

## ZIMBABWE SCHOOL EXAMINATIONS COUNCIL General Certificate of Education Advanced Level

#### MATHEMATICS

9164/3

PAPER 3 Mechanics and Statistics

#### NOVEMBER 2015 SESSION

3 hours

Additional materials: Answer paper Graph paper List of Formulae Scientific calculator

TIME 3 hours

#### INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Answer all questions.

If a numerical answer cannot be given exactly, and the accuracy required is not specified in the question, then in the case of an angle it should be given to the nearest degree, and in other cases, it should be given correct to 2 significant figures.

If a numerical value for g is necessary, take  $g = 9.81 \text{ ms}^{-2}$ .

#### INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 120.

Within each section of the paper, questions are printed in the order of their mark allocations and candidates are advised, within each section, to attempt questions sequentially.

The use of a scientific calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

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# **Advanced Level Mathematics 9164 2014**

Krishna R. Reddy,Susheel Kalia,Srinivas Tangellapalli,Divya Prakash

#### **Advanced Level Mathematics 9164 2014:**

Practice-Oriented Research in Tertiary Mathematics Education Rolf Biehler, Michael Liebendörfer, Ghislaine Gueudet, Chris Rasmussen, Carl Winsløw, 2023-01-01 This edited volume presents a broad range of original practice oriented research studies about tertiary mathematics education These are based on current theoretical frameworks and on established and innovative empirical research methods It provides a relevant overview of current research along with being a valuable resource for researchers in tertiary mathematics education including novices in the field Its practice orientation research makes it attractive to university mathematics teachers interested in getting access to current ideas and results including theory based and empirically evaluated teaching and learning innovations. The content of the book is spread over 5 sections The secondary tertiary transition University students mathematical practices and mathematical inquiry Research on teaching and curriculum design University students mathematical inquiry and Mathematics for non specialists **Learning in Water Treatment** Rakesh Namdeti, Arlene Abuda Joaquin, 2025-10-21 Machine Learning in Water Treatment is a must have for anyone interested in how artificial intelligence is transforming water treatment offering practical insights case studies and a deep dive into cutting edge machine learning techniques that can improve water quality management Machine Learning in Water Treatment explores the complex fields of wastewater treatment and water purification offering a thorough analysis of the cutting edge machine learning methods used to solve problems with water quality control It provides insights into how artificial intelligence can be incorporated with conventional procedures bridging the gap between conventional water treatment techniques and state of the art data driven solutions. The book will cover the foundations of water treatment procedures providing insights into the ideas behind physical chemical and biological treatment modalities Difficulties in managing water and wastewater quality are paving the way for the use of machine learning as an effective tool for control and optimization Fundamentally the book explains how machine learning models are used in water treatment system control optimization and predictive modeling Readers will learn how to take advantage of machine learning algorithms potential for real time treatment process optimization quality issue identification and water pollutant level prediction through a thorough investigation of data collection preprocessing and model creation Case studies and real world applications provide insightful information about the application of machine learning technologies in a variety of scenarios With its unique combination of theoretical understanding and real world applications this book is an invaluable tool for understanding how water quality management is changing in the age of data driven decision making Power Systems Research and Operation Olexander Kyrylenko, Serhii Denysiuk, Denys Derevianko, Ihor Blinov, Ievgen Zaitsev, Artur Zaporozhets, 2022-11-30 The book examines the problems in the fields of power systems functioning optimization of operating modes of electric power facilities and their control systems information and measuring systems and metrological support in the electric power industry ensuring the functioning of the electric power system in the conditions of a competitive market of the electric power The book is devoted to modern problems ensuring operational reliability and safety of objects integrated power system of Ukraine in the areas such as distribution systems automation forecasting and optimization of energy processes with solar power plants hydropower plants and other plants and development solutions for smart monitoring systems for DERs The presented research results in the book allow to increase the reliability and efficiency of operation of energy facilities and ensure the stability of power systems the introduction of effective methods and tools for forecasting electricity supply and optimize power systems taking into constraints in modern of electricity markets The book consists of 14 chapters. The book is for researchers engineers as well as lecturers and postgraduates of higher education institutions dealing with problems of operation control diagnosis and monitoring of integrated power system power equipment and other **Urban Geology** Pradeep Bhaskarrao Jadhav, 2025-09-26 This book presents the result of an innovative challenge to create a systematic literature overview driven by machine generated content Questions and related keywords were prepared for the machine to guery discover collate and structure by Artificial Intelligence AI clustering The AI based approach seemed especially suitable to provide an innovative perspective as the topics are indeed both complex interdisciplinary and multidisciplinary for example climate planetary and evolution sciences Springer Nature has published much on these topics in its journals over the years so the challenge was for the machine to identify the most relevant content and present it in a structured way that the reader would find useful The automatically generated literature summaries in this book are intended as a springboard to further discoverability. They are particularly useful to readers with limited time looking to learn more about the subject guickly and especially if they are new to the topics Springer Nature seeks to support anyone who needs a fast and effective start in their content discovery journey from the undergraduate student exploring interdisciplinary content to Master or PhD thesis developing research questions to the practitioner seeking support materials this book can serve as an inspiration to name a few examples It is important to us as a publisher to make the advances in technology easily accessible to our authors and find new ways of AI based author services that allow human machine interaction to generate readable usable collated research content Sustainable Materials and Systems for Water Desalination Inamuddin, Anish Khan, 2021-09-30 This edited book explores the most promising and reliable technological developments expected to impact on the next generation of desalination systems. The book includes research studies which takes the reader on a fascinating walk through the multidisciplinary world of membrane science applied to water treatment Concerning the ultimate technological advancement the book seeks to investigate how to bridge the gap between the **Recent Advances in Sustainable Environment** Krishna R. laboratory scale and the applicability to industry Reddy, Susheel Kalia, Srinivas Tangellapalli, Divya Prakash, 2022-10-25 The book presents the select proceedings of the International Conference on Recent Advances in Sustainable Environment RAiSE 2022 It discusses recent challenges and advances in various areas of sustainable environment The topics covered include environmental dynamics atmospheric

physics physical oceanography global environmental change ecosystems management climate climatic changes global warming ozone layer depletion carbon capture storage integrated ecosystems management satellite applications in the environment environmental restoration ecological engineering habitat reconstruction biodiversity conservation deforestation landscape degradation restoration ground water remediation soil decontamination environmental sustainability renewable sources of energy clean technologies toxicity assessment epidemiological studies indoor air pollution etc This book will be useful for the researches academicians scientists and professionals working in the various areas of environment Water Pollution and Management Practices Anita sustainability especially sustainable civil engineering Singh, Madhoolika Agrawal, Shashi Bhushan Agrawal, 2021-04-12 Water pollution is a matter of concern for both developing and developed parts of the world This book presents an overview on water pollution and its sustainable management The book discusses the fundamental aspects of water pollution as well as advanced sustainable technologies for abating water pollution It is a comprehensive collection of information related with water pollutants which are extremely harmful to man other living organisms and to the ecosystems It is all inclusive coverage of technical socio political scientific as well as social issues revolving around water pollution and management The book brings out innovative ideas promoting sustainable technologies and extensively covers the diversity of modern technologies related to prevention of water pollution Book also covers social aspects of water related issues It is an essential reading for upper level graduates and undergraduates pursuing environmental studies and researchers in the field of waste water management **ProOuest Statistical Abstract of the** United States 2014 Bernan Press, ProQuest, 2013-12-19 Questions come across the reference desk on all topics How many hate crimes were there in 2008 Are there many book clubs in the U S Do you have the GDP for the U S for the past 10 or so years How many people use Facebook All of these questions can be answered by the ProQuest Statistical Abstract of the United States Published annually by the Federal Government since 1878 The Statistical Abstract of the United States is the best known statistical reference publication in the country and perhaps the world You ll find it behind nearly every reference desk in U S libraries as the authoritative go to source Librarians value the Statistical Abstract as both an answer book and a quide to statistical sources As a carefully selected collection of statistics on the social political and economic conditions of the United States it is a snapshot of America and its people The Statistical Abstract print edition resembles the Census version that users know and love plus more with Thousands of tables from hundreds of sources and valuable detailed bibliographic documentation Updated introductory sections and back of the book index 8 1 2 x 11 hardcover format to withstand heavy use 25% larger type for easier reading Use the Abstract as a convenient volume for statistical reference and as a guide to sources of more information Advances in Natural, Human-Made, and Coupled Human-Natural Systems Research Svetlana G. Maximova, Roman I. Raikin, Alexander A. Chibiley, Marina M. Silantyeva, 2023-03-30 This book is a unique collection of advanced research on natural human made and coupled human natural systems The contributors analyze the current state of

