



Minerals Council Strata Control, Rock Mechanics and Rock Engineering Certificates of Competency

## **GOVERNANCE OF EDUCATION**

### **1. MANDATE**

Auspices of the examination for certificates in rock engineering were given by the Minerals Council of South Africa (MCSA) to the South African National Institute of Rock Engineering (SANIRE) being the voluntary association and professional body for regulation of the discipline. All examinations committee members will be appointed by SANIRE council. The future naming of the certificates may be amended by consultation between various parties.

### **2. PURPOSE**

- To set & conduct examinations according to syllabi and to test for knowledge and competency in the science of Rock Mechanics (RM) and its engineering application in the Rock Engineering (RE) design of mine layout, support and related risk assessment and management systems.
- This committee is not an education body. The certificates are not aimed at repeating school or tertiary education. It expects of nominated candidates' prior proficiency in relevant science & engineering subjects at National Qualifications Framework (NQF) Level 6. This is the level at which examinations are set.
- The certificates are intended to be Stage 2 qualifications, which are aimed at testing competency in contextualising, synthesising, analysing, interpreting and concluding on the physics, mathematics and statistics of rock parameters and rock mass behaviour in the rock engineering of mine designs.
- Certification involves passing the competency test of whether candidates can study the syllabus material and translate their education into holistic mine design in real mining conditions.
- The certificate is also a proven practical process towards establishing a professional engineering practice in a discipline that does not have a first degree presented at tertiary level.

### **3. EDUCATION PORTFOLIOS**

The South African National Institute of Rock Engineering (SANIRE), through the President of SANIRE will appoint the following portfolios to manage and ensure that the relevant governance is appropriately applied in accordance with this document:

- Chair of Theory Examinations
- Chair of Rock Mechanics Practical Examinations
- Chair of Strata Control Practical Examinations
- Chair of Future Education

## **4. THEORY EXAMINATIONS**

### **4.1. Chair of Theory Examinations**

South African National Institute of Rock Engineering (SANIRE) appoints the Chair of the Theory Examinations and the Examinations Committee as being the holder of the SANIRE Council's Education: Theory Examinations Portfolio. The Chair is elected, delegated and replaced according to the constitution of SANIRE.

### **4.2. Roles and responsibilities for the Chair of Theory Examinations**

- The Chair is neither examiner nor moderator.
- The Chair, via Council, sets and modifies governing rules of examination for the competency assessment of candidate RE practitioners.
- The Chair sets the examination schedule and key dates for all examinations in consultation with SANIRE council and Minerals Council.
- The Chair via the administration team, can check application credentials for acceptance or otherwise. Queries may be levelled at Sponsors / Mentors. Correspondence may be entered into if deemed justified. The Chair may consult with examination committee members or SANIRE Council members.
- The Chair resolves discrepancies / differences of opinion between examiners and moderators as well as any other examination related issues that may arise.
- The Chair authorises final marks and results for distribution to all candidates.
- The Chair must include the examiner and moderator of the particular paper in the email distribution of final approved marks to the Minerals Council
- The Chair of Education may withhold or withdraw marks based on discrepancies that may occur until such time that the issues are appropriately resolved.
- The Chair must update the SANIRE website Education section in terms of Certificate holders (Strata Control, Rock Mechanics and Advanced Rock Engineering Certificate).
- The Chair will also liaise with the Minerals Council with regards to the awarding of the Advanced Rock Engineering Certificate

The Chair of Education is not remunerated for his / her efforts.

### **4.3. Appointment of Theory Examiners and Moderators**

SANIRE Council appoints examiners and moderators from a combination of senior-level RE practitioners (holders of the CoM Rock Mechanics and Advanced Rock Engineering Certificates where possible) and tertiary training providers. Examiners and moderators are appointed for two years per subject on an offset basis (i.e. overlapping rather than all change at the same time), by means of letters to employers and practitioners.

