UNITED REPUBLIC OF TANZANIA

ENGINEERS REGISTRATION BOARD

REGISTRATION MANUAL 2019

(Volume I)

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AC	-	Alternating Current
ACET	-	Association of Consulting Engineers Tanzania
ADE	-	Advanced Diploma in Engineering
BEng	-	Bachelor of Engineering
BRELA	-	Business Registration and Licensing Agency
BSc (Eng.)	-	Bachelor of Science in Engineering
BTech	-	Bachelor of Technology
CAT	-	Computerised Axial Tomography
CATA	-	Contractors Association of Tanzania
CE	-	Consulting Engineer
CPD	-	Continuing Professional Development
CV	-	Curriculum Vitae
DC	-	Direct Current
EAC	-	East African Community
ECF	-	Engineering Consulting Firm
EMTL	-	Engineering Materials Testing Laboratory
EPC	-	Engineering, Procurement and Construction
ERB	-	Engineers Registration Board
ET	-	Engineering Technician
FECF	-	Foreign Engineering Consulting Firm
FTC	-	Full Technician Certificate
GE	-	Graduate Engineer
GIE	-	Graduate Incorporated Engineer
GN No	-	Government Notice Number
HCI	-	Human Computer Integration
HVAC	-	Heating, Ventilation and Air Conditioning
ICE	-	Independent Consulting Engineer
IE	-	Incorporated Engineer
IET	-	Institution of Engineers Tanzania
ILO	-	International Labour Organisation
IP	-	Internet Protocol
ISCO	-	International Standard Classification of Occupations
IT	-	Information Technology
LAN	-	Local Area Network
MSc	-	Master of Science
MIS	-	Management Information System
MRI	-	Magnetic Resonance Imaging
NACTE	-	National Council for Technical Education
NTA	-	National Technical Award
OSI	-	Open Systems Interconnection

PDU	-	Professional Development Unit
PE	-	Professional Engineer
PGD	-	Post Graduate Diploma
PTR	-	Practical Training Report
PhD	-	Doctor of Philosophy
ReTAC	-	Registration and Technical Affairs Committee
SADC	-	Southern Africa Development Community
SEAP	-	Structured Engineers Apprenticeship Programme
TACECA	-	Tanzania Civil Engineering Contractors Association
TCE	-	Temporary Consulting Engineer
TCP	-	Transmission Control Protocol
TCU	-	Tanzania Commission for Universities
TPE	-	Temporary Professional Engineer
VLSI	-	Very Large Scale Integration
WAN	-	Wide Area Network

GLOSSARY OF REGULARLY USED TERMS

Code of Conduct: A set of rules outlining the engineers' mission, values and principles, linking engineers with standards of professional conduct in engineering practice.

Code of Ethics: A set of rules outlining the ethical principles that govern the profession, and facilitating the protection of the public by forming the basis for appropriate disciplinary action.

Engineering: A profession in which the knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilise economically the materials and forces of nature for the benefit of humankind.

Engineering Team: A team that consists of "engineering scientists," "engineers," "engineering technologists," "engineering technicians," and "craftsmen." However, for this Manual, engineering team is limited to "engineers" and "engineering technicians".

Engineer: A graduate of a Bachelor of Science in Engineering or Bachelor of Engineering programme or equivalent, who uses the knowledge of mathematics and natural sciences gained by study, experience, and practice, applied with judgment, to develop ways to economically utilize the materials and forces of nature for the benefit of mankind.

Engineering Service: Professional services that are advisory in nature and relating to any engineering work, selling supplying for gain or reward any plan, sketch, drawing, design, specification or other document relating to any professional engineering works, services or goods.

Engineering Technician: A graduate of a National Technical Award Level 6 or 7 or Full Technician in Engineering, or equivalent, and works with equipment, primarily assembling and testing component parts of devices or systems that have been designed by others; usually under the direct supervision of an engineer. His preference is given to assembly, repair, or to making improvements to technical equipment by learning its characteristics, rather than by studying the scientific or engineering basis for its original design.

Engineering Work: Professional services that are not advisory in nature, such as consultation, investigation, evaluation, planning, designing, management of engineering projects or responsible supervision of construction or operation of buildings, machines, equipment, processes, works or projects that requires application of engineering principles and data.

Professional Ethics: Principles and standards that govern the behaviour of a person, or group in engineering practice.

Professionalism: The level of competence expected of an engineer of engineering firm in abiding to code of conduct and ethics and applying proper standards and principles in engineering practice.

1.0 INTRODUCTION

1.1 Background

The Engineers Registration Board (*hereafter to be referred as ERB or the Board*) is a statutory body established by Act No. 15 of 1997 as amended by Act No. 24 of 2007 with the responsibility for regulating the activities and conduct of engineers and engineering consulting firms in Tanzania. Amongst other provisions, the Act requires that all persons practicing engineering to register with the Board, and all employers of engineers and engineering services must engage only registered persons. Thus, one of the major involvements of the Board in regulating the engineering practice is to oversee the registration of engineers, engineering technicians and engineering consulting firms in the country.

In that regard, the Act has mandated ERB with the following specific functions, amongst others:

a) To maintain and keep a register of engineers, engineering technicians and engineering consulting firms;
b) To consider and decide on applications for registration;
c) To certify academic awards given by training institutions for consideration in an application for registration;
d) To conduct examinations for purposes of registration and grant certificates, diplomas and other awards of the Board to successful candidates;
e) To provide facilities and opportunities for learning and professional exposure and skills acquisition; and cause to be held professional training for graduate engineers and continuing development programmes for engineers and engineering technicians, *towards promotion of their registration and maintenance of status*;
f) To promote and maintain professional conduct and integrity of the profession;
g) To take legal action against persons or firms that practice engineering without being registered by the Board; and
h) To impose penalties on engineers, persons, employers of engineers and engineering consulting firms found guilty of professional misconduct for contravening any provisions of the Act.

In order to operationalise the indicated and other functions, ERB has set and is maintaining standards of professional competence, experience and ethics by which individuals (engineers and engineering technicians), and engineering consulting firms are assessed before registration. These are contained in various ERB Regulations, Rules and By-laws.

This Manual provides stakeholders with a convenient collation and consistent presentation of transparent registration information and processes by the Board.

1.2 Purpose of Registration

ERB registers engineers, engineering technicians and engineering consulting firms with the main purpose to protect the interests of customers and consumers of engineering services, as well as the general public. It assures that registered engineers, engineering technicians and engineering consulting firms can perform respective engineering practice with the desired quality while maintaining safety of human life, property and the environment in general.

More specifically, registration provides the following:

a) A benchmark through which the public, employers of engineers and clients can have confidence and trust that registered engineers, engineering technicians, and engineering consulting firms have met appropriate professional standards, as defined by the Board.

b) A basis for maintaining an up-to-date record of engineers, engineering technicians and engineering consulting firms to allow ERB to conduct effective monitoring of performances and enforcement of compliance of engineering professional requirements.

c) An opportunity to engineers and engineering technicians to demonstrate before peers their professional attainment and commitment to professional standards and continuous development for enhancing competence.

d) A feedback towards public identification of engineering education programmes that meet the stated criteria for respective graduates to qualify for registration. It also provides feedback to the Government, academic regulators and education providing institutions on required areas for improvements of engineering curricula and modes of delivery for enhanced eligibility of graduates to register and practice.

e) A basis for international comparability and mobility of engineers and technicians.

1.3 Benefits of Registration

1.3.1 Registered engineers, engineering technicians and engineering consulting firms

Individual engineers, engineering technicians and consulting firms that are registered with the Board may benefit from enhanced employability and job prospects; related higher earnings potential; accesses to ERB capacity building initiatives; and attainment of more self-motivation, command of respect and international recognition.

(i) Enhanced employability and job prospects

There exists a statutory requirement that only registered engineers and firms are allowed, or be employed to carry-out engineering works and services in Tanzania. Such reservation of work of engineering nature for the exclusive performance by registered persons and firms provides a platform for their more employability and job prospects. Further, the registration process requires peer recognition of engineering academic qualification of applicants as well as their professional competences and experiences. This brings additional guarantee to employers of one's achievement and credibility. The guarantee is solidified with commitments to executing work diligently, safely, and in compliance with the Codes of Conduct and Ethics, as well as maintaining and enhancing one's competence for meeting current and future engineering needs, which are facilitated by taking oaths.

(ii) Higher earnings potential

Enhanced employability with ERB registration may also lead to wider employment options, career progression and promotion. All these point to subsequent higher earnings potential.

(iii) Access to ERB capacity building initiatives

Registered engineers and engineering technicians are eligible to benefit from opportunities provided or facilitated by ERB for learning, professional exposure and skills acquisition and updating. Such ERB services are being provided with a view to promoting registration of candidates and employment prospects. ERB also facilitates capacity building of engineering consulting firms in order to qualify for more jobs.

(iv) Self-satisfaction/motivation

Registration provides a benchmark through which one can one-self confirm attainment of the peer-appreciable professional standards for registration at the appropriate level. Attaining the status of being part of an engineering elite and the exclusive use of reserved titles by registered engineers and be referred to by others is an incentive. The same are widely respected being a demonstration of one's level of competence and experience within the engineering profession.

(v) Command of respect

Achieving professional registration shows that one has the knowledge, competence and skills within his or her engineering field of expertise, as well as within one's organisation. It also confirms recognition in professional associations, enhanced networks with other people within the field of expertise and beyond, as well as more potential for involvement in influential activities, such as in task forces, special committees, campaign teams for related developmental undertakings, etc.