knowledge address methodological challenges and explore engaging cases The chapters demonstrate the balanced disciplinary strength and discuss interdisciplinary perspectives. The authors undertake a holistic and spatially integrative analysis to understand the sustainability of environmental economic and social systems emphasizing the coupled nature of such systems In particular the chapters explore biodiversity conservation and natural resources the sustainability of natural and human altered ecosystems sustainability vulnerability issues in coupled human natural systems mechanisms to foster sustainable environmental practices eventually accumulating sustainability research and practice in various fields More than that the challenges of educational and economic systems are studied closely. The authors rely on unique data develop regional and local knowledge and explore global trends at local scales A separate focus is devoted to human health and well being The book has seven sections 1 Advances in Natural and Coupled Human Natural Systems Research 2 Economic Systems in the Age of Digital Changes and Unstable Environments 3 Sustainable Social Systems Migration Flows and Social Cohesion 4 Taking Action for Greater Security and Effective Partnerships for Sustainable Development 5 Systemic Challenges and Changes in Education Systems in Russia and Around the Globe 6 Advances in Cultural Traditions and Innovation Development Barriers and Social Stability 7 Human Health and Well being Taking Action for Sustainable Development Written by scholars and practitioners from multiple fields of knowledge the book is designed for a broader audience interested in the following research areas systems research and thinking sustainability research and thinking system dynamics management of complexity decision analysis organization theory governance natural resources environmental studies economic development social policies cleaner production innovation cultural studies and sustainable practices Renewable Energy Systems Sanjay Kumar, Nikita Gupta, Sandeep Kumar, Subho Upadhyay, 2022-11-01 RENEWABLE ENERGY SYSTEMS Providing updated and state of the art coverage of a rapidly changing science this groundbreaking new volume presents the latest technologies processes and equipment in renewable energy systems for practical applications This groundbreaking new volume examines recent advances in the area of renewable energy systems including modeling and optimization using different methods like GAMS HOMER AI techniques and MATLAB Simulink and others Covering extensively diverse topics ranging from solar radiation prediction model to improving solar power output by studying the tilt and orientation angle of rooftop mounted systems a multitude of practical applications are covered offering solutions to everyday problems as well as the theory and concepts behind the technology Among these applications are increasing the longevity of PV by studying its degradation and its use by operating an electrolyzer for hydrogen production using biodiesel as a green energy resource as an alternative to diesel fuel concentrating the black liquor based biomass as a source from multiple stage evaporator along with thermo vapour compressor and the real time problems of modeling and optimizing renewable energy sources Written and edited by a global team of experts this groundbreaking new volume from Scrivener Publishing presents recent advances in the study of renewable energy systems across a variety of fields and

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sıralanabilmektedir yaş zaman içerisinde aşınanan kıkırak doku özellikle ileri yaşlardaki hastalarda kireçlenme problemine yol açmaktadır bu problemin yapılan araştırmalar sonucunda kadınlarda daha çok görüldüğü de saptanmıştır

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