

# **MINE HEALTH AND SAFETY INSPECTORATE**

## **RULES AND SYLLABI FOR THE MECHANICAL AND ELECTRICAL ENGINEER'S CERTIFICATES FOR MINES AND WORKS FRAMED UNDER MINERALS ACT REGULATION 28.6, IN FORCE IN TERMS OF SCHEDULE 4 OF THE MINE HEALTH AND SAFETY ACT 1996 (ACT 29 OF 1996)**



**the dme**

Department:  
Minerals and Energy  
REPUBLIC OF SOUTH AFRICA

## CONTENTS

1.	Certificates of Competency	1
2.	Qualifying Examinations	1
3.	Acceptance of Candidates for a GCC for Mines and Works as Mechanical or Electrical Engineer	2
4.	Syllabi and Examination Rules	4
5.	Alternate Certificates and Exemptions	4
6.	Summarised Procedure	5
7.	Factories Certificates	6
Annexure A	Acceptable Trades and Experience	7
Annexure B	Syllabus for Plant Engineering	8
Annexure C	Syllabus for Mine Health and Safety Act and Regulation	
Annexure D	Practical Knowledge to be completed by Mentor/ Engineer and Candidate, to be submitted with Application	11 13
Annexure E	Practical Experience	14

## **EXAMINATIONS FOR THE MECHANICAL AND ELECTRICAL ENGINEER'S GOVERNMENT CERTIFICATE OF COMPETENCY (GCC) FOR MINES AND WORKS**

**(Revised: 15 January 2007)**

### **1. CERTIFICATES OF COMPETENCY**

The following instructions, rules and syllabi for the examinations are framed in terms of Minerals Act Regulation 28.6 in force in terms of the Mine Health and Safety Act, (Act No.29 of 1996) regulation 28.6.

- 1.1 The following Certificates of Competency are issued by the Department of Minerals and Energy:
  - (a) Certificate of Competency as Mechanical Engineer for Mines and Works.
  - (b) Certificate of Competency as Electrical Engineer for Mines and Works.
- 1.2 Written examinations for each of these certificates are conducted in June and November by the Department of National Education in collaboration with the Commission of Examiners of the Department and the Department of Labour.
- 1.3 The procedure required to be followed to acquire a certificate of competency is summarised in paragraph 6.

### **2. QUALIFYING EXAMINATIONS**

- 2.1 To qualify for a Certificate of Competency as Mechanical or Electrical Engineer for Mines and Works, the following subjects must be passed by persons accepted as candidates:
  - (a) **Plant Engineering; and**
  - (b) **Legal Knowledge (Health and Safety Act and Regulations).**
- 2.2 To qualify for a Certificate of Competency, candidates must obtain at least 50% in each subject stipulated in 2.1. Candidates need not pass both subjects at the same examination sitting, but the second subject must be passed within three years or six consecutive examination sittings after passing the first, otherwise both subjects must be re-written. However, if a candidate obtains 75% or more of the full marks in a subject he/she will be permanently exempted from re-writing that subject. An appropriate Certificate of Competency will be forwarded to candidates who have passed the subjects required to qualify for such a certificate.

### 3. ACCEPTANCE OF CANDIDATES FOR A GCC FOR MINES AND WORKS AS MECHANICAL OR ELECTRICAL ENGINEER

3.1 No person will be allowed to enter for the qualifying examination, unless he/she has been accepted as a candidate by the Commission of Examiners, and no credit will be given for a pass in the subjects mentioned in 2.1, prior to such acceptance. An applicant shall not be accepted as a candidate by the Commission of Examiners, unless he/she has submitted proof that he/she has reached the age of 23 years, of sobriety and general good conduct and that he/she is in possession of qualifications and experience in engineering as follows:-

3.2.1 A B.Sc. degree in mechanical or electrical engineering recognised by the Commission of Examiners and at least two years post graduate appropriate practical experience in the maintenance and operations of mechanical and electrical machinery, satisfactory to the Commission of Examiners and of which at least one year has been at a mine in the RSA; or

3.2.2 A course (Technikon route) in engineering (mechanical or electrical as the case may be), a National Diploma (S4) plus at least two years experience subsequent to the issue of such diploma in the maintenance and operations of mechanical or electrical machinery as the case may be, which is satisfactory to the Commission of Examiners, and of which at least one year has been at a mine in the RSA. The completion of such course shall include passing all the subjects with a mark of at least 50%.

Individual Technikons may structure a curriculum to cover the electrical and mechanical course according to the requirements of the Plant Engineering syllabus (Annexure II). The Technikon must subsequently certify that a candidate for the

Government Certificate of Competency, having followed the Technikon route, has -

- (i) Completed a curriculum, which covers the syllabus for Plant Engineering;
- (ii) Acquired a National Diploma with a mark per subject of at least 50%; and
- (iii) Received the required experiential training; or

3.2.3 Enrolled for the B.Tech. Degree, at a Technikon granted permission by the Commission of Examiners with the undertaking from such Technikon to monitor and control the required experiential training after completion of such degree.

3.2.3 A course (Technical College route) in engineering (mechanical or electrical as the case may be). The completion of such course shall include passing all the subjects with a mark of at least 50%. Such person shall also have served an apprenticeship in an appropriate trade and has gained experience

In maintenance and operations of mechanical or electrical machinery, as the case may be, as listed in Annexure I. Such experience, of which at least one

year has been at a mine in the RSA, shall be satisfactory to the Commission of Examiners.

The Department of National Education will structure a curriculum to cover the electrical and mechanical course according to the requirements of the Plant Engineering Syllabus Annexure II. After completion of the prescribed course, the Department of National Education will be required to certify that a candidate for the Government Certificate of Competency, having followed the Technical College route, has -

- (i) Completed a curriculum, which covers the syllabus for Plant Engineering; and
  - (ii) Acquired a National Certificate on the N6 level, with a mark of at least 50% in all subjects.
- 3.3 The Commission of Examiners will consider other qualifications and experience on merit.
- 3.4 When an applicant follows an approved practical training program, such an applicant may be accepted as a candidate to write the qualifying examination, before the applicant has completed the required practical experience as stipulated in paragraph 3.2.1, 3.2.2, and 3.2.4, provided that the applicant can provide proof that not more than four months of the approved practical training program is still outstanding at the closing date for acceptance as a candidate to write the qualifying examination. Upon successful passing of the qualifying examination, a certificate will only be issued if proof of completion of the full-approved practical training program has been submitted.
- 3.5 Persons who wish to be accepted as candidates and who are in possession of a foreign degree, diploma or certificate in engineering, or who are in possession of engineering qualifications other than those mentioned in 3.2.1, 3.2.2 and 3.2.4 must have such degree, diploma or certificate evaluated by the **South African Qualifications Authorities, Private Bag X06, Pretoria, 0001, Telephone Number 012 431 5000** to check what additional subjects, if any, must be passed in order to comply with the requirements for acceptance. A request for valuation must indicate that it is for the Engineer's Certificate of Competency and must include a list of the subjects, including marks obtained, which led to the obtaining of the degree, diploma or certificate. A copy of the evaluation and a certified copy of the degree, diploma or certificate must accompany the application for acceptance as a candidate.
- 3.6 **A person who has been accepted by the Commission of examiners as a candidate and has not obtained a Certificate of Competency in seven years (7) from date of acceptance must re-apply to the Commission for acceptance.**

**NOTE: An evaluation by the Human Sciences Research Council on its own is not sufficient.**

#### 4. SYLLABI AND EXAMINATION RULES

4.1 The syllabi for the legal Knowledge subject mentioned in 2.1 is given in Annexure C.

4.2 Plant Engineering (Mining) is a “closed book” examination. It will consist of both mechanical and electrical questions, with a limited choice of questions. The time allowed for the examination is three hours.

Candidates may not use alphanumerical or programmable calculators in the examination room.

4.3 The question paper on the Mine Health and Safety Act and Regulations is also a closed book examination. There is no choice of questions and all questions must be answered. The time allowed for the examination is three hours.

It should be noted that the syllabus includes the practical application of the Act and Regulations. This implies an understanding of the Act and Regulations rather than committing the wording to memory only.

#### 5. ALTERNATE CERTIFICATES AND EXEMPTIONS

5.1 A candidate with a B.Sc. degree in electrical or mechanical engineering or equivalent qualifications, recognised by the Commission of Examiners, who has had at least three years post-graduate experience satisfactory to the Commission of Examiners and accepted as a Professional Engineer (appropriate qualified) by the Engineering Council of South Africa (ECSA), may be exempted from the subject “Plant Engineering”.

**This ruling shall expire on 31 December 2003 after which exemption for Plant Engineering will no longer be granted.**

5.2 The holder of a Certificate of Competency for “Factories” who wishes to qualify for the equivalent certificate for “Mines and Works” shall re-apply for acceptance as a candidate together with proof of at least one year’s experience in the maintenance and operation of appropriate machinery at a mine satisfactory to the Commission of Examiners and after acceptance will be required to pass the subjects mentioned in 2.1.

5.3.1 The holder of a Certificate of Competency as Mechanical Engineer who wishes to qualify for a certificate, as Electrical Engineer shall re-apply for acceptance as candidate together with proof of appropriate experience (appointment letter(s) as an engineer in charge of machinery). Such experience shall be satisfactory to the Commission of Examiners and shall consist of at least two years experience in the maintenance and operation of electrical machinery or at least four years “mixed” experience in the maintenance and operation of both electrical and mechanical machinery, which was gained after the acquisition of the mechanical certificate. The applicant will also be required to produce proof obtained from a Technikon or

Technical College of passing the subjects required to cover the Syllabus for the Certificate of Competency as Mechanical Engineer, with a mark of at least 50%.

- 5.4 The holder of a Certificate of Competency as Electrical Engineer who wishes to qualify for a certificate, as Mechanical Engineer shall re-apply for acceptance as a candidate together with proof of appropriate experience (appointment letter (s) as an engineer in charge of machinery). Such experience shall be satisfactory to the Commission of Examiners and shall consist of at least two years experience in the maintenance and operation of mechanical machinery or at least four years "mixed" experience in the maintenance and operation of both mechanical and electrical machinery, which was gained after the acquisition of the electrical certificate. The applicant will also be required to produce proof obtained from a Technikon or Technical College of passing the subjects required to cover the syllabus for the Certificate of Competency as Mechanical Engineer, with a mark of at least 50%.

## 6. SUMMARISED PROCEDURE

- 6.1 Obtain application forms for acceptance from:

The Secretary  
Commission of Examiners  
Department of Minerals and Energy  
Private Bag X59  
PRETORIA  
0001

Tel.: (012) 317-8079.

For further information see the DME website: [www.dme.gov.za](http://www.dme.gov.za)

- 6.2 Return the completed forms where applicable to the above-mentioned address together with:
- (a) A R50.00 uncancelled revenue stamp (s) (stuck on form); and
  - (b) Certified copies of degrees, diplomas or certificates (see paragraph 3); and
  - (c) A certified letter of evaluation from the Department of National Education stated that the syllabus of the subject Plant Engineering has been covered (N 6 route); or
  - (d) A certified letter from a approved Technikon, stated that the syllabus for Plant Engineering has been covered. (S4 and B-Tech route); and
  - (e) Certified proof of appropriate practical experience (see annexure D) and record of service signed by time keeper/ payroll manager; and
  - (f) A testimonial letter of sobriety and good conduct from the Resident Engineer (original letter); and

(g) A certified copy of candidates ID document.

- 6.3 If the application is successful, the Commission of Examiners will send a letter of acceptance to the candidate to enrol for the examination.
- 6.4.1 The candidate must take the letter of acceptance to enter for the qualifying subjects (par.2.1) to any Technical College or to any Local Secretary of the Department of National Education, to whom the examination fees must be paid.
- 6.4.2 The examinations are in June and November and the closing dates for entry are **20 March** and **25 September** respectively.
- 6.5 The Commission of Examiners will only consider applications for the GCC examination **30 working days** prior to the closing date set by the Department of Education (see paragraph 6.4). The results obtained by a candidate in any examination **will not** be recognised by the Commission of Examiners, if such candidate entered for the examination without having obtained a letter of acceptance from the Commission of Examiners.