(vi) International recognition

ERB has good working relationships with various bodies that regulate the engineering profession in other countries within the East African Community (EAC), the Southern Africa Development Community (SADC) and beyond. The registration standards of ERB, against which individuals are assessed for professional registration in Tanzania are well respected by most such bodies. This may attract direct recognition, or some exemptions in the registration of engineers and technicians originally registered by ERB in those countries.

1.3.2 Employers of engineers, engineering technicians and engineering consulting firms

Engagement of registered engineers, engineering technicians and engineering consulting firms will benefit employers from avoiding the consequences of non-compliance to statutory requirements. It also enhances marketability and competiveness of the organisations, as well as value addition to their recruitment process and related human resources management.

(i) Compliance with statutory requirements

The Act restricts employment of persons and firms that are not registered by ERB to carry out engineering works and services in Tanzania. Recruiting or engaging registered engineers, engineering technicians and consulting firms helps to overcome the complications and stipulated consequences to defaulters.

(ii) Marketability of the organisation

Employment of registered engineers and engineering technicians attracts more confidence, and brings a great sense of credibility and respect from customers, the wider industry, and the public. This may attract more job prospects and contracts to the organisation. Regional and international recognition of engineers registered by ERB will allow organisations with such registered engineers and technicians to also access jobs in other countries.

(iii) Value addition to the recruitment process and related management of human resources

Registration of engineers and engineering technicians may add value to the recruitment process that the employee has satisfied a rigorous assessment of their engineering competence by peers, and some assurance that the credentials being claimed are actually held. Having being registered by ERB also provides confirmation that the recruited employee is committed to proper professional conduct and ethics following oaths taken by engineers to that effect, and also commitment to continuous professional development and lifelong learning.

1.3.3 Engineering Education Providers and Academic Regulators

Outcome from the registration process will provide the engineering education providers and academic regulators such as TCU and NACTE feedback on the standards required for professional registration by ERB. In that respect the institutions will obtain evidence that respective qualification or degree programme is recognised professionally and meets standards set by the profession and may thus attract more prospective students.

1.3.4 Other stakeholders

Other stakeholders include customers and consumers of engineering services, the wider society and the Government. While customers will be assured with the value for money from investments on engineering works and services performed with registered individuals and firms, consumers and the wider society will directly or indirectly benefit from the use of products realised from engineering works and services, in terms of functions and enhanced safety. From the Government perspectives, registration will promote good governance and the rule of law, as well as attract more revenue from tax as a result of formalised and enhanced engineering undertakings.

1.4 Objectives of the Registration Manual

Existence of this Manual is provided by Regulation 4 of the Engineers Registration Regulations, 2010 (GN No. 35 of January 29, 2010). Its main objective is to avail in one document a compilation that defines in transparent manner and simple terms the registration standards and processes by which engineering technicians, engineers, engineering consulting firms and materials testing laboratories are currently being supported, as appropriate, and assessed before registration. Essentially, the intention is to enhance stakeholders' understanding of the provisions in the law that governs the registration process and related issues.

Such law - the Engineers Registration Act No. 15 of 1997 as amended by Act No. 24 of 2007 (hereafter referred to as "the Act") is being operationalised in respect of the registration function by Regulations, Rules and By-Laws. Currently, these include: *the Engineers Registration Regulations, 2010; the Engineers Registration By-Laws, 2010; the Engineers Registration (amendment) By-Laws, 2013; the Engineers Registration (professional practice, conduct, oath and ethics) Rules, 2014; the Engineers Registration (Registration of Independent Consulting Engineers) Rules, 2016; and the Engineers Registration (Registration of Engineering Technicians) Rules, 2014*.

The Manual has been prepared for use by various stakeholders, including ERB registrants and potential registrants, employers, engineering institutions, government and the wider public.

1.5 Scope

The Registration Manual includes the main document, guidelines and related instruments collectively covering the standards and procedures for registration of engineering technicians, engineers and engineering consulting firms, as well as professional development activities for their promotion. This is Volume I of the Manual providing the overall framework and a description of the processes and procedures for registration of Engineers.. Volume II will provide for processes and procedures for Engineering Technicians, while Volume III will be for the classification of Engineering Consulting Firms.

2.0 ENGINEERING WORKS AND SERVICES RESERVED FOR HANDLING BY REGISTERED ENGINEERS

The Act has reserved professional engineering works and services for the exclusive performance by registered persons and firms only.

2.1 Professional Engineering Work and Service

Professional engineering work includes professional services, consultation, investigation, evaluation, planning, designing, management of engineering projects or responsible supervision of construction or operation in connection with any public or privately owned public utilities, buildings, machines, equipment, processes, works or projects where public interest and welfare or the safeguarding of life, public health, environmental sustainability or property is concerned or involved and that requires application of engineering principles and data.

Professional engineering service on the other hand, means advisory services relating to any professional engineering work, selling supplying for gain or reward any plan, sketch, drawing, design, specification or other document relating to any professional engineering works, services or goods. Professional engineering services with a liability to be sued are referred to as consulting engineering services.

Pursuant to the Act, no person other than a registered engineer, or as exempted shall engage in professional engineering works and services, and neither be employed to undertake such works and services, whether under contract or any other form of agreement. Furthermore, no body of person whether corporate or unincorporated is allowed to carry on as engineer unless one of its partners, members or shareholders as the case may be is a registered engineer.

2.2 Exemptions

A person is deemed not engaged in professional engineering work or service:

(i) If that person renders such services to his employer by whom is employed under a contract of service in a full time basis;

(ii) At the time of so doing, that person is under the direction or supervision of a registered engineer who shall assume professional responsibility of the work or service.

3.0 REGISTRATION STANDARDS

3.1 Categories of Registration, Basic Requirements and Roles

In order to allow vertical and horizontal progression in the engineering profession, the Board has introduced various categories of registration based on one's academic qualification, professional competence and experience, as well as the manner in which engineering is practiced by registrants.

3.1.1 Clusters of registration categories

The prevailing legislations provide for the Board to register different categories of individuals and entities. These are clustered and diagrammatically shown in Fig. 1.

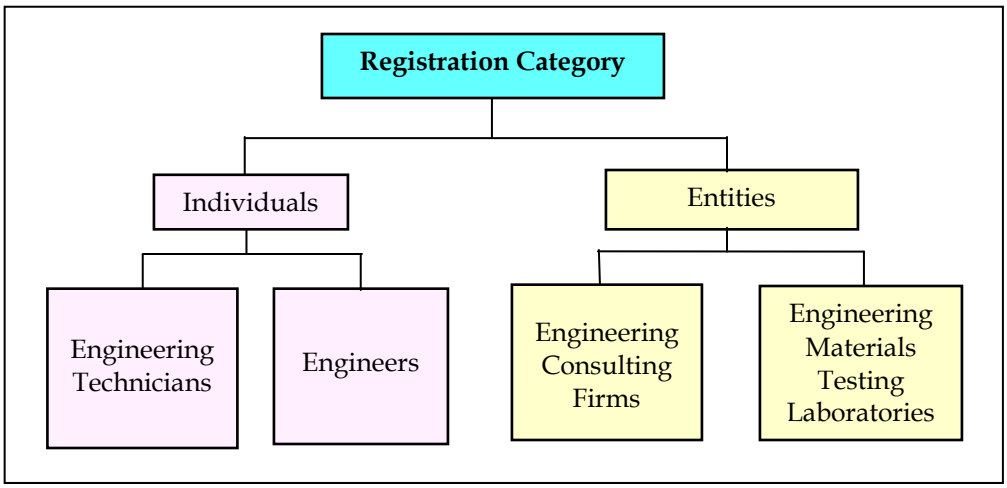

Figure 1: Cluster of registration categories

While individuals are registered in persons based on respective capabilities, an engineering entity is registered based on its capability (quality of persons) and capacity to deliver the required engineering services.

3.1.2 Engineering Technicians

(a) Registration categories

Registration of engineering technicians is made in two categories, namely Engineering Technicians Level II (ET II) and Engineering Technicians Level I (ET I) as shown in Fig. 2.

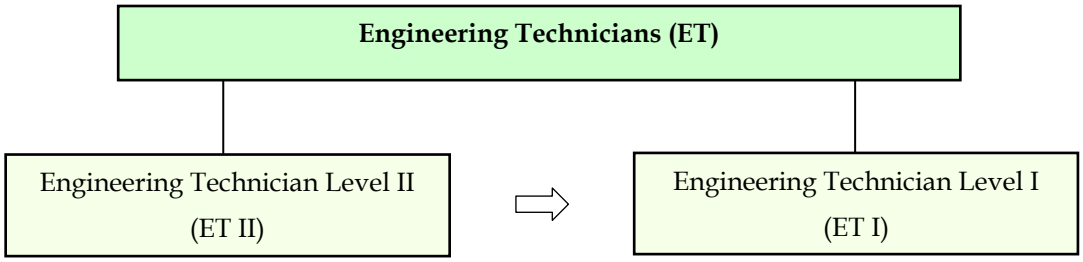

Figure 2: Registration categories for Engineering Technicians

(b) Basic requirements

(i) Engineering Technicians Level II (ET II)

Holder of the National Technical Awards Levels 6 or 7 or its equivalent.

(ii) Engineering Technician Level I (ET I)

Engineering Technicians Level II (ET II) with evaluated working experience of not less than three (3) years.

(c) Key roles and responsibilities

Using basic knowledge and well-developed skills in carrying out processes with significant choice of standard procedures that are mainly routine in nature, with a view to applying proven techniques and procedures to the solutions of practical engineering problems, under the supervision of engineers in engineering projects or research and development, in line with the Code of Conduct and Ethics for Engineers and Engineering Technicians.

