer look at research on the world's top performers from professional athletes to Nobel laureates shows that early specialization is the exception not the rule David Epstein examined the world's most successful athletes artists musicians inventors forecasters and scientists He discovered that in most fields especially those that are complex and unpredictable generalists not specialists are primed to excel Generalists often find their path late and they juggle many interests rather than focusing on one They're also more creative more agile and able to make connections their more specialized peers can't see Provocative rigorous and engrossing Range makes a compelling case for actively cultivating inefficiency Failing a test is the best way to learn Frequent quitters end up with the most fulfilling careers The most impactful inventors cross domains rather than deepening their knowledge in a single area As experts silo themselves further while computers master more of the skills once reserved for highly focused humans people who think broadly and embrace diverse experiences and perspectives will increasingly thrive

**Literature 1983, Part 1** S. Böhme, Prof. Dr. Walter Fricke, H. Hefele, I. Heinrich, W. Hofmann, D. Krahn, V. R. Matas, Dr. Lutz D. Schmadel, G. Zech, 2013-11-11 Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of the literature concerning all aspects of astronomy astrophysics and their border fields It is devoted to the recording summarizing and indexing of the relevant publications throughout the world Astronomy and Astrophysics Abstracts is prepared by a special department of the Astronomisches Rechen Institut under the auspices of the International Astronomical Union Volume 33 records literature published in 1983 and received before August 1 1983 Some older documents which we received late and which are not surveyed in earlier volumes are included too We acknowledge with thanks contributions of our colleagues all over the world We also express our gratitude to all organizations observatories and publishers which provide us with complimentary copies of their publications Starting with Volume 33 all the recording correction and data processing work was done by means of computers The recording was done by our technical staff members Ms Helga Ballmann Ms Mona El Choura Ms Monika Kohl and Ms Sylvia Matyssek Mr Martin Schlotelburg and Mr Ulrich Überall supported our task by careful proofreading It is a pleasure to thank them all for their encouragement Heidelberg September 1983 The Editors

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**THE PHYSICISTS** Daniel J. Kevles, 2013-06-05

This magnificent account of the coming of age of physics in America has been heralded as the best introduction to the history of science in the United States. Unsurpassed in its breadth and literary style, Kevles's account portrays the brilliant scientists who became a powerful force in bringing the world into a revolutionary new era. The book ranges widely as it links these exciting developments to the social, cultural, and political changes that occurred from the post-Civil War years to the present. Throughout, Kevles keeps his eye on the central question of how an avowedly elitist enterprise grew and prospered in a democratic culture. In this new edition, the author has brought the story up to date by providing an extensive, authoritative, and colorful account of the Superconducting Super Collider from its origins in the international competition and intellectual needs of high-energy particle physics through its establishment as a multibillion-dollar project to its termination in 1993 as a result of angry opposition within the American physics community and the Congress.

NASA in the World John Krige, Ashok Maharaj, Angela Long Callahan, 2013-08-20

Since its inception, NASA has participated in over 4,000 international projects, yet historians have almost entirely neglected this remarkable aspect of the agency's work. This groundbreaking work is the first to trace NASA's history in a truly international context, drawing on unprecedented access to agency archives and personnel.

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