#### **Results notice for issuing certificates**

- 6.6 A candidate, who has passed the qualifying subjects (par 3.2) must forward certified proof of having passed the prescribe subjects to the Commission of Examiners to the above-mentioned address.
- 6.7 A candidate who has passed a subject (s) (par.6) by means of a remark must notify the Commission of Examiners accordingly.
- 6.7.1 No results will be given telephonically.  
Results should be obtain by the Colleges where the examination was written.
- 6.8 The appropriate GCC will only be issued by the Department on receipt of a letter together with the following information by a candidate-
- a) Proof of Examination results from the Department of Education .
  - b) Proof of Identity Number
  - c) Postal Adders
  - d) A letter requesting the issuing of the appropriate GCC i.e. Mechanical or Electrical.

#### 7. "FACTORIES" CERTIFICATES

Persons who wish to qualify for a certificate of competency for "Factories" must apply to:

The Secretary  
Commission of Examiners  
Department of Labour  
Private Bag X117  
PRETORIA  
0001

Tel.: (012) 309-4111

## ANNEXURE A

### ACCEPTABLE TRADES AND EXPERIENCE

Trade in which the Minimum appropriate post-apprenticeship has apprenticeship experience been served in the general maintenance and operation of machinery

#### YEARS

Aero engine fitter, ground engineer or equivalent....	2
Armature winder .....	2
Blacksmith .....	3 not as a blacksmith
Boilermaker .....	3 not as a boilermaker
Diesel Mechanic .....	2 not as a diesel mechanic
Electrician .....	2
Engine-room fitter .....	2
Fitter .....	2
Fitter and armourer.....	3
Fitter and rigger (Air Force) .....	2
Fitter and turner .....	2
Instrument mechanic or instrument maker.....	4 not as an instrument mechanic
Instrument Technician an.....	2 not as an Instrument Technician
Lift mechanic .....	2
Millwright .....	2
Motor mechanic .....	2 not as a motor mechanic
Refrigeration mechanic .....	3
Tool and die maker .....	2
Welder .....	4 not as a welder

## ANNEXURE B

### SYLLABUS FOR PLANT ENGINEERING

#### THE THEORETICAL SECTION OF THE SUBJECT PLANT ENGINEERING TO BE INCLUDING IN THE SYLLABI OF TECHNIKONS AND TECHNICAL COLLEDGES

Questions will be framed on all aspects of the theory and the practical application of such theory in its widest sense as would be expected of a certificate engineer while performing his normal duties. Accent is placed on his competency in the exercise, control and supervision over the safe installation, maintenance and operation of machinery.

### SYLLABUS FOR PLANT ENGINEERING

#### 1. SAFETY AND MANAGEMENT

##### MECHANICAL

Accident prevention  
Fire protection  
Risk control  
Project management  
Financial management  
Loss control

##### ELECTRICAL

Accident prevention  
Fire protection  
Risk control  
Project management  
Financial management  
Loss control

#### 2. ELECTRICAL TECHNOLOGY

##### MECHANICAL

Direct - current machines  
Direct - current generators  
Direct - current motors  
Efficiency of D C. machines

Alternating voltage and current

Single and three phase circuits  
Transformers

Production of a rotating magnetic field  
Characteristics of synchronous  
Generators and motors  
Three phase induction motors  
Semi conductor devices  
Electric lamps and illumination  
Electric power transmission & distribution

##### ELECTRICAL

Direct - current machines  
Direct - current generators  
Direct - current motors  
Efficiency of D C motors

Alternating voltage and current  
Single and three phase circuits  
Transformers  
Alternator windings  
Production of a rotating magnetic field  
Characteristics of Synchronous  
Generators and motors  
Three phase induction motors  
Semi conductor devices  
Electric lamps and illumination  
Electric power transmission & distribution

**ANNEXURE B CONTINUED****MECHANICAL**

Circuit breakers  
 Underground cables  
 Insulators  
 Overhead lines  
 Economics of power supply  
 maximum demand  
 Power factor correction

Fault discrimination (basics)  
 (Symmetrical faults only)  
 Illumination  
 Explosion proof equipment  
 Lightning protection