3.1.3 Engineers

(a) Registration categories

Registration of engineers is made in two main lines, namely for Incorporated and Professional Engineers as diagrammatically shown in Fig. 3, depending on one's basic qualification in engineering education.

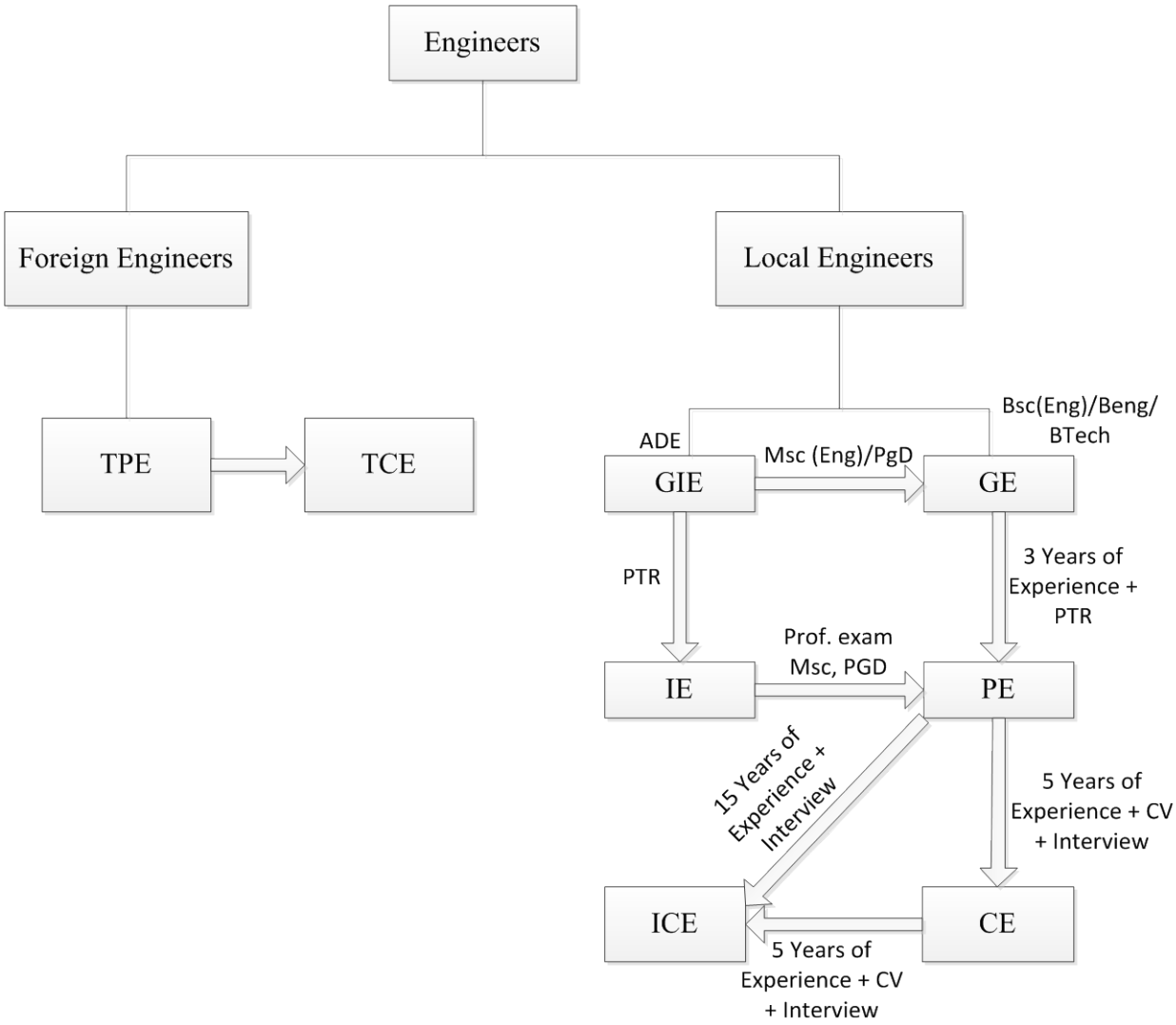

Figure 3: Registration categories for Engineers

(b) Basic requirements

As shown in Fig. 3, registration of local engineers is done under all specialisations recognised by the Board. In overall the Board currently registers individual engineers in eight (8) categories.

Under the Incorporated Engineers' line there are two (2) categories, all involving citizens of Tanzania with the following other respective basic requirements for registration:

(i) <u>Graduate Incorporated Engineer (GIE)</u>

Holder of a higher diploma or equivalent qualification in engineering obtained from an engineering polytechnic or college recognized by the Board.

For those in Marine Engineering, GIE will be:

- Holder of Advanced Diploma in engineering and has attained a minimum period of 21 months of sea service; *or*
- A person who has passed a cadet course in marine engineering for at least 18 months after 1994 and has attained a minimum period of 21 months of sea service.

(ii) Incorporated Engineer (IE)

Graduate Incorporated Engineer with a minimum of 3 years of practical experience of such nature as to satisfy the Board as to one's competence to practice as IE. This include practical experience obtained from successful completion of Structure Engineers Apprenticeship Programme (SEAP), and submission of the requisite SEAP documents.

For those in Marine Engineering, IE will be:

- Holder of Class Two Certificate of Competency in Marine Engineering and has passed written examination of Class One Certificate of Competency in Marine Engineering; *or*
- Holder of Class Two Certificate of Competency in Marine Engineering from the Dar es Salaam Maritime Institute graduated before July, 1993 but has not passed written examination of Class One Certificate of Competency in Marine Engineering but attained a minimum period of 36 months of sea service.

The Professional Engineers' line on the other hand, has four (4) categories with the following respective basic requirements for registration:

(iii) Graduate Engineer (GE)

Tanzania citizen who is a holder of a degree or diploma which is recognised by the Board as furnishing a sufficient guarantee of an academic training in engineering.

For those in Marine Engineering, GE shall be a Tanzania citizen who is a holder of a degree in engineering and a Class Three Certificate of Competency in Marine Engineering and has attained a minimum period of 21 months of sea service.

(iv) Professional Engineer (PE)

- A member of an institution of engineers, the membership of which is recognized by the Board as furnishing a sufficient guarantee of academic knowledge of, and practical experience in engineering, *or*

- Graduate Engineer and has a minimum period of three (3) years practical experience in planning, design, field work and engineering management. This include practical experience obtained the three (3) years' Structured Engineers Apprenticeship Programme (SEAP) being directed by the Board, or other modes whereby graduates undergo unstructured and self-directed training at work places, but are able to demonstrate possession of adequate professional experiences comparable to that acquired under SEAP; *or*

- Academic and research engineering staff with a minimum period of two (2) years of practical experience after obtaining master degree in engineering and one year for holders of Ph.D. in engineering; *or*

- Incorporated Engineer with a minimum of one (1) year post registration experience and has either passed the prescribed professional examination as set by the Board or undergone and passed an examinable and additive postgraduate course of at least one year duration, or has other qualifications as may be determined by the Board as being commensurate with the field under which the candidate has applied for registration.

For those in Marine Engineering, PE will be:

- A member of an institution of engineers, the membership of which is recognized by the Board as furnishing a sufficient guarantee of academic knowledge of, and practical experience in engineering; *or*

- A holder of Class One Certificate of Competency in Marine Engineering; *or*

- A holder of a degree in engineering and a Class Two Certificate of Competency in Marine Engineering and has attained a minimum period of 36 months of sea service.

All Professional Engineers shall be Tanzania citizens.

(v) Temporary Professional Engineer (TPE)

TPE registration is reserved to non-Tanzania citizens who are less than 70 years old and have contract of employment in Tanzania. These should at least possess either of the following:

- Professional membership that may enable him to practice as Professional Engineer in his home or any other country; *or*
- Registration as chartered engineer; *or*
- Acceptable performance record of not less than five (5) years before coming to Tanzania, in accordance with the ERB Guidelines; *or*
- Evidence of personal involvement in at least three (3) engineering projects in the last five (5) years.

(vi) Consulting Engineer (CE)

- Professional Engineer with at least five (5) years post registration proven experience in planning and design, management and of exposure in the field of specialization; *and*
- Must be employed or engaged in an engineering consulting firm.

(vii) Temporary Consulting Engineer (TCE)

TCE registration is reserved to non-Tanzania citizens who have contract of employment with engineering consulting firm having working contract in Tanzania and at least possess the following:

- Proof of registration that may enable him to practice as consulting engineer in his home or any other country, and
- A record of acceptable performance of not less than five (5) years, before coming to Tanzania, and submitted in accordance with the Guidelines of the Board.

(viii) Independent Consulting Engineer (ICE)

- A Tanzania citizen with a minimum of five (5) years post registration experience as CE in the field of specilaisation applied

for, or a minimum of fifteen (15) years post registration experience as PE in the field of specialisation applied for; *and*

- Satisfactory professional competence and clean record of professional conduct and ethics as may be determined by the Board.

(c) Key roles and responsibilities

(i) Graduate Engineers (GIE/GE)

Using advanced knowledge and understanding of mathematics and basic sciences to conceptualize engineering components, systems and processes, and use the principles of engineering sciences to identify and solve complex and open ended engineering problems under the mentorship and supervision of registered professionals in engineering projects, in line with the Code of Conduct and Ethics for Engineers and Engineering Technicians.