### **4.4. Roles and Responsibilities for the Theory Examinations (written papers)**

- Examiners and Moderators work according to the examinations schedule and key dates.

- Examiners prepare examination papers and model answers, referencing the syllabi and setting paper-specific examination rules and references.
- Moderators check and verify papers and model answers, especially:
  - Prior interpretation of expected answers,
  - Contents in line with syllabus,
  - Mark allocation, special examination rules and formulae, materials required,
  - Standard, length of paper and general correctness
- By iterative process with examiners, moderators request and approve changes if required.
- Examiners e-mail the examination paper to the Chair of Education on the agreed date.
- The Chair of Education will ensure that all theory examination papers are sent via e-mail to the Minerals Council
- The Minerals Council will confidentially print out all theory examination papers and seal bundles of papers for distribution to venues.
- The Minerals Council will arrange courier of examination papers to venues; venues to Minerals Council; Minerals Council to the examiner; examiner to moderator and from moderator back to the Minerals Council. This will be done through the Minerals Council.
- Registration of written theory examinations will be administered by the Minerals Council.
- Model answers are only sent to the Chair of Education following the examinations.
- Examiners mark, sum results and summarise their perspectives of the candidates and their abilities to answer the questions.
- Examiners submit scripts with examiners notes, candidate list with marks and examiners comments to the moderator.
- Moderators apply examination rules when moderating examination scripts and they answer to the Chair.
- Moderators verify the examiner's marking and summation, and summarise their perspective of the candidates and their ability to answer the questions.
- Examiner and moderator present the examination results and comments to the Chair for ratification at an Education Committee meeting that is held prior to releasing results via the Minerals Council.

Ideally Theory Examiners and Moderators are remunerated at the tariffs determined by the relevant administrating institution per paper moderated and comment supplied. The administration must be negotiated and put in place. This will not jeopardize any examinations.

## **5. PRACTICAL EXAMINATIONS**

The primary role of the respective practical examination Chair's is to ensure that reasonable and consistent standards are maintained for individual examinations held on the different levels. The respective Chair's must provide examination format, assistance and reference for examiners in setting practical examinations.

All Strata Control Practical Examinations will be arranged through the Chair of Strata Control Practical Examinations but arranged and hosted by the various SANIRE Branches through the respective Branch Chairman.

The Rock Mechanics Practical examinations will be co-ordinated by the Chair of the Rock Mechanics Practical Examination. The appointed examiners set exams and model answers and interact with the Chair of the Rock Mechanics Practical Examination to resolve standards, consistency and logistical arrangements. The Chair of the Rock Mechanics Practical Examination will make all required arrangements to successfully host the portfolio and interactive planning sections of the examinations. The examiners will collate the marks and forward the outcomes to the Chair of the Rock Mechanics Practical Examination. Queries during the examinations will be resolved immediately with the Chair of the Rock Mechanics Practical Examination. There will be no post-examination dispute resolution process.

For reference the two practical examinations are distinguished as follows:

- The focus of the Strata Control Certificate practical examinations, set and conducted at the mines, is on understanding of rock engineering terminology and mining practice, as well as observation and interpretation of the effects of mining and quality of related activities on excavation condition and stability – this is very much an underground related examination. The report writing skills will also be tested. For record purposes, written records will be maintained of the various sections of the examination as far as practically possible.
- The focus of the Rock Mechanics Certificate practical examination is on mine planning, layouts, design methods, instrumentation and interpretation (including mine seismology) in the four types of mining. The portfolio portion of the examination will also be based on the respective type of mining that the candidate has registered for. This examination may be largely on surface and may exclude the underground component altogether or it may have both surface and underground components and may be spread over two days if required.
- For both SCO and RM Practical examinations there are specific guideline documents that must be referred to.

Examiners and Moderators for all practical examinations are not remunerated. This will not jeopardize any examinations.

