MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

TANZANIA INSTITUTE OF EDUCATION

FRAMEWORK FOR IMPLEMENTATION OF TECHNICAL SECONDARY SCHOOLS EDUCATION

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DECLARATION

This Framework for the implementation of Technical Secondary Education is approved for use in Technical Secondary schools in Tanzania.

Approved by .....Dr. Lyabwene M. Mtahabwa.....

Signature ....

Date _____20_____ / _____09_____ / 2019

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PREFACE

The framework for the implementation of Technical Secondary Education provides a guideline for the implementation of the 2019 Technical Secondary Schools syllabi. This framework has been prepared to address the changes made in the Technical Secondary Education Form I-IV syllabi. It is anticipated that the changes made in the 2019 syllabi will provide learners with technical knowledge and skills that will enable them to work in various economic sectors and henceforth, nurture economic development in the country.

This Technical Secondary Education programme targets primary school leavers who passed the Primary School Leaving Examination (PSLE). The students at the Technical Secondary Schools will take Technical and non-Technical subjects as stipulated in this guideline. A candidate shall be awarded a Certificate of Secondary Education Examinations (CSEE) after successfully completing four years of the Technical Secondary Education programme and passing the Secondary Education Examinations administered by NECTA.

The framework consists of objectives, rationale, implementation strategies, assessment, and evaluation of the Technical Secondary Education programme. This framework is intended to support teachers, students and other education stakeholders in the implementation of the programme. It is expected that the Technical Secondary Education programme will facilitate the provision of appropriate and cost effective vocational education at secondary school level.

Tanzania Institute of Education

ACKNOWLEDGEMENTS

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Dr. Aneth Komba
Director General
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LIST OF ABBREVIATIONS

BEST	Basic Education Statistics in Tanzania
CA	Continuous Assessment
EGM	Economics, Geography and Mathematics
ETP	Education and Training Policy
FTNA	Form Two National Assessment
FE	Final National Examinations Marks
ICT	Information and Communication Technology
MoEC	Ministry of Education and Culture
MoEST	Ministry of Education, Science and Technology
MoEVT	Ministry of Education and Vocational Training
NECTA	National Examinations Council of Tanzania
NSDS	National Skills Development Strategy
NSGRP	National Strategy for Growth and Reduction of Poverty
PCB	Physics, Chemistry and Biology
PCM	Physics, Chemistry and Mathematics
PGM	Physics, Geography and Mathematics
OSHA	Occupational Safety and Health Agency
CF	Construction Fields
ME	Mechanical Engineering
EECE	Electrical, Electronics and Communication Engineering
UNDP	United Nations Development Programme

CHAPTER ONE

BACKGROUND INFORMATION

Introduction

This framework provides guidelines on how to effectively and efficiently incorporate and implement Technical subjects in secondary schools. The framework has been prepared to address changes made in the structure of the syllabi and number of subjects for the Technical Secondary Education programme. The changes made aim at: (1) reducing the number of subjects in order to broaden specializations and provide basic skills and knowledge in technical aspect to secondary school students; and (2) improving learner's theory and practical training in technical subjects so that they develop skills for solving socio-economic problems that are faced in the society.

It is expected that access to improved technical education would help Tanzania to progress towards sustainable economic achievements and would facilitate the attainment of the National Strategy for Growth and Reduction of Poverty (NSGRP, 2010) and National Development Vision 2025 whose goals are to move Tanzania to a middle income country. Furthermore, improved Technical Secondary Schools will contribute to the development of skilled manpower needed for work in various economic sectors and henceforth, nurture the economic development in our country.

The Technical subjects' syllabi reflect the paradigm shift from content based to competence-based curriculum that gives a room for the learners to build their skills and competencies in Technical subjects.

The framework underlines the teaching programme, assessment and evaluation structures for the implementation of the Technical subjects in secondary schools. Technical Secondary Education programme targets standard seven leavers who passed the Primary School Leaving Examination (PSLE).

1.1 The purpose of the programme

The main purpose of the programme is to incorporate Technical subjects in secondary education in order to equip students with various technical skills at their early stage of education. Students in Technical Secondary Schools shall be prