THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

Volume 1:
Programme Implementation Document (PID)

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PREFACE

The Engineers Registration Board was first established in 1968 under Act No. 49, but was re-established in 1997 under Act No. 15 of 1997 with powers to regulate the conduct of engineers, and to provide for their registration and related matters. The Act allows only registered engineers to engage in professional engineering work and/or services. Registration is thus a licence and the only way of ensuring that one is professionally qualified to practise engineering. To qualify for registration in the categories of professional and technician engineers one has to acquire adequate professional competence and experience in areas specified by the Board.

One of the functions of the Board is to promote and provide opportunities and facilities for the study of and for professional training in engineering. Thus, in order to help graduate engineers acquire sufficient professional competence within a period of three years as stipulated in the Act, the Board has conceived and designed a structured professional training programme which is named, the Structured Engineers Apprenticeship Programme (SEAP).

The programme is designed to enable young graduates to gain hands-on professional experience under close supervision by senior registered professional members of the profession. Under the Progamme trainee engineers will undergo professional training, following training guidelines specific to one's field of engineering practice. SEAP is therefore intended to ensure that trainee engineers are equipped to pursue their professional careers with precision and confidence thereby becoming competitive and able to effectively play their roles in national development. SEAP is a structured internship programme for engineers.

SEAP was officially launched by the Minister for Works, Hon. John Joseph Pombe Magufuli on January 13, 2003. During the fiscal year 2002/2003 the Board, with the support of the government, admitted 120 graduate engineers into the programme. In 2003/04 an additional 130 graduate engineers were admitted into the programme.

The Structured Engineers Apprenticeship Programme is documented in two volumes. Volume 1 is a Programme Implementation Document and includes Guidelines, for each field of engineering practice or discipline, on the role and what is expected of each of the following players during the training; the SEAP Provider, the Professional Training Supervisor (Mentor), and the SEAP Trainee. Volume 2 is a Directory of SEAP Providers, containing a compilation of information on all known potential SEAP Providers. The training guidelines contained herein accommodate the views of key stakeholders in the engineering sector which were given during a stakeholders' workshop held on 24th June 2003.

NOMENCLATURE

AQRB	-	Architects and Quantity Surveyors Registration Board
CAD	-	Computer Aided Design
CET-UDSM	-	College of Engineering and Technology of Univesity of Dar es Salaam
CRB	-	Contractors Registration Board
DIT	-	Dar es Salaam Institute of Technology
DFID	-	Department for International Development, UK
ERB	-	Engineers Registration Board
ICE	-	Institution of Civil Engineers, UK
IET	-	Institution of Engineers Tanzania
IT	-	Information Technology
MOWLD	-	Ministry of Water and Livestock Development
NGO	-	Non-governmental Organisation
PLC	-	Programmable Logic Controllers
PORALG	-	President's Office, Regional Administration and Local Government
PTG	-	Professional Training Guidelines
PTS	-	Professional Training Supervisor
SUA	-	Sokoine University of Agriculture
TASAF -	-	Tanzania Social Action Fund
TBL	-	Tanzania Breweries Limited
TIRDO -	-	Tanzania Industrial Research and Development Organization
TQM	-	Total Quality Management
UCLAS -	-	University College of Lands and Architectural Studies
UDSM -	-	University of Dar es Salaam
UK	-	United Kingdom
URT	-	United Republic of Tanzania

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1.0 INTRODUCTION

1.1 Background

The Engineers Registration Board (ERB) was first established in 1968 under Act No. 49, but was strengthened by Act No. 15 of 1997 which charged it with the responsibility for regulating the activities and conduct of engineers and engineering consulting firms. To this end ERB has been mandated, among other things, to promote and provide opportunities and facilities for the study of and for professional training in engineering.

One of the major preocupations of the Board has been to address the need for young graduates to gain adequate professional experience to enable them to become professional engineers within the minimum period prescribed in the Act. It is this concern that has prompted the Board to initiate the Structured Engineers Apprenticeship Programme (SEAP) for fresh graduates.

Implemenation of SEAP is a joint effort of ERB, Engineering Organizations, Professional Engineers serving as supervisors (mentors), Employers and the Graduates, and will be conducted according to the guidelines as outlined herein.

1.2 Review of Training Needs

The need to train graduate engineers has been felt for a long time, and has in fact been a subject of debate among engineers, ERB and the Institution of Engineers Tanzania (IET), for many years. SEAP is intended to enable graduate engineers to enter the job market with greater confidence. This is more so in the current environment where engineers are expected to become job creators rather than job seekers.

Experience has shown that many engineers are assigned challenging projects, as soon as they enter the job market, without any guidance from senior professionals, and, they are expected to deliver quality product!

Experience has also shown that engineers who do not get mentored during the early stages of their working career take considerably longer to develop into professional engineers. They lack self-confidence, and hence they get scared even to apply for the professional status.

The engineering population in Tanzania is estimated to be about 6000. Statistics show that the University of Dar-es-Salaam alone has produced more than 3500 engineers since it started producing engineers in 1977. There have also been engineering graduates from the University College of Lands and Architectural Studies (UCLAS), Dar-es-Salaam Institute of Technology (DIT), and Sokoine University of Agriculture (SUA). The population of engineers who have graduated from foreign universities is also considerable. If all these engineers were getting the right experience immediately after graduation, the population of professional engineers in Tanzania would have been in excess of 5000 by now. However, the registration figures for professional and consulting engineers as of June 2004 were only 3069, as shown in Table 1.1 below.

An equally unimpressive picture is depicted by the statistics of the Institution of Engineers Tanzania (IET), as presented in Table 1.2. Basically the table shows that during the period of five (5) years (1998 to 2002) hardly 50% of the graduate members were able to advance to the category of Corporate Members, which is equivalent to the category of Professional Engineers in ERB.

Table 1.1: Registration Statistics for Engineers from 1968 to 2004

Category	1968-1997	1998	1999	2000	2001	2002	2003	2004	Total
Graduate Technician Engineers	-	121	12	10	30	89	107	77	**446**
Graduate Engineers	-	584	217	121	150	265	743	423	**2,503**
Technician Engineers	-	177	106	19	21	27	9	4	**363**
Professional Engineers	1,102	645	299	114	127	151	81	94	**2,613**
Temporary Professional Engineers	-	88	73	28	23	45	23	25	**305**
Consulting Engineers	-	50	41	13	12	8	12	15	**151**
Temporary Consulting Engineers	-	9	14	-	1	10	3	6	**43**
Total Registered Engineers	**1,102**	**1,674**	**762**	**305**	**364**	**595**	**978**	**644**	**6,424**

In the light of the above, it is deemed important that graduate engineers are guided thr ough the profession during the initial three years of their working experience. This will enable them to cultivate the right work attitudes, and to gain the self-confidence necessary for efficient and effective engineering practice.

Table 1.2: Membership of IET from 1977 to 2004

Class	1977-98	1999	2000	2001	2002	2003	June 2004
Honorary Fellows	4	6	6	6	7	7	7
Fellows	29	31	34	40	46	48	50
Senior Members		3	9	16	16	21	25
Corporate Members	679	769	846	902	940	946	962
Associate Members	28	33	41	44	44	44	46
Companions	8	8	8	8	8	7	7
Associates	32	32	32	32	32	32	32
Affiliate Members	87	88	94	97	104	127	128
Graduates	574	592	614	644	670	775	786
Associate Graduates		2	3	3	7	14	16
Total Members	**1,441**	**1,564**	**1,687**	**1,792**	**1,874**	**2,021**	**2,059**

1.3 Possible Modes of Implementing SEAP

The Board recognizes three main modes of implementing professional training following the Structured Engineers Apprenticeship Programme (SEAP) Guidelines, namely:

(a) SEAP Training using funds administered by the Board (including Government subvention);
(b) SEAP Training financed directly by employers of the engineers;
(c) Self initiated Professional Training.

(i) SEAP Training using funds administered by Board

This mode covers engineers in the service of the Government and fresh graduate engineers who have not secured employment. The number of trainees taken into the programme depends on the financial allocation made by the Government and other financiers each financial year. As financial allocations are always lower than actual requirements, the Board has in place a transparent selection criterion. Using this criterion, applicants for the programme are assessed, ranked and required number selected based on the ranking. In this mode the Board is responsible for:

(a) Scrutinizing the applications.
(b) Looking for training placements.
(c) Identifying mentors for the trainees.
(d) Selecting the SEAP Trainees and arranging for their training placements.
(e) Paying allowances to the trainees.
(f) Taking disciplinary actions on defaulting trainees.
(g) Providing trainees with safety gear.

(ii) SEAP Training Financed by Employers

Quite a good number of employers of engineers have realized the immense importance of the programme. Accordingly, in addition to providing professional training to SEAP Trainees placed by the Board, employers of fresh graduate engineers also require their graduate engineers to undergo SEAP training. In some cases the training programme follows a blend of the SEAP Guidelines prepared by the Board and the employers' in-house training programmes. In this

case the Board is responsible for providing SEAP Guidelines, while the employers are responsible for the upkeep of the engineers and identification of professional engineers within the organization to mentor the trainee(s).

(iii) Self Initiated Professional Training

This training applies where graduate engineers pursue the SEAP programme on their own initiatives. In such a case the Board provides SEAP Guidelines to the Trainees and may assist them to identify mentors.

In all the three modes of implementing SEAP, the Board also does the following:

(a) Following up on the progress of the professional training of all the graduate engineers. This is done through visits to their training organizations and talking to the trainees, their mentors and the managements of the organizations providing the training;
(b) Checking trainees' logbooks;
(c) Evaluating trainees' quarterly reports;
(d) Maintaining a database of SEAP trainees;
(e) Handling any other matters pertaining to the trainees' professional training.

1.4 Benefits of SEAP

The core objective of SEAP is to enable young engineers to acquire high level professionalism and professional competence so that they can register as professional engineers within the minimum period specified in the Engineers Registration Act, and therefore be able to contribute effectively towards national development. The main benefits of SEAP include:

(i) To the trainee

(a) Acquisition of high level professionalism and competence within a minimum period of three years and therefore achievement of professional engineer status.
(b) Enhanced employment prospects.
(c) Enhanced possibility of self-employment in engineering practice.
(d) Enhanced confidence and commitment to practice engineering.

(ii) To the Mentors

Mentors who supervise SEAP Trainees gain Professional Development Units (PDUs) in the Structured Continuing Professional Development (CPD). CPD is compulsory to all practicing engineers, where one is required to get a minimum of 30 PDUs in a year.

(iii) To SEAP Providers

(a) Provision of a sure way to identify potential employees.
(b) Provision of cheap labour as SEAP trainees are able to contribute to productivity of the firm/organization. Regular SEAP providers can therefore reduce their personnel establishment in some areas of production.

(iv) To Employers

(a) Employers are assured of employing competent engineers who practice their profession with confidence and deliver services of high quality.
(b) Reduced reliance on foreign engineers, hence less personnel costs and other related expenses.
(c) Enhanced ability to deliver quality products and services arising from employing competent engineers thus enhancing corporate image of the firm/ organization.

(v) To the Engineering Community

(a) Improved image, respect and dignity.
(b) Enhanced attraction of engineering.
(c) Improved bargaining power for better package and incentives.
(d) Uniformity of standards of professional competences as SEAP is a quality benchmark of competences for engineers of different disciplines.

(vi) To the Nation

(a) An increase in the number of professionally qualified engineers will effectively contribute to the socio–economic development of the country.
(b) Tanzania will have its own pool of professionally qualified engineers who can be called upon to undertake specialized engineering assignments.
(c) Enhanced ability to easily meet the requirements of the Washington Accord and the Engineers Mobility Forum and thereby enhanced competitiveness regionally and internationally.
(d) Reduced dependence on foreign engineers.
(e) Ready availability of professionally qualified and competent engineers for the development and maintenance of infrastructure and keeping Tanzania at par with the rapidly advancing technology, thereby meeting the aspirations of Vision 2025.

2.0 TRAINING OBJECTIVES, COMPETENCE STANDARDS AND DESCRIPTORS

2.1 General

As mentioned earlier, the purpose of the SEAP is to prepare graduate engineers to become professional engineers, able to manage engineering undertakings on their own, in the shortest time possible. Since the training will be conducted by the industry, a successful apprenticeship training programme must be the collaborative effort of the Board, Industry (the Training Engineering Organizations and Employers), Supervising Professional Engineers and the Trainees. Each of these has a critical role to play, without which the whole exercise will flop. It is therefore important for each of these partners to know precisely what their roles are in the programme.

It is understood that many employers have own internal training programmes for their engineers, and that such programmes would vary from one employer to another. SEAP is not intended to substitute such programmes, which are important for the efficient performance of the industry. Training organizations are, however, urged to ensure that the SEAP requirements are fully covered and are integrated in their internal programmes, whenever possible.

Because of the diversity of the engineering organizations participating in the programme, it may not be practical to design a training programme that will meet the entire needs of these organizations. Hence, in this Section an endeavour will be made to give guidance notes on how a workable training programme should be set up. It will then be upon the Training Organizations' Training Officer to draw up the programme with the concurrence of the Board. Every Training Programme should include the following elements:

(a) A description of the training organization and its induction procedure;
(b) The training policy of the organization;
(c) The roles and responsibilities of the training organization, the supervisors, the trainee and the Board;
(d) The training requirements of the Board as set out in the guidelines presented above, and those of the training organizations, which are industry-specific;
(e) Guidelines on reporting by the trainee (quarterly and annual reports);
(f) The monitoring process, say, quarterly and annual reviews.

2.2 Training Objectives

The basic objectives of the training programme whose training outcomes and competence levels are clearly spelt out in Section 2.3 include:

(i) To enable graduate engineers to acquire professional competence in their areas of training in a structured manner and so register with the Board as professional engineers;
(ii) To enable graduate engineers to acquire professional competence that will enable them to secure employment or appropriately employ themselves in the engineering sector and thus break the vicious cycle of '*no experience-no employment-no experience';*
(iii) To enable the nation to have a pool of competent and professionally qualified and experienced engineers who will contribute positively and effectively towards national development.

The specific generic objectives of the programme are:

(a) To acquire knowlegde on the role and responsibility of engineers to society and to the organizations in which they work, and the need to observe ethics and professional conduct.
(b) To acquire knowlegde on the history, purpose and organization of engineering institutions in Tanzania namely ERB, IET, ACET, CRB, etc.

(c) To develop and maintain interest in the affairs of ERB, IET and other statutory bodies concerned with engineering in Tanzania.
(d) To acquire general knowledge of overall engineering procedures in one's discipline.
(e) To keep up to-date with current technological and business developments in engineering, particularly in one's area of discipline.
(f) To develop interest in current affairs both nationally and internationally.
(g) To develop the ability to communicate accurately, concisely and with confidence.
(h) To acquire knowlegde on one's responsibilities with respect to health and safety of oneself and others by being familiar with current legislation.
(i) To understand the structure of the organization in which the trainee is working
(j) To acquire experience in identifying and defining a problem accurately.
(k) To acquire professional experience in the identification and evaluation of alternative solutions to a problem.
(l) To understand the application and limitations of national and international standards, codes of practice, technical memoranda, etc.
(m) To develop the ability to identify and analyse problems and produce the solution for the same.
(n) To develop the ability to properly present solutions to problems.
(o) To acquire knowlegde and appreciate the impact of engineering solutions to the environment and vice versa.
(p) To understand technical specifications as an essential part of the solution of a problem.
(q) To acquire experience in costing solutions to problems and building up competitive cost estimates
(r) To develop the ability to implement health and safety procedures in problem solving.
(s) To acquire knowlegde on how various parties to a contract exercise their duties and responsibilities and appreciate the practical application of the various documents forming a particular contract.
(t) To acquire knowlegde on the procedure for the issue and/or receipt, registration and preparation of work instructions and/or drawings and amendments.
(u) To develop the ability to keep accurate daily records of events and instructions.
(v) To develop the ability to coordinate drawings and/or implement work instructions by being involved on a day-to-day basis in this process.
(w) To acquire the ability to participate in quality management of the work one is implementing.
(x) To acquire knowlegde on the specifications, performance, application, and cost of engineering systems, equipment and/or plant used in implementing a solution.
(y) To develop ability to plan, programme and monitor implementation of engineering works or processes, and report progress.
(z) To develop ability to measure and record or independently assess work done for payment purposes.

Details of the programme, and time allocations to be spent in different departments, should be given to enable the trainee to know the way one's career path is likely to develop, and the opportunities that will be afforded through the training.

2.3 Competence Standards

2.3.1 General

SEAP is intended to give the graduate engineer skills, not only in the technical field, but also in administration, management, external and internal relations, safety, quality and financial controls appropriate to the organisation in which one is working. Thus, in assessing whether the candidate has attained a satisfactory level of professionalism some objective criteria have been set.

Although the graduate engineer will be training according to particular syllabi or guidelines applicable to one's discipline of engineering, it is important that the training is viewed objectively, to enable the candidate acquire the right skills. The candidate should therefore be able to demonstrate to the Board

that he/she has acquired the minimum level of proficiency or ability to manage an engineering undertaking.

2.3.2 Levels of Competence

Four levels are proposed for the training outcomes outlined in Table 4. A candidate must satisfy the Board that he/she has attained the minimum level of competence set against each of the outcomes. These levels are:

- ***Level (1) - Appreciation***
  This calls for a general understanding of the specified training outcome, what it entails, as well as an appreciation of the reasons for its inclusion.

- ***Level (2) - Knowledge***
  This requires knowing how and what to do to achieve the training outcome, and is additional to any general understanding and appreciation.

- ***Level (3) - Experience***
  To reach this standard the candidate must have performed activities leading to the achievement of the training outcome independently. He/she must therefore demonstrate the experience of the relevant techniques involved.

- ***Level (4) - Ability***
  In addition to displaying appreciation, knowledge and experience, as well as the ability to perform the activities leading to achievement of training outcome without supervision, the candidate will be expected to have the competence to supervise others. This must be demonstrated.

Table 2.1: Competence Levels for the Various Training Objectives

S/N	Training Outcome	Competence Level
1.	Knowledge of the responsibility of engineers to society and to the organizations in which they work, vis-à-vis ethics and professional conduct	2
2.	Knowledge of the history, purpose and organisation of engineering institutions in Tanzania, namely ERB, IET, ACET, CRB, etc	2
3.	Development and maintainance of an interest in the affairs of ERB, IET and other statutory bodies concerned with engineering in Tanzania	3
4.	Acquisition of a general knowledge of overall engineering procedures in ones discipline	2
5.	Keeping up to-date with current technological and business developments in engineering, particularly in ones area of discipline	1
6.	Development of interest in current affairs both nationally and internationally	1
7.	Development of the ability to communicate accurately, concisely and with confidence	4
8.	Knowledge of ones responsibilities with respect to health and safety of oneself and others by being familiar with current legislation and regulations	2
9.	Understanding the structure of the organization in which the trainee is working	2
10.	Acquisition of experience in identifying and defining a problem accurately	3
11.	Acquisition of professional experience in the determination and evaluation of alternative solutions to problems	3
12.	Understanding of the application and limitations of national and international standards, Codes of Practice, Technical Memoranda, specifications, etc.,	2
13.	Development of the ability to identify problem analyse and produce the solutions to problems	4
14.	Development of the ability to properly present solutions to problems	4
15.	Knowledge and appreciate of the impact of engineering solutions to the environment and vice versa	2
16.	Understanding of the significance of technical specifications as an essential part of the solution of a problem	2
17.	Acquisition of the experience of costing the solutions to problems and building up competitive cost estimates	3
18.	Development of the ability to implement health and safety procedures in problem solving	4

S/N	Training Outcome	Competence Level
19.	Knowledge about how all parties to a contract exercise their duties and responsibilities, by appreciating the practical application of the various documents forming a particular contract	2
20.	Knowledge of the procedure for the issue and/or receipt, registration and preparation of work instructions and/or drawings and amendments	2
21.	Development of the ability to keep accurate daily records of events and instructions	4
22.	Development of the ability to coordinate drawings and/or implement work instructions by being involved on a day-to-day basis in this process	4
23.	Ability to participate in quality management of the work one is implementing	4
24.	Knowledge of the specifications, performance, application, and cost of engineering systems, equipment and/or plant used in implementing a solution	2
25.	Development of ability to plan, programme and monitor implementation of engineering works or processes, and report progress	4
26.	Development of ability to measure and record and independently assess work done, for payment purposes	4

2.4 Competence Descriptors

2.4.1 Baseline Competences expected of Engineering Graduates

Typical baseline competencies expected from Graduate Engineers and Graduate Technician Engineers as enabled by the standard subjects/course modules covered in learning programmes are as shown in Table 2.2.

2.4.2 Baseline Competences expected of Professional Engineers, Technician Engineers and Engineering Technicians

Professional Engineers and Technician Engineers posses all the competencies indicated in **Table 2.2** below for Graduate Engineers and Graduate Technician Engineers respectively, plus additional professional work experience obtained in the workplace. Hence, the baseline competence descriptors for Professional Engineers and Technician Engineers are expansions of those indicated in Table 2 but not referred to subjects or courses taken rather to workplace attributes. These are indicated in **Table 2.3** hereunder.

Table 2.2: Baseline Competences Expected of Engineering Graduates

Enabling Subject Group	Baseline Competence Descriptors	
	Graduate Engineer	**Graduate Technician Engineer**
Mathematics	***Ability to:*** – Perform formal analysis and modeling of engineering components, systems and processes – Communicate concepts, ideas & and theories using mathematics – Reason about and conceptualise engineering components, systems or processes using mathematical concepts; – Deal with uncertainty and risk using probability and statistics	***Ability to:*** – Use mathematics to solve technical problems and simple modeling – Support reasoning in technical subjects – Evaluate results of calculations – Perform statistical analyses
Basic Sciences	***Ability to:*** Perform formal analysis, modelling of and reasoning about engineering components, systems or processes using principles and knowledge of the basic sciences	***Ability to:*** Focus on the needs of specialised technology area and support reasoning about engineering phenomena
Engineering Sciences	***Ability to use techniques, principles and laws of engineering science to:*** – Identify and solve open-ended engineering problems; – Create engineering knowledge and its applications; – Work across engineering disciplinary boundaries	***Ability to use techniques, principles and laws of engineering science to:*** – Focus on specialist know-how in specialist field, – Relate knowledge and its application in related areas. – Interact with other specialists and generalists.
Design and Synthesis	***Ability to:*** – Perform creative, non-procedural design – Synthesize of components, systems, works, products or processes to meet various needs	***Ability to:*** – Apply known engineering principles to innovate and perform non-procedural design – Apply fundamental principals and critical procedures in design
Computing and information technology	***Ability to:*** – Use computer software to enhance personal /team productivity – Assess, use and validate results produced by packages, – Develop software for engineering applications	***Ability to:*** – Use computer software to enhance personal/team productivity – Assess outputs of programmes, – Develop software for engineering applications
Complementary Studies	***Ability to:*** – Communicate effectively – Apply planning and management techniques into engineering activity – Bring techniques and considerations from other cognate disciplines into engineering activity	***Ability to:*** – Communicate effectively – Apply planning and management techniques into engineering activity

Table 2.3: Baseline Competences Expected of the Various Engineering Cadres

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
A: General	Professional Engineers are characterized by their *ability to develop appropriate solutions to engineering problems*, using new or existing technologies, through innovation, creativity and change. They *promote advanced designs and design methods, introduce new and/or more efficient production/construction techniques, as well as marketing concepts*, and might develop and apply new technologies, pioneer new engineering services and management methods. Professional Engineers are variously engaged in *technical and commercial leadership* and possess competencies that involve application of knowledge and skills in a wide and unpredictable variety of contexts with *substantial personal responsibility*, and *responsibility for the work of others* including allocation of resources, policy, planning, execution and evaluation	Technician Engineers are characterized by their *ability to act as exponents of technology* through creativity and change. They *maintain and manage applications of current and developing technologies*, and may undertake engineering design, development, manufacture, construction and operation of technologies. Technician Engineers are variously engaged in *technical and commercial management* and possess competencies that involve application of knowledge and skills in a broad range of complex technical activities, a *high degree of personal responsibility* and *some responsibility for work of others*	Engineering Technicians are characterized by their *ability to apply proven techniques and procedures* to the solution of practical engineering problems. They carry out technical responsibility, exercising aptitudes and skills *within defined fields of technology*, and may contribute to the design, development, manufacture, construction, commissioning, operation or maintenance of products, equipment, processes or services. Engineering Technicians are engaged in *safe systems of work*, whose main tasks require skills and knowledge to assume *operational responsibilities and mainly self*.

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
B: Knowledge and Understanding	Professional Engineers will be able to use a combination of general and specialist engineering knowledge and understanding to *optimize the application of existing and emerging technologies.* They will be able to maintain and extend a sound theoretical approach in *enabling the introduction and exploitation of new and advancing technology* and other relevant developments and *engage in the creative and innovative development of engineering technology and continuous improvement of systems*. In that context, Professional Engineers shall demonstrate and/or work with: • A broad knowledge base with *substantial depth in key subject areas* and a *critical understanding of* principal *theories, concepts* and terminologies. • *Analytical interpretation* of a *wide range of data*. • *Synthesis and evaluation of information* pertaining to problems and data in the subject area and general practice. • Capability to *broaden and deepen own knowledge* base through *research* and experimentation.	Technician Engineers will be able to use a combination of general and specialist engineering knowledge and understanding to *apply existing and emerging technologies.* They will be able to maintain and extend a sound theoretical approach in the *application of technology in engineering practice*, as well as *use sound evidence-based approach to problem solving* and *contribute* to continuous improvement of systems. In that context Technician Engineers shall demonstrate and/or work with: • A broad range of knowledge base incorporating *some core theories*, *principles and concepts*. • A range of *standard applications* to *process and interpret data* for use in both familiar and new contexts. • *Informed judgment* • A range of innovative responses to *concrete* but *often unfamiliar problems*. • An *outline knowledge and understanding of research* and equivalent scholarly /academic processes.	Engineering Technicians will be able to determine operational problems and suggest tentative solutions. They will have awareness of the evolving or changing nature of knowledge and understanding, including demonstrating ability to react to such changes. Engineering Technicians will be able to demonstrate and/or work with: • *Basic theoretical and operational knowledge* • *Readily available information* and be able to interpret the same. • *Discretion and judgment.* • A broader range of *known responses to familiar and non-familiar problems*. • *Little generation of new ideas.*

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
C: Practical Skills	Professional Engineers will be able to apply appropriate theoretical and practical methods to the *analyses and solutions of engineering problems.* They will be able to *define, investigate, analyze, design and develop* solutions to *complex engineering problems* in accordance with good engineering practice. This may include identification of potential projects and opportunities, *conducting appropriate research, undertaking design and development of engineering solutions*, implementing design solutions, and *evaluating their effectiveness.* Professional Engineers will carry out processes that: • Require a wide range of technical or *scholastic* skills. • Involve a *wide choice* of standard and non-standard procedures. • Are routine and non-routine. • *Require routine principles of enquiry and/ or research.* • Exercise *sound* professional engineering judgment. • Practice appropriate methods and procedures in response to a range of concrete problems with *some theoretical basis* in line with the local jurisdictions.	Technician Engineers will be able to apply appropriate theoretical and practical methods to the *solutions of engineering problems.* They will be able to *define, investigate, and analyze engineering problems* in accordance with good engineering practice. This may include identification, reviewing and selecting techniques, procedures and methods to undertake engineering tasks, *contributing to the design and development* of engineering solutions, and implementing design solutions and *contributing to their evaluation*. Technician Engineers will be able to carry out processes that: • Require a wide range of technical skills. • Offer a *considerable choice* of standard and non-standard procedures. • Are routine and non-routine. • Exercise professional engineering judgment. • Practice appropriate methods and procedures in response to a range of concrete problems in line with the local jurisdictions.	Engineering Technicians will be able to apply appropriate practical methods to the *solutions of engineering problems that are moderate in range, established, familiar or less familiar and which offer a clear choice of routine responses* and sometimes go beyond routine functions. Engineering Technicians will be able to carry out processes that: • Require a *range of well-developed skills.* • Offer a *significant choice of standard procedures* • Are *mainly routine* in nature. • Practice appropriate methods and procedures in response to *concrete problems* in line with the local jurisdictions.

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
D: Leadership/ Supervisory Skills	A Professional Engineer will be able to manage oneself and others in performing simple operational, as well as *predictable and unpredictable complex tasks*. **In doing so, he/she will be able to provide technical and commercial *leadership,* including:** • Working with others in *self-directed and sometimes directed activities*. • Planning for effective project implementation. • *Planning, budgeting, organizing, directing and controlling* tasks, people and resources. • *Leading* teams and developing staff to meet changing technical and managerial needs. This involves working with *full responsibility* for the nature, quantity and quality of group outcomes • *Bringing about* continuous improvement through quality management.	A Technician Engineer will be able to manage oneself and others in performing simple operational as well as *predictable complex tasks*. **In doing so, he/she will be able to provide technical and commercial *management* including:** • Working with others in *self-directed activities.*. • Planning for effective project implementation. • *Managing plans, budgets and organization* of tasks, people and resources. • *Managing* teams and developing staff to meet changing technical and managerial needs. This involves working with *complete responsibility* for the nature, quantity and quality of group outcomes • *Managing* continuous quality improvement	An Engineering Technician will be able to manage self and others in performing simple operational tasks and *sometimes predictable complex tasks*. **In doing so, he/she will be able to work:** • In a team in *directed activity*. • Under *general supervision and quality checking*. • With *some reasonable responsibility* for the quantity and quality of own output. • *Managing limited resources* within well-defined areas of work. • With *possible responsibility* for the output of others within *well-defined areas of work*.

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
E: Communication Skills	Professional Engineers will be able to demonstrate effective interpersonal skills. This will be evident with the ability to: • Effectively communicate information, ideas, problems and solutions to both specialist and non-specialists audiences possessing language proficiency, ability to chair and record meetings and discussions, draft letters, documents and reports, exchange information and provide advice to various colleagues. • Communicate with professional level peers and senior colleagues, including presentation and discussion of proposals, leading and sustaining debates with audiences and feeding the results back to improve proposals. • Use a *wide range of techniques* to initiate and undertake critical analysis of data, and to propose solutions to problems arising from analyses. • Use a *wide range of Information and Communication Technology (ICT)* applications to support and enhance professional work. • *Interpret,* use and evaluate *a wide range of numerical and graphical data* to *set* and achieve goals/ targets.	Technician Engineers will be able to demonstrate effective interpersonal skills. This will be evident with the ability to: • Effectively communicate information, ideas, problems and solutions to both specialist and non-specialist audiences possessing language proficiency and ability to chair and record meetings and discussions, draft letters, documents and reports, exchange information and provide advice to various colleagues. • Communicate with professional level peers and senior colleagues, including presentation and discussion of proposals, leading and sustaining debates with audiences and feeding the results back to improve proposals. • Use *established techniques* to undertake critical analysis of data, and to propose solutions to problems arising from analyses. • Use *standard ICT* applications to support and enhance professional work. • Use and evaluate numerical and graphical data to *measure* progress and achieve goals/ targets	Engineering Technicians will be able to demonstrate *reasonable interpersonal skills*. This will be evident with the ability to: • *Produce and respond to simple written and oral communication* in familiar, routine and sometimes non-routine contexts • Select and use *basic ICT* applications to obtain and process information. • *Use* a range of numerical and graphical analysis skills to *achieve set goals/ targets*.

Competence Category	Baseline Competence Descriptors		
	Professional Engineer	**Technician Engineer**	**Engineering Technician**
F: Wider Abilities	Typically Professional Engineers will be able to work: • Alone or with others in *self-directed and sometimes directed activities*. • Within *broad general guidelines or functions*. • Exercising *autonomy and initiative* in carrying out *engineering activities* at a professional level. • Delegating functions to technicians and *peers*. • Demonstrating a personal commitment to professional standards, recognizing obligations to society, the profession and the environment. This may be achieved by complying with the ERB Code of Ethics and Professional Conduct, as well as managing and applying safe systems of work. • Undertaking engineering activities in a way that contribute to poverty reduction and sustainable national development. • Carrying out Continuing Professional Development (CPD) necessary to maintain and enhance competence in own area of practice	Typically Technician Engineers will be able to work: • Alone or with others in *self-directed activities*. • Under *broad guidance and evaluation*. • Exercising *some initiative and independence* in carrying out *defined engineering activities* at a professional level. • Delegating functions to technicians. • Demonstrating a personal commitment to professional standards, recognizing obligations to society, the profession and the environment. This may be achieved by complying with the ERB Code of Ethics and Professional Conduct, as well as managing and applying safe systems of work. • Undertaking engineering activities in a way that contribute to poverty reduction and sustainable national development. • Carrying out Continuing Professional Development (CPD) necessary to maintain and enhance competence in own area of practice	Typically Engineering Technicians will be able to work: • Alone or with others in *directed activities*. • Under *general supervision and quality control*. • Exercising *some independence* in carrying out *well-defined engineering activities*. • Delegating functions to *artisans*. • *Applying safe systems of work*.

3.0 SEAP REQUIREMENTS, GUIDELINES AND STRUCTURE

3.1 General

A professional development programme should be designed to provide the individuals with skills, not only for the immediate and specific employment, but also to equip them for lifelong professional development. However, the initial professional development, such as the Structured Engineers Apprenticeship Programme (SEAP), can be completed only in the context of an immediate specific employment.

Professional Training is intended to provide a smooth transition between academic training and professional practice. It gives the trainee the opportunity to tackle engineering problems from first principles with confidence in the shortest time during his/her career. Graduate engineers who do not get supervised training upon graduation take very long to become professional engineers. This is because they are cautious of making decisions for fear of making mistakes. As a result they cannot be trusted with any major responsibility in an engineering enterprise.

The SEAP will provide an opportunity for the graduate engineer to merge theory and practice. It offers training in a "real life" situation, which is different from that simulated during the degree course. In this way the trainee learns about the problems one may encounter in one's future career as an engineer. Thus, the goals of SEAP can be summarized as being to impart skills; to sharpen knowledge; to develop abilities; and to foster attitudes.

Upon completion of SEAP the graduate engineers must have reached a stage where their employment requires them to demonstrate and be accountable for their technical competence. Their work requires the exercise of independent technical judgment and direct responsibility for human and material resources while taking into account financial, commercial and regulatory aspects. The competence must range across several aspects of design, development, research, construction, manufacture, operation and maintenance of products, systems or services.

Although the graduate engineer is not expected to cover the entire range of training needs in the specified period of the SEAP, a balance must be struck between technical, business and regulatory responsibilities which are required for a specific employment or job description and authorization to practice as a professional engineer. The graduate engineer must be briefed and given guidelines in respect of the SEAP. He/she will be introduced to the mentor (Professional Training Supervisor) and informed of the procedure used to evaluate the acquired experience.

The SEAP period is an inter-phase between a predominantly academic environment to that of an occupational sector and employment. The induction must therefore embraces culture of the work place, the company, and relevant industrial sector regulations including health, safety and environmental issues and the direct supervisor at the work place. The programme must also include understanding of the ethical constraints applied to professional engineering, the community and to professional peers.

The Professional Training Guidelines (PTG) requirements recommended in this document are structured such that they enable the trainee to acquire all the basic skills for managing an engineering enterprise or project with confidence and with least supervision. It is mandatory that trainees demonstrate full understanding of the key elements of engineering practice as detailed herein. For effective learning or mentoring, trainees will be expected to keep close contact with their supervisors for the periods specified.

3.2 Employers Specific Training

The employer specific training extends from the general training to training that cater for the special needs of the employer and the industry of which it is part. It enables the trainees to make an effective contribution to the organisation while they are getting the opportunity to enhance their general capability through the training experience gained from their mentor or professional training supervisor. The employer specific training covers the following general aspects or combinations thereof: design, procurement, contracting, engineering systems, management, marketing and finance. The employer specific training may also cover

respective combinations of manufacturing, mining, industrial process and control, operations and maintenance, research and development, etc.

(i) Design

Professional training in Design should be implemented in a manner that will enable the trainee to gain sufficient knowledge and skills/expertise in the following:

a) **Communication Skills:** Ability to communicate accurately, concisely and with confidence whether verbally, in writing or by use of drawings, sketches or information technology (IT) based methods, and in a manner which is appropriate to the organization to which one is attached and the industry at large.

b) **CAD:** Application of computer aided design and drafting softwares and application of the output parameters to the practical solution of engineering problems.

c) **Standards and Codes of Practice:** Proper application of national and international standards, codes of practice, regulations, specifications, technical memoranda, etc and knowing the limitations to their application in engineering practice.

d) **Project Appraisals:** Project identification, planning, financing and appraisals.

e) **Specifications and Drawings:** Development of design philosophy and concepts, data, assumptions, specifications (for materials, plant, equipment and systems, etc.), preparation of working drawings including conventional and IT based, calculations and bills of quantities.

f) **Design and the Environment:** Analysis of the impact of the design and particular design elements on the environment and vice versa.

g) **Tender Documentation:** Preparation and compilation of tender documents including specifications, bills of quantities, drawings, drawing details, diagrams and brochures.

h) **Cost Estimation:** Preparation of cost estimates by application of competitive pricing.

(ii) Procurement

Professional training in Procurement should enable the trainee gain sufficient knowledge and skills/expertise in the following:

a) **Consultants Procurement Procedures:** Knowledge and application of procurement procedures for consultancy services and methods of charging for the consultancy services, including negotiations.

b) **Consultancy Contracts:** Knowledge of types and preparation of Contracts for the consultancy services between the client/employer and consultant, and between the client/employer and the contractor.

c) **Tender Procedures:** Identification and application of national and international tendering procedures and practices.

d) **Evaluation of Tenders:** Evaluation of tenders, preparation and presentation of tender evaluation reports.

e) **Contract Documents:** Preparation of contract documents for execution of respective projects.

(iii) Contracting and Engineering Systems

Professional training in Contracting and Engineering Systems should enable the trainee gain sufficient knowledge and skills/expertise in the following:

a) **Communication Skills:** Ability to understand correctly, unambiguously with clarity whether by listening, reading or interpretation of drawings, sketches or data from IT based methods, and in the manner which is appropriate to the organization to which one is attached and industry at large.

b) **Translation of Designs:** Translate designs made using conventional or computer aided methods, into physical solutions of respective problems whilst exercising technical judgment and some direct responsibility for human and material resources, taking account of financial, business, safety, statutory and national consideration.

c) **Planning and Tendering:** Planning of materials, plant, equipment, system, labour and financial requirements.

d) **Procurement:** Procurement of materials, plant/equipment, systems and labour.

e) **Verification of Compliance with Specifications, Quality Control:** Verification of materials, plant, equipment and system for compliance with standards (quality control), specifications for quality and according to design.

f) **Evaluation and Payments:** Processing valuation of works according to claims, preparing payment certificates and financial appraisals.

g) **Testing and Commissioning:** Supervision, testing and commissioning of erection works.

h) **Completion and Final Account:** Issuing of completion certificates and preparation of final account.

(iv) Management

Professional training in Management should enable the trainee gain sufficient knowledge and skills/expertise in the following:

a) General Management
- Office management and administrative procedures;
- Human resources management;
- Time management; and
- Conduct and management of meetings.

b) Contract Management
- Types of contracts;
- Administrative procedures; and
- Roles and responsibilities/rights in contracts.

c) Resources Management
- Equipment/plant acquisition, utilization and maintenance;
- Financial planning and control;
- Materials management;
- Labour management and relevant legal issues; and
- Energy management.

d) Occupational Health, Safety and Environment
- Legal framework; and

- Practice – procedures and tools.

e) Operations and Maintenance of Facilities

f) Performance Improvement/Management Philosophies and Procedures
e.g Total Quality Management (TQM)

g) Project management
- Appraisal;
- Planning;
- Financing;
- Implementation; and
- Evaluation.

(v) Marketing and Finance

Professional training in Marketing and Finance should enable the trainee gain sufficient knowledge and skills/expertise in the following:

a) **Application of Competence Records to Market Personnel:** Preparation of CVs specific to request for personnel.
b) **Legal Procedures and Arbitration:** Presentation of technical, commercial, legal and social facts at an interview, arbitration or as a witness.
c) **Appreciation of Accounting Procedures:** Interpretation of balance sheet and Income and Expenditure statements.
d) **Taxation:** Understanding of taxation systems and financial record keeping.
e) **Sales and Pricing:** Marketing of manufactured products and pricing, etc.
f) **Trade:** Mercantile, national and world trade, etc.
g) **Presentation of Company Marketing Information:** Preparation and presentation of company profiles and brochures, business cards, complimentary slips and letterheads, and information for company website.

3.3 Disciplines Specific Training

3.3.1 Aeronautical Engineers

Aeronautical engineering is a field of engineering that deals with machines that operate in space and therefore requires a high degree of precision of and reliability. This situation demands that the engineer should attain high qualifications and professional experience before one can be trusted to undertake independent work.

Professional aeronautical engineers require an in-depth knowledge and understanding of the principles, designs, construction, operation and maintenance of aeronautical machinery and its auxiliary equipment and control systems. The professional engineers must have analytical capabilities, ability to identify and find solutions, management capabilities, communication skills and adherence to professional principles.

The main thrust of the professional training of Aeronautical Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field.

(a) Design

Professional training in Design with respect to Aeronautical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i. Understanding and interpretation of engineering drawings and technical information including maintenance manuals, parts catalogues, overhaul manuals, services bulletins and modification data and maintenance schedules
ii. Aircraft structures
iii. Sub-structures (e.g. folded metal, sheet metals extrusions, tubing, holes, fasteners, honey combs, panels and consoles, drains and drain masks, equipment racks and storages intakes, etc.
iv. Material and Parts: Common parts, gases and compounds, metals, non metals (reinforced plastics, epoxy composites wood, fabrics, and furnishings
v. Aircraft engines (reciprocating engines and turbine)
vi. Principles, Terminology, Definitions and laws
vii. Construction arrangements.

(b) Field Practice

Professional training in Field Practice with respect to Aeronautical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

Hangar/Workshop common practices and tools covering:
i. Lubrication methods and application
ii. Hand tools and simple machine tools
iii. Precision measuring instruments
iv. Torque loading
v. Soldering, brazing and welding including assessment of in service conditions
vi. Corrosion identification
vii. Painting and paint stripping
viii. Fire protection and safety
ix. Storage and handling
x. Non-destructive condition testing

Aircraft Systems:
i. Flight controls
ii. Hydraulic
iii. Landing Gear
iv. Pneumatic
v. Ice and Rain protection
vi. Environmental and passenger systems (Air conditioning, pressurisation, oxygen, toilets, waste and water, Galley service, Baggage, Entertainment and Passenger services)
vii. Electrical
viii. Instruments and Equipment

Engine Systems:
i. Carburation/induction, ignition and starting
ii. Fire protection and indication
iii. Lubrication
iv. Supercharging/turbocharging
v. Aircraft, fuel, fuel controls and systems
vi. Water injection
vii. Engine control
viii. Engine instruments

ix. Propellers and shaft power provisioning
x. Thrust reversing
xi. Auxiliary or Air Power Unit (APU)
xii. Cooling sealing and bleed Air services
xiii. Surge protection and airflow control
xiv. Ice and fire protection
xv. Pods, pylons, cowlings and mountings
xvi. Ground handling

Flying Controls

i. General construction arrangements
ii. Transmission systems
iii. Equipment and instruments
iv. Ice and rain protection
v. Heating and ventilation

Aeronautical Telecommunications

i. Compass compensation
ii. Radio and audio systems
iii. Radar systems category 'R'
iv. Instrument category 'X'
v. Basic gyroscopes and servomechanisms
vi. Automatic pilots (Auto pilots)

(c) Management

Professional training in Management with respect to Aeronautical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i. General management, certification and Licensing Laws:
ii. Regulations
iii. Maintenance engineers licenses and type rating requirements
iv. Log books and technical logs
v. Aircraft documentation and requirement
vi. Approvals
vii. Defect and damage identification, analysis and rectification
viii. Joint Aviation Authority requirements
ix. Labour management and staff relations
x. Selection of production process
xi. Materials supply, storage and handling
xii. Programming and estimation
xiii. Budgeting and revenue
xiv. Maintenance analysis and resultant feedback for rectification improved aircraft production and/or increased enterprise productivity
xv. Environmental impact issues (oils and waste disposal, exhaust)
xvi. Communication Skills

3.3.2 Agricultural Engineers

The main thrust of the professional training of Agricultural Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in the Agricultural engineering discipline shall complete training in the types of works specified for a minimum period specified herein. Technological and engineering inputs are very important in agricultural production systems. In commercial farming for instance, engineering systems such as irrigation, machinery, farm structures and post-harvest systems may constitute more than 90% of the capital investment. Therefore, the design and effective management of engineering systems is central to the profitability and sustainability of commercial farming.

Both the industrial development and the agricultural policies of Tanzania, and the follow-up strategies, emphasise the development of agro-processing industries as a basis for national development. This is also in-line with the fact that most industries in Tanzania are agro-based. Thus, a well prepared program is required to equip the professional agricultural engineer with the technical know-how, competence and the get-up-and-go attitude needed to address the great challenges ahead. These challenges include:

i. ensuring adequate and safe food supply for the expanding and increasingly urbanising populations;
ii. managing and protecting water and land resources;
iii. exploiting existing energy resources and supplying adequate power for farming and livelihood in the rural areas; and
iv. minimising losses and adding value to meet higher quality local and global market demands.

SEAP for graduate agricultural engineers entails the following:

i. Preparing the graduate agricultural engineer to spearhead the move to modernize agriculture;
ii. Providing the trainee with the necessary technical, analytical and managerial skills which will enable the trainee to analyse and assess engineering systems for effective application to agriculture;
iii. Enhancing the trainee's professionalism to fill responsible professional positions that demand both engineering and agricultural related skills.

More specifically, the training will seek to do the following:

i. Impart knowledge and skills in design, construction, operation, management and maintenance of water supply systems including rain water harvesting for agricultural production;
ii. Training on techniques and skills for land use planning and conservation;
iii. Impart knowledge and skills required to fill in gaps encountered in agricultural based industries;
iv. Impart knowledge and skills to design and construct simple renewable energy sources for agricultural production as well as for domestic purposes;
v. Understand engineering principles for planning, design and management of agricultural mechanization programmes;
vi. Induce competence in the technology and art of handling, processing and storage of agricultural products with the objective of minimizing losses and adding value to satisfy market demands;
vii. Develop entrepreneurial skills required for creating and operating small and medium scale engineering enterprises.

To obtain such knowledge base and skills, the training program will require working in a combination from the following areas:

i. Large-scale irrigation farms;
ii. Small and medium scale farmer managed irrigation projects;
iii. Food processing industries;
iv. Design and manufacturing firms dealing with agricultural machines and implements;
v. Small and Medium Scale industries producing energy saving systems suitable for agricultural and rural household use;

vi. Firms using controlled environment production systems;
vii. Engineering sales and advisory firms;
viii. Consulting firms;
ix. Land use management and environmental protection organizations;
x. NGOs promoting use of low cost agricultural engineering based technologies;
xi. Research and training institutions.

(a) General Workshop Practice

Every trainee shall work under the supervision of a registered professional Agricultural Engineer for a minimum period of 9 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in General Workshop Practice with respect to Agricultural Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

1) Workshop

i Machine shop;
ii Metal work;
iii Welding;
iv Casting and forging;
v Finishing work – panel beating, painting, etc.;
vi Heat treatment;
vii Carpentry;
viii Masonry.

2) Garage Works

i Overhaul and repair of agricultural, plant, transport and construction machinery and equipment;
ii Implementation of planned maintenance schedules for agricultural, plant, transport and construction machinery and equipment.

3) Stores

i General stores operations;
ii Maintenance of optimal stock levels of workshop materials.

4) Workshop Management

i General administration.
ii Maintenance of logbooks and machinery repair and maintenance records;
iii Planning and specification of schedules for costs of materials and labour requirement;
iv Development and implementation of fault diagnosis and inspection of machines and equipment for repair and maintenance.

(b) Farmstead and Field Operations

Every trainee shall work under the supervision of a registered professional Agricultural Engineer for a minimum period of 12 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in Farmstead and Field Operations with respect to Agricultural Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

1. Farm Machinery and Mechanization

i Scheduling and implementation of agricultural field operations including cultivation, planting, fertilizer application, crop protection against weeds, pests and diseases, harvesting and transportation;
ii Implementation of mechanization operations for animal production including feed production, feeding, protection against disease and harvesting (slaughter, milking, etc.);
iii Development and optimal use of farm power including use of animal traction, selection of tractor power and matching of implements to the power sources, renewable energy sources, etc.

2. Development of Land and Water Resources

i Evaluation of land and water resources;
ii Land capability classification, and land use planning
iii Remote sensing and GIS;
iv Planning and implementation of irrigation, drainage and soil conservation for agricultural use;
v Operation, maintenance and management of irrigation and soil conservation schemes;
vi Development and operation of smallholder irrigation and water use schemes;
vii Rain water harvesting technologies;
viii Use of controlled environment engineering e.g. for floriculture and green house production systems.

3. Post Harvest and Agricultural Processing

i Agro processing at rural and industrial level e.g. milling, oil extraction, sugar production, milking machines and dairy processing equipments;
ii Drying of agricultural products and application of other preservation techniques – dehydration, refrigeration, sealed-bin storage and chemical treatment;
iii Technical needs of small and medium scale agro processing and agro food industry;
iv Quality assessment and assurance – cleaning, sorting, grading and packaging.

4. Farm Structures and Services

i Rural electrification,
ii Biomass engineering,
iii Construction of market centers,
iv Construction of abattoirs,
v Rural road construction.

5. General Management

General management as applicable to workshop practice and field operations and safety.

(c) Design

Every trainee shall work under the supervision of a registered professional Agricultural engineer for a minimum period of 9 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in Design with respect to Agricultural Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

1. Farm Machinery and Mechanization

i Selection, design, evaluation, development and manufacture of farm machinery, equipment and power sources for agricultural mechanization operations;
ii Selection, design and development of agricultural machines with ergonomic consideration for human comfort and safety;
iii Design of maintenance and workshop support facilities for field machinery.

2. Soil and Water Engineering

i Planning, design and construction of an irrigation scheme and tertiary system design;
ii Rural development for small holder irrigation schemes and water supply
iii Land drainage;
iv Design of sprinkler irrigation system.

3. Post Harvest and Agricultural Processing

i Generation of design specification for crop and animal product storage structures;
ii Selection, design and development of processing machinery and equipment for cleaning, sorting, grading and packaging of agricultural produce.

4. Farm Structures and Services

i Design and construction of buildings for processing and handling of crop and animal products;
ii Design and construction of buildings for farm animals to meet their environmental and psychological needs and to meet management needs for ease of feeding, handling and hygiene;
iii Selection, design and construction / provision of energy supplies to farm and rural communities, including animal power, electricity, biogas, wind power, solar power, water power and engine power;
iv Selection, design and provision of water supplies to farm and rural communities;
v Design and implementation of farm waste disposal schemes;
vi Design, construction and maintenance of rural roads and market centers;
vii Design and operation of controlled environments for floriculture and green house production systems.

(d) Management

Every trainee shall work under the supervision of a registered professional Agricultural engineer for a minimum period of 6 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in Mnagement with respect to Agricultural Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

1. Agricultural Machinery Garage Management

i Service and maintenance of farm equipment and machinery.

2. Farm Machinery and Mechanization

i Management of field and workshop operations with special regard to technical and financial aspects;

ii Systems analysis to identify improved sequences of operations using technical, economic and social criteria.

3. Farmstead and Factory Operations

i Farmstead planning, construction and maintenance;
ii Installation and operation of various utility systems – rain water harvesting systems, renewable energy sources and waste disposal systems;
iii Planning and scheduling of factory material handling operations.

4. Small-holder Irrigation Management

i Develop capacity of local communities to operate and manage small irrigation schemes;
ii Develop and promote low cost irrigation technologies.

5. Sales Engineering

i Conducting market research;
ii Advisory work to clients on selection of products;
iii Providing training on application and effective operation of agricultural equipment and machinery.

6. Consulting Work

i Conducting feasibility studies and environmental impact studies;
ii Planning and design of facilities and equipment for processing, packaging and marketing of agricultural products.

7. Environmental Considerations

Environmental impact assessment and rectification.

3.3.3 Chemical and Process / Biochemical Engineers

The main thrust of the professional training of Chemical and Process/Biochemical Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify and design solutions, management capabilities, communication skills, and adherence to professional ethics.
Every trainee in the Chemical & Process or Biochemical engineering discipline shall complete training in the types of works specified for a minimum period specified herein.

The specific SEAP requirements for Chemical and Process/Biochemical Engineers are as detailed in the sub-sections that follow.

(a) Process Plant Operation and Equipment Design

Every trainee shall work under the supervision of a registered professional Chemical & Process or Biochemical engineer for a minimum period of 15 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in Process Plant Operation and Equipment Design with respect to Chemical and Process/Biochemical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

(i) Process Flowsheeting and Drawing

This should involve:

a) Preparation of detailed flowsheets, P&I Diagrams and engineering drawings;
b) Interpretation and proper use of existing flowsheets and drawings;
c) Modification of process flowsheets and drawings;
d) Use of computer software for drafting and simulating a chemical process.

(ii) Quality Management

Aspects to be covered under this sub-paragraph should include:

a) Familiarization with the relevant test procedures and standards;
b) Conducting tests on raw materials, intermediates and finished products with appropriate laboratory practice;
c) Formulation, implementation and monitoring of quality control procedures;
d) Statistical analysis, design of experiments.

(iii) Process Control

a) Maintenance of process control devices;
b) Monitoring and interpretation of controlled parameters;
c) Instrumentation.

(iv) Plant /Process Equipment Design

a) Project conception;
b) Feasibility study;
c) Codes of practice and Standards;
d) Equipment selection;
e) Preparation of preliminary process plant design and process equipment specification;
f) Simple equipment design;
g) Detailed design, procurement;
h) Preparation of cost estimates;
i) Evaluation of tenders;
j) Economic considerations.

(b) Management of Process Plant and Resources

Every trainee shall work under the supervision of a registered professional Chemical & Process or Biochemical Engineer for a minimum period of 9 months or as determined by the Board in accordance with the Engineers Registration Regulations.

Professional training in Management of Process Plant and Resources with respect to Chemical and Process/Biochemical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

(i) Plant Management

Aspects to be covered under this sub-paragraph should include:-

a) Organizations of labour work schedules, stock control etc.
b) Production planning and process optimization
c) Costing and management accounting
d) Manufacture/hire/buy decisions
e) Communication skills
f) Materials management

(ii) Environmental Management

Aspects to be covered under this sub-paragraph should include:-

a) Environmental pollution prevention and control
b) Management of process plant wastes (solid, liquid gaseous)
c) Environmental impact assessment/risk auditing
d) Hazardous waste management

(ii) Human Resource Management

a) Personnel management
b) Job design
c) Employee training
d) Industrial relations

(c) Plant and Process Maintenance

Every trainee shall work under the supervision of a registered professional Chemical and Process or Biochemical engineer for a minimum period of 12 months or as determined by the Board in accordance with the Engineers Registration Regulations during which time knowledge and experience should be acquired in most of the following areas:

i) The collection and Interpretation of measured data and the preparation of mass and energy balances;
ii) Planning and scheduling of process plant activities;
iii) Troubleshooting, to identify and resolve operational problems of a technical nature;
iv) Plant maintenance and preparation of planned maintenance and schedules;
v) Preparation of daily process plant reports;
vi) Inspection and resultant maintenance;
vii) Energy management;
viii) Evaluation of plant/equipment efficiency;
ix) Process optimization.

3.3.4 Civil Engineers

The main thrust of the professional training of Civil Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics. The specific SEAP requirements for Civil Engineers are detailed in the sections that follow.

(a) Design Office Practice

Professional training in Design Office Practice with respect to Civil Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Project planning and appraisals including environmental impact assessment;
ii) Knowledge and ability to judge on application of various design standards and codes of practice;
iii) Development of design data assumptions, calculations, specifications and drawings (including structural details, where relevant, using computer aided design (CAD) methods);
iv) Estimation of quantities and costs;

v) Preparation of contract documents;
vi) Appraisal of construction defects/damages/failures and design of remedial solutions/measures for the defects/damages/failures.

(b) Construction Site Practice

Professional training in Construction Site Practice with respect to Civil Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Setting out and surveying;
ii) Processing supply, scheduling utilization and recording of Materials, Labour and Plant;
iii) Weighting and Batching;
iv) Preparation and implementation of Work Schedules (programs);
v) Production of Building/Civil works components
vi) Quality control through field/laboratory testing of materials and building/civil works components;
vii) Measuring up works, costing and preparation of accounts;
viii) Use of explosives and quarry operations;
ix) Staff and Labour relations.

(c) Maintenance

Professional training in Maintenance with respect to Civil Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Infrastructure condition evaluation using visual inspection and equipment;
ii) Design/planning of required maintenance interventions;
iii) Preparation of specifications;
iv) Processing supply, scheduling utilization and recording of materials, labour and plant;
v) Preparation and implementation of work programs;
vi) Measurement and costing of works;
vii) Quality control;
viii) Staff and labour relations.

(d) General Management

Professional training in General Management with respect to Civil Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) General office routines/administration;
ii) Organization structures and their translation in practice;
iii) Communication skills;
iv) Staff regulations and Labour Laws;
v) Materials/equipment procurement, management, storage and handling;
vi) Safety and health practices at site;
vii) Production planning and control of resources (labour, equipment, material, funds);
viii) Tendering procedures including tender preparation and tender evaluation;
ix) Various types of contracts and the applicable conditions of contract;
x) Contract administration;
xi) Supervision of works;
xii) Quality management.

3.3.5 Computer and Information Technology Engineers

The main thrust of the professional training of Computer and Information Technology Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every SEAP trainee in Computer Engineering and Information Technology shall complete training in the types of works specified for a minimum period specified herein. Computer engineering spans a broad range off activities, from the design and modeling of devices used in the construction of computer systems to the configuration of large systems and networks of computers, including both hardware and software.

The specific SEAP requirements for Computer and Information Technology Engineers are as detailed in the sub-sections that follow.

(a) Design Office Practice

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 12 months or as determined by the Board.

Professional training in Design Office Practice with respect to Computer Engineering and Information Technology should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Application of relevant international and local standards, codes of practice and regulations;
   (a) Digital signal measurement,
   (b) Analogue signal processing,
   (c) Counter value measurement,
   (d) Pre-processing on-the-spot,
   (e) Control/regulation.

ii) Application of Computer Aided Design (CAD) Programmes;
iii) Project planning and appraisals;
iv) Cost estimates;
v) Development of design philosophy, requirements, assumptions and specifications;
vi) Design calculations, drawings and bills of quantities;
vii) Tendering procedures including tender preparation and tender evaluation;
viii) International tendering procedures and practices;
ix) Analysis of impact on the environment and other systems of design in applications.

(b) Erection/Installation Site Work

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 12 months or as determined by the Board.

Professional training in Erection/Installation Site Work with respect to Computer Engineering and Information Technology should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Drafting of working programmes;
ii) Planning of plant/equipment/system, labour and financial requirements;
iii) Interpretation of drawings, marking and setting of erection works;
iv) Processing and reporting on erection works;
v) Processing of financial appraisals/claims/payment certificates, and
vi) Supervision, testing and commissioning of works.

(c) Maintenance

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 6 months or as determined by the Board.

Professional training in Maintenace with respect to Computer Engineering and Information Technology should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Routine condition monitoring of plant/equipment/system and rectification where parameters are beyond the required values;
ii) Preparation of planned maintenance schedules for plant/equipment/system;
iii) Fault diagnosis and servicing/overhauling techniques for plant/equipment/system; and
iv) Plan, design and specify materials required for corrective and preventive maintenance of plant/equipment/system, including preparation of schedules for costs of materials and labour requirement.

(d) General Management

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 6 months or as determined by the Board.

Professional training in General Management with respect to Computer Engineering and Information Technology should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Office management including knowledge of organization structures and their translation in practice;
ii) Communication skills;
iii) Labour management including staff regulations, labour laws and Industrial laws;
iv) Materials management including specifications, procurement, storage and handling;
v) Knowledge of Safety regulations and first aid procedures;
vi) Planning and control of resources i.e. human, material and finance;
vii) Contracts management;
viii) Quality management;
ix) Project management.

3.3.6 Environmental Engineers

The main thrust of the professional training of Environmental Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in the environmental engineering discipline shall complete training in the types of works specified for a minimum period specified herein.

(a) General Training

The general SEAP requirements for Graduate Environmental Engineers are as summarized below:

(i) Construction materials and technology for environmental engineering construction works;
(ii) Building services and sanitation services;

(iii) Use of analytical instruments in water quality analysis (e.g. Gas Chromatography, Atomic Absorption Spectrophotometer, High Performance Liquid Chromatography), Use of the standard methods in water quality analysis (BOD analysis kit, TKN analysis kit);
(iv) Environmental auditing;
(v) Planning of quality monitoring programmes.

(b) Specialized Training

The Specialised Professional Training with respect to Environmental Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Design and construction of environmental management works (water pollution, solid waste, air pollution works);
ii) Design of urban waste management systems;
iii) Environmental Impact Assessments for various projects such as road works, water works, mining, industrial development, land reclamation, waste management etc.;
iv) Pollution studies in the project area (air, land and water pollution);
v) Operation and maintenance of environmental management works;
vi) Waste minimization works;
vii) Application of environmental management systems;
viii) Diseases and public health studies;
ix) Development of environmental mitigation measures;
x) Development of environmental management and plans;
xi) Water pollution prevention and control;
xii) Air pollution prevention and control;
xiii) Solid waste management;
xiv) Hazardous waste management;
xv) Risks analysis and risk management;
xvi) Disaster management.

(c) General Management

Professional training in General Management with respect to Environmental Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) General office routines/administration;
ii) Organisational structures and their relation to project execution;
iii) Staff regulations and labour laws;
iv) Environmental laws and legislation;
v) Environmental policies (national and as well as sectoral policies);
vi) International treaties on environmental management;
vii) Safety practice during field work and at project sites;
viii) Work planning and control of resources (labour, equipment, materials and funds);
ix) Tendering procedures including tender preparation and tender evaluation;
x) Knowledge of various types of contracts and conditions of contract;
xi) Contract administration;
xii) Communication skills.

3.3.7 Electrical Engineers

The main thrust of the professional training of Electrical Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in the electrical engineering discipline shall complete training in the types of works specified for a minimum period specified herein:

(a) Design Office Practice

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 12 months or as determined by the Board.

Professional training in Design Office Practice with respect to Electrical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Application of relevant international and local standards, codes of practice and regulations;
ii) Application of Computer Aided Design (CAD) Programmes;
iii) Project planning and appraisals;
iv) Cost estimates;
v) Development of design philosophy, requirements, assumptions and specifications;
vi) Design calculations, drawings and bills of quantities;
vii) Tendering procedures including tender preparation and tender evaluation;
viii) International tendering procedures and practices;
ix) Analysis of impact on the environment and other systems of design in applications.

(b) Erection/Installation Site Work

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 12 months or as determined by the Board.

Professional training in Erection/Installation Site Work with respect to Electrical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Drafting of working programmes;
ii) Planning of plant/equipment/system, labour and financial requirements;
iii) Interpretation of drawings, marking and setting of erection works;
iv) Processing and reporting on erection works;
v) Processing of financial appraisals/claims/payment certificates, and
vi) Supervision, testing and commissioning of works.

(c) Maintenance

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 6 months or as determined by the Board.

Professional training in Maintenance with respect to Electrical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Routine condition monitoring of plant/equipment/system and rectification where parameters are beyond the required values;
ii) Preparation of planned maintenance schedules for plant/equipment/system;
iii) Fault diagnosis and servicing/overhauling techniques for plant/equipment/system; and
iv) Plan, design and specify materials required for corrective and preventive maintenance of plant/equipment/system, including preparation of schedules for costs of materials and labour requirement.

(d) General Management

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 6 months or as determined by the Board.

Professional training in General Management with respect to Electrical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Office management including knowledge of organization structures and their translation in practice;
ii) Communication skills;
iii) Labour management including staff regulations, labour laws and Industrial laws;
iv) Materials management including specifications, procurement, storage and handling;
v) Knowledge of Safety regulations and first aid procedures;
vi) Planning and control of resources i.e. human, material and finance;
vii) Contracts management;
viii) Quality management and
ix) Energy management.

3.3.8 Marine Engineers

The main thrust of the professional training of Marine Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in marine engineering shall complete training in the types of works specified for a minimum period specified herein. Marine engineering is a field of engineering that demands solid knowledge to be able to battle against the dynamic and often violent forces of nature. The marine engineer must therefore have hands-on experience in relevant areas as detailed in the sections that follow.

(a) Design Office Practice

Every trainee shall work under the supervision of a registered professional Marine Engineer for a minimum period of 9 months or as determined by the Board.

Professional training in Design Office Practice with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Engineering drawings and technical information including maintenance manuals, parts catalogues, overhaul manuals, services bulletins and modification data and maintenance schedules;
ii) Ship structures;
iii) Sub-structures (e.g. folded metal, sheet metals extrusions, tubing, holes, fasteners, honey combs, panels and consoles, drains and drain masks, equipment racks and storages intakes, etc.;
iv) Materials and parts (common parts, gases and compounds, metals, non metals - reinforced plastics, epoxy composites wood, fabrics, furnishings;
v) Engines (internal combustion engines and turbine);
vi) Principles, terminology, definitions and laws;
vii) Construction Arrangements;
viii) Design of ship and boat structures;
ix) Be able to carry out design of ship auxiliary machinery;
x) Design and re-design of machinery components and physical property of the material commonly used;
xi) Assessment and calculations of power propulsion.

(b) Field Practice

(i) Workshop Training (Pre-Sea Training)

Every trainee shall work under the supervision of a registered professional Marine Engineer for a minimum period of 6 months or as determined by the Board.

Professional training in Pre-Sea Training with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

(a) Workshop safety;
(b) Bench work including punching, scraping, filing, gauging;
(c) Machine shop practice, including drilling, shaping, milling, threading;
(d) Welding including gas halogen;
(e) Electrical and electronics appliances practice including control circuits DC and AC machinery;
(f) Pipe work and pipe fitting;
(g) Sheet metal work;
(h) Manufacturing methods for various machinery components and physical property of the material commonly used;
(i) Ship building and repair of ship structures;
(j) Maintenance (inspection, assembling/dismantling of engines and auxiliary equipment, service and repair of electrical supply lines and equipment, piping work and electronic and communication equipment).

(ii) At Sea Training

Every trainee shall work under the supervision of a registered professional Marine Engineer for a minimum period of 12 months or as determined by the Board.

Professional training in At Sea Training with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

(a) Diesel main propulsion machinery

i. Main diesel engines generating system and main components of truck and cross-head engines;
ii. Establish and understand main engine components including air starting system, fuel system, lubricating system, cooling, air supply, etc;
iii. Establish and understand the pressure and temperature through the system for normal running conditions;
iv. Establish and understand the main engine control system and operate the controls thoroughly;
v. Working principles and constructional details of marine diesel engines, gears, clutches and auxiliary equipment.

(b) Steam main propulsion machinery

i. Establish and understand the boilers system including condenser operation, boilers fuel combustion burner, water gauge pressure control valves, etc;
ii. Establish the temperature and pressure throughout the system for normal running conditions;
iii. Establish and understand the main engine control system and operate the controls thoroughly.

(c) Ships support systems

i. Have knowledge of understanding and locating ships system including bilge main, ballast system, fuel transfer system, fire mains, etc;
ii. Knowledge of operational repair maintenance of ships main and auxiliary machinery;
iii. Knowledge of the ships bilge, ballast, fire main pumps and piping system, including pollution prevention equipment and system;
iv. Full control of propulsion transmission system, including thrust and shaft bearing, stern tubes and propellers;
i. Steam boiler mountings, feed water system and boiler testing conditions;
ii. Constructional details of alternators, motors, switch gears and electrical distribution systems of DC and AC motors;
iii. Locate bankers, observing all precautions and requirements relating to anti pollution;
iv. Prepare steering gear for sea passage and make routine checks and tests during a voyage;
v. Graphical expressions and transmissions of information related to ships machinery;
vi. Principal operations, faults rectification of basic automatic control systems.

(d) Dry docking and hull inspection

i. Steering and stability systems;
ii. Refrigeration machinery and air conditioning systems;
iii. Fresh water production and conditioning;
iv. Deck machinery and cargo handling system;
v. Marine diesel engines gearing and clutches.

(e) Others

i. Understanding the knowledge of watch keeping principles and procedures for protection of the environment;
ii. Procedure for treatment and condition of heavy fuel oil, lubricating oil and cooling water;
iii. Rescue operations.

(c) Main Propulsion Machinery and Systems

Professional training in Main Propulsion Machinery and Systems with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Graphical expressions and transmissions of information related to ships machinery;
ii) Manufacturing methods for various machinery components and physical property of the material commonly used;
iii) Working principles and constructional details of marine diesel engines, gears, clutches and auxiliary equipment;
iv) Procedure for treatment and conditioning of heavy fuel oil, lubricating oil and cooling water;
v) Principal operations, faults rectification of basic automatic control systems.

(d) Management, Maintenance and Legislation

Professional training in Management, Maintenance and Legislation with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Care management, repair and maintenance of ships machinery;
ii) Assessment and calculations of power propulsion;
iii) Maritime legislation and safety working practices;
iv) Communication skills;

v) Report writing on docking procedure and survey of ships;
vi) Understanding the knowledge of watch keeping principles procedures for protection of the environment;
vii) Ability to carry out demand or manufacturing of ship auxiliary machinery, main generators, paralleling procedure, etc;
viii) Ability to carry out demand scheduling and maintenance programs;
ix) Precautions against fire or explosions, explosive mixtures, source of ignition
x) Codes of safe working practices associated with carriage of dangerous cargo;
xi) Shipboard administration, management and control of spares;
xii) Legislation on merchant shipping and international convention;
xiii) Report writing on dry docking procedures and hull surveys.

(e) Main Machinery Propulsion, Transmission and Ships Support Systems

Professional training in Main Machinery Propulsion, Transmission and Ships Support Systems with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Main diesel engines generating system and main components of truck and cross-head engines;
ii) Operational repair and maintenance of ships' main and auxiliary machinery;
iii) Ships bilge, ballast, fire main pumps and piping system, including pollution prevention equipment and system;
iv) Full control of propulsion transmission system, including thrust and shaft bearing, stern tubes and propellers;
v) Steam boiler mountings, feed water system and boiler testing conditions;
vi) Constructional details of alternators, motors, switch gears and electrical distribution systems of DC and AC motors.

(f) Dry Docking and Hull Inspection

Professional training in Dry Docking and Hull Inspection with respect to Marine Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Steering and stability systems;
ii) Refrigeration machinery and air conditioning systems;
iii) Fresh water production and conditioning;
iv) Deck machinery and cargo handling system;
v) Marine diesel engines gearing and clutches;
vi) Safe working principles as published and amended by relevant authorities.

3.3.9 Mechanical Engineers

Mechanical engineering is a field of engineering that deals with the design, manufacture, operation, maintenance and management of machines and their systems, equipment, and tools. This requires knowledge of materials, processes and ability in planning, organizing and communicating effectively. They also need development of the right attitudes towards work, including safety, cost and efficiency. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Mechanical engineering covers a diverse specialization and therefore demands that the engineer should attain high qualifications, wide exposure and professional experience before one can be trusted to undertake independent work. Mechanical engineering graduates need skills in using equipment, machines and tools; knowledge of materials and processes; and ability to plan, organize and communicate effectively. They also need to develop the right attitudes towards work, including safety, cost and efficiency.

The main thrust of the professional training of Mechanical Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. The specific SEAP requirements for graduate mechanical engineers are as detailed the sections that follow.

(a) Design Office Practice

Professional training in Design Office Practice with respect to Mechanical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Engineering material: types, properties, metals, plastics, and ceramics;
ii) Design and manufacturing technology;
iii) Communication and information systems;
iv) Development of design requirements, assumptions, and specifications;
v) Preparation of detail and assembly drawings, design of jigs and fixtures
vi) Design calculations and drawings including application of Computer Aided Design (CAD) programmes;
vii) Layout and engineering drawing;
viii) Fixing production time costs;
ix) Redesign work/adaptation for maintenance;
x) Application of relevant standards and codes of practice;
xi) Design of maintenance systems and schedules of repairs;
xii) Appraisal of damage/defects/failures including troubleshooting, damage/defects/failure analysis and design of remedial solutions for the damages/defects/failures;
xiii) Analysis of impact on the environment and other systems of designs in application;
xiv) New design of products, processes, machinery, and equipment.

(b) Workshop/Laboratory Practice

Professional training in Worshop/Laboratory Practice with respect to Mechanical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Methods of measurement and testing;
ii) Workshop practice (forging, foundry, sheet metal work, bench work, machine shop practice /machining, material joining/welding, finishing work, carpentry and joinery work, electrical and electronic workshop practice);
iii) Material forming;
iv) Electroplating;
v) Laboratory work (heat and surface treatment;
vi) Maintenance and repairs;
vii) Installation, testing, calibration and operation of machinery and plants;
viii) Specialised applications;
ix) Store keeping;
x) Computer applications in engineering, and manufacturing systems;
xi) Inspection of manufactured and purchased parts on drawings and other specifications;
xii) Material testing and other laboratory work;
xiii) Operation of automatic process lines including supervision and recording;
xiv) Work planning manufacture of simple products and spare parts;
xv) Tool making, manufacturing jigs and fixtures, dies and patterns;
xvi) Development of new products, components and processes;
xvii) Ordering of store supplies, spare parts and equipment;
xviii) Setting-up and testing of new machinery;
xix) Faultfinding in machinery and processes.

(c) Management

Professional training in Management with respect to Mechanical Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

i) Basic supervision of work and personnel, incentive schemes, the role of trade unions and their relationship with management, safety and welfare, training associated legislation;
ii) Production planning and control for industrial engineering, value engineering and the inter-relationships of technical, production and service departments; and an introduction to the way in which computers are used in these areas should be included;
iii) Financial implications of engineering decisions at all stages of design, manufacture and operation;
iv) Costing and estimating;
v) Purchasing, sales and marketing;
vi) Production stock control;
vii) Quality reliability;
viii) Product reliability;
ix) General management including knowledge of organisation structures and their relation to production;
x) Labour management and staff relations, including knowledge of staff regulations, labour laws, industrial laws etc;
xi) Production planning and control, including selection of production processes, tooling, supply of materials for production, storage and handling, allocation and control of labour, machine and material to ensure optimum production output;
xii) Financial management including programming, and estimating (budgeting) costing and record keeping;
xiii) Procurement and materials management including material specifications tendering and storage;
xiv) Contract administration;
xv) Quality control to ensure compliance with established quality standards
xvi) Practice of safety in production including of safety gear, safety precautions, environmental issues etc.
xvii) Management of services for staff welfare;
xviii) Office administration;
xix) Communication skills;
xx) Accounting and finance;
xxi) Personnel management;
xxii) Project management;
xxiii) Investment management;
xxiv) Productivity management;
xxv) Budgetary control;
xxvi) Rationalisation of work-studies, studies to improve productivity, studies concerning material handling, cost and prices calculations, studies concerning issues of the environment in the Factory;
xxvii) Layouts of expansions and new plants with regard to production and machinery;
xxviii) Process and production to improve existing lines and to develop new products;
xxix) Factory management with respect to participation in the making of management decision; involvement in technical, administrative, financial and personnel problems;
xxx) Liaison to wholesalers, suppliers, labour offices, etc;
xxxi) Planning, costing, evaluation, design, production, maintenance, testing, commissioning, purchasing, etc.

3.3.10 Mineral Processing/Metallurgy Engineers

The main thrust of the professional training of Mineral Processing / Metallurgy Engineers is on knowledge, understanding of subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in Mineral Processing/Metallurgy engineering shall complete training in the types of works specified for a minimum period specified herein.

In mining, most mined materials – including hard-rock ores, coal and industrial minerals – are subjected to some type of comminution or beneficiation operation. In most cases, several unit operations are performed sequentially in order to produce a marketable product or fed to an extraction operation such as leaching or smelting. A tremendous number of unit operations are included under the broad heading of "Mineral Processing". A wide range of mechanical equipment is used in these applications. Important ancillary operations include materials handling and feeding, particle agglomeration (palletizing, briquetting, or sintering), and such activities as dust control, water treatment, and tailings disposal. The mineral processing engineer cum metallurgical engineer uses scientific principles, technological knowledge, and managerial skills to recover or concentrate the useful mineral from the ore using these unit operations.

Every trainee shall work under the supervision of a registered professional Mineral Processing or Metallurgical Engineer for a minimum period of 21 months or as determined by the Board.

The specific SEAP requirements for graduate mineral processing engineers / metallurgy engineers are as detailed in the sections that follow.

(a) General Aspects

The general SEAP requirements for Graduate Mineral Processing Engineers / Metallurgy Engineers are as summarized below:

i. Geological works (sampling, exploration drilling, mapping, sample assays, etc.);
ii. Surface or underground production operations;
iii. Mineral Processing Laboratory;
iv. Maintenance of plant equipment and facilities;
v. Water and power supply;
vi. Comminution Processes (Crushing, grinding, and screening);
vii. Minerals separation processes (gravity concentration, heavy media separation, magnetic separation, electrostatic separation, flotation, agglomeration, etc.);
viii. Metal extraction processes: Hydrometallurgical (leaching, solvent extraction etc.); Electrometallurgical (electro-refining, electrowinning); Pyro-metallurgical (roasting, smelting, fire refining etc.);
ix. Design of tailings dam, construction, and monitoring;
x. Other chemical and toxic waste disposal and treatment systems;
xi. Plant safety and rescue (procedures, equipment, etc.);
xii. Environmental considerations;
xiii. Mineral production management, finance, and accounting;
xiv. General safety regulations.

(b) Specialized Aspects

The specific SEAP requirements for Graduate Mineral Process / Metallurgy Engineers are as detailed in the sections that follow.

(i) Mining Geological Works

Professional training in Mining Geology Works with respect to Mineral Process / Metallurgy Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

- Gain understanding and knowledge on the detailed mineralogy of the deposit/ore being mined, ore types and composition, hard rocks or soft rocks, deleterious trace elements, minerals, rock types, etc.,
- Gain understanding of the spatial distribution throughout a deposit in order to determine indications of the proportions of the various ore types for short-term planning, etc.,
- Gain understanding of the coordination required between the geologist and the metallurgical engineer in obtaining composite samples of the various ore types for bench-scale metallurgical testing to ensure the samples are representatives of the entire deposit, etc.,
- Gain understanding and experience on the different methods of collecting bulk-samples for pilot-scale metallurgical testing, etc.,
- Gain understanding on the detailed descriptions of the ore and gangue minerals, i.e., mineral assemblage, grain sizes and shapes, textural relationships (e.g., interlocking or coating), etc.,
- Gain knowledge on the routine spectrographic analyses of samples to determine potential by-products and trace elements, etc.

(ii) Minerals Assaying Laboratory Techniques and Procedures

Professional training in Minerals Assaying Laboratory Techniques and Procedures with respect to Mineral Process / Metallurgy Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

- Gain understanding and knowledge on sample preparation and assaying, compositing, assay checks, splitting of samples, sand washing between samples, types of samples (e.g., soils, stream sediments, RAB chips, Ferricrete, cores, rock chips, etc.), etc.,
- Gain understanding and knowledge on assay methods, i.e., Geochemical analysis, Wet Assay, Fire Assay, Screen Assay, Base metals analysis by AA, SG determination, ICP analysis (Aqua Regia Digestion & Multi Acid Digestion)

(iii) Comminution (Size Reduction)

Professional training in Comminution (Size Reduction) with respect to Mineral Process / Metallurgy Engineering should enable the trainee gain sufficient knowledge and skills/expertise in the following:

- *Crushing:*
  - Gain understanding, knowledge and experience of operating and managing crushers; working principles and mechanisms, etc.; types of crushers i.e., jaw, gyratory, and cone; required reduction ratio, etc.,
  - Gain understanding of the tonnage rates for crushing, size distribution of the product, methods of feeding, control, operating schedule, etc.,

- Gain understanding and knowledge of the ore characteristics to be crushed, bulk density, work index, abrasivity, compressive strength, clay content, etc., that led to the selection of the crushing circuit,
- Gain understanding and knowledge of the crusher parts for continual replacement and ordering i.e, jaws, bearings, plates, etc.,
- Gain understanding and knowledge of the crushing circuit design, whether the ore requires primary, tertiary or secondary crushing, etc.,

- *Grinding:*

  - Gain understanding and knowledge of grinding operation using tumbling mills, ball mills, rod mills, autogenous mills, pebble mills, tower mills, roller mills, cage mills, vibratory ball mills, fluid energy mills, etc.; principles of operation and mechanisms (wet or dry process), maintenance, etc.,
  - Gain understanding and knowledge of the method used to size and select the mill, basic power consumption calculation, work index of ore, and general mill circuit design, etc.,
  - Gain understanding of the size distribution of the feed and the product; amount of circulating load; mill charge consumption, etc.,
  - Gain understanding and knowledge of the mill parts for continual replacement and ordering i.e, mill liners, bolts and nuts, jaws, bearings, plates, etc.,

- *Classification:*

  Gain understanding and knowledge of classification operations after the crushing and grinding operations; basis of classification if by weight or size; use of stationary screens, vibrating screens, sieve-bend screens, hydro-cyclones, mechanical classifiers (rake, spiral, or drag units), etc.,

(iv) Mineral Concentration

- *Flotation*

  - Gain understanding and knowledge of froth flotation; principles of aeration and/or agitation in conjunction with reagents affecting surface chemistry of the fine particles, etc.; use of flotation modifiers, i.e., depressants, activators, pH modifiers, cationic agents, anionic agents, etc.,
  - Gain understanding of the flotation machines in use; mechanical ones, pneumatic ones, froth separators, and column types,
  - Gain understanding of the level of instrumentation and control of flotation circuits, etc.,

- *Gravity Concentration*

  - Gain understanding and knowledge of separating particles of mixed sizes, shapes, and specific gravities by using the force of gravity and/or centrifugal force.
  - Gain understanding and knowledge of using concentrating equipment such as jigs, wet concentrating tables, spiral concentrators, heavy media cyclones; heavy media separation; flowing film concentration, etc., principles of operation, maintenance, etc.,

- *Magnetic Concentration/Separation*

Gain understanding and knowledge of concentrating or separating minerals with paramagnetic properties from nonmagnetic gangue particles using wet and/or dry magnetic separators; principles of drum separators, magnetic filter, high intensity wet magnetic separator for wet and the cross belt and induced roll for dry concentration, etc.,

(v) Chemical and Electrolytic Processing:

- Gain understanding and knowledge of the methods that use chemical and electrolytic processing of metals, i.e., *Carbon-in-Pulp (CIP) and Carbon-in-Leach (CIL,* methods of ore recovery; the carbon stripping (elusion) and carbon regeneration cycles; electrowinning; kinetics of the metals adsorption in carbon, etc.;
- Gain understanding and knowledge of the molten salt electrolysis for production of aluminium, magnesium, and sodium; (electrolysis in fused salts), etc.,
- Gain understanding and knowledge of heap leaching technology, handling and use of chemicals (sodium cyanide, zinc sulphate, etc.,), methods, etc.,

(vi) Smelting of the concentrates

Gain understanding and knowledge of roasting and smelting of concentrates; principles and concepts of dealing with metals in molten states, etc.; equipment, tools and general handling of the processes, etc.

(vii) Refining of the metals

Gain understanding and knowledge of refining metals; principles and concepts of dealing with metal refineries; equipment, tools, and general handling of the processes, etc.,

(viii) Tailings dam design, maintenance and control

- Knowledge of the effects of the accumulated mine waste to the environment such as waste dump, tailings dump, etc.,
- Gain the general knowledge of the design of the tailings impoundments, compacting, continuous control and draining, etc.,
- Gain understanding of the chemical effluents contained in the tailings, control and monitoring methods of the surrounding environment, etc.

(ix) Other chemical and toxic waste disposal and treatment systems (design, maintenance, monitoring, etc)

- Gain understanding and knowledge of the methods of handling and disposing chemical and toxic wastes; methods of treatment, monitoring, etc.,
- Gain understanding and knowledge of designing chemical and toxic waste disposal systems, maintenance, etc.,

(x) Plant safety and rescue

- Gain understanding and knowledge of the major safety risks in operating plants.
- Gain knowledge and experience of managing safety in plants, knowledge and understanding of rescue policies, procedures and practice, etc.,

- Gain knowledge of mine regulations development and present status worldwide; Tanzanian mining regulations; enforcement of regulations and mines and plant inspections; and general professional ethics in mining and mineral processing.

(xi) Mine environmental considerations

Gain awareness of the environmental consequences of mining, water pollution control, air pollution control, solid waste and contaminant control, reclamation, noise abatement, etc.,

(c) Plant Management

- ***Familiarization with mine organization structure***
  Gain understanding of the organizational chart of the mine, organization size, functions, etc.,

- ***Organization of labour, labor relations, etc.***
  - Gain knowledge and understanding of the wages, benefits, and working conditions of employees at different levels, etc.,
  - Gain knowledge and experience of dealing directly with employees during labour negotiations, workers unions, etc.,
  - Gain experience of handling work stoppages, correcting an employee and progressive disciplining of employees, firing, etc.,

- ***Corporate production plans & scheduling***
  - Gain understanding of the Long-term goals of the company that will be achieved through strategic planning by the top management of the company; identify missions and objectives of the company, etc.,
  - Gain understanding and knowledge of the short-term goals of the company that will be achieved through operational planning by the operating management; identify actions and strategies being taken to achieve the missions and objectives, etc.,

- ***Realization of the production plans***
  - Gain understanding and knowledge of the measurement of production performance, quantitatively and qualitatively, etc., comparison with targets, variances, etc.,
  - Gain understanding and knowledge of the corrective actions for short-term aberration and also for strong negative trends, etc.; policy and procedures to be utilized to normalize negative trends, etc.,
  - Gain understanding of the manner in which an organization influences and monitors activities in an effort to achieve or redirect action to attain planned goals, etc.,

- ***Costing system and cost centres***
  - Gain understanding and knowledge of the system of costing applicable to the processing plant, i.e., cost of labour, supplies for the process including chemicals, cost of power, cost of water, cost of crushing, grinding, and the general separation and concentration processes, etc., per ton of ore processed; cost of general mine services, maintenance, supervision, or plant activities that are not specific to the process flow sheet.
  - Gain understanding and knowledge of the overhead costs for the company/project, i.e., administration costs, i.e., accounting, legal costs, recruitment, contracting, etc.,

- ***Purchasing and inventory management***

  - Gain understanding and knowledge of the role of purchasing materials and supplies; cost consideration of materials procurement, clerical and paperwork, etc.,
  - Gain understanding and knowledge of the role of Inventory Management; rules that determine the ordering and stocking philosophy, etc.,
  - Gain understanding of the warehousing's responsibility of receiving, storing, issuing, and delivering to the users, including accurate record keeping, etc.,

- ***Mine maintenance management***

  - Gain understanding and knowledge of communicating in an accurate and timely manner to Inventory Management and Purchasing, what requirements are for spare parts, etc.,
  - Identify parts used on an ongoing basis for stocking in a warehouse; slow and non-moving items, obsolete items, etc.,
  - Gain knowledge and experience of dealing directly with vendor representatives in determining an item's specification, application requirement, and items for standard substitutes, etc.,

- ***Communication***

  - Gain understanding of the methods and tools of transmitting information, changing signals or messages that can be understood, etc.,
  - Gain awareness of the type and form of communication that flows up, horizontally, and that flows down the management ladder, etc.,
  - Differentiate between upward communication in an organization involving financial and accounting information, complaints, grievances, suggestions, problems, reporting, and exceptions, etc., with the downward communication in an organization involving mission, objectives, plans, procedures, practices, training information, etc.
  - Gain understanding of the general Management Information System of the organization, etc.,

3.3.11 Mining Engineers

The main thrust of the professional training of Mining Engineers is on knowledge, understanding subject matters, analysis and methods so as to enable the trainees acquire sufficient specific skills/expertise to become reliable and competitive professionals in the field. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Mining consists of the processes, the occupation, and the industry concerned with the extraction of minerals from the earth***. Mining engineering***, on the other hand, is the art and the science applied to the processes of mining and to the operation of mines. The trained professional who relates the two is the ***Mining Engineer.*** He/She is responsible for helping to locate and prove mines, design and develop mines, and exploit and manage mines.

The essence of mining in extracting minerals from the earth is to drive (construct) an excavation or an opening to serve as a means of entry from the existing surface to the mineral deposit. Whether the openings lie on the surface or are placed underground, fixes the locale of the mine. The mining engineer uses scientific principles, technological knowledge, and managerial skills to bring the mineral property through the four stages of the life of the mine: prospecting, exploration, development, and exploitation.

The specific SEAP requirements for Mining Engineers are intended to enable trainees acquire knowledge and skills/expertise in general aspects and specialized aspects as detailed in the sections that follow.

(a) General Aspects

(i) Surface Mining

- Mine planning and Design
- Geo-technical works and ground control
- Drilling and blasting operations
- Mine haulage & Materials Handling
- Production scheduling, monitoring, and grade control
- Surface mine drainage and dewatering systems
- Tailings dam design, maintenance and control
- Mine safety and rescue (procedures, equipment, etc*)*
- Mine environmental considerations*.*

(ii) Underground Mining:

- Mine Planning and design
- Underground geo-technical
- Mine ventilation and air conditioning systems
- Drilling & blasting operations underground
- Production scheduling, monitoring and grade control
- Ore and waste haulage (tramming), storage and general materials handling systems.
- Ore and material hoisting systems
- Underground mine drainage and dewatering systems
- Tailings dam design, maintenance and control
- Mine safety and rescue (procedures, equipment, etc)
- Mine environmental considerations.

(b) Specialized Aspects

The specific SEAP requirements for Graduate Mining Engineers are as detailed in the sections that follow.

(i) Surface Mining

- *Geological works*
  Appreciate the role of geological sampling, exploration drilling, geological data management systems, maps, sections as sources for mine planning and design of excavations and ore extraction systems, gain an understanding and knowledge of rock structures and types in the mining area, the strike and dip of the deposit, ore elemental composition, etc.

- *Surface Mine surveying*
  Gain an understanding and knowledge of the mine grid system, preparation of useful maps and sections, surface surveys and measurement of the movement of rock masses, dip, fault and 3-dimentional coordinate system, etc.

- *Surface Mine planning and Design*
  - Gain knowledge and skills of the basics of planning for a mine property, design of hard rock mines, open pits, quarries, strip (coal) mines, surface deposits of salt, dredge mining systems, industrial minerals, etc.,
  - Gain knowledge on the use of diamond drill data for geotechnical data for mine design, orebody modelling, metallurgical testings, etc.,

- Gain understanding of the role of mathematical models and economics in developing optimal designs of surface mines, etc.
- Gain knowledge and experience of using computers in planning and computer aided design of surface mines, etc.,

- *Geo-technical works, ground control and pit slope monitoring*
  - Gain understanding and knowledge of using geo-technical data for design of excavations and waste dump containments,
  - Gain understanding, knowledge on the use of rock mass classification techniques in the analyses of slope stability, open pit design, tunnelling, etc.,
  - Gain knowledge and experience of the effects of ground water in design of rock structures, effects of rock failures, etc.
  - Experience on the use of various instrumentations in geo-technical works, etc.

- *Design of drilling patterns and execution of production drilling operations*
  - Gain knowledge and experience on the optimum planning and designing of blast-hole patterns based on rock types and conditions,
  - Experience of selecting drilling equipment and optimum utilization of drilling equipment,
  - Gain experience of correlating drilling patterns with efficient design of blasting techniques in order to minimize negative impacts of blasting and ensuring optimum rock fragmentation.

- *Design of blasting patterns and execution of blasting operations (Blasting certificate to be obtained)*
  - Gain understanding and knowledge on the types and properties of commercial explosives and accessories; systems of blast initiation; methods of charging; smooth blasting techniques, controlled blasting, etc.,
  - Gain experience of designing pit or quarry benches; design of blasting rounds, controlled air blast and control of ground vibrations,
  - Gain knowledge and experience on the use of equipment for air blast and ground vibration monitoring and techniques being used,
  - Gain knowledge and understanding on the control, safe practices, regulations regarding explosives handling, etc..

- *Ore/Waste handling*
  - Gain knowledge and experience on the use of materials handling systems applicable to the mine,
  - For the shovel/truck system, gain an understanding of the shovel matching, cycle times, digging conditions, based on the loading equipment performance charts, efficiency, operating and maintenance schedules, etc., Gain experience on the effects of truck cycle times to production, shovel/truck compatibility, planned maintenance schedules versus random breakdowns, tonnage capacities of trucks versus specific gravity of material, dry and wet condition effects on performance, etc.
  - Gain experience of managing in-pit crushers, material belt conveying systems, maintenance, repairs, etc., knowledge of belt capacities, planned and unscheduled maintenance and repairs, design and management of surge and storage bins, etc.,
  - Gain knowledge and experience of managing hydraulic monitors and accessories for hydraulic mining systems, slurry pumping systems, pipes and accessories,

- Gain knowledge and experience on the use of support equipment such as bulldozers, wheel loaders, scrapers, etc.,

- *Production scheduling, monitoring, and grade control*
  - Gain knowledge and understanding on scheduling production to meet desired annual capacity, production monitoring systems in use including the use of computers, etc.,
  - Gain understanding of the effects of scheduling to direct operating expenses, final product delivery to the market, etc.,
  - Gain knowledge and experience on methods of grade control, correct and necessary procedures for sampling, sampling from blast holes on pit benches, etc.,
  - Gain knowledge and understanding on blending requirements of the head grade ore, effects of dilution, etc.,

- *Surface mine drainage and dewatering systems*
  - Gain understanding and knowledge of the water inflow patterns of the mine; sump location, construction and management; channel construction and maintenance; pumping system's control and maintenance, etc.,
  - Gain understanding and knowledge of the effects of water to the mine stability, movement of equipment, and production in general;
  - Gain understanding and experience of controlling erosion and sediments, etc.,
  - Gain understanding of the water control measures in advance of mining, borehole drilling to lower the phreatic line of the aquifer, etc.,
  - Use of diversions, energy dissipaters, etc.,
  - Knowledge and experience of completely integrating drainage, erosion, and sediment controls at every stage of the mining operation.
  - Experience of using common sense mining method and observations to control erosion and sedimentation.

- *Tailings dam design, maintenance and control*
  - Knowledge of the effects of the accumulated mine waste to the environment such as waste dump, tailings dump, etc.,
  - Gain the general knowledge of the design of the tailings impoundments, compacting, continuous control and draining, etc.,
  - Gain understanding of the chemical effluents contained in the tailings, control and monitoring methods of the surrounding environment, etc.

- *Mine safety and rescue (procedures, equipment, etc)*
  - Gain understanding and knowledge of the major safety risks in mines.
  - Gain knowledge and experience of managing mine safety, knowledge and understanding of mine rescue policies, procedures and practice, etc.,
  - Gain knowledge of mine regulations development and present status worldwide; Tanzanian mining regulations; Enforcement of regulations and mines inspections; disputes, and general professional ethics in mining.

- *Mine environmental considerations.*
  Gain awareness of the environmental consequences of mining, water pollution control, air pollution control, solid waste control, reclamation, noise abatement, etc.,

(ii) Underground Mining

- *Geological works*
  Appreciate the role of geological sampling, exploration drilling, geological data management systems, maps, sections as sources for mine planning and design of excavations and ore extraction systems, gain an understanding and knowledge of rock structures and types in the mining area, the strike and dip of the deposit, ore elemental composition, etc.

- *Surface and Underground Mine Surveying*
  - Gain an understanding and knowledge of the mine grid system, preparation of useful maps and sections, measurement of the movement of rock masses, etc.,
  - Gain knowledge of the basics of planning for a mine property, design of hard rock mines, underground coal mines, underground deposits of salt, industrial minerals, etc.,
  - Gain knowledge on the use of diamond drill data for geo-technical data for mine design, orebody modelling, metallurgical tests, etc.,
  - Gain understanding and knowledge of the role of mathematical models and economics in developing optimal designs of underground mines, etc.
  - Gain knowledge and experience of using computers in planning and computer aided design of underground mines, etc.,

- *Underground mine design and planning*
  - Gain knowledge and experience of designing mine cuts, drifts, cross-cuts, ramps, from initial drill-hole data and also based on the geological and ore body models, etc.,
  - Gain appreciation of design problems on complex ore bodies; and gain knowledge of incorporating the design with renovations which may entail ground stability, ventilation, systems analysis, equipment selection, maintenance, etc, with safety and economics as the basic criteria for design.

- *Underground geo-technical works*
  - Gain understanding and knowledge of using geo-technical data for design of excavations, i.e., shafts, drifts, cross-cuts, etc.,
  - Gain understanding and knowledge on the use of rock mass classification techniques in the analyses of tunnelling, drifting, raising, etc.,
  - Gain knowledge and experience of the effects of ground water in design of rock structures, effects of stress, rock burst, etc.
  - Experience on the use of various instrumentations in geo-technical works, stress monitoring, caving control, etc.
  - Gain knowledge and experience in crown/sill/rib pillar design and general monitoring of ground movements, long-term supports such as backfilling, etc.,
  - Gain knowledge and experience of building short-term supports such as rock bolting, wire mesh, square sets and general timbering, hydraulic props, frictional props, etc., understanding the principles.

- *Mine ventilation and air conditioning systems*
  - Gain understanding and knowledge of the design of the ventilation network system, i.e., parallel & series networks, knowledge of the concepts of head-loss and resistances in airways, etc.,

- Gain understanding and knowledge of the air quality control (i.e., toxic gases, methane & coal dust control), quantity control (i.e., auxiliary or face ventilation and local exhaust), temperature-Humidity control (i.e., cooling & dehumidification), etc.,
- Gain knowledge and experience of designing, using and locating the air control devices such as stoppings, overcasts, and regulators, etc., use of ventilation fans (axial & centrifugal fans), etc.,

- *Design of Underground drilling patterns and execution of primary (long hole) production drilling operations & Secondary drilling*
  - Gain knowledge and experience on the optimum planning and designing of blast-hole patterns based on rock types and conditions in underground hard rock mines, coal mines, etc.
  - Gain experience of selecting drilling equipment and optimum utilization of drilling equipment,
  - Gain experience of correlating drilling patterns with efficient design of blasting techniques in order to minimize negative impacts of blasting and ensuring optimum rock fragmentation.

- *Design of blasting patterns and execution of primary blasting operations (Blasting certificate to be obtained)*
  - Gain understanding and knowledge on the types and properties of commercial explosives and accessories; systems of blast initiation; methods of charging; smooth blasting techniques, controlled blasting, etc.,
  - Gain experience of designing primary blasting rounds in sublevels, undercuts, etc.; controlled air blast and control of ground vibrations, etc.
  - Gain knowledge and experience on the use of equipment for charging, air blast and ground vibration monitoring and techniques being used,
  - Gain knowledge and understanding on the control, safe practices, regulations regarding explosives handling, etc.

- *Production scheduling, monitoring and grade control*
  - Gain knowledge and understanding on scheduling production to meet desired annual capacity, production monitoring systems in use including the use of computers, etc.,
  - Gain understanding of the effects of scheduling to direct operating expenses, final product delivery to the market, etc.,
  - Gain knowledge and experience on methods of grade control, correct and necessary procedures for sampling, sampling from blast holes, ore passes, draw points, etc.,
  - Gain knowledge and understanding on correct methods of ore draw from ore-draw points, control of ore dilution, blending requirements, etc.,

- *Underground Ore/Waste Handling*
  - Gain experience of managing all underground mucking and tramming systems and equipment i.e., LHDs, scrapers/slushers, mine cars, trucks, etc.,
  - Gain experience of constructing, managing and maintaining mine ramps, rail-tracks, trolley-lines, grizzlies, loading boxes, ore-passes, etc.,
  - Gain knowledge and experience of managing ore crushing systems underground, belt conveying systems underground; slurry pumping systems for industrial /crushed minerals, etc.,

- *Material hoisting operation*

- Gain knowledge and experience of designing, managing and maintaining shaft conveyances, i.e., headframes, surge bins, skips, cages, shaft guides, winders, hoist ropes, sheaves, etc.,
- Gain understanding of the hosting communication system, safety procedures, etc.,

- *Underground mine drainage and dewatering systems*
  - Gain understanding and knowledge of the water inflow patterns of the mine; sump location, construction and management; channel construction and maintenance; pumping system's control and maintenance, etc.,
  - Gain understanding and knowledge of the effects of water to the mine stability, air conditioning processes, and production in general;
  - Gain understanding of the water control measures in advance of mining, borehole drilling to lower the phreatic line of the aquifer, etc.,

- *Tailings dam design, maintenance and control*
  - Knowledge of the effects of the accumulated mine waste to the environment such as waste dump, tailings dump, etc.,
  - Gain the general knowledge of the design of the tailings impoundments, compacting, continuos control and draining, etc.,
  - Gain understanding of the chemical effluents contained in the tailings, control and monitoring methods of the surrounding environment, etc.

- *Mine safety and rescue (procedures, equipment, etc)*
  - Gain understanding and knowledge of the major safety risks in mines.
  - For coal mines, gain understanding, knowledge and experience of preventing, managing and controlling methane and coal dust emissions and hazards, etc.,
  - Gain knowledge and experience of managing mine safety, knowledge and understanding of mine rescue policies, procedures and practice, etc.,
  - Gain knowledge of mine regulations development and present status worldwide; Tanzanian mining regulations; Enforcement of regulations and mines inspections; and general professional ethics in mining.

- *Mine environmental considerations.*
  Gain awareness of the environmental consequences of mining, water pollution control, air pollution control, solid waste and contaminant control, reclamation, noise abatement, etc.,

(iii) Mine Management

Every trainee shall work under the supervision of a registered professional Mining for a minimum period of 9 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas detailed in the sections that follow.

- *Familiarization with mine organization structure*
  Gain understanding of the organizational chart of the mine, organizational size, functions, etc.,

- *Organization of labour, labor relations, etc.*
  - Gain knowledge and understanding of the wages, benefits, and working conditions of employees at different levels, etc.,
  - Gain knowledge and experience of dealing directly with employees during labour negotiations, workers unions, etc.,

- Gain experience of handling work stoppages, correcting an employee and progressive disciplining of employees, firing, etc.,

- *Corporate production plans & scheduling*
  - Gain understanding of the Long-term goals of the company that will be achieved through strategic planning by the top management of the company; identify missions and objectives of the company, etc.,
  - Gain understanding and knowledge of the short-term goals of the company that will be achieved through operational planning by the operating management; identify actions and strategies being taken to achieve the missions and objectives, etc.,

- *Realization of the production plans*
  - Gain understanding and knowledge of the measurement of production performance, quantitatively and qualitatively, etc., comparison with targets, variances, etc.,
  - Gain understanding and knowledge of the corrective actions for short-term aberration and also for strong negative trends, etc.; policy and procedures to be utilized to normalize negative trends, etc.,
  - Gain understanding of the manner in which an organization influences and monitors activities in an effort to achieve or redirect action to attain planned goals, etc.,

- *Costing system and cost centres*
  - Gain understanding and knowledge of the system of costing applicable to the mine, i.e., cost of labour, supplies for drilling, blasting, ground support, etc.; cost of loading, haulage of ore, crushing, hoisting, etc., per unit of time (per day/week); general mine services, maintenance, supervision, or mine activities that are not specific to the mining methods being used to recover ore from the pit or stopes, etc.,
  - Gain understanding and knowledge of the overhead costs for the company/project, i.e., administration costs, i.e., accounting, legal costs, recruitment, contracting, etc.,

- *Purchasing and inventory management*
  - Gain understanding and knowledge of the role of purchasing materials and supplies; cost consideration of materials procurement, clerical and paperwork, etc.,
  - Gain understanding and knowledge of the role of Inventory Management; rules that determine the ordering and stocking philosophy, etc.,
  - Gain understanding of the warehousing's responsibility of receiving, storing, issuing, and delivering to the users, including accurate record keeping, etc.,

- *Mine maintenance management*
  - Gain understanding and knowledge of communicating in an accurate and timely manner to Inventory Management on spare parts requirement, etc.,
  - Identify parts used on an ongoing basis for stocking in a warehouse; slow and non-moving items, obsolete items, etc.,
  - Gain knowledge and experience of dealing directly with vendor representatives in determining an item's specification, application requirement, and items for standard substitutes, etc.,

- *Communication*
  - Gain understanding of the methods and tools of transmitting information, changing signals or messages that can be understood, etc.,

- Gain awareness of the type and form of communication that flows up, horizontally, and that flows down the management ladder, etc.,
- Gain understanding of the general Management Information System of the organization, etc.,

3.3.12 Telecommunications Engineers

The main thrust of professional training of engineers is on exposure to and acquisition of practical skills and general transferable skills including management of resources and time. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

The specific SEAP requirements for Graduate Telecommunications Engineers are intended to enable them acquire knowledge and skills/expertise in the areas outlined in the sections that follow.

(a) Systems Engineering

Every trainee shall work under the supervision of a registered professional Telecommunications Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of systems engineering detailed below.

i. Estimation of the demand for telecommunications services using standard demand forecasting procedures.
ii. Telecommunications Systems Planning including site selection, radio path calculations, received signal level calculations, signal quality calculations, system availability and reliability calculations, digital signal processing, digital transmission standards, digital signal hierarchies and overall performance criteria; for those specializing in transmission.
iii. Switching philosophy, matrices, statistical multiplexes, digital switching, digital signal standard bit rates and interface signal levels; for those specializing in switching.
iv. Preparation and interpretation of block schematic representation of telecommunications systems including standard symbols and standard signal transmission levels.
v. Ability to apply and interpret telecommunications design objectives and standards, particularly the ITU-T and the ITU-R Recommendations.
vi. Ability to relate the design objectives to system specifications.
vii. Ability to prepare system specifications for any or all of the telecommunications system units of the block schematic depending on specialization. Those specializing in transmission systems shall demonstrate an ability to prepare specifications for radio systems and those specializing in switching shall demonstrate the ability to prepare specifications for switching multiplex systems.
viii. Estimation of quantities and costs of the elements making up a telecommunications system.
ix. Preparation of tender documents.
x. Preparation of Contract Documents.
xi. Environmental impact assessment and management.

(b) Installation of Telecommunications Systems

Every trainee shall work under the supervision of a registered professional Telecommunications Engineer for a minimum period of 12 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of telecoms installation detailed below.

i. Participation in radio propagation survey and site selection.
ii. Participation in installation site preparation.
iii. Preparation and implementation of rollout plans.
iv. Preparation of installation testing and acceptance data forms.

v. Participation in installation testing including in-station tests, hop tests, system end-to-end tests, commissioning and acceptance testing. In this respect the aspiring professional engineer shall demonstrate a knowledge and understanding of standard test procedures and test equipment.
vi. Staff and Labor relations.

(c) Maintenance

Every trainee shall work under the supervision of a registered professional Telecommunications Engineer for a minimum period of 12 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of maintenance detailed below.

- Determination of maintenance requirements using the Mean Time between Failures (MTBF) and the Mean Time To Restore (MTTR) criteria.
- Use of MTBF and MTTR to report on system availability and reliability.
- Demonstrate an understanding of routines and routine maintenance procedures.
- Preparation of routine maintenance schedules.
- Participation of major overhaul and or retrofitting.
- Estimation of maintenance requirements in terms of manpower, test equipment, spare parts and transport.
- Generation of maintenance reports and fault statistics.
- Staff and Labor relations.
- Customer relations.

(d) General Management

Every trainee shall work under the supervision of a registered professional Telecommunications Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of general magement detailed below.

- General office routine procedures/administration.
- Organization structures and their translation in practice.
- Communication skills.
- Staff regulations and labor laws.
- Materials and equipment procurement, management, storage and handling.
- Safety procedures and practices.
- Tendering procedures including tender preparation, tender evaluation and international tendering procedures and practices.
- Contract administration, knowledge of various types of contracts and the applicable conditions.
- Regulatory practices.
- Quality of service measurement procedures and reporting.

3.3.13 Textile Engineers

The main thrust of professional training of engineers is on exposure to and acquisition of practical skills and general transferable skills including management of resources and time. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

The specific SEAP requirements for Graduate Textile Engineers are intended to enable them acquire knowledge and skills/expertise in the areas outlined in the sections that follow.

(a) General Workshop Practice

Every trainee shall work under the supervision of a registered professional Textile Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of general workshop practice detailed below.

- ♦ Foundry work (including casting, pattern making and knowledge material composition of the castings)
- ♦ Bench work
- ♦ Machine shop practice i.e. drilling, shaping, turning, milling, grinding etc.
- ♦ Wood work (carpentry)
- ♦ Welding both gas and electric
- ♦ Plumbing
- ♦ Leather works such as stitching and gluing
- ♦ Finish work such as panel beating, shot-blasting, painting metal joining and forging

(b) Process Plant Work

Every trainee shall work under the supervision of a registered professional Textile Engineer for a minimum period of 18 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of process plant work detailed below.

(i) Production Line

- ◊ Functioning of the scutcher (in Blowroom), cards, draw frames, combers, speed–frames, ring–frames and cone winders, and the central waste collection centre.
- ◊ Warping, sizing pin winding, looms, knitters, drawing–in and inspection and batching frames including shearing machines.
- ◊ Operations on singeing, desizing, bleaching, washing, mercerizing, steam ageing, soaper, dyeing, printing, pre-shrinking, calendaring, folding, baling and packing, etc.

In all these situations the trainee should become conversant with the following:

- o Mechanisms governing operations of textile machinery;
- o Process flowsheeting and drawings which involve the preparation of detailed flowsheets and engineering drawings
- o Trouble – shooting, identifying and resolving operational problems of a technical nature
- o Planning, preparation of planned maintenance, scheduling it and making follow up of the schedule
- o Data collection of power consumption per metre of grey fabric of a given product (in weaving)
- o Data collection on power dyestuff and chemicals consumption per metre of a given shade dyed or printed (in dyehouse)
- o Data collection on spares, accessories and lubricant consumptions
- o Familiarize with the internal transportation modes and in process material storage.

(ii) Utilities

- ➢ Operation of steam and thermal boilers, air conditioner and air compressors and their efficiencies
- ➢ Data on water, air steam, fuel and power consumption
- ➢ Installation and insulation of steam pipes and electrical cables
- ➢ Layout of water and compressed air pipes
- ➢ Data collection on air, steam, water and power wastage as well as on Maximum (power) Demand (MD) and power factor.

- Data collection on the ratio of fuel, air, steam and power consumption against total production
- Controlling the standards of water (i.e water treatment)
- Treatment of the effluent.

(iii) Quality Management

- Familiarization with the laboratory, the maintenance mechanics (fitters) and the management
- Familiarization with the relevant test procedures and standards
- Conducting tests on raw materials, intermediates and finished products with appropriate laboratory practice and advise for appropriate measures
- To formulate, implement and monitor the quality control procedures

(iv) Commissioning of New Equipment

- Conditions of storage of equipment prior to installation
- Installation and Start up
- Operational and test data
- Performance and evaluation
- Assessment of environmental hazards such as noise level, floor vibrations, illumination, etc
- Assessment of machine guarantee periods

(c) Plant and Equipment Design

Every trainee shall work under the supervision of a registered professional Textile Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of plant and equipment design detailed below.

- Preparation of preliminary plant design and equipment specification
- Component design
- Preparation of cost estimates
- Evaluation and award of tenders, contracting and tendering (contract management)

(d) Plant Management

Every trainee shall work under the supervision of a registered professional Textile Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the areas of plant magement detailed below.

- Familiarization with the plants MIS (Management Information System) and Organization structure;
- Organizations of labour work schedules, stock control, etc;
- Production planning;
- Realization of the production plans;
- Evaluation of work load, and work assignment (labour utilization);
- Costing and cost centres;
- Waste and Energy control measures;
- Stores and stores management;
- Procurement and budgeting;
- Tendering and contract administration;
- Communication skills;
- Plant safety.

4.0 ORGANIZATION OF SEAP

4.1 General

The organization and management of SEAP is likely to demand a lot of time and energy of the ERB Secretariat, not only to get the trainees properly assigned, but also to ensure that both they and their mentors are conversant with the training requirements, and the desired output. For this reason, SEAP is structured in such away that it enables tracking of all the trainees and their mentors promptly, and thereby ensures that the training programme achieves the intended goal.

Managing SEAP necessitates setting up of a unit specifically dedicated to the programme. The Board has, therefore, established a training unit. The unit has a full time Training Officer who is responsible for the daily administration of the Programme. In addition to the activities enumerated in Table 6.1, the Board shall:

(i) Follow up the implementation of the Programme through visits to all SEAP Trainees every quarter. During the visits the Board shall talk to the trainees and their respective mentors and hold discussions with managements of the firms offering the training.
(ii) Visit other potential SEAP Providers on a continual basis in order to identify and establish more professional training placements and more partners in the Programme.
(iii) Establish partnerships with key stakeholders in the engineering sector in order to ensure sustainability of the Programme.
(iv) Work out and periodically review incentives for SEAP Providers and mentors.

4.2 Parties Involved, Roles and Responsibilities

SEAP requires commitment by all parties involved in the implementation of the Programme. Apart from the SEAP Trainees, the other parties are:

- The Board itself,
- SEAP Providers i.e Training Organizations, and
- Mentors, i.e Professional Training Supervisors.

These parties have distinct roles to play in the implementation of SEAP. Success of the programme, to a large extent, thus, hinges on the commitment of parties involved in the programme. On its part, the Board has to ensure that selected trainees understand the objectives and benefits of the programme to themselves and the country, and what is expected of them. The Board has also to ensure smooth placement of the trainees and never to transfer problems of the trainees to the SEAP providers. The Engineers Registration Board is therefore expected to play an effective coordination role.

The role of mentors in the implementation of the SEAP is also critical. The importance of the mentors is derived from the fact that they are the ones who will work with the trainees, giving the trainees the necessary guidance and assistance in their professional development. Commitment by mentors is therefore vital in imparting the required professional competences and professional attributes to the trainee engineers.

The engineering organizations that are willing and able to participate in the programme have been identified and details thereof entered into the SEAP Directory, viz. SEAP Vol. 2 document. The Board will make firm undertakings with the organizations upon which an Employer will assign a responsible senior person to act as a trainer. The trainer will be expected to take personal interest in the trainees under his/her care, and to interact with them regularly.

The roles and responsibilities of the Board and the Trainees have also been clearly defined in the formal tripartite agreement.

4.3 Incentives and Motivation

It is an accepted fact that both the SEAP Providers and Mentors expend resources in the professional training of the young engineers. Such resources include material and time resources, facilities, etc. On the other hand the Board does not have the financial resources to compensate them in financial terms. Whilst acceptance of graduate engineers for professional training is, admittedly, a national obligation on the part of SEAP Providers and a professional obligation on the part of Mentors it is important that the Board has in place a system of motivating both the SEAP Providers and the Mentors.
The Board's financial resources are limited. The Board will thus adopt the following incentives to motivate both the SEAP Providers and the Mentors. These are:

(i) Giving certificates of recognition to mentors.
(ii) Recognizing SEAP Providers by giving them trophies bearing ERB Logo.
(iii) Inviting mentors and SEAP Providers to participate in ERB organized activities.
(iv) Award of Professional Development Units (PDU) to mentors. Determination of the number of hours should be based on the achievements made by individual trainees, quality of the report of the trainee as well as the quality of the mentor's comments on the trainee's Quarterly Reports.
(v) Organizing get-togethers for SEAP Providers and Mentors.
(vi) Influencing the Government to give job opportunities to firms that undertake professional training of graduate engineers.
(vii) Regular contacts with the SEAP Providers and Mentors.
(viii) Providing ERB Newsbriefs, ERB Calendars and any other relevant documents to SEAP Providers and mentors.
(ix) Annually publishing names of SEAP Providers and mentors giving number of trainees (and their disciplines); etc.
(x) Allowing SEAP Providers (excluding consultants) to advertise their business in the ERB Newsbrief at half the rate.

5.0 PROCEDURES GOVERNING THE MANAGEMENT OF SEAP

5.1 General

The organization and management of SEAP entails getting the Trainees properly assigned and ensuring that both the Trainees and their Mentors are conversant with the training objectives, requirements and the desired inputs from and obligations of various parties to the programme.

Hence, the main task in the management of SEAP is to identify SEAP Providers and Professional Training Supervisors (Mentors), to properly place Trainees and to promptly track all the Trainees and their respective Mentors to ensure that the training programme achieves the intended goal. To this end the Board shall prepare, maintain and keep under periodical review a database of SEAP Providers as well as Professional Engineers who can act as mentors. In addition the Board shall maintain and regularly update a training matrix showing the movement of trainees from one SEAP Provider to another. The matrix which shall include duration of training at each training organization is intended to ensure timely movement of the trainees between different SEAP Providers.

5.2 Selection Criteria

Engineers who are employed in the civil service but do not possess adequate professional experience must undergo SEAP. They will be required to undergo prescribed professional training in areas where they are observed to deficient in their professional competences. The duration of such training will depend on the identified deficiencies. These engineers will be admitted into the programme in phases until all such engineers acquire the requisite professional competences. It is expected that the Board will cover all such engineers by the 2006/07 intake.

Selection of other candidates will be based on the selection criteria approved by the Board taking into account academic achievement (GPA), years since graduation (should have an inverse relationship) age of the applicant, prior experience, etc. These attributes have been assigned maximum points as shown in Table 5.1 below. In case the training budget cannot accommodate all eligible candidates, they shall be ranked according to their scores and their selection made on the basis of highest scores after taking on board all female applicants. The maximum score one can get is 65 points. Female candidates shall be accorded preferential treatment.

Table 5.1 Selection Criteria for Admission into SEAP

Criteria	**Maximum Score**
Academic Qualifications	25 points for GPA 5.0, tapering to 5 points for the lowest Pass degree
Years Since Graduation	10 points for 0-1 years, tapering to 2 points for 5 years
Prior Experience	10 points for no experience, tapering to 2 points for 5 years unsupervised work
Age of Candidate	10 points for less than 26 years, tapering to 2 points forgreater than 32 years or above
Registration with ERB	10 bonus points for Graduate Member of ERB

5.3 Administration of the Training

After the SEAP Providers and Mentors have been identified and the Trainees selected and approved by the Board, the Trainees are required to sign a Tripartite Agreement and collect relevant information, including training kits. Other parties to the Tripartite Agreement are the Board and the SEAP Providers. A detail of the Tripartite Agreement is in Appendix 4.

Once the Tripartite Agreement has been signed, the SEAP Trainee reports to the SEAP Provider with his/her training kit which also includes an Introductory Letter and Arrival Note. The PTS shall sign the

Arrival Note, develop the specific training plan with the Trainee and send copies to the Board. The PTS will assign the Trainee tasks in accordance with the training programme and the specific training plan. In turn, the Trainee shall submit quarterly reports to the Board in a pre-determined format. The quarterly reports must be checked, commented upon and signed by the Mentor.

The Training Programme should start with an outline of the organization in which the trainee will be working, indicating the scope and range of its activities, and areas where the trainee will be assigned. This is an important element as it prepares the trainee psychologically for the task ahead. An induction programme would also be advantageous.

Table: 5.2 Step-wise Administration of SEAP

Stage	Activity
Identification of SEAP Providers	Registrar writes to prospective SEAP Training Providers {or Partner} (SEAP-TP) requesting them for provision of training places based on Training Directory* (to be developed and updated on continuous basis).
	Registrar compiles list of SEAP training places offered by SEAP-TP
	Registrar presents a list of SEAP-TP for the financial year (or training year) to the Board for Approval.
	ERB Board approves the available number of training opportunities presented by the Registrar based on the budget.
Application Process	Registrar advertises training opportunities stating the number required in the public media.
	Applicants submit duly completed application forms (Appendix 2a) to ERB Registrar;
	Registrar scrutinizes applicants & proposes placement of applicants to different SEAP-TPs based on approved Guidelines
	Registrar presents list of successful applicants, placement and training budget to the Board for approval
	Board receives, discusses and approves the list of applicants, placements and budget or otherwise.
	Registrar informs all the applicants and SEAP-TPs of Board's decision through public media
Admission of the Trainees into SEAP and Begin of Training	Registrar identifies Professional Training Supervisors (PTS) submits to the Board for approval
	ERB approves list of PTS
	After successful applicants are offered the placement, the Candidates are required to contact Registrar to: • Sign a training agreement (see Appendix 4); • Collect further information including the training kit (training kit consists of items listed in Appendix 3);
	ERB signs training agreement with the SEAP-TPs in which the SEAP Professional Training Supervisor (PTS) is named and provided with Terms of Reference (not more than 5 trainees per PTS at any one time).
	SEAP Trainee reports to the SEAP-TP Offices with his/her training kit that includes an introductory letter and Arrival Note (see Appendices 6 and 7 respectively)
	PTS signs the Arrival Note, develops the training plan with the trainee and sends copies to the Registrar.
	Registrar receives the Arrival Note
Implementation of Training	PTS assigns tasks to SEAP Trainees in accordance with the training programme and plan
	Trainee submits training reports to the PTS in a specified format – every two weeks
	PTS checks and signs the reports periodically verifying tasks performed and competencies attained
	Trainee submits Quarterly Reports to ERB (or SEAP Co-ordinator) in a pre-determined format (see Annex - part of the training kit)
	Registrar submits summary quarterly SEAP reports to the Board. The report to include placement of trainees, progress attained, special problems that may require the attention/action of the Board, etc.
	Registrar strives to ensures that the Trainees are promptly placed upon completion of training with one SEAP-TP for continuity preferably determined at the start of the programme
	Upon completion of the training period, SEAP Trainee submits a complete report to ERB Registrar together with an application for registration.
	ERB Registrar processes applications using approved rules and procedures
Administrative Issues	Payments shall be made by ERB to SEAP Trainee on monthly basis or otherwise as per agreement to cover subsistence and transport costs.
	ERB shall pay a flat rate for trainees travel costs to and from training locations throughout the training period
	The responsibility to look.for and pay for accommodation shall reston the SEAPTrainee.
	Payments made to the trainee shall be deemed to cover all medical costs including self insurance in case of a serious illness
	ERB shall review and amend these procedures from time to time

As mentioned earlier, it is likely that there will be two sets of training requirements, those of the Board and those of the Training organizations. The former has been outlined in Chapter 3 above, while the latter covers specific training needs for the training organization. It is important that the training programme

clearly identifies each of these requirements. Those of the Board must be stated as they are, without alteration.

5.4 Supervision and Monitoring

To ensure effective implementation of the SEAP, the Board will conduct SEAP Monitoring Visits to SEAP Providers and Trainees on a regular basis. The main objectives of the monitoring visits are: to promote close working relationships between the Board and SEAP Providers; to sensitize engineering organizations on the importance of the SEAP programme; to discuss with Mentors and Trainees on issues pertaining to professional training; to assess adequacy of professional training facilities and to perform other activities related to the SEAP programme.

The Quarterly Reports prepared by the Trainees will only serve a useful purpose if they are assessed. The trainer will therefore have the task of critically evaluating the reports and discussing his/her assessment with the trainee. This means that the trainer will need to have at the least quarterly interviews with the trainees to discuss progress made. The intention of the interviews is to assist both the trainer and the trainee to adjust the programme for best results. Copies of the Quarterly Reports, with the trainer's comments or assessment will be submitted to the Board.

At the end of the year the trainee will prepare and submit to the Board, an Annual Report, of not less than 2000 words and not more than 3000 words, outlining what the trainee covered during the period, roles played and experiences/competencies acquired. The report shall be commented upon by the trainee's mentor. This report will be in addition to the Trainee's Quarterly Reports.

5.5 Log-book and Reporting

During the training period the Trainee will be required to maintain a Training Logbook where main activities covered during any specific period will be entered. Entries into the Logbook will be commented upon by the respective PTS (or Mentor) and the same will regularly be inspected by an official of the Board. It is advisable that entries into the Logbook are made on weekly basis.

The Training Record Logbook should contain the following components:

(i) Introduction to the Training Record
(ii) Relevant details of Training Agreement
(iii) The Training Scheme
  - o Training Scheme of the Employer, where it exists
  - o Training Guidelines of ERB

(iv) Outline of record of all technical and professional experience gained
(v) Involvement with ERB, IET and other Professional Engineering Bodies
(vi) Quarterly Reports.

The Graduate Engineer training under the SEAP is responsible for keeping a detailed record of the training he/she undergoes. He/she is required to complete a Training Record Logbook, which will be submitted to the ERB Board for professional review.

It is the joint responsibility of the trainee and the Professional Training Supervisor (PTS) to ensure that all specified components are included in the Training Record Logbook. The trainee must submit to the PTS three-monthly reports (Quarterly Reports) which must be signed, dated and commented upon by the PTS, and filed properly. The Quarterly Reports should be more than a statement of work undertaken during the preceding three months, giving an account of the Trainee's attitude towards the work, a discussion on alternative solutions that could have been applied to problems that arose and comments on items of interest encountered.

It is the responsibility of the trainee to submit these Quarterly Reports regularly and punctually to the PTS for verification and comment. The Training Record Logbook, complete and up-to-date, must always be available for inspection by the ERB Training Department.

As mentioned earlier, trainees have the responsibility of preparing and submitting to their supervisors and eventually to ERB, reports on the training that they receive. These reports include details of the daily activities performed, which are to be recorded in a logbook, and Quarterly Reports. Quarterly Reports should be concise, not more than 1500 words in length, and should contain an account of the Trainee's technical work. A discussion of alternative solutions to problems that the trainee encountered should be presented, as well as general comments on other issues of interest to the Trainee. The report may include tables, sketches, computer print outs and photographs.

At the end of the training period the trainee will fill a Training Completion Form that gives a summary of the work undertaken during the apprenticeship period. This will be submitted to ERB along with the logbook and a file containing the quarterly reports.

5.6 Assessment of SEAP Trainees

Candidates who have completed the SEAP and are applying for registration as professional engineers must satisfy the Board in all of the following:

(a) Submit to ERB a Training Record Logbook properly filled and certified, as detailed above;
(b) Write and submit to ERB a Final PT Report, of not less than 2,000 words and not more than 3,000 words, on the SEAP training outlining experience gained. The format the professional training report is given in Appendix 8.
(c) The details of the report shall include:
    (i) Introduction
    (ii) Summary of the PT report itemizing all the activities covered during the entire training period.
    (iii) Details of the professional Training of some selected activities, showing role(s) played and experiences/competencies acquired.
    (iv) Conclusion(s).
(d) Subject to acceptance of the documents referred to above, attend and pass an interview with ERB;
(e) Write an essay on a subject matter covered in the candidate's 2000-word report. The essay, whose subject will be selected by ERB, will be done under examination conditions subsequent to the interview, and a maximum of one and half-hours will be allowed. The purpose of the essay is three-fold.
    - To test the candidate's ability to communicate properly in acceptable English;
    - To expose the candidate's ability to marshal thoughts and express them clearly and concisely.
    - To further ascertain the technical and professional competence of the candidate.

A candidate will be assessed in all the major areas of professional training, namely; Field/Site/Workshop Practice, Design and Management. A satisfactory Professional Training Report shall thus cover these areas. The assessment sheet is shown in Appendix 8.

5.7 Graduation

Depending on the duration of the professional training (prescribed training takes shorter period) and the date the trainee commenced his/her professional training, the SEAP Trainees will complete their training at different times of the year. SEAP trainees who successfully complete their training will be awarded ***"SEAP Completion Certificates"*** by the Board. The certificates will be given during a graduation ceremony to be organized by the Board at appropriate time.

6. 0 FEEDBACK AND IMPACT ASSESSMENT

6.1 General

In order to be able to assess the impact, SEAP will have on the performance of graduate engineers, it is important that a mechanism is put in place to get feed back from the graduate engineers themselves and also their training organizations and employers. The mechanism would deal with the assessment of the participants of the training programme and the relevance and impact that the training would have had on the performance of the trainees.

This will entail design of an impact assessment mechanism that consists of the following:

(i) An initial assessment questionnaire that would be administered at the beginning, to establish the standing of participants who have not undergone such a training;

(ii) A feedback questionnaire, which will be administered to participants at the end of the internship programme, to evaluate the conduct of the programme, and experience gained or acquired.

(iii) A modified version of the initial questionnaire to be administered some years later (at least two years after SEAP) to employers who have employed the former SEAP trainees and who have had experience with engineering graduates who had not undergone SEAP. This is intended to establish the impact of the knowledge and experience gained, and skills acquired on the candidates and their work.

(iv) Another questionnaire is to be directed to the Apprenticeship Providers (Training Organization)

The feedback and impact assessment will form a basis for future revisions of the programme and modes of delivery of the courses.

6.2 Initial Assessment

Each participant will fill a questionnaire at the start of the internship programme. The aim is to assess the level of understanding, knowledge and skills that the participant has in his/her specialization. Where possible a simple quiz could be administered in order to test the participants' competencies. This assessment will assist ERB in deciding on the best ways to deliver the internship programme.

This questionnaire will be developed by ERB. A checklist for designing the questionnaire is as follows:

(i) Personal data of participant (name of participant, name and address of training institution, academic and professional qualifications, name of Company and position in the Company – for those who are employed).

(ii) Indication if they have attended such training programme before. If so they should give details of the programme, including offering institution, dates, duration, type of certificate etc.

(iii) Own assessment of the level of knowledge and skills they have with regard to the contents of the SEAP e.g. none, poor, low, average, medium, high and very high.

(iv) Indication if they feel that lack of such knowledge and skills has affected their performance in the Company (for those who are already employed). For those who are not employed, they should indicate if lack of internship training has affected their chances of getting employment or performing professional work confidently.

(v) Indication of areas of training, which they would like to be given more attention during the programme.

6.3 End-of-Training Assessment

Each successful SEAP attendant will fill in a questionnaire at the end of the programme. The aim is to assess if the training has imparted new knowledge and skills to the participant. Participants will also be given an opportunity to give their views on the conduct of the programme, logistical arrangements and the training mentors.

The ERB will develop this questionnaire. A checklist for designing the questionnaire is as follows:

(i) Personal data of participant (name of participant, name and address of Company offering the training, academic and professional qualifications).
(ii) Own assessment of the level of knowledge they have gained e.g. none, poor, low, average, medium, high and very high.
(iii) Indication whether the knowledge they have gained through SEAP will help in improving their performance in their employment.
(iv) Indication of areas which they would like to be given more attention during the programme.
(v) Assessment of the logistical arrangements and suggest improvements that they would like to be made.
(vi) Assessment of the conduct of the training including views on whether the time allocated was sufficient, assessment of modes of delivery of the training and contents.
(vii) Assessment of the competence of training supervisor(s) and their capability to deliver the material to the participants.

6.4 Impact Assessment

This is a questionnaire aimed at establishing whether the training has had an impact in improving the participants' performance in their Companies. The questionnaire would be administered to the participants in the period of at least two years after the training. The ERB will develop this questionnaire. A checklist for designing the questionnaire is as follows:

(i) Personal data of participant (name of participant, name and address of Company, academic and professional qualifications, position in the Company, name of organization where the SEAP training was conducted and dates).
(ii) Indication if one has changed employer(s) from the time of the training.
(iii) Indication if participants have attended other training programmes after the SEAP. If so they should give details of the training, including name of the programme, offering institution, dates, duration, type of certificate, etc.
(iv) Opinion on the level of relevance of the programme to their activities in the Company e.g. none, poor, low, average, medium, high and very high.
(v) Explanation how useful they found the knowledge and skill acquired during the training in relation to their performance in the Company.
(vi) Indication how they have tried to help other workers in the Company to acquire the skills and knowledge gained during the training.

The employers of the participants will also be asked to give their opinion on how they perceive the training, and whether it has helped in improving the performance of the employee. The Logical Framework Analysis could be conducted together with this assessment.

The three impact assessment mechanisms stated above should in principle be performed on a continuous basis in order to effect minor modifications to the programme and also form an input into a longer term impact assessment mechanism in the form of **"Professional Engineer and Employer Survey"** outlined in this section.

"Professional Engineer and Employer Survey" will be similar to the "**Graduate and Employer Surveys"** carried out by the University of Dar es Salaam, which has been found to be a very effective means of impact assessment. In this form of study, whose methodology and tools are now well established and tested, a sufficient sample size of both professional engineers registered after being

trained under SEAP will be required to respond to key aspects of their performance. A parallel sample of employers of such professionals shall also be required to respond to questions that would enable an assessment of impact. It is proposed that such **Professional Engineer and Employer Surveys (or Tracer Studies)** be conducted every five years so as to form a basis for major modifications / improvements to the programme. It is through such tracer studies that ERB will be able to establish the effectiveness of the SEAP training, as perceived by the professional engineers as well as their employers.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE FOR POTENTIAL SEAP PROVIDERS

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

QUESTIONNAIRE FOR POTENTIAL APPRENTICESHIP PROVIDERS

1. Name of Organization, Institution or Company:
   ……

2. Address……
   ……
   ……..
   Tel……..
   Fax: ……..
   Email: ……..
   Name of the CEO/MD/GM of the Organization, Institution or Company
   ……..…….

3. Main Activities of the Organization, Institution or Company:
   ……
   ……..

4. Contact Person: …….. Position … ……..……..

5. Major Engineering Disciplines Embraced by Organization/Institution/ Company
   (i)……..
   (ii)……
   (iii)……
   (iv)……

   Attach additional sheet in case the space provided is not sufficient

6. Do you have internal/in-house training for your new engineers? YES/NO.

7. If YES, how long is the in-house training of Engineers?…….months

8. Do you support the requirement that all engineers should have a minimum of professional training exposure before they can be absorbed by the industry as professional engineers? □ YES □ NO

9. Is your organization/institution/company willing to take some trainee engineers in the major engineering fields currently covered by your organization/ institution/company? □ YES □NO

10. If the answer to Question 9 above is Yes, then for how long?
    □ 6 Months □ 12 months □ 18 months □ 24 Months

11. How many trainees can your organization/institution/company absorb per turn for the relevant disciplines? *Please indicate in the table below.*

ENGINEERING DISCIPLINE	No. of Trainees
AERONAUTICAL ENGINEERING	
AGRICULTURAL ENGINEERING	
CHEMICAL AND PROCESS ENGINEERING	
CIVIL ENGINEERING	
• Civil and Structural Engineering	
• Civil and Transportation Engineering	
• Civil and Water Resources Engineering	
ELECTRICAL ENGINEERING	-
• Electrical Engineering	
• Electrical Power Engineering	
• Computer Engineering and Information Technology	
• Telecommunications Engineering	
ENVIRONMENTAL ENGINEERING	
MARINE ENGINEERING	
MECHANICAL ENGINEERING	-
• Mechanical Engineering	
• Production Engineering	
• Electromechanical Engineering	
MINERAL PROCESSING ENGINEERING	
MINING ENGINEERING	
TEXTILE ENGINEERING	

12. Please indicate number of graduate engineers employed in different disciplines covered by the organization/institution/company.

Engineering Discipline	No. of Graduate Engineers

Attach additional sheet in case the space provided is not sufficient

13. Do you have registered professional engineers who can be deployed to supervise the professional training of graduate engineers at your organization/institution /company? □ YES □ NO

14. If the answer to Question 13 above is YES, please provide details in the table below.

Name of potential Professional Training Supervisor (PTS)	Discipline	Qualifications e.g. BSc, etc.	Experience (in years)

Attach additional sheet in case the space provided is not sufficient

15. When can your organization/institution/company be ready to start taking on some trainee engineers for professional training? (Please tick?)

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2003				
2004				
2005				
2006				

16. Organizations/Institutions/Companies can also use their involvement in SEAP as a means of identifying possible future employees. Do you think this may also be applicable to your organization/institution/company? □ YES □ NO

17. The professional training under SEAP will be largely financed by ERB. Is your organization/institution/company willing to contribute financially towards the training programme?
□ YES □ NO

18. If your answer to Question 17 is YES, please indicate how much you are willing to contribute and in what form per month?
- □ The equivalent of TShs 50,000 -100,000/= ;
- □ The equivalent of TShs 100,001-150,000/=;
- □ Full support for …….trainees (number);
- □ Some Other Support (Please specify) ……

Filled by (Name): ……

Position: ……

Signature: ……..

Date: ..……

Official Stamp

THANK YOU VERY MUCH FOR BEING SO KIND AS TO RESPOND TO THIS QUESTIONNAIRE!!

APPENDIX 2: APPLICATION FORM FOR ADMISSION INTO SEAP

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

Application Form for Graduate Engineers Seeking Admission into SEAP

Section 1: Particulars of the Applicant

1.1 Name of the applicant (*first and surname in full*): .....

Gender and age ☐ Male ☐ Female Age……years

1.2 Highest academic qualification attained by the applicant: .....

1.3 Engineering specialisation (eg. civil, mechanical, electrical, mining, textile, etc): .....

1.4 GPA Score the academic degree/diploma award ..... (or equivalent, max. 5 pts)

1.5 Name of institution from which applicant graduated:……..

1.6 Postal Address: .....

1.7 E-mail Address: ……

1.8 Current Employment (if any): :

1.9 Please state your main duties and responsibilities at your current employment:

a. .....

b. .....

c. .....

d. .....

1.10 Please attach the following documents:

- Certified copy of degree/diploma certicate (or other qualification);
- Academic transcript;
- Curriculum vitae;
- Letter from employer (if employed);
- Any other relevant information that the applicant wishes to include;
- Two (2) passport size photographs.

Section 2: Declaration

I certify that the particulars furnished in this application form are correct and complete in all respects and that no relevant information has been withheld. I understand that misrepresentation, falsification and/or withholding information in regard to this application are serious offences that may result in nullification of the application or withdrawal of the admission into SEAP and/or prosecution.

Applicant's Signature: ……Date:……

Section 3: Applicant's Witness and Referee (*must be registered engineer*)

This is to certify that I know …… as a graduate engineer, and that to the best of my knowledge the particulars entered in this form are correct.

Signature: …….

Name: ……..

Category of Registration: ……Reg. No.: ……..

Address: ……..

Date: …….. (Engineers Official Stamp)

Section 4: Assessment by ERB Secretariat

4.1 Criteria for Selection
(Please tick in the appropriate score column – where 1 denotes lowest score while 5 denotes highest score)

Criteria	*Maximum Score*	Scores				
		1	2	3	4	5
Academic Qualification	*25 for GPA 5.0*					
Years since Graduation	*10 for 0-1 yr and tapering to 2 for 5 yrs*					
Prior experience	*10 for no experience, tapering to 2 for 5 years unsupervised experience*					
Age	*10 for26 years, and tapering to 2 for 32 years*					
Registration with ERB	*10 bonus pts forregistration with ERB*					

4.2 Total Score (max. 65): …….

4.3 Recommendation by ERB Secretariat

☐ Application Accepted ☐ Application Rejected

Reason: ……...

4.4 Allocation of Training

The candidate is recommended for placement with …….. for SEAP training for a period of …….. months, starting from: ……

Signature ……..... Date …….

AR-PDA, ERB

Section 5: Decision of the Board

The Board during its …… meeting of …… deliberated on the submission by the applicant and the recommendations by the ERB Secretariat and made the following decision:

1. The applicant be placed with …….. for SEAP training for a period of …….. months starting from:……..
2. The application is rejected.

Further remarks (if any)

……..

……

Signature ……..….Date ……
Secretary of the Board

(Official Stamp)

THE UNITED REPUBLIC OF TANZANIA
ENGINEERS REGISTRATION BOARD

LOG BOOK

FOR

STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP) TRAINEES

NAME OF TRAINEE_____

NOTES ON THE USE OF SEAP LOGBOOK

(1) This logbook is issued to and used by all engineers pursuing the Structured Engineers Apprenticeship Programme (SEAP). The Engineers (SEAP Beneficiaries) include:

(i) SEAP Beneficiaries whose training is funded through Government subvention;
(ii) SEAP Beneficiaries whose training is administered by their respective employers; and
(iii) Engineers pursuing the SEAP through their own initiatives.

(2) The engineer training under the SEAP is responsible for keeping a detail record of the training he/she undergoes. The trainee is required to complete this Training Logbook for submission to the Board for professional review. This will enable the Board to obtain reliable information to assist it in deciding whether or not the engineer has undergone sufficient professional training.

(3) It is the joint responsibility of the SEAP Trainee, and the Professional Training Supervisor (PTS) or mentor to ensure that the Logbook is properly filled.

(4) At the end of every three months the logbook will be submitted to the Mentor for his comments. Records of the activities undertaken during the period will form the basis of the quarterly report for the period.

(5) The quarterly reports shall be commented upon by the mentor before submitting them to the Board. The quarterly reports shall be submitted to the Board by the trainees themselves.

(6) The logbook, complete and up–to–date, must always be available for inspection by a Board official.

(7) All training activities shall be recorded in chronological order.

(8) Topics to be recorded in the logbook are as contained in the Training Guidelines for the respective engineering disciplines.

PARTICULARS OF THE TRAINEE

(1) Name of SEAP Trainee: ……..

(2) ERB Registration No: …….....

(3) Training is governed by Agreement No.* ……

(4) Name of SEAP Provider and their Addresses: (including telephone Nos and E-mail addresses)

(i) ……

……

……

(ii) ……

……

……

(iii) ……

……

(5) Names of Professional Training Supervisors and their Addresses:

(a) ……

……

……

(b) ……

……

……

(c) ……

……

……

(6)Period covered by the Training Agreement: From ……..To……..

(7)Date of the Agreement: ……

*A tripartite agreement will be entered into between ERB, the SEAP Provider and the Trainee. Each of the three parties is expected to respect this agreement in letter and spirit.

THE TRAINING SCHEME

(a)Summary of Employer's Training Scheme (Where applicable)

……

……

……

……

……

……

……

……

……

……

(b)Summary of relevant ERB's SEAP Requirements and Guidelines

……

……

……

……

……

……

……

……

……

……

……

SUMMARY OF TRAINING RECORD (for a 3–month period)

Training Activities	Period	
	From	To

Supervisor's Comments

DETAILS OF TRAINING
(Describe in detail the professional experiences outlined in the previous page, indicate the position held or roles assigned, projects dealt with indicating its size and cost)

Name of Supervisor
(in block letters)

Supervisor's Signature

Date: ____________________

APPENDIX 4: TRIPARTITE AGREEMENT BETWEEN ERB, SEAP PROVIDER AND TRAINEE

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

Tripartite Agreement Between ERB, SEAP Provider and Trainee

Preamble

This agreement is made in recognition of the need to state and agree on the rights and responsibilities of the main parties involved in the implementation of the ***Structured Engineers Apprenticeship Programme (SEAP)*** under the Engineers Registration Board. It is a ***Tripartite Agreement*** so as to ensure that the parties are all aware of their roles stated in a single document.

Definition of Terms

The following terms used in this agreement shall be interpreted as follows:

"*Annual Engineers Day*" is an event celebrated annually by the engineering fraternity, organized by the Engineers Registration Board

"SEAP Provider" shall mean a company, institution or organisation that has agreed to provide apprenticeship to a SEAP trainee within a specified period;

"Guarantor" is a person who undertakes to guarantee the trainee admitted into SEAP;

"Local Transport Costs" is a fixed sum of money that shall be paid to trainees who are Government employees to cover local transport costs only;

"Meal Allowance" is a fixed sum of money that shall be paid to trainees who are Government employees to subsidize cost of meals;

"Professional Training Supervisor (PTS)" or ***"Supervising Professional Engineer"*** is a professional engineer registered with ERB with sufficient academic training and professional experience in the respective engineering discipline who shall be responsible for training, supervising and mentoring the trainee at the place of training;

"Quarterly Reports" reports of not more than 1500 words in length submitted to ERB by the SEAP trainee every three months summarising work done and competencies achieved;

"Structured Engineers Apprenticeship Programme" is the entire programme developed by ERB for the purpose of training graduate engineers to enable them to attain professional status in a structured manner;

"Trainee" shall be a graduate engineer who has been accepted into the Structured Engineers Apprenticeship Programme by the Engineers Registration Board;

"Training Allowance" this shall be a sum of money payable to the trainee during the period of training and only applies to trainees who are not on employment;

"Training Guidelines" a description of training elements and levels of competencies to be achieved by trainees, roles, responsibilities and obligations of trainee, Apprenticeship Provider, Professional Training Supervisor and ERB;

"Training Logbook" a book in which is entered a detailed and up-to-date record of activities undertaken by a Graduate Engineer on SEAP training, and which shall enable the Board to obtain reliable information on whether or not the Trainee has undergone sufficient training. The logbook shall be available for inspection by the Board at any time.

"Training Programme" a specific list of activities and time schedule that the trainee has to undertake while on SEAP training; and

"Travel costs" is the cost of travel in a mode appropriate for the trainee using the most direct route to the place of training including the cost of travelling when changing the placement station.

The Agreement

This agreement made on the ……day of ……, between **the Engineers' Registration Board (ERB), of P.O. Box 14942, Dar-es-Salaam,** hereinafter referred to as the **'Board'**, on the one part, and **Messrs**…….., **of P.O. Box**……., hereinafter referred to as the **'SEAP Provider'**, on the second part, and **Mr./Mrs./Ms**……., **of P.O. Box** ……., hereinafter referred to as the **'Trainee'**, on the third part;

In relation to a Structured Engineers Apprenticeship Programme, details of which have been availed to the parties;
Hereby witnesseth as follows:

1. The **SEAP Provider** undertakes to provide supervised training to the Trainee, of the nature and details specified by the Board, for a period of ……months, with the specific aim of enabling the Trainee to gain relevant professional qualifications and experience;
2. The **SEAP Provider** undertakes to designate a Senior Professional Engineer (PTS) who will act as the Trainer and Mentor of the Trainee for the designated period of ……months from (date)……. to (date) …….., and will certify the reports prepared by the Trainee;
3. The **SEAP Provider** undertakes to prepare a training schedule for the Trainee that will accommodate the training guidelines of the Board applicable to the Trainee's field of apprenticeship, and to abide by it;
4. The **Trainee** undertakes to follow the Training Programme diligently; to exhibit satisfactory conduct during the training period; to observe all the rules and regulations of the Apprenticeship Provider and the instructions of the PTS; and to follow all the stipulations of ERB in respect of keeping a logbook of daily activities and preparing quarterly reports.

5. The **Board** undertake to pay an allowance of TShs. …… per month to the Trainee during the period of training to cover the living expenses of the Trainee who is unemployed. In the case of Trainee who is already in Government employment the Board will pay a fixed sum of Tshs ……per month to cover local transport costs and a fixed amount of Tshs.…….per month to subsidise the cost of meals.
6. Transport costs shall only be paid during the change of placement station.
7. The **Board and the SEAP Provider** will not be responsible for meeting the health and any other social security costs of the Trainee during the period of training;
8. The **Board** undertakes to recognize the Apprenticeship Providers and Professional Training Supervisors during the ERB Annual Engineers' Day.
9. Any differences arising between the parties during the implementation of the programme will be amicably resolved through consultations.
10. In case the Trainee fails to complete the training programme due to unacceptable reasons, the Trainee or his/her Guarantor shall refund all the training costs incurred by the Board.
11. The SEAP Training Rules and Regulations, hereby attached shall be construed to be part and parcel of this agreement.

Signed and Delivered by the parties concerned on the date aforesaid:

Name: …… Signature: ……
Registrar, Engineers Registration Board

Name: ……... Signature: ……..……
SEAP Provider

Name: ……..…… Signature: ……
Trainee

Name:…….. Signature:……..…
Guarantor

APPENDIX 5: SEAP COMPLETION FORM

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

APPLICANT'S FORM FOR ASSESSMENT OF TRAINING COMPLETED

All candidates must complete Sections A, B and Declaration (c) on Page 4. Please refer to Training Guidelines of the "**Structured Engineering Apprenticeship Programme".** Candidates who have completed the structured training should enter full details in Section C and obtain a Mentors' Report in Section D.

Please return to:
The Engineers Registration Board
Pamba Roard
P.O. Box 14942
Dar es Salaam
Tanzania
Tel: +255 (0) 22 2122836
Fax: +255 (0) 22 2115373
E-mail:erb@intafrica.com

SECTION A (*To be completed by the candidate*)

Surname	Dr/Mr/Mrs/Ms/Miss/oth	Date of Birth
Other Names	Job Title	
Home Address	Employment Address	
Tel (Home)	Tel (Work)	Fax
ERB Reg. No.& Category *	e-mail/mobile	

***The candidate MUST have been registered or be applying for ERB registration**

Educational Institution	Course Title	Full/Part Time, Sandwich	Duration of Course	Date of Final Exam	Grade

SECTION B (*To be completed by the candidate*)			
Name of Present Employer or Organisation:	From	To	ERB
Other organizations, sites or subsidiaries from which this training/experience has been carried out:/ acquired			

For Office use only

Application	Previous Assessment	Decision (*delete) DEFER CREDIT APPROVE*	
Received	Made	Taken	Remarks
	Effective	Effective	
Training registered	Training (mths)	Training (mths)	
			Signed
	Elements needed	Elements needed	Date

SECTION C (*To be completed by the candidate*)

Candidate's Name: ----------

Validation: Please ensure that each entry in Section C has been initialed by the mentor(s) and the report in Section D written & signed accordingly.

Code	**Training Element**		
A	Induction		
B	Consultancy		
C	Contracting and engineering systems		
D	Management		
E	Marketing and finance		

Enter details in chronological order, earliest first. All six columns including totals must be completed.

Start Date		No. of	Departments in which training took place and content of training	State appropriate Training	Mentors'
Month	Year	Weeks		Element Code(s)*	Initials
Sub-Total (Wks)					

* See Section E: Training Elements

SECTION C (*continued*)

Candidate's Name

Start Date		No. of	Departments in which training took place and content of training	State appropriate Training	Mentors'
Month	Year	Wks		Element Code(s) *	Initials
Sub-Total (Wks)					

SECTION C (*continued*)

Candidate's Name

Start Date		No. of	Departments in which training took place and content of training	State appropriate Training	Mentors'
Month	Year	Wks		Element Code(s) *	Initials
Sub-Total (Wks)					
Holidays					
Total Time		**Date Training Completed:**			

I certify that the statements I have entered on this form are correct.

Signature of candidate Date

SECTION D (*to be completed by the Mentor or Professional Training Supervisor*)

Report for		(candidate's name)

Please include comments on the effectiveness of the training, the quality of the training record, and the candidate's progress and potential.

I certify that the training programme detailed in Section C, initialed and reported on by me has been completed satisfactorily.

Signed			Name			Date	
Organization			Position			Tel (Day)	
ERB Reg. No.			Reg Category				

To be completed if a second mentor or establishment has contributed towards the training:

I certify that part of the training programme detailed in Section C of this form and initialed by me has been completed satisfactorily during the period I was his/her PTS.

Date of Trng:From			To (date)		
Signed			Name		Date	
Organization			Position		Tel (Day)	
ERB Reg. No.			Reg Category			

SECTION E: Training Elements/Codes

	Code	Training element		Code	Training element
(a)	**A**	**Induction**		*D7*	Financial management
(b)	**B**	**Consultancy**		*D8*	Contract management
	B1	Communication skills		*D9*	Stores and materials management
	B2	Computer aided design		*D10*	Operations and maintenance management
	B3	Standards and codes of practice		*D11*	Energy supply and demand side management
	B4	Project appraisals	**(e)**	**E**	**Marketing and Finance**
	B5	Specifications and drawings		*E1*	Application of competence records to market personnel
	B6	Design and the environment		*E2*	Legal process and arbitration
	B7	Tender documentation		*E3*	Appreciation of accounting procedures
	B8	Cost estimation		*E4*	Taxation
	B9	Consultants procurement procedures		*E5*	Sales and pricing
	B10	Consultancy contracts		*E6*	Trade
	B11	Tendering procedures		*E7*	Presentation of company marketing information
	B12	Evaluation of tenders and report			
	B13	Construction contracts			
(c)	**C**	**Contracting and Engineering Systems**			
	C1	Communication skills			
	C2	Translation of designs including computer aided design			
	C3	Planning and tendering			
	C4	Procurement			
	C5	Setting out			
	C6	Management of construction site			
	C7	Verification for compliance with specifications			
	C8	Evaluation and payments			
	C9	Testing and commisioning			
	C10	Completion and final account			
(d)	**D**	**Management**			
	D1	Project management			
	D2	Human resources and labour control			
	D3	HSE management			
	D4	Time management			
	D5	Office management			
	D6	Total quality management			

APPENDIX 6: TRAINEE'S LETTER OF INTRODUCTION

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

COMPANY: ……..

……..

Re: THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)
Sub: Introduction of SEAP Trainees

We wish to express our profound gratitude and appreciation to your firm for agreeing to provide apprenticeship training to the **ERB-SEAP Trainees.**

We are pleased to inform you that Mr./Ms…….. whose **SEAP ID No.** is……has been selected to pursue professional training at your firm/company/organization in the field of …… …….. ……. for a duration of ……months commencing on the ……

We kindly request you to acknowledge the arrival of the Trainee by signing the **Trainee's Arrival Note** and the **Tripartite Agreement**, to be presented to you by the Trainee.

Yours sincerely,
Engineers Registration Board

Registrar

APPENDIX 7: TRAINEE ARRIVAL NOTE

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

TRAINEE'S ARRIVAL NOTE

Name of Trainee ……SEAP Reg. No……..……

Field of Training ……..

Tentative Training Start Date……

Tentative Finishing Date……

I declare that I have started working with (Apprenticeship Provider)

…… ……

Company/Organization Address: ……

Tel.No. …… Fax. No……...

E-mail ……..

Actual Starting Date ……...

Under the supervision of Mr./Mrs./Ms ……..…

Who is Site Engineer/Manager, Plant Engineer, Executive Engineer, etc. ……..…

Date ……..… Trainee's Signature ……...

Trainee's Contact Address: ……..…

SEAP Provider's Signature and Stamp. ……..……

N.B. This note should be duly endorsed by the SEAP Provider. The Trainee should mail this note by registered mail within the first week after starting the training programme.

APPENDIX 8: ASSESSMENT AND RATING OF PT REPORTS

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

ASSESSMENT AND RATING OF PT REPORTS

Section 1: Particulars of the Applicant

1.1 Name of the applicant: ----------

1.2 Specialization (e.g. civil, mechanical, electrical, mining, textile, etc): ----------

1.3 Gender and age: Male ☐ Female ☐ Age (Year): ----------

1.4 Postal Address: ----------

1.5 E-mail: ----------

1.6 Current Employment (if any): ----------

1.7 Name and Address of Employer (where applicable): ----------

---

1.8 Application No./ERB Reference No. ----------

1.9 Academic qualifications:

Name of Institution	Course of Study	Year Completed	Awards(s)

Section 2: Particulars of the application

The application is in respect of registration in the category of:

(i) Technician Engineer ☐

(ii) Professional Engineer ☐

Section 3: Assessment Criteria and Rating

Area of Practice	Assessment Criteria	Rating	Score
1. Field/Site /Workshop Competence	1.1 Maintenance practice 1.2 Ability to use theoretical and applied knowledge in independent practice 1.3 Problem diagnosis 1.4 Problem investigation and solving 1.5 Laboratory work or machine and workshop practice 1.6 Trouble shooting	0 – 10 0 – 10 0 – 5 0 – 5 0 – 5 0 – 5	
	Total	40	
2. Design Competence	2.1 Application of engineering standards 2.2 Innovativeness depicted 2.3 Balance between technical effectiveness and costs 2.4 Design calculations and drawings 2.5 Specifications 2.6 Quantities and estimating	0 – 4 0 – 4 0 – 4 0 – 10 0 – 4 0 – 4	
	Total	30	
3. Management	3.1 Ability to make effective engineering decisions 3.2 Ability of innovative planning, design and management 3.3 Staff and Labour Management (Material, labour etc) 3.4 Programming and Estimating 3.5 Maintenance Management 3.6 Costing and accounts 3.7 Quality assurance 3.8 Safety 3.9 Environmental issue	0 – 5 0 – 4 0 – 3 0 – 3 0 – 3 0 – 2 0 – 2 0 – 3 0 – 3	
	Total	30	
	GRAND TOTAL	**100**	

An applicant will be deemed registrable as a professional engineer if the total score is above 60 points. In the case of civil/structural engineering competence in design the applicant must score at least 18 points in design.

Section 4: Evaluator's Recommendation

*An applicant is registrable if overall assessment is **good*** in two (2) or **fair**** in three (3) areas of assessment. In the case of civil/structural engineering experience in design is mandatory.*

_____

_____

_____

Name:_____ Signature: _____ Date: _____

Section 5: Recommendation by ReTAC:

_____

_____

_____

Name	Signature
_____	_____
_____	_____
_____	_____

Date: _____

NB: *Assessment will be deemed **"good"** if the applicant scores more than 60% of the rating in two areas of practice.

Assessment will be deemed **"fair" if the applicant scores between 50% and 60% of the rating inall areas of practice.

APPENDIX 9A: SEAP IMPACT ASSESSMENT- INITIAL ASSESSMENT QUESTIONNAIRE

THE UNITED REPUBLIC OF TANZANIA
ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

SEAP IMPACT ASSESSMENT-INITIAL ASSESSMENT QUESTIONNAIRE
(*To be completed by the SEAP trainee at the start of the programme)*

1.0 Personal Particulars:

1.1 Name of SEAP Beneficiary:
_____

1.2 Age: _____

1.3 Postal Address:
_____

1.4 Physical Address:
_____

1.5 Telephone No:
_____

1.6 Fax No:
_____

1.7 E – mail Address:
_____

1.8 Engineering Education:

Name of Institution	Course of Study	Period		Awards
		From	To	

1.9 Employment Details (if employed)

Period		Name and Address of Employer	Duties and Responsibilities
From	To		

2.0 Previous Post Qualification Professional Training

2.1 Summary of Professional Training:

Period		Training Organization	Type/Area of Training	Achievement
From	To			

2.2 Effectiveness of the Training:

2.3 Very Good ☐ Good ☐ Fair ☐ Low ☐

2.4 Mentoring of the Training:

Provided ☐ Not Provided ☐ Self–Managed training ☐

2.5 Mentor effectiveness (where provided)

Very Good ☐ Good ☐ Fair ☐ Low ☐

3.0 Level of Skills/Competences Achieved From the Training

3.1 Field/workshop Practice: High ☐ Medium ☐ Low ☐

3.2 Ability to design systems/components:

High ☐ Medium ☐ Low ☐

3.3 Management: High ☐ Medium ☐ Low ☐

3.4 Research: High ☐ Medium ☐ Low ☐ None ☐

3.5 Teaching: High ☐ Medium ☐ Low ☐ None ☐

3.6 Ability to use modern engineering tools necessary for effective engineering practice:

High ☐ Medium ☐ Low ☐ None ☐

3.7 Innovativeness: High ☐ Medium ☐ Low ☐ None ☐

3.8 Communications Skills: High ☐ Medium ☐ Low ☐

3.9 Computer Aided Design: High ☐ Medium ☐ Low ☐ None ☐

3.10 Computer Literacy: High ☐ Medium ☐ ☐

3.11 Ability to identify, formulate and solve engineering problems:

High ☐ Medium ☐ Low ☐

3.12 Recognition for the need for Lifelong Learning: Yes ☐ No ☐

3.13 Ability to manage effective production and service systems:

High ☐ Medium ☐ Low ☐

3.14 Ability to integrate the engineering and business processes of an organization:

High ☐ Medium ☐ Low ☐

3.15 Any other relevant information on previous competences acquired by the SEAP Trainee:

_____

_____

_____

4.0 Effect of lack of Professional Training on Trainee's Professional Career or Employment Opportunities

4.1 Employed Trainees

4.1.1 Display of commitment and self confidence in understanding engineering activities:

High ☐ Average ☐ Low ☐

4.1.2 Leadership, managerial and organizing abilities:

High ☐ Average ☐ Low ☐

4.1.3 Innovativeness, ability to design systems, components or processes to meet desired needs:

High ☐ Average ☐ Low ☐ None ☐

4.1.4 Ability to identify, synthesize and solve engineering problems:

High ☐ Average ☐ Low ☐ None ☐

4.1.5 Understanding of professional and ethical responsibility:

High ☐ Average ☐ Low ☐

4.1.6 Ability to communicate effectively:

High ☐ Average ☐ Low ☐

4.1.7 Ability to use techniques, skills and modern tools necessary for Engineering practice:

High ☐ Average ☐ Low ☐

4.1.8 Ability to manage effective production and service systems:

High ☐ Average ☐ Low ☐

4.1.9 Ability to integrate the engineering and business processes of an organization:

High ☐ Average ☐ Low ☐

4.1.10 Recognition for the need and ability for lifelong learning:

High ☐ Average ☐ Low ☐

4.1.11 Personal responsibility for work, including activities of subordinates:

High ☐ Average ☐ Low ☐

4.1.12 Broad understanding of the impact of engineering solutions in a global Societal context:

High ☐ Average ☐ Low ☐

4.1.13 Quality of engineering works undertaken or supervised;

High ☐ Average ☐ Low ☐

4.1.14 Ability to contribute effectively towards national development:

High ☐ Average ☐ Low ☐

4.1.15 Professionalism: High ☐ Average ☐ Low ☐

4.1.16 Any other information

_____

_____

_____

_____

_____

_____

4.2 Unemployed Trainees

4.2.1 Opportunities/chances of securing direct employment:

High ☐ Average ☐ Low ☐ None ☐

4.2.2 Ability to employ oneself:

High ☐ Average ☐ Low ☐

4.2.3 Opportunity to contribute effectively towards national development:

High ☐ Average ☐ Low ☐

4.2.4 Any other information

_____

_____

_____

_____

_____

_____

_____

5.0 Preferred Area(s) of Training

Indicate areas of professional training, giving reasons, in which more emphasis should be placed:

_____

_____

_____

_____

_____

_____

_____

6.0 Any other general information on the professional training of the Graduate Engineer:

APPENDIX 9B: SEAP IMPACT ASSESSMENT- END OF TRAINEEING QUESTIONNAIRE

THE UNITED REPUBLIC OF TANZANIA
ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

SEAP IMPACT ASSESSMENT- END OF TRAINEEING QUESTIONNAIRE

(To be completed by SEAP trainee at the end of the programme)

1.0 Personal Particulars:

1.1 Name of SEAP Beneficiary:
_____

1.2 Age: _____

1.3.1 Postal Address:
_____

_____

1.4 Physical Address:
_____

_____

1.5 Telephone No:
_____

1.6 Fax No: _____

1.7 E-mail Address:
_____

1.8 Engineering Discipline:
_____

1.9 Date of SEAP Completion:
_____

1.10 Name(s) and Address (es) of SEAP Provider(s):
(i) _____

_____

_____

(ii) _____

_____

(iii) _____

_____

1.11 Name and Address of Employer:

_____

_____

_____

2.0 Personal Assessment of level of Professional Competence Gained by the Trainee

2.1 Desired professional skills and competences gained during the programme:

(i) Field/workshop Experience

Adequate ☐ Average ☐ Not adequate ☐

(ii) Design Experience:

Adequate ☐ Average ☐ Not adequate ☐

(iii) Management Experience

Adequate ☐ Average ☐ Not adequate ☐

2.2 Ability to use modern engineering tools necessary for effective engineering practice:

High ☐ Average ☐ Low ☐

2.3 Innovativeness and ability to identify synthesize and solve engineering problems:

High ☐ Average ☐ Low ☐

2.4 Ability to manage effective production and service systems:

High ☐ Average ☐ Low ☐

2.5 Awareness of the need for lifelong learning:

High ☐ Average ☐ Low ☐

2.6 Ability to integrate the engineering and business processes of an organization:

High ☐ Average ☐ Low ☐

2.7 Understanding of professional and ethical responsibilities:

High ☐ Medium ☐ ☐

2.8 Any other relevant information:

_____

_____

_____

3.0 Personal Assessment of the Impact of the Knowledge Gained through SEAP and how it will improve performance of the Trainee

3.1 Quality of the engineering works undertaken by the trainee.

High ☐ Average ☐ Low ☐

3.2 Effectiveness and efficiency in implementing or engineering projects/works:

High ☐ Average ☐ Low ☐

3.3 Leadership, managerial and organizing abilities:

High ☐ Average ☐ Low ☐

3.4 Innovativeness and ability to design systems, components or processes to meet desired needs:

High ☐ Average ☐ Low ☐

3.5 Ability to identify, synthesize and solve engineering problems:

High ☐ Average ☐ Low ☐

3.6 Ability to communicate effectively:

High ☐ Average ☐ Low ☐

3.7 Ability to integrate the engineering and business process of an organization:

High ☐ Average ☐ Low ☐

3.8 Any other relevant information:

_____

_____

_____

_____

_____

4.0 Areas to be Emphasized During the Programme

Based on experience and taking recognizance of the requirement of the industry, a Trainee to indicate areas of professional training that will have greater impact on the development of the country:

_____

_____

_____

_____

_____

_____

5.0 Logistical Arrangements and Suggestion to Improve the SEAP

Based on his/her experience, a trainee to suggest improvements which should be made to the SEAP:

_____

_____

_____

_____

_____

_____

_____

6.0 Assessment of the Conduct of Training

6.1 Effectiveness of the training:

High ☐ Average ☐ Low ☐

6.2 Views on the length of the SEAP:

Adequate ☐ Not adequate ☐

6.3 Adequacy of the Training Guidelines:

Adequate ☐ Not adequate ☐

6.4 Any other relevant information:

_____

_____

_____

_____

_____

_____

_____

_____

7.0 Assessment of the Competence of Training Supervisors

7.1 Professional ability of the mentors:

High ☐ Average ☐ Low ☐

7.2 Commitment by the mentors to the SEAP

High ☐ Average ☐ Low ☐

7.3 Mentoring effectiveness:

High ☐ Average ☐ Low ☐

7.4 Ability of the mentors to guide the trainees:

High ☐ Average ☐ Low ☐

7.5 Awareness of importance of the SEAP

High ☐ Average ☐ Low ☐

7.6 Any other relevant information/suggestion:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX 9C: SEAP IMPACT ASSESSMENT-FEEDBACK QUESTIONNAIRE

THE UNITED REPUBLIC OF TANZANIA
ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

SEAP IMPACT ASSESSMENT-FEEDBACK QUESTIONNAIRE
(*To be completed by SEAP beneficiaries two years after completing the training programme)*

1.0 Personal Particulars:

1.1 Name of SEAP Beneficiary:
_____

1.2 Age: _____

1.3 Postal Address:
_____

1.4 Physical Address:
_____

_____

1.5 Telephone No:
_____

1.6 Fax No: _____

1.7 E – mail address: _____

1.8 Engineering Discipline:
_____

1.9 Date of SEAP Completion:
_____

1.10 Name and Address of Employer:
_____

_____

_____

1.11 Business of the Employer:
_____

_____

1.12 Post held by the SEAP Beneficiary in the organization/firm:

_____

1.13 Name(s) and address(es) of the SEAP provider(s) where the Beneficiary underwent professional training:

(i) _____

_____

(ii) _____

_____

(iii) _____

_____

2.0 Employment Record Before and After SEAP Training

2.1 Name and Address of Employer before SEAP Training:

_____

2.2 Type of business of employer before SEAP Training:

_____

2.3 Name and address of current employer:

_____

_____

2.4 Type of business of current employer:

_____

_____

2.5 Reason(s) for changing employment:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

3.0 Further training and CPD programmes attended by the SEAP Beneficiary after SEAP Programme:

Name of Institution	Type of Training	Period		Awards
		From	To	

4.0 Relevance of SEAP to the Beneficiaries Professional Activities in the company:

4.1 Level of relevance:

Very high ☐ High ☐ Average ☐ Low ☐ None ☐

4.2 Level of awareness by the employer on the importance of SEAP:

High ☐ Average ☐ Low ☐

4.3 Effect on the quality of the works undertaken by the SEAP Beneficiary:

High ☐ Average ☐ Low ☐

4.4 Effect on the quantity of the works undertaken by the SEAP Beneficiary:

High ☐ Average ☐ Low ☐

4.5 Any other relevant information:

_____

_____

_____

_____

5.0 Usefulness of the Skills and Knowledge Acquired During the Training

5.1 Usefulness to the employing company:

Very high ☐ High ☐ Average ☐ Low ☐ None ☐

5.2 Usefulness to self – employment:

High ☐ Average ☐ Low ☐ None ☐

5.3 Usefulness to professional career development:

High ☐ Average ☐ Low ☐

5.4 Usefulness to employment prospects:

High ☐ Average ☐ Low ☐

5.5 Impact of the skills and knowledge to the development of the country:

High ☐ Average ☐ Low ☐

5.6 Any other relevant information:

_____
_____
_____
_____
_____
_____

6.0 Usefulness of the programme to other workers in the company/organization SEAP

Beneficiary to indicate how he has imported the skills and knowledge acquired during SEAP Training to other workers in the company/organization:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

APPENDIX 10: JOINING INSTRUCTIONS FOR SEAP BENEFICIARIES

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

JOINING INSTRUCTIONS FOR SEAP BENEFICIARIES

1. Preamble

These joining instructions are intended to ensure smooth and orderly placements of graduate engineers who have been selected to undergo the Structured Engineers Apprenticeship Programme (SEAP). The instructions serve to inform the trainees of various requirements they should fulfill before commencing the training.

2. Joining Instructions

2.1 All SEAP Trainees are required to report to their respective SEAP Providers within three (3) days from the date specified by the Board. Trainees must produce to the SEAP Provider all relevant original documents issued by the Board.

2.2 The Board will not entertain any change of SEAP Provider during the training period.

2.3 All SEAP Trainees are required to undergo medical examination before commencing the training. The doctor examining the Trainee shall complete a Medical Examining Form provided by the Board. Medical examinations shall be carried out by a government hospital.

2.4 All SEAP Trainees are expected to conform entirely to the Board's Training Regulations and Rules as well as SEAP Provider's Regulations.

2.5 All SEAP Trainees are expected to abide by the SEAP Professional Training Guidelines, and the terms and conditions of the Tripartite Agreement to be signed between the SEAP Provider, Trainee and the Board.

2.6 All SEAP Trainees are expected to diligently and effectively follow up the Board Training Programme as well as the SEAP Provider's internal training scheme.

2.7 Violation of the terms and conditions of the Board Training Regulations and the Tripartite Agreement will lead to forfeiture of the SEAP placement and recovery of any monies already paid to the trainee before the expiry of the training period.

2.8 Under the SEAP programme, the Board will pay:

- Training Allowances to Trainees who are not employed;
- Local transport costs and meal allowances only to Trainees who are already employed by the Government;
- Transport costs only, where applicable, when moving from one SEAP provider to another.

The Training Allowance will be paid to the Trainee's through Bank Accounts.

2.9 All SEAP Trainees are fully responsible for their accommodation, health, and social costs during the training period.

2.10 At the end of the training period all SEAP Trainees will complete and sign the relevant training documents that indicate that the Trainees have completed the Board's Professional Training Programme.

Registrar
Engineers Registration Board

APPENDIX 11: SEAP TRAINING REGULATIONS AND RULES

THE UNITED REPUBLIC OF TANZANIA
THE ENGINEERS REGISTRATION BOARD

THE STRUCTURED ENGINEERS APPRENTICESHIP PROGRAMME (SEAP)

SEAP TRAINING REGULATIONS AND RULES

1.0 INTRODUCTION

These rules and regulations have been established to ensure that the Structured Engineers Apprenticeship Programme (SEAP) is conducted in an orderly manner. All trainees are required to strictly follow them so as to win trust and cooperation of SEAP providers, Mentors and Financiers as well as all other stakeholders in the engineering sector. Proper implementation of the programme will not only ensure its expansion and sustainability, but it will also ensure that the nation gets value for money as the objectives of the programme will be achieved.

The Board, through respective SEAP providers and mentors, will be responsible for enforcing these rules and regulations.

2.0 THE REGULATIONS AND RULES

2.1 Acceptance of Offer of Training under SEAP

A graduate engineer selected to join the programme is required to indicate his/her acceptance, or otherwise, of the "**Offer of Training under SEAP**" within three weeks from the date of the offer or the date the list of selected trainees is published in the public media. Failure to do so will result in the forfeiture of the offer.

2.2 Reporting for Training

- A graduate engineer selected for professional training under SEAP is required to leave for training within three days from the date of finalizing placement formalities with the Board.
- Upon arrival at the training organization (SEAP provider), the trainee will produce the letter of introduction and "**Trainee Arrival Note**" to the SEAP Provider. The SEAP Provider will sign the Arrival Note and also indicate the date of arrival of the trainee. Soon thereafter, the trainee will return the Arrival Note to the ERB Secretariat.

2.3 Commitment to the Programme

Trainees are required to show great commitment to the Programme by:

(i) Pursuing the Programme diligently and assiduously.
(ii) Correctly completing the training logbook.
(iii) Timely submission of quarterly reports. Reminders from the Board shall imply that the trainee is not serious with the programme.

2.4 Attendance

- Trainees shall see to it that they attend all work schedules prescribed by their SEAP Providers. Absenteeism will not be accepted. Excused absences will only cover:
  - illness for which documentary evidence will be required.
  - death in the immediate family.
  - spousal leave for childbirth.
  - court summons (verified by subpoena).
- Trainees shall not leave their training organizations without the express Permission of the Board end or the SEAP Provider.

2.5 Looking for Employment during SEAP Training

- The Board encourages trainees to look for employment while pursuing the programme. This will enable the Board to select other trainees to fill the vacant training placements, created as a result of trainees securing employment. Trainees invited to appear for employment interviews will, however, require to obtain specific permission from the Board or the SEAP Provider to the travel to the venue of the interview.
- Undertaking part-time employment during SEAP training period is strictly not allowed. Trainees who do so, risk disciplinary action.

2.6 Follow up of Trainee's Progress and Attendance

- The Board will visit trainees at their training places biannually to check on their progress. During the visits the Board will, among others, check the trainees' logbooks.
- The ERB Secretariat will check the attendance of each trainee at least once a month. This will be done before processing the trainees' allowances.

2.7 Uniforms and Safety Gear

A trainee is required to wear ERB uniforms or safety gear when at work. Failure to do so constitutes a breach.

2.8 Respect of SEAP Providers Regulations

Trainees shall identify themselves as part and parcel of the SEAP Providers workforce and perform assigned tasks like employees of their respective training organizations. The trainees are therefore expected to obey and respect regulations of their SEAP Providers.

2.9 Evaluation of Quarterly Reports and Feedback

Trainees will be advised on the evaluation results/observations of their quarterly reports. Trainees shall resubmit their reports within one month, when required to do so, from the date of the advice.

2.10 Cooperation with SEAP Providers Workers

In order to reap maximum benefits from the Programme, SEAP Trainees are required to closely cooperate will the SEAP Providers' employees to the extent that nobody can differentiate between an employee and a trainee.

2.11 Handling of Trainees' Problems/Complaints

All problems or complaints on matters related to the SEAP shall be handled by ERB Secretariat. Where deemed necessary, the ERB Secretariat shall involve mentors and SEAP Providers.

2.12 Movement of SEAP Trainees From one SEAP Provider to Another

Where Trainees are unable to complete their professional training in one organization due to lack of requisite training facilities, the Board will transfer such trainees to other SEAP Providers.

2.13 Completion of SEAP Training

At the end of the training programme, the Board will notify the trainees on the completion of the programme; release employed engineers to their respective employers and unemployed engineers into the job market. Trainees who successfully complete the training will be issued “SEAP Completion Certificates”. Unceremonial departure is prohibited.

2.14 Personal Demeanour and Conduct

During the period of training all trainees are expected to comply with the laws of the country, employers’ regulations, ERB Training Regulations and the Code of Ethics for Engineers. Non-compliance will lead to appropriate disciplinary action being taken against defaulting trainees, which may include termination of training. Trainees whose training is terminated shall be required to reimburse the Board all costs incurred on them.