**ELECTRICAL**

Circuit breakers  
 Underground cables  
 Insulators  
 Overhead lines  
 Economics of power supply  
 Maximum demand  
 Circuit breakers  
 Power factor correction  
 High frequency transients  
 Methods of earthing  
 Protection  
 Storage of energy  
 Rectification

Fault discrimination  
 Illumination  
 Communication  
 Explosion protected apparatus  
 Lightning protection  
 Basics of data transmission

**3. APPLIED THERMODYNAMICS****MECHANICAL**

Air- and gas compressors and  
 blowers  
 Air motor (applications)  
 Compressed air columns  
 Compressed air receivers  
 Refrigeration and properties of  
 refrigerants  
 Air conditioning  
 Psychometric tables and charts  
 Steam generators (boilers & ancillary  
 equipment)  
 Properties of steam  
 Heat balancing  
 Condensers  
 Steam and gas turbines  
 Fans  
 Internal combustion engines  
 Heat transfer  
 Fuels and combustion

**ELECTRICAL**

Air- and gas compressors and  
 blowers (rotary compressors only)  
 Compressed air columns  
 Refrigeration and properties of  
 refrigerants  
 Air conditioning  
 Steam generators (boilers & ancillary  
 equipment)  
 Properties of steam  
 Fans (classification)  
 Internal combustion engines

**ANNEXURE B CONTINUED****4. STRUCTURES AND STRENGTH OF MATERIALS****MECHANICAL**

Simple stresses  
 Simple stress and strain  
 Thin-walled pressure vessels  
 Torsion of circular shafts  
 Close coiled helical springs  
 Shear force and bending moments  
 Temperature stresses  
 Strain energy due to direct  
 Stresses

Second moment of area

Bending stresses  
 Shear Stress in beams  
 Struts & buckling  
 Catenaries  
 Foundations  
 Fatigue failure  
 Mechanical and chemical properties of  
 metals  
 Testing of materials  
 Twisting of shafts  
 Ropes  
 Properties of different  
 Types of ropes  
 Reinforced concrete  
 Retaining walls  
 Fastenings

**ELECTRICAL**

Simple stresses  
 Simple stress and strain  
 Thin-walled pressure vessels  
 Torsion of circular shafts  
 Shear force and bending moments

Temperature stresses

Second moment of area  
 Bending stresses

Catenaries

Mechanical and chemical properties of  
 metals  
 Testing of materials

Ropes

Fastenings

**5. THEORY OF MACHINES****MECHANICAL**

Conveyors  
 Winding plant (Double drum, Single  
 drum, Koepe, Blair Multi-rope and multi-  
 drum) (Degree of protection)  
 Elevators  
 Traction  
 Motion and inertia  
 Displacement, velocity and acceleration  
 Static and dynamic balancing  
 Belt and chain drives  
 Brakes and dynamometers  
 Toothed gearing  
 Gear Trains

**ELECTRICAL**

Conveyors  
 Winding plant (Double drum, Single drum,  
 Koepe, Blair Multi-rope and multi-drum)  
 (degree of protection)  
 Elevators  
 Traction  
 Motion and inertia  
 Displacement, Velocity and acceleration  
 Static and dynamic balancing  
 Belt and chain drives  
 Brakes and dynamometers

**ANNEXURE C**

## SYLLABUS FOR MINE HEALTH AND SAFETY ACT AND REGULATIONS

- 1.. **MINE HEALTH AND SAFETY ACT (ACT NO. 29 OF 1996)**
2. **The following Mine Health and Safety Act and Minerals Act Regulations (As amended):**

Chapter 1	1.1(1) 1.2.1(1)
Chapter 6	6.3, 6.4, 6.5, 6.6, 6.7 and 6.9
Chapter 8	All Regulations
Chapter 10	All regulations
Chapter 16	All regulations
Chapter 20	All definitions
Chapter 21	All regulations
Chapter 23	All regulations
3. **Minerals Act Regulations in force in terms of Schedule 4 of the MHSAs(as amended)**