(ii) Professional and Incorporated Engineers (PE/IE)

Performing professional work alone or with others, in directed or self-directed activities within broad general guidelines or functions, touching base with advanced knowledge and understanding of mathematics, basic and engineering sciences to conceptualize engineering components, systems and processes, and applying effective practical and interpersonal skills to solve predictable and unpredictable complex problems in engineering projects or research and development, in line with the Code of Conduct and Ethics for Engineers and Engineering Technicians.

(iii) Consulting Engineers (CE/TCE)

Performing independent professional work, taking more team responsibility and providing effective leadership and management, including in planning, budgeting, organizing, directing and controlling tasks, human and physical resources for effective engineering project implementation and continuous improvement through quality management, in line with the Code of Conduct and Ethics for Engineers and Engineering Technicians.

(iv) Independent Consulting Engineers (ICE)

Independent Consulting Engineer is essentially an experienced professional or consulting engineer, and thus comparable roles and responsibilities. ICE is however registered as such for performing

professional work on assignments for which teams of personnel or additional outside professional are not required, and the experience of the individual are the paramount requirement.

3.1.4 Engineering Consulting Firms

(a) Registration categories

Engineering consulting firms are registered as local or foreign firms as diagrammatically shown in Fig. 4.

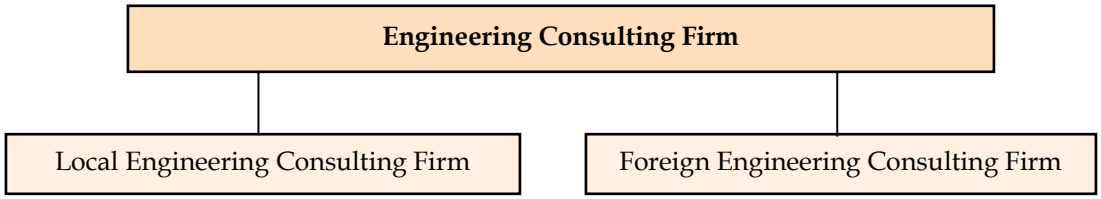

Figure 4: Registration categories of Engineering Consulting Firms

(b) Basic requirements

(i) Local Engineering Consulting Firm (LECF)

- At least fifty one percent (51%) of shares held by consulting engineers who are Tanzania citizens; and
- Certificate of Incorporation/registration with the Registrar of Companies, or Act of establishment for parastatals or agencies; and
- Current business license (if obtained); and
- Tax Clearance from Tanzania Revenue Authority; and
- Office ownership or lease agreement; and
- Documentary evidence of ownership of equipment/facilities; and
- Listing of owned reference books, code of practice, design manuals, engineering design software; and
- Existence of a consulting engineer in each of the fields of specializations applied for registration.
- Evidence of independence of practice for public institution consulting units.

(ii) Foreign Engineering Consulting Firm (FECF)

- Certificate of Incorporation or registration in Tanzania with the Registrar of Companies; and
- Company profile of previous consulting works;
- Current annual returns filed with Registrar of Companies (for new companies – Article and Memorandum of Association);
- Current business license or evidence of offer/contract of engagement or business in Tanzania; and
- Office ownership or lease agreement; and
- Documentary evidence of ownership of equipment/facilities; and
- Listing of owned reference books, code of practice, design manuals, engineering design software; and
- Existence of a consulting engineer in each of the fields of specialization applied for registration; and
- Extract from contract in case of a firm engaged in Government projects showing equipment and facilities for the project availed to the consulting firm.
- Power of Attorney deposited and endorsed by Registrar of Titles.

3.1.5 Engineering Materials Testing Laboratory (EMTL)

(a) Registration categories

The Board registers Engineering Materials Testing Laboratories in one category with condition that these entities offer consultancy business in materials testing for public consumption.

(b) Basic requirements

The basic requirements by the Board in the registration of EMTL include the following:

(i) Legal establishment status
(ii) Ownership or lease of premises
(iii) Job description of key staff for the laboratory
(iv) Quality assurance policy and operational manual
(v) Organisation structure of the laboratory
(vi) The Laboratory-in-Charge must be a Professional Engineer
(vii) Listing of owned testing machines and purpose
(viii) Calibration records
(ix) Listing of owned reference manuals

3.1.6 Engineering Projects

There Board also registers engineering projects in order to allow effective monitoring of performance of engineering activities and conduct of engineers and engineering consulting firms during implementation. It is the responsibility of the respective engineer and engineering consulting firms to report to the Board on all engineering projects they are involved in prior to commencement. Registration of such engineering works and services shall indicate type and nature of the project and abide by other requirements as may be provided by the Board.

3.2 Engineering Disciplines

The Board has prescribed a total of eleven major (11) engineering disciplines under which registration consideration is based, as shown in Table 1. The Board may consider additional engineering disciplines as may be deemed necessary. Branches that are associated with the prescribed engineering disciplines and respective areas of practice are shown in ***Appendix I.***

Table 1: Prescribed Engineering Disciplines and respective major characteristics

S/N	Engineering Discipline	Major Characteristics
1	Agricultural	Conduct research on; advise on, develop ways to conserve soil and water, and to improve the processing of agricultural and forest products; design machines and machinery for agricultural mechanization and value addition to crop, animal, fish and forest products, and direct their functioning, maintenance and repair; advise on all other technological aspects of related materials, products and processes.
2	Bioengineering	Conduct research on; advise on, develop and direct bioprocesses and methods for production of materials, technology and systems for health, medical, agricultural and other industrial applications; and direct their functioning, maintenance and repair; and advise on all related technological aspects of particular materials, products and processes.
3	Chemical and Process	Conduct research on; advise on, develop and direct chemical processes and methods for production of various substances and items such as crude oil, petroleum derivatives, food and drink products, medicines or synthetic materials; advise on, and direct maintenance and repair of chemical plant and equipment; and advise on all other chemical aspects of related particular materials, products and processes.
4	Civil	Conduct research on; advise on, plan, design and direct the construction of civil engineering structures, such as bridges, dams, docks, roads, airports, railways, canals, pipelines, waste disposal systems, industrial and other buildings, etc., including specifying construction methods, materials and quality standards; manage their

S/N	Engineering Discipline	Major Characteristics
		operation and maintenance; and advise on all other technological aspects of related materials and processes.
5	Computer and Information Technology	Conduct research on; advise on, design and direct the development of computer hardware, software, and information technology including for internet, intranet and multimedia technology; advise on complex system design and architecture specifications and data models in the development, configuration and integration of computer systems, databases and information systems to ensure their optimal performances, data integrity and security; and advise on all technological aspects of related materials, products and processes.
6	Electrical	Conduct research on; advise, design and direct the construction of electronic, electrical and telecommunications systems, components and equipment; manage the operations, maintenance and repair; establish control systems to monitor performance and safety of assemblies and systems; and advise on all other related aspects of electrical engineering materials, products and processes.
7	Environmental	Conduct research and advise on, design and direct implementation of solutions to prevent, control or remedy negative impacts of human activity on the environment; advise on operational effectiveness of industrial and municipal facilities and programmes; conduct environmental assessments of engineering projects and apply valid principles to pollution control, recycling and waste disposal.
8	Marine and Naval Architecture	Conduct research on; advise on and direct the design and construction of marine vessels including hull form, stability, propulsion, steering and other equipment and systems; manage the operations, maintenance and repair of ships, boats and related equipment and establish control systems to monitor their performance and safety; and advise on all other technological aspects of related materials, products and processes.
9	Mechanical	Conduct research on; advise on, develop effective ways in using the basic factors of production in manufacturing products and offering engineering services; design and direct production of industrial machinery, equipment, plants and related systems, automotive technology (motor vehicles, locomotives, aircrafts, ships, etc.); and direct their functioning, maintenance and repair; advise on all aspects of related materials, products and processes.
10	Mining	Conduct research on; advise on, develop and maintain commercial-scale methods of extracting metals from their ores, or minerals from the earth, and of developing new alloys, ceramic and other materials; develop equipment for safe mining and mineral processing operations and product handling; advice on mining or metallurgical aspects and standards of related particular materials, products and processes.
11	Petroleum and Gas	Conduct research on; advise on, determine the drilling methods to be used, and monitor drilling and production operations; design and develop equipment, technology, methods and processes to achieve the maximum profitable recovery of oil and gas, and for safe oil and

S/N	Engineering Discipline	Major Characteristics
		gas recovery and transportation; study and advice on all other petroleum and gas aspects and standards of related materials, products and processes.

The indicated major characteristics of the engineering specialisations are in harmony with the definitions of the corresponding occupations in ISCO-08 as published by ILO in 2012.

4.0 REGISTRATION PROCESS AND PROCEDURES

4.1 Registration Process

The registration process follows the sequence as shown in Fig. 5 and applies to all categories of registration.