## **5.1. ROCK MECHANICS PRACTICAL**

### **5.1.1. Chair of the Rock Mechanics Practical**

South African National Institute of Rock Engineering (SANIRE) appoints the Chair of the Rock Mechanics Practical as being the holder of the SANIRE Council's Education Portfolio – Rock Mechanics Practical Examinations. The Chair of the Rock Mechanics Practical Examinations is elected, delegated and replaced according to the constitution of SANIRE.

### **5.1.2. Roles and responsibilities of the Chair of the Rock Mechanics Practical**

- The Chair is neither examiner nor moderator of the Rock Mechanics Practical Examination but can assist with the SCO or Theory examinations.

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 Education: Mr A. Cooper  
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- The Chair, via Council, sets and modifies governing rules of examination for the competency assessment of candidate RM practitioners.
- The Chair consults with the SANIRE Council then sets the Rock Mechanics Practical Examination schedule and key dates.
- The Chair will ensure that the RM Practical examination dates are communicated to the RM candidates.
- The Chair will ensure that appropriately qualified examiners are obtained for the practical examination.
- The Chair, via the administration team, can check application credentials for acceptance or otherwise. Queries may be levelled at Sponsors / Mentors. Correspondence may be entered into if deemed justified. The Chair of the Rock Mechanics Practical Examination may consult with examination committee members or SANIRE Council members.
- The Chair resolves discrepancies / differences of opinion between examiners and moderators as well as any other Rock Mechanics Practical Examination related issues that may arise during the Rock Mechanics Practical Examination.
- The Chair authorises final marks and results for distribution to all candidates. The marks are sent to the Chair of Theory Examinations for release to the MCSA for distribution to candidates and certification where applicable.

The Chair of the Rock Mechanics Practical Examination is not remunerated for his / her efforts.

## **5.2. STATA CONTROL PRACTICAL**

### **5.2.1. Chair of the Strata Control Practical Examinations**

South African National Institute of Rock Engineering (SANIRE) appoints the Chair of the Strata Control Practical as being the holder of the SANIRE Council's Education Portfolio – Strata Control Practical Examinations. The Chair of the Strata Control Practical Examinations is elected, delegated and replaced according to the constitution of SANIRE.

### **5.2.2. Roles and responsibilities of the Chair of the Strata Control Practical Examinations**

- The Chair of is neither examiner nor moderator of the Strata Control Practical Examinations but can assist with the Rock Mechanics Practical or Theory examinations.
- The Chair, via SANIRE Council, sets and modifies governing rules of examination for the competency assessment of candidate SCO practitioners.
- The Chair, via the SANIRE Council, sets an approximate examination schedule.
- The Chair must obtain the key dates of the examination schedule from each SANIRE Branch Chairman and ensure that the Branch Chairman communicate such dates to the SCO candidates.
- The Chair, via the administration team, can check application credentials for acceptance or otherwise. Queries may be levelled at Sponsors / Mentors. Correspondence may be entered into if deemed justified.
- The Chair may consult with relevant SANIRE Branch examination committee members or SANIRE Council members.

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- The Chair resolves discrepancies / differences of opinion between examiners and moderators as well as any other examination related issues that may arise during the various Strata Control Practical Examinations.
- The Chair authorises final marks and results for distribution to all candidates. The marks are sent to the Chair of Theory Examinations for release to the MCSA for distribution to candidates and certification where applicable.

The Chair of the Strata Control Practical Examination is not remunerated for his / her efforts.

## **6. ROLE OF SPONSOR / MENTOR (TYPICALLY HEAD OF DEPARTMENT / CONSULTANCY)**

Sponsors / mentors are defined as members of SANIRE, being senior rock engineering practitioners, and being holders of the relevant Minerals Council rock mechanics and rock engineering certificates where possible. Sponsors / mentors will verify a candidate's application for examination. Verification will be with respect to the candidates' experience, perceived proficiency and professional conduct befitting engineering practice. The burden of primary assessment of competency for a candidate's examination of proficiency in RE is borne by the sponsor / mentor. If they are not the permanent geotechnical manager of the candidate, then they must state their level of continuous involvement in supervising the candidate's RE prowess.