Chapter 1	Definitions
Chapter 2	2.5.2.1, 2.5.2.2, 2.5.4, 2.6.1, 2.6.2, 2.6.4, 2.9, 2.10.2, 2.10.4, 2.10.5, 2.10.14 to 2.10.19, 2.13.1 to 2.13.12, 2.17.1 to 2.17.7, 2.18.1 to 2.18.2, 2.19.1 to 2.19.7
Chapter 3	All Regulations
Chapter 4	All Regulations
Chapter 5	5.8.1 to 5.8.3, 5.9.1 to 5.9.2, 5.11 5.13 to 5.13.4, 5.14 to 5.14.4 and 5.15
Chapter 6	6.1.1, 6.1.2, 6.2.2.2, 6.3.2.3, 6.4, 6.5.1 to 6.5.2.2 6.6 to 6.6.6, 6.7, and 6.9
Chapter 7	7.1, 7.3.1 to 7.3.4, 7.5.1, to 7.5.3, 7.7,1 to 7.7.3, 7.8.1 to 7.8.3, and 7.9.1 to 7.9.2
Chapter 9	9.15.1, 9.30.1, 9.30.2.1 to 9.30.22.9.30.3.1, 9.38.6
Chapter 11	All Regulations
Chapter 14	All Regulations except 14.3
Chapter 16	All Regulations

Chapter 17	All Regulations
Chapter 18	All Regulations
Chapter 19	All Regulations
Chapter 20	All Regulations
Chapter 21	All Regulations
Chapter 22	All Regulations
Chapter 23	All Regulations
Chapter 24	All Regulations
Chapter 26	All Regulations
Chapter 27	All regulations
Chapter 28	28.1.1 to 28.6, 28.9 to 28.12, 28.22.1 to 28.31, 28.47.1 to 28.47.7, 28.48.1, to 28.48.2
Chapter 29	All Regulations
Chapter 30	30.1,to 30.4.4, 30.7 30.8
Chapter 31	31.1 to 31.10
Chapter 35	All Regulations

4. The practical application of the Act and Regulations
5. Machinery guideline issued in terms of Section 9 (3) of the Mine Health and Safety Act.
  - 5.1 Guideline for the completion of a mandatory code of practice for underground Rail bound Transport Equipment.
  - 5.2 Guideline for the compilation of a mandatory code of practice for prevention of coal dust explosion in under ground coal mines.
  - 5.3 Guideline for the compilation of a mandatory code of practice on Mine Residue Deposits.
  - 5.4 Guideline for the compilation of a mandatory code of practice for trackless Mobile Machinery.
  - 5.5 Guideline for the compilation of a mandatory code of practice for the Safe Operation of Monorails Systems.
- 6 SANS referenced in Regulations and Guideline.
- 7 Machinery Guidance Notes issued by the Chief Inspector of Mines.
- 8 Machinery Instructions issued by the Chief Inspector of Mines.

## ANNEXURE D

### **PRACTICAL KNOWLEDGE TO BE COMPLETED BY MENTOR/ENGINEER AND CANDIDATE, TO BE SUBMITTED WITH APPLICATION**

#### **PRACTICAL KNOWLEDGE (MINES)**

Candidates must be conversant with the following plant, equipment, practices and processes on surface and underground at mines with emphasis on the general design, lay out, reticulation, production capacity, energy requirements, motion characteristics, economic, operation, efficiency testing, commissioning, maintenance, safety precautions and devices. This section is complimentary to and additional to the theoretical curriculum obtained at Universities, Technikons or Technical Colleges. Certain experience is required- Please indicate on the attached form the experience gained under each section.

- **Certain Experience is required – Please indicate on attached Annexure E experience gained under each item. Return the completed Annexure E (original signature of Mentor) with your application.**
- **Please note: ACTUAL EXPERIENCE GAINED AFTER ACADEMICAL QUALIFICATIONS HAVE BEEN COMPLETED**
- **Please note: ACTUAL EXPERIENCE GAINED AFTER ACADEMICAL QUALIFICATIONS HAVE BEEN COMPLETED**

## ANNEXURE E

NAME: .....

MINE: .....

ID NO: .....

MINING GROUP: .....

Description	Start Dates No Working Days	Completion Dates No Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
<b>WINDING PLANT (60 days)</b>					
1. Various winding systems					
1.1 Double drum					
1.2 Single drum					
1.3 Multi Rope					
1.4 Automatic					
1.5 Stage winders					
2. Control Systems					
2.1 A C					
2.2 D C closed loop					
2.3 Variable speed					
3. Signalling and safety Devices					
4. Wire ropes and Attachments					
5. Front and back end rope cuts NDT and EMT testing					
6. Sheaves, shafts and shaft bearings including sheave profile					

Description	Start Dates No Working Days	Completion Dates No Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
7. Cages, skips and other types of conveyances					
8. Rope, steel, timber, and timber and rail guides					
9. Loading and unloading arrangements for persons, material and minerals					
10. Headgear's, bins and loading chutes					
11. Shaft sinking operations 11.1 Signalling systems 11.2 Safety devices					
12. Inspections and tests					
<b>LIFTING EQUIPMENT (10 days)</b>					
1. Lifting Machines 2. Lifting tackle					
<b>LIFTS (ELEVATORS) (10 days)</b>					
1. Type of Lifts 1.1 AC 1.2 DC 1.3 Rack and Pinion Lift					
2. Safety devices					
3. Ropes and Chains					

Description	Start Dates No Working Days	Completion Dates No of Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
4. Hatchway and cars					
5. Motor room and Controls					
6. Inspections and tests					
<b>CHAIRLIFTS (10 days)</b>					
1. Safety devices					
2. Ropes and Splices					
3. Chains					
4. Chairs and attachments					
5. Brakes					
6. Boarding/Alighting Station					
7. Travelling Clearances					
8. Inspections and tests					
<b>COMPRESSED AIR AND RETICULATION (10 days)</b>					
1. Air compressors					
1.1 Rotary					
1.2 Screw					
1.3 Piston					
2. Ancillary equipment					
3. Control of safety Devices					
4. Reticulation					

Description	Start Dates No Working Days	Completion Dates No Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
5. Measurement of compressed (auto compression)					
6. Compressed air Motors					
7. Testing of air compressor systems/ including vessels under pressure					
<b>DRILLS (20 days)</b>					
1. Rotary and percussion machine for drilling pneumatic and electric					
2. Machine cutting rock					
3. Rock drill machine					
4. Raise bore					
5. Diamond drilling and cover drilling					
6. Drills and drill bits					
7. Drill sharpening					
<b>ENVIROMENTAL ENGINEERING (25 days)</b>					
1. Ventilating and cooling including main and aux fans					
1.1 Inspection and testing of fans					

	Start dates	Completion Dates	Mentor Signature	Engineer in	Name of Shaft
--	-------------	------------------	------------------	-------------	---------------

Description	No Working Days	No working days	(Engineer)	Training Signature	where experience gained
2. Air conditioning					
3. Refrigeration including heat balance					
4. Dust and fumes: cause and prevention					
5. Noise: cause and Prevention					
6. Hearing protection					
7. Illumination of working Places					
<b>MATERIAL/MINERAL HANDLING EQUIPMENT (50 days)</b>					
1. Conveyors					
2. Scraper winches					
3. Endless rope and mono-winch installation					
4. Underground rail bound equipment					
5. Underground trackless equipment					
6. Use of flame proof and non flameproof diesel engines in fiery mines and hazardous locations					
6. Use of flame proof and non flameproof diesel engines in fiery mines and hazardous loc.					
<b>Description</b>	<b>Start dates</b>	<b>Completion Dates No working days</b>	<b>Mentor Signature (Engineer)</b>	<b>Engineer in Training</b>	<b>Name of Shaft where experience</b>

	No Working Days			Signature	gained
7. Man-riding conveyors					
8. Mono-rail systems					
<b>FLUID HANDLING (30 days)</b>					
1. Stope drainage					
2. Haulage water drainage					
3. Mine de-watering pump station					
4. Underground settlers					
5. Underground dams/ Plugs					
6. Multi-stage pumps (high pressure)					
7. Sludge pumps					
8. Water treatment					
9. Measurement of flow					
10. U/G water system					
11. Pelton wheels					
12. Water balance					
<b>ELECTRIAL (50 days)</b>					
1. Electrical power Reticulation					
2. Transformers					
3. Switchgear					