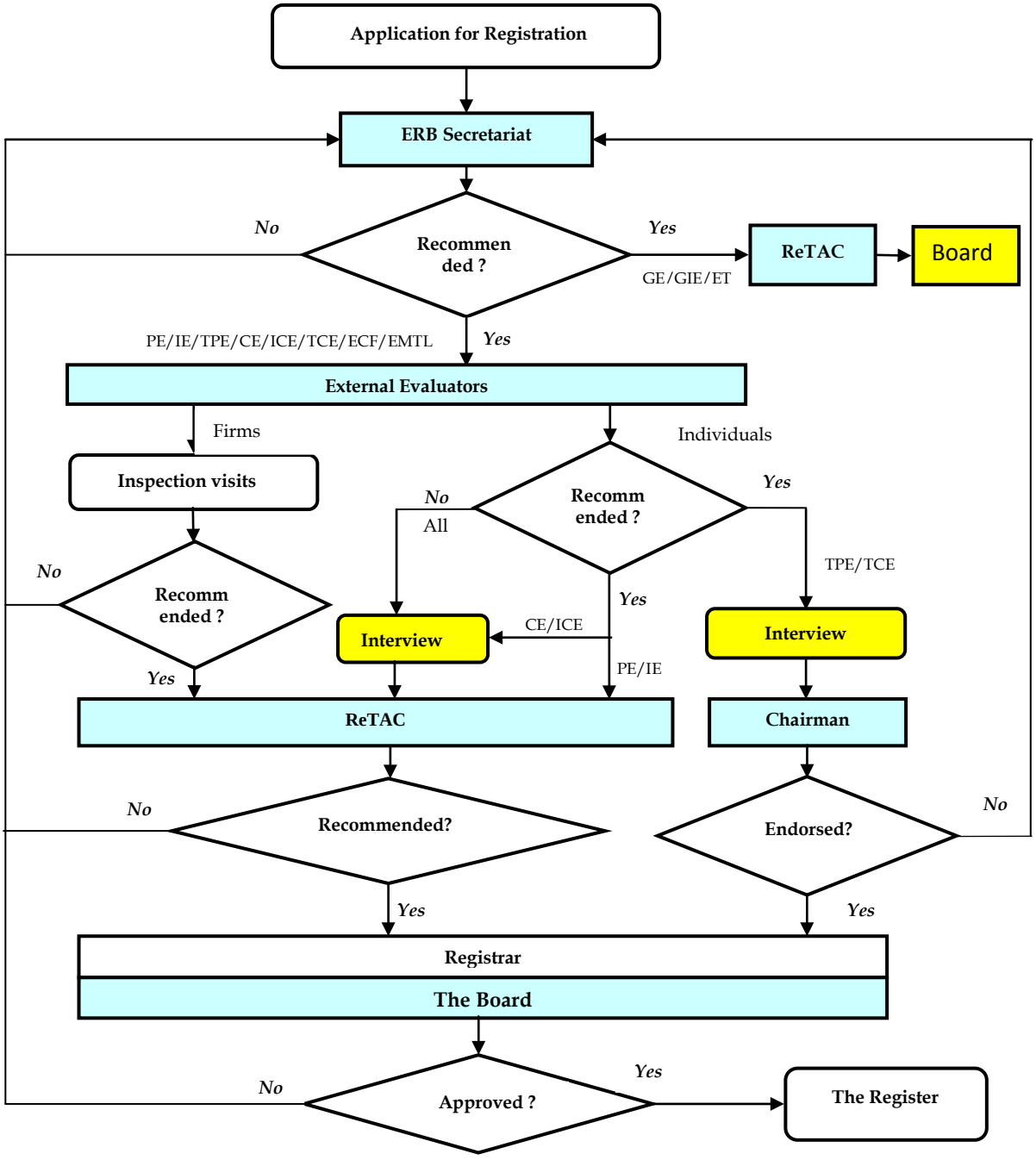

Figure 5: Registration Flow Chart

The process is coordinated by the ERB Secretariat under the oversight of the Board, through its Registration and Technical Affairs Committee (ReTAC). As it is apparent from Fig. 5, five (5) main centres exist for evaluation of applications before the name of a successful applicant is entered into the Register. These are the Secretariat, External Evaluators, ReTAC, ERB Chairman, and the Board as follows:

(a) The Secretariat receives the applications and scrutinizes to ensure fulfilment of the basic requirements. The recommended applications are directed to a specific route depending on the category applied for while the unsuccessful applications are referred back to the applicant;

(b) Applications for graduate engineers and engineering technicians are submitted to ReTAC for further evaluation;

(c) All other applications which are recommended by secretariat are sent to Independent Evaluators for more detailed evaluation;

(d) After independent evaluation of applicants;

(i) Successful local applicants towards PE, IE and are sent for review by ReTAC while the unsuccessful ones are referred for interview before review by ReTAC.

(ii) All local applicants towards CE and ICE are referred for interview before review by ReTAC.

(iii) All foreign applicants towards TPE and TCE are referred for interview before review by the Chairman of ERB.

(iv) Applicants towards registration of firms and laboratories (LECF, FECF and EMTL) are subject to inspection before sending recommendations to ReTAC for further consideration.

(e) ReTAC and Chairman of ERB review the submissions as the case may be, and submit the accepted applications to the Registrar for presentation to the Board;

(f) The Board makes the final decision on the applications;

(g) The names of successful applicants for registration are published in the manner that is appropriate to the Board. Unsuccessful applicants are notified in writing by the ERB Secretariat as appropriate.

4.2 Registration Procedure

All actors in the registration process are expected to adhere to the procedure laid down by the Board to that effect.

4.2.1 Applicants

Applicants can contribute to the speeding-up of the registration process by timely providing all the information required to support their applications. In order to avoid unnecessary delays or a failed application, a person wishing to be registered under any of the categories and broad engineering disciplines as highlighted in Chapter 3 of this Manual shall:

(a) Satisfy themselves attainment of the following, as the case may be, before lodging respective applications:

(i) Adequacy in the engineering academic qualifications prescribed for the category being applied for, which has been obtained from institutions recognized by the Board, or from its certification after passing ERB professional examinations;

(ii) Adequacy in professional experience for registration. Applicants shall provide proof of the practical experience as required for the category being applied for, which shall include details of duration and description of the practical experience obtained, endorsed in line with guidelines of the Board. For applicants who have obtained practical experience from successful completion of Structured Engineers Apprenticeship Programme (SEAP), ERB final professional training report, training logbook and completion form may serve the purpose;

(iii) Registration as a professional by a recognised regulatory body or professional association for foreign applicants;

(iv) An acceptable performance record before coming to Tanzania for foreign applicants, to be submitted in accordance with the Guidelines of the Board;

(v) Required legal proof of business and office ownerships, and adequacy of equipment, facilities, reference materials and key personnel for registration of Engineering Consulting Firms and Engineering Materials Testing Laboratories.

(b) Make an application to the Board, and pay the requisite application fee. Such application shall be made in English and lodged together with proof of meeting all the basic requirements as prescribed in sections 3.1.2 to 3.1.5 for the applicable registration categories.

(c) Prepare and avail themselves for professional interview when called, in order to demonstrate respective professional competence, as claimed. This is mandatory for applicants in consulting engineers' categories (CE and ICE) and all foreign applicants.

4.2.2 ERB Secretariat

The Secretariat shall coordinate the overall registration process and specifically do the following activities:

(a) Receive and record the applications from the applicants;

(b) Perform scrutiny and preliminary evaluation of all application documents to clarify and/or confirm the completeness of the applications; validity of the submitted documents; fulfilment of the basic requirements in terms of academic engineering qualification and professional experience for the category of registration being applied for; and payment of the requisite application fee;

(c) Communicate the appointments of independent evaluators (as appointed by the Board) and terms of references and submit to them the relevant application documents for evaluation and obtain the necessary feedback in line with the Guidelines of the Board;

(d) Communicate to ReTAC or ERB Chairman, as the case may be, the observations and recommendations of independent evaluators on the assessed applications for consideration, in line with the Guidelines of the Board;

(e) Through the Registrar, present to Board the observations and recommendations of ReTAC or ERB Chairman for approval or endorsement, as the case may be;

(f) Communicate decisions made on applications to the respective applicants.

4.2.3 Independent evaluators

Independent evaluators are appointed by the Board to provide independent evaluation of applications for registration in all categories, save for Engineering Technicians, Graduate Engineers and Graduate Incorporated Engineers. Specifically, independent evaluators are expected to do the following activities:

(a) Receive applications for registration as recommended by the Secretariat;

(b) Perform independent and more detailed technical review of relevant documents relating to the application to confirm the fulfilment of the basic requirements in terms of academic engineering qualification and professional experience for the category of registration being applied for;

(c) Interview the applicants, where required with a view to confirming applicant's attainment of the basic requirements in terms of adequacy and relevance of professional experience for the category of registration being applied for;

(d) Visit the premises of applicants for registration of engineering consulting firms and engineering materials testing laboratories to confirm adequacy and appropriateness of equipment, facilities and other requirements for the category of registration being applied for;

(e) Submit recommendations on the evaluated applications in line with the format approved by the Board.

4.2.4 Registration and Technical Affairs Committee of ERB (ReTAC)

ReTAC is a committee of the Board, established to provide technical assistance on all matters related to registration and monitoring of engineering practice in the country. In this respect, ReTAC is responsible for the following undertakings:

(a) Receive applications for registration of engineering technicians and graduate engineers for evaluation as recommended by the Secretariat;

(b) Review the observations and recommendations of independent evaluators on applications for registration of local residents in all other categories. For foreign applicants in all categories however, such observations and recommendations are reviewed by the Chairman of ERB with a view to shortening the process, considering the short time that may be available for their engagement;

(c) Submit recommendations on the reviewed applications through the Registrar to the Board for approval.

4.2.5 The Registrar

In addition to the overall oversight of the ERB Secretariat, the Registrar is responsible for submitting all registration recommendations to the Board for consideration and final decision. Based on the decision of the Board, the Registrar oversees the publication of the names of successful applicants for registration in the manner appropriate to the Board and notifies the unsuccessful applicants in writing as appropriate.

4.2.6 Timeframe

The timeframe for concluding the registration process for registration of Tanzanian/Resident Applicants varies from fourteen (14) days to one twenty (120) days depending on completeness of submission while for foreign applicants varies from two (2) days to fourteen (14) days.

4.2.7 Fees, charges and payment process

Fees and charges are payable in accordance with the Schedule of Fees as prescribed by the Board from time to time. Similarly, the payment process shall be prescribed by the Board from time to time.

(a) *Fees payable:*

(i) All applicants shall pay an application fee upon submission of the relevant application.

(ii) Successful applicants shall be required to pay prescribed fees which include as applicable: registration and certificate fee, annual fee, engineer's rubber stamp and practicing License.

(iii) Temporary Professional Engineers, Consultants, Firms and Engineering Materials Testing Laboratories shall pay renewal fees for practicing License and certificates as appropriate.

(b) *Charges:*

There exist charges for services including registration of engineering works and services, search of the Register, publications, Professional Development Units (PDUs) computation and participation in events organized by the Board. Furthermore, the Board charges penalty as and when is applicable.

(c) *Payment process:*

The Board shall raise the fees and charges through a demand note specifying the purpose on which the payment is to be made. Payments to the Board for various fees and charges shall be made through the Bank and/or via electronic mode of payment and receipt shall be issued by the Board.

Upon payment of the prescribed fees/charges, the applicant's name shall be entered into the Register of Engineers. The person thus registered will be given a registration number and issued with the certificate, License and a rubber stamp as appropriate.

4.2.8 The Register of Engineers

The Board keeps the register which is the official record keeper of all registered persons. The Registrar shall keep and maintain the register in which to register the name of every person entitled to have his name entered in there as soon as is practicable after his being accepted by the Board. The register shall keep and update the *Date of entry; Name and postal address; Qualifications; Registration number; Nationality (local or foreign);Category of registration (permanent or temporary);Physical address; Key managerial, professional, technical*

and other personnel in the case of a firm; Principal of the firm; Duration of registration; and any other particulars which the Board may direct.

4.2.9 Registration tools

A registered person shall be issued with registration tools as follows: registration certificates, engineers' rubber stamp, practicing license, and practicing certificate for relevant category of registration. Other tools include site instruction book and sticker for the registration of engineering works and services.

- Registration certificate which is a testimony that a person has been registered by the Board in the respective category, and hence can use it as appropriate as required by the law;

- Practicing License which is a testimony that a person has been licensed by the Board in the respective category, and hence use it as appropriate as required by the law to practice engineering in Tanzania.

- Engineers' Rubber Stamp which is the testimony for responsibility and accountability for the certifying professional. The rubber stamp for the professional engineer shall be used for certifying engineering reports and documents in their respective institutions. In engineering consulting firms, the rubber stamp for the professional engineer shall be used for certifying design calculations, drawings and test results interpretation for internal use, whilst, issuance to the public and project implementation, the rubber stamp for the consulting engineer and firm shall be used;

- Site instruction book and sticker are issued to the consulting firms which offer engineering services and supervision of the engineering works, subject to successful application. Site instruction books shall be used appropriately and stickers displayed on site for the duration of the project. In addition to that, upon issuing the relevant instructions, the issuing engineer has to sign and rubber stamp using the Board's stamp on each page. Accordingly, the receiving engineer on the Contractor's side has to countersign and rubber stamp on each page with the relevant Board's stamp.

The details on the administration of the registration tools are as shown in Table 2.

Table 2: Administration and use of the registration tools by registrants

S/N	Category of Registration	Tools	Application and Limitations of Use
1	Engineering Technician	Certificate of registration	Engagement
2	Graduate Engineer	Certificate of registration	Engagement

S/N	Category of Registration	Tools	Application and Limitations of Use
3	Professional Engineer (PE/TPE)	Certificate of registration	Engagement
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	For certifying accountability in engineering works and services in the respective areas of practice and documents in their respective institutions.
4	Consulting Engineer (CE/TCE)	Certificate of registration	Engagement
			Registration of engineering consulting firm
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	Certifying design calculations, drawings and test results interpretation for, issuance to the public and project implementation.
5	Independent Consulting Engineer	Certificate of registration	Engagement
		Practicing License	For Professional engagement and identification.
		Rubber Stamp	Limited to engineering services as provided for in the scope of work of independent consulting engineer. It excludes engineering design and construction supervision.
6	Engineering Consulting Engineering Consulting Firm	Certificate of registration	Engagement
		Practicing Certificate	For Professional engagement and identification.
		Rubber Stamp	Certifying design calculations, drawings and test results interpretation.
7	Engineering Materials Testing Laboratory	Certificate of registration	Engagement
		Practicing Certificate	For Professional engagement and identification.
		Rubber Stamp	Certifying test results

4.2.10 Renewal of registration status

Temporary Professional Engineers are registered by the Board and given certificate of registration which is valid for a period of one year. Upon expiry the certificate of registration is subject to application and fulfillment of the following requirements for renewal of registration:

(i) A signed letter to the Registrar requesting renewal;

(ii) Certified copy of Valid Contract/Letter of employment in Tanzania;

(iii) Certified copy of previous expired TPE Certificate;

(iv) Certified copy of expired (previous) Resident/working Permit;

(v) Certified copy of passport of the applicant; and

(vi) Evidence of payment of relevant fees.

4.2.11 Renewal of practicing license

Renewal of Practicing License involves four categories of registration which are Temporary Professional Engineers, Professional Engineers, Consulting Firms and Engineering Materials Testing Laboratories, subject to payment of relevant fees. Practicing Licenses for professional engineers are renewed every three years of practice while other categories are renewed annually.

Table 3 presents the general guidelines of the requirements for the renewal of practicing licenses.

Table 3: Renewal of practicing licenses

S/N	Categories of Registration	Requirements
1	Temporary Professional Engineer (TPE)	▪ License request form. ▪ Copy of expired work permit. ▪ Expired practicing license ▪ Valid employment contract. ▪ Evidence of payment of fees
2	Professional Engineers (PE)	▪ Continuous Professional Development logbook. ▪ Evidence of oath taking ▪ Expired practicing license ▪ Evidence of payment of fees
3	Consulting Engineer (CE)	▪ Continuous Professional Development logbook. ▪ Evidence of oath taking ▪ Expired practicing license ▪ Evidence of payment of fees
4	Temporary Consulting Engineer	▪ License request form. ▪ Copy of expired work permit. ▪ Expired practicing license ▪ Valid employment contract. ▪ Evidence of payment of fees
5	Independent Consulting Engineer	▪ Continuous Professional Development logbook. ▪ Evidence of oath taking ▪ Expired practicing license ▪ Annual Returns ▪ Evidence of payment of fees
6	Engineering Consulting Firms	▪ Annual returns ▪ Evidence of payment of fees
7	Engineering Material Testing Laboratories	▪ Annual returns ▪ Evidence of payment of fees

4.2.12 Code of Conduct and Ethics for Engineers

The Board has put in place the Code of Conduct and Ethics for Engineers to promote highest standard of professionalism and integrity based on following tenets towards the public, employers and clients:

a) Truth, honesty, impartiality, fairness, and openness;

b) Professional competence and engineering excellence;

c) Professional accountability;

d) Respect for human life and welfare; and

e) Protection of the environment for sustainable development.

It is a fundamental requirement that all registered individuals and firms in the engineering practice are bound to embrace and adhere to the prescribed professional ethics, conduct and integrity. Failure to comply shall constitute professional misconduct and therefore be liable to disciplinary action as provided for in Regulation 74 of Engineers Registration Regulations, 2010 (GN No. 35), and which may include deletion from the Register.

4.2.13 Deletion from the Register, Appeals, Restoration and Exemption

Any individual or firm registered by the Board may be deleted from the Register or suspended by the Board, and is eligible to appeal against the decision for restoration of status if successful.

(a) *Deletion*

One may be deleted from the Register based on the following situations:

(i) Guilty of misconduct or breach of the Code of Conduct and Ethics; or

(ii) Failure to notify the Registrar of change of address appearing in the Register; or

(iii) Failure to pay annual fees for a period of two years consecutively; or

(iv) Requested that his name be deleted provided there are no pending or potential criminal proceedings under the Act; or

(v) Deceased.

(b) *Suspension:*

Registration status of any registered individual or firm that is convicted of any offence under the Act, or found guilty of any such omission may be suspended, where punishment imposed is a fine and the person so fined refuses or fails to pay the imposed fine within 30 days.

(c) *Appeals*:

A person who shall not be satisfied by the decision made by the Board to refuse to register his name, to delete the name of the registrant, to refuse to restore a name to the Register, or to suspend the effect of registration of his name may appeal to the Appeals Authority as provided under Section 20 of the Engineers Registration Act No. 15 of 1997.

(d) *Restoration of registration status*:

All names deleted from the Register shall not be again entered in the Register except by the direction of the Board. A person deleted by the Board shall be restored in the Register after successful appeal as provided under Section 16 of the Engineers Registration Act No. 15, 1997.

(e) Exemption

Exemption on non payment of fees and other charges shall be determined by the Board from time to time.

4.2.14 Management Information System (MIS)

Unless otherwise as determined by the Board, the entire processes for registration of registrants will be managed by the Management Information Systems which is a Web-based integrated system.

5.0 PROFESSIONAL DEVELOPMENT OF ENGINEERS

Professional development is important for all categories of registrants in order to meet the requirements for first registration or effective upgrading or maintenance of registration status.

5.1 Graduate Engineers

Having graduated from an accredited programme offered by training institutions recognized by the Board, graduate engineers need to be mentored to acquire competences for performing independent professional work, and progress from an assisting role to taking more individual and team responsibility until competence can be demonstrated at the level required for registration as a professional engineer.

ERB is implementing the Structured Engineers Apprenticeship Programme (SEAP) towards formation of graduate engineers and graduate incorporated engineers into professional engineers or incorporated engineers respectively via training, mentorship and experience. At the end of the three year programme, the trainee has to submit a final report for evaluation and consideration for registration as a professional engineer/incorporated engineer. SEAP is administered in accordance to rules and regulations and other provisions as provided for in the SEAP Implementation document

Alternatively, graduates may follow unstructured professional training. Under this training mode, graduates undergo training in various employment opportunities without being monitored by the Board and apply for registration as professional engineers with minimum three years period since graduation. It may take longer period than three years for the graduate to acquire necessary skills and competences for consideration for registration as a professional engineer or incorporated engineer, as the case may be. The graduate has to demonstrate to have acquired adequate and relevant professional experience similar to that acquired in a period of structured training.

5.2 Professional Engineers

Once registered, the engineer must maintain and expand competenceon a continuous basis for further career progression, global competitiveness and mobility, when necessary. All practicing engineers are therefore required to engage in relevant professional development activities and shall achieve a minimum of thirty (30) Professional Development Units (PDUs) per calendar year. The 30 PDUs shall comprise a minimum of 20 PDUs in structured learning

activities and the remainder can be obtained from either structured or non-structured learning activities.

The structured activities are those sanctioned by the Board including the following:

a) Relevant postgraduate degree, diploma or certificates courses;

b) Attending workshops, conferences and seminars;

c) Training other professionals;

d) Undergoing short courses and in-house courses on technical, management and professional development matters relevant to engineers;

e) Conducting accredited courses, lectures, seminars and other learned discourses;

f) Undertaking research and publications; and

g) Registering an engineering patent.

Unstructured activities on the other hand, may include the following, among others as will be approved by the Board:

a) Membership of professional societies, Boards and technical committees (ACET, IET, TACECA, CATA, etc.);

b) Reading relevant technical/management literature; viewing of training videos, CD ROMS and TV programmes;

c) Participation in tool box meetings and/or safety induction trainings;

d) Listening to training tapes, or taking distance and open learning courses and submit a summary of what was read;

e) Attending informal in-house training and presentations; conducting informal in-house training and presentations;

f) Attending organized and accredited technical site visits and exhibitions; and

g) Attending professional and technical courses which are not accredited.

APPENDICES

APPENDIX I: MAJOR ENGINEERING DISCIPLINES, ASSOCIATED SUBSIDIARIES AND CONTENTS/AREAS OF PRACTICE

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
1	**Civil**	Structural	Buildings, Dams, Tunnels, Bridges, Drainage, Water Retaining Structures, Railways.
		Geotechnical	Soils Analysis, Rock Analysis, Building Foundation, Earthen Structures, Underground Facilities, Dams, Tunnels, Roads, materials, pavement, Drilling, Geological engineering.
		Water Resources	Irrigation, hydroelectric Power applications, Control and Use of Water, Raw Water Supply, Flood Control, hydraulics, Water Quality Management, Municipal and Industrial Services engineering, Sanitary, river engineering.
		Engineering Survey	Construction surveying, mapping and spatial capture, boundaries, land divisions, materials quantification.
		Transportation	Rural and Urban Roads, Streets, Highways, Airports, Rail Roads, Mass Transit, Harbours/Ports, Traffic engineering and management, Pipelines, Tunneling.
		Ocean	Beach protection and enrichment, coastal structures, coastal erosion, development of oceanic energy resources, instrumentation for coastal and off-shore measurements, marine dredging, dredged material placement, moored and towed systems, ocean mining, off-shore petroleum recovery, off-shore structures, ports and harbours, search and survey, suspended and dissolved constituent transport, sub-sea pipelines and cables, submersible vehicles and other water

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
			acoustics.
		Architectural Engineering	Structures, mechanical and electrical systems planning and design of buildings, construction management, Safety and sustainability.
2	**Mechanical**	Industrial	Ergonomics and safety, Facility Design, Management Decision Making, Manufacturing, Quality Control, worker productivity, work station design and analysis, Production, Automation, material handling techniques and equipment, systems analysis and design, costing and performance measurement, logistics including production planning and control, distribution and storage and warehousing methods, organization and economic aspects.
		Operations and Maintenance	Planning, operational performance, preventive maintenance, curative maintenance, condition monitoring.
		Energy	Heating, Turbines, Air-Conditioning, ventilation, Power Plants, thermal (coal, gas, fossil fuel, nuclear), renewable (wind, solar, geothermal, ocean waves, hydro), Biomass, waste.
		Transportation	Roads, Railways, Airways, Waterways, Ports and Harbours, Pipelines,
		Automobile	Design, manufacturing, operation and maintenance of trucks, buses, motorcycles, and other engine propelled vehicles.
		Electromechanical	Plants and Equipments systems, electrical and Mechanical.
		Mechatronics	Mechatronics in industries and other applications

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
		Buildings	Water and waste water systems, Plumbing, scaffolding, HVAC, Escalators, building management systems, green building (management of energy efficiency).
		Materials and Metallurgy	Composite Material, Metallurgical, Polymeric, Materials science, Ceramic Materials, Electronic Materials, production of metals, metal objects, materials, testing procedures, metal processing, failure analysis procedures and the development of metal alloys, the research, design, construction, and development of devices and facilities of production.
		Nuclear	Nuclear power systems and science, nuclear components and systems, construction, operational regulations, emergency planning, licensing regulation, codes and standards, nuclear fuel and waste management, nuclear radiation, protection, radiation shielding, interaction of radiation with matter, nuclear criticality, kinetics, neutronics, and nuclear measurements and instruments, radioactive materials for medical or industrial applications.
		Aerospace	Aerodynamics (Design of external surfaces), Structural Design and Materials selection, Propulsion Systems, Guidance and Control Systems, design and performance of aerospace vehicles, integrated subsystems of aerospace vehicles.
3	**Electrical**	Electrical Power	Generation (power plants), transmission, distribution, power electronics, electromagnetics,

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
			electrical networks, electronics, high voltage, electric machines and drives, switch gears, transformers, substations, measurements and instrumentation, control, communication, electrical installation, protection and safety systems, navigation systems, automation, renewable energy systems, electrical materials, electrical and electronics systems, electronics and electrical circuits, signal processing; design, implementation and testing of electrical/electronic systems, smart grid, electric vehicle, power storage, utilisation of electrical energy, Solar Energy Conversion,
		Telecommunication	Planning, designing, and engineering of telecommunication system (wide area fiber optic/microwave hybrid network), communication and information transfer modes (wireless telephony services, radio and satellite communications, internet and broadband technologies). Telecommunications systems (copper, optic cabling, complex networks, switching systems, voice, data, radio, fiber optics and waves), handling disruption of services, broadcasting, mobile and optical communications, telephone networks, Networks (planning, design, synchronization, protection, capacity, utilisation, maintenance, restoration, wireless and wired), digital and analogue communication, signal processing. Radio Frequency (RF) test gear, microwave, redundancy, grounding, maintenance of public

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)	
			safety dispatch centers, mobile and portable troubleshooting and preventative maintenance, interoperability, sensors.
		Electronics	Analogue electronics, digital electronics, signal processing, communication systems, design and testing of electronic circuits, filters, electrical and electronics materials, electronics systems, instrumentation, data acquisition, embedded systems, integrated circuits, electrical networks, radio engineering, audio and visual systems, computers and microprocessors/microcontrollers, digital systems, optical electronics, signal conditioning, power electronics, Mixed Signal VLSI Design, solid state electronics
		Robotics and Control Systems	Robotics and Autonomous Systems, Networked Control System, Systems and Control Theory, Electric Energy Systems, sensors, actuators, networking, control (linear, nonlinear, adaptive optimal and estimation, robotics, smart materials/subsystems), communication, mechatronics, electronics, mechanics, real-time computing architecture software development, modelling and simulation, computer engineering, image processing, mobile sensor networks, internet-based tele-operation, manufacturing automation, human and computer interaction, micro-robots and systems, nano-robotics, embedded systems
		Renewable Energy	Biomass, Solar, Wind, Geothermal, Ocean Waves

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
4	**Agricultural**	Irrigation, Soil and Water Engineering	Natural resource engineering involving soil, water and plant systems, Crop irrigation systems, erosion control, pesticide/fertilizer use/management,
		Mechanization and Machinery	Facility engineering of plant, equipment and machinery, machinery involving power, electrical and electronic machines, controls and sensors
		Bio-Process and Post-Harvest	Process engineering involving but not limited to food, animal feed, fiber, sorting, drying, packaging, storage, Biotechnology
		Animal Farm Engineering, Processing and Farm Structures	Animal, and commodity environments and structures, Animal housing and feeding systems
		Forest Engineering	
5	**Chemical and Process**	Petroleum and Natural Gas	Crude oil refining, natural gas, refining and processing
		Biotechnology	Agricultural, food, medical, industrial applications
		Polymers	Production of polymeric materials-plastics, synthetic rubbers and fibers, films and composite materials, materials engineering
		Process	Managing and optimizing the operation of large-scale, chemical-based industrial operations
		Chemical	Applied chemistry, both industrial and nonindustrial, concerned with chemical materials, their composition, locations, transportation, and storage; chemical and physical-chemical processes naturally occurring or artificially operated, their matter and energy changes, the conditions of temperature, concentration and media for those changes, including apparatus and

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)	
			analytical control; chemical products, their quality, quantity, applications, uses, and values; preparation of materials for public or industrial use, including water supply, waste abatement, and pollution control.
		Textile	
6	**Environmental**	Municipal and Industrial Services Engineering	Air Pollution Control, Natural Systems Modeling, wastewater, storm water, ambient air, emissions sources, and control strategies; environmental impact assessment, remediation, and emergency response and applicable codes, environmental standards, regulations, guidelines.
		Sanitary Engineering	potable water supply, water resources management, water quality management, Sanitary Engineering
		Wastewater	Hazardous Waste Treatment and Disposal
		Solid Waste	Solid, hazardous, and special waste, Recycling and Solid Waste Disposal
7	**Computer and IT**	Artificial intelligence	Bioinformatics, Computational ecology and ecosystem management, Computer vision, big data, Databases and knowledge-bases, machine learning and data mining, Natural language processing, Pattern recognition, Planning and decision-making, Probabilistic representation and reasoning, Reinforcement learning, knowledge engineering, neural-fuzzy networks systems, Advanced user interfaces, speech and character

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)	
			recognition, knowledge and reasoning, Configuring Hardware and Software, Diagnosing and Treating Problems, Scheduling for Manufacturing, access authentication control.
		Information technology Engineering	Neural Network Engineering and Intelligent System Application; Decision Support System and Information; Modelling System; Reverse Software Engineering and Reusable Software Engineering; The application of Cryptography in Computer Security System; Enterprise Architectural Framework and Application; Distributed Engineering and Business Services; Sensing, Monitoring, Control and Structural Dynamics; Human and Social Modelling for Design Simulations; Computational Engineering; Virtual Office and Optimization; Networking computing for Engineering; IT Applications in Engineering; Systems and Network Technologies; Interactive Media and Internet Development; Supply Chain and Logistics Management, computing infrastructure, network and systems technologies, digital signal processing and information transmission.
		Computer Engineering	Algorithms and Complexity, Computer Architecture and Organisation, Computer Systems Engineering, Circuits and Signals, Database Systems, Digital Logic, Digital Signal Processing, Electronics, Embedded Systems, Human-Computer Interaction, Computer Networks, Operating Systems, Programming Fundamentals, Social and Professionalism

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
			aspects, Software Engineering, Design and Fabrication, Discrete Structures, Probability and Statistics, Computer Hardware & Microcomputers, control, instrumentation, electrical networks, communication, security, VLSI Design, Design and Analysis of Computer Algorithms, Artificial Intelligence, Computer Design and Engineering, Information Technology, Robotics, Software Applications. Design of computing hardware, software, networks, and processes.
		Software engineering	Scientific, engineering, managerial, economic, and production, aspects of software industry. Mix of computer science and engineering: data management, data transformations, design patterns, algorithm paradigms, programming languages, human-computer interfaces, programming principles, data structures &algorisms, digital circuits, digital computers, dynamic systems, databases, operating systems, networks and security, performance evaluation, abstraction and specification, project management, requirements, software architecture, testing and quality assurance, systems. End-user software engineering (end-user programming/debugging/testing/design), Software errors debugging, software testing, formal modes of software, Programming tools, environments, and program analysis, Open source software development, HCI, Usability

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)	
		Systems Engineering	Interface of computers with the business world, database management, computer security, transaction processing, Modelling, simulation, reliability, safety analysis of complex systems, Applied Algorithms for Engineering, networking and its control(wired and wireless), product development and launching, business management, Control Systems, Applied Algorithms for Engineers, control, Supply Chain Engineering, software design and applications, systems integration, Queuing Systems, Randomized Network Algorithms, Mobile Networking and Computing
		Computer and Networking Eng.	E-Business, computer networking, TCP/IP, and the OSI model, Communication Networks (data communication networks and Internet protocols; LAN, WAN, and the technology), Network Security (Encryptions, firewalls, and digital signatures), Communication Engineering (digital communications, receiversdesigns, and channel modulations and encoding. Source coding), Broadband Networks (modems to broadband LANs, optical networks). Architecture and protocols,special services (e.g. Bluetooth, WiFi). Quality and relating technologies to one another, Network Penetration and Ethical Hacking. Computer networking and telecommunications technologies, Analogue and digital Electronics, Electrical Engineering Principles, Digital Devices and Systems Computer Engineering and Applications, Engineering Design, Engineering

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
			Programming, Network and Service Administration, Computer Network Applications, Telecommunication Network Services, Engineering Management, Software Development, Database Design, Operating Systems, Entrepreneurship, Network Programming, Network Operating Systems, System Analysis & Design, Network Administration and Management, Voice/IP Convergence, Network Troubleshooting, Communication Technology, Cellular and mobile networks, Cloud and mobile computing, Low-power system design, Mobile wireless networks, Multimedia systems, Network coding, Network resource optimization and management, Parallel and distributed computing
8	**Mining and Mineral Process**	Mining	Mining Equipment Design and Operation
		Mineral Process	Identification and Estimation of Mineral Reserves, Mine Design and Operations, , Mineral Processing
		Engineering Geology	Geological Engineering which include application of geological principles with a focus on the exploration for, and extraction of, natural resources such as oil, natural gas, coal, minerals, exploration, location, and recovery of mineral commodities, and the research, design, construction, and development of structures, devices, and facilities of production.
9	**Petroleum and Gas**	Petroleum and Natural Gas	
		Drilling Engineering	Land-based Well Drilling Equipment/Facilities

S/n	Engineering Discipline			Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)		
				and Operations, Offshore Well Drilling Equipment/Facilities and Operations, Storage and Transportation Equipment/Facilities and Operations, exploration, location, and recovery of natural fluid hydrocarbons,
		Production Engineering		Production, operations of devices, facilities of production.
		Reservoir Engineering		Crude Oil and Natural Gas Reserves (Identification and Estimation
		Subsurface Engineering		
		Refining		
10	**Bioengineering**	Biomaterials		Living tissue and artificial materials used in implantation applications
		Biomechanics		Classic engineering mechanics principles to medical problems
		Biotechnology		Development and production of pharmaceuticals products
		Clinical engineering		Technology for health care in hospitals,
		Medical Devices/Equipment		X-ray, CAT Scan, MRI treatment devices
		Biomedical	Biomaterials	Living tissue and artificial materials used in implantation applications
			Biomechanics	Classic engineering mechanics principles to medical problems
			Biotechnology	Development and production of pharmaceuticals products
			Clinical engineering	Technology for health care in hospitals,
			Medical Devices/Equipment	X-Ray, CAT Scan, MRI treatment devices
		Biological/Bio-Resources/Bio-Systems Engineering.		

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	**Subsidiary(ies)**	
11	**Naval Architecture and Marine**	Marine	Design, development, production and maintenance of the equipment used at sea and onboard sea vessels.
		Naval Architecture and Marine	Design, construction and repair of ships, boats, other marine vessels and offshore structures both civil and military including merchant ships-Oil and Gas Tankers Cargo ships Cruiser liners.
		Automation	Design, program, simulate and test automated machinery and process in order to complete exact tasks. Car engineering and food processing plants where robots are used to perform specific functions, signal processing.
		Ocean	Technology applied to ocean environment including civil, electrical, naval architecture and applied oceanography.
		Corrosion	Application of Scientific knowledge, natural laws and physical resources in order to design and implement materials, structures, devises, systems and procedures to manage the natural phenomena known as corrosion.
		Ship	Construction of ships and other floating vessels, activities takes place at shipyards.
		Harbour	Construction of harbour and docks, as well as breakwaters, dredging and land reclamation.
		Coastal	Application of basic engineering principles to the analysis of design, construction, and management systems that operate in the coastal environment.
		Marine Engineer at Sea	Main machinery propulsion transmission and ships support system (Main diesel engines generating system and main components of truck and cross-head engines, Knowledge of

S/n	Engineering Discipline		Contents/Areas of Practice
	Major Discipline	Subsidiary(ies)	
			operational repair maintenance of ships main and auxiliary machinery, Knowledge of the ships bilge, ballast, fire main pumps and piping system, including pollution prevention equipment and system, full control of propulsion transmission system, including thrust and shaft bearing, stern tubes and propellers, Steam boiler mountings, feed water system and boiler testing conditions, Constructional details of alternators, motors, switch gears and electrical distribution systems of DC and AC motors). Dry docking and hull inspection (Steering and stability systems, Refrigeration machinery and air conditioning systems, Fresh water production and conditioning, Deck machinery and cargo handling system, Marine diesel engines gearing and clutches, Knowledge of safe working principles as published and amended). Management and legislation (Precautions against fire or explosions, explosive mixtures, source of ignition, Knowledge of codes of safe working practices associated with carriage of dangerous cargo, Knowledge of shipboard administration, management and control of spares, Knowledge of legislation Merchant shipping act and international convention, Report writing on dry docking procedures and hull surveys).

APPENDIX II: APPLICATION FORMS

S/N	NAME	FORM NUMBER
1	ENGINEERING TECHNICIAN	AET-01
2	GRADUATE INCORPORATED ENGINEER	AGIE-02
3	GRADUATE ENGINEER	AGE-03
4	INCORPORATED ENGINEER	AIE-04
5	PROFESSIONAL ENGINEER	APE-05
6	CONSULTING ENGINEER	ACE-06
7	TEMPORARY PROFESSIONAL ENGINEER	AICE-07
8	TEMPORARY CONSULTING ENGINEER	ATPE-08
9	INDEPENDENT CONSULTING ENGINEER	ATCE-09
10	ENGINEERING CONSULTING FIRM	AECF-10
11	ENGINEERING MATERIALS TESTING LABORATORY	ALAB-11