## **7. ADMINISTRATION**

Arranging Examinations Committee meetings, setting agendas with the respective Chair, keeping minutes and records of meetings, communication with Examinations Committee members, printing written examination papers, arranging examination stationery and formula sheets, courier services, venues, invigilators, registrations, marks, electronic record keeping of all administration and examination related documents (papers, memoranda, model answers, comments), certification and payment of examiners and moderators will be vested in the administration department of the relevant administering institution.

## **8. GENERAL RULES**

Candidates realise the gravity of the responsibility and professionalism required of their employment as potential rock engineering practitioners. The examinations will be conducted on this premise.

- Candidates will be examined based on the specific mining type that they have registered for of which will be reflective on certificates. Note: In the past the mining type was either coal or metalliferous. This has now changed and will reflect either Massive, Open Pit/Surface, Coal or Metalliferous/Narrow Tabular.
- For the theory examinations, candidates must adhere to the examination rules set by the Minerals Council.
- For the practical examinations, candidates must adhere to venue / host mine rules and regulations as well as SANIRE rules.
- The examinations are aimed at delivering competent and professional rock engineering practitioners to the mining industry. This will not be compromised.

If any doubt exists, then the bias will be towards protecting both the discipline and the candidate by deciding against the candidate – i.e. any benefit of doubt will go to the discipline.

- The Examinations Committee in conjunction with the relevant administering institution will set the schedule of preparation, examination, marking and publication of outcomes.
- Examinations are set based on the syllabus; queries will be read and resolved in this context.
- Examinations will be conducted in English and written papers will not exceed 3 hours. Examination time may be extended pro rata in the event of a power failure during the examination – students must remain seated and silent throughout.
- The pass mark for all written examinations is 60%. For practical examinations it is 60% for the RMC certificate and 80% for the SCO certificate. Examiners and moderators are under no obligation to fabricate numbers to facilitate a pass or significant fail. A miss by one mark is a miss none the less.
- Scripts can be re-marked at a cost of R 500 per paper but, candidates will not be allowed to view their scripts.
  - Remarking of theory scripts will be from 55% and above
  - Remarking of SCO Practical scripts will be from 75% and above
  - Remarking of RM Practical scripts will be from 55% and above
- Examination outcomes are confidential until officially released. Results will be released following the next examination committee meeting (Theory or Practical Examinations). Theory examination results will be published on the COMCERT website/Minerals Council electronic platform. Practical results will be published by either the Chair of the Strata Control Practical or Chair of the Rock Mechanics Practical. Queries for prior information will not be entertained by the administration office.
- Candidates will query any aspects of the examinations only via their sponsors / mentors who will verify the validity of such queries before bringing it to the Examinations Committee.
- Only answers according to the examiners instructions on the front cover of the theory examinations questionnaire will be marked. This includes the sequence and limitations imposed. If only four answers are required, then a fifth one will not be marked. The examiners' instructions are part of the examination.
- Any dishonesty will bar a candidate from further examination for two years – this includes attempts to take examinations without having registered and paid for it. It is the candidates' responsibility to ensure that their examination fees are paid and received by the administrative body before the date of the examination.
- Candidates are entitled to the following which will be made available via the SANIRE website or via a candidates query via their sponsor/mentor:
  - Relevant syllabus
  - Marks per question attempted (via sponsor/mentor)
  - Any available previous examination papers
  - Formula sheets
  - Note: No model answers / memorandums will be issued other than what is currently available on the SANIRE website

## **9. CERTIFICATES OF COMPETENCY OFFERED BY THE MINERALS COUNCIL:**

### **9.1. CoM/Minerals Council Strata Control Certificate (SCC)**

This is an introductory level, quality control, observation, basic rock mechanics and assessment of rock engineering aspects.