Description	Start Dates No Working Days	Completion Dates No of Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
3.1 Oil 3.2 Minimal oil 3.3 Vacuum circuit breaker 3.4 SF6					
4. Underground and surface electrical reticulation					
5. Electrical power control and measurements					
6. All type of electrical motors 6.1 AC 6.2 DC 6.3 Synchronous motors					
7. Emergency power generating installations					
8. Heating equipment					
9. Lightning equipment					
10. Protection against lightning surges					
11. Earth leakage and overload protection including discrimination and testing of equipment					
12. Fault current calculations					

---

Description	Start Dates No Working Days	Completion Dates No of Working Days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of Shaft where experience gained
13. Power factor and power factor correction					
14. Power costs and tariff calculations					
15. Explosion protected apparatus					
16. Classification of hazardous locations					
17. Repair and manufacturing of electrical equipment					
<b>MINERALS PROCESS PLANT (20 days)</b>					
1. Crushing plant and equipment					
2. Storing, screening, washing plant					
3. Grinding plant (mills)					
4. Mill product thickening					
5. Filtering					
6. Vacuum systems					
7.Recovery 7.1 Flotation					
8. Residue handling and residue deposits					

---

Description	Start date No working days	Completion dates No of working days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of shaft Where experience gained
<b>STEAM GENERATING (15 days)</b>					
1. Type of boilers					
1.1 Gas					
1.2 Coal					
1.3 Electrical					
1.4 Oil					
2. Safety devices					
3. Ancillary equipment					
4. Steam piping systems					
5. Autoclaves					
6. Super heaters					
7. Condensers					
8. Water treatment					
9 Boiler inspections and Tests					
<b>WORKSHOPS (30 days)</b>					
1. Electrical workshop					
2. Fitting shop					
3. Boiler shop					
4. Carpenter shop					
5. Mine store					
6. Workshop organisation					
7. Cable repair shop					
8. Garage workshop					
9. Earth moving vehicles					

	Start Dates	Completion Dates	Mentor	Engineer in	Name of Shaft where
--	-------------	------------------	--------	-------------	---------------------

Description	No Working Days	No of Working Days	Signature (Engineer)	Training Signature	experience gained
<b>STRUCTURES (20 days)</b>					
1. Buildings erected to house machinery					
2. Provision for cranes and lifting gear					
3. Underground chambers support of excavation					
4. Lifting arrangements					
5. Scaffolding					
<b>CONCRETE WORK (10 days)</b>					
1. Reinforced concrete					
2. Composite beams					
3. Shuttering and concrete hardening					
4. Protection against chemical wear					
<b>STEEL AND ALLOYS (5 days)</b>					
1. Mechanical properties of various type of steel and alloys					
2. Stress in structures					
3. Composite beams					
4. Corrosion and abrasion protection of steel					

Description	Start date No working days	Completion dates No of working days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of shaft Where experience gained
5. Effects of fluctuating temperatures					
<b>LUBRICATION (10 days)</b>					
1. Elementary theory of lubrication					
2. General properties of oil and greases					
3. Modification of properties by additives such as detergents					
4. Extreme pressure additives and antioxidants					
5. Condition monitoring					
<b>FIRE PREVENTION AND CONTROL (5 days)</b>					
1. Fire prevention and control					
2. Use of different types of fire extinguishers					
3. Maintenance and repair of fire prevention systems					

---

Description	Start dates No working days	Completion dates No of working days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of shaft Where experience gained
<b>OPERATION AND MAINTENANCE OF PLANT (30 days)</b>					
1. Operations					
2. Planned maintenance					
3. Supervision and Inspection/audits					
4. Safety precautions					
5. Safety devices					
6. Automation in operating or production processes					
7. Financial control					
8. Commissioning of Projects					
<b>PROJECT MANAGEMENT (20 days)</b>					
1. Planning methods					
2. Control and implementation of projects					
3. Critical route scheduling					
4. Gantt-chart					

---

Description	Start dates No working days	Completion dates No of working days	Mentor Signature (Engineer)	Engineer in Training Signature	Name of shaft Where experience gained
5. Nett present values					
6. Retention payments					
7. Risk Assessment techniques					

Name of Engineer in full: .....

Date: .....

Signature of Engineer: .....

Cert No. of Engineer : .....

Name of shaft.....