- The theory examination is set by an examiner in the respective SANIRE Branch's Examinations Committee, of which is led by the Branch Chairman.
- The practical examination is hosted at a mine, arranged by the respective SANIRE Branch Chairman.
- Candidates can only attempt 1 practical examination in a specific cycle (maximum of 2 exam attempts per year).

All certificates issued before October 2007 remain valid for the relevant type of commodity (i.e. Metalliferous or Coal).

### **9.2. CoM/Minerals Council Rock Mechanics Certificate (RMC)**

Examination for this certificate is only available to holders of the strata control certificate. The syllabus has been revised and became effective in the October 2007 examinations. The RMC is the engineering practitioner-level for a specific type of mining and qualifies a candidate to practice according to the MH&S Act 29 of 1996 Regulation 14.1(8) read with the associated schedule 22.14.1(8). These may be expanded by the government to describe the types of mining reflected in the RMC.

#### **REGULATION 14.1: Entering of working places**

At every underground mine where a risk of rock bursts, rock falls or roof falls exists, and at every other mine where a significant risk of rock bursts, rock falls or roof falls exists, the employer-

(8) must ensure that the input of a competent person is properly and timeously considered and integrated into mine design, planning and operations.

**REGULATION 22.14.1(8):** For purposes of Regulation 14.1(8) competent person means a person who is at least in possession of either the Chamber of Mines Certificate in Rock Mechanics (Metalliferous Mines), or the Chamber of Mines/Minerals Council Certificate in Rock Mechanics (Coal Mines), whichever is appropriate for the type of mine concerned.

[Reg. 22.14.1 inserted by GN R959/2002]

The RMC consists of rock mechanics theory, engineering design and the practical application of rock engineering.

- Theory and practical examinations will be set of which a specific four will constitute a certificate of competency for the type of mining chosen for Paper 3 and the RM practical.
- All theory examination papers are set and arranged by the Examinations Committee.
- The four papers for a RMC will consist of Theory (Paper 1), Basic Practice (Paper 2), Mining Type Specific (Paper 3 – choice between tabular hard rock mining,



tabular soft rock mining, massive mining and surface mining) and a Practical Examination (Paper 4) related to the type of mining chosen for Paper 3.

- The Practical Examination (Paper 4) related to the type of mining passed in Paper 3 for the RMC can only be taken after the three required written examinations have been passed.
- Setting and conducting the Practical Examination (Paper 4) require specific logistical and experiential skills, described in the practical examination guidelines.
- COM/Minerals Council RM Certificates issued before and up to the October 2007 examinations remain valid for the relevant type of commodity (i.e. Metalliferous or Coal). A person with a COM RMC obtained prior to October 2007 can operate on an open pit or massive mining operation provided the individual has a minimum of 5 years' relevant work experience after obtaining his certificate. A grandfathering process was considered for competent open pit practitioners and consultants not in possession of a RMC.
- Practitioners with certificates issued from October 2007 will have the relevant type of mining reflected on their certificates.
- Each practitioner will carry only one RMC. That certificate will reflect all the types of mining qualified for and it will be re-issued if an additional mining type is added. The new certificate will be exchanged for the previous one.

### **9.3. CoM Comprehensive Rock Engineering Certificate (CREC)**

This certificate will be issued when a candidate had passed all four Paper 3 and 4 mining type examinations, in addition to papers 1 and 2. It reflects a principal practitioner qualified to work in any commodity and any type of mining.

### **9.4. CoM Advanced Rock Engineering Certificate (AREC)**

This qualification represents study in greater depth into the specialised aspects of rock mechanics and rock engineering, on a post-graduate level. It is also the process of obtaining higher degrees with specific reference to rock engineering subjects at the universities.

**NOTE:** A science or engineering degree of any type, GDE or Honours degree per se does not qualify anyone to practice in rock engineering as a competent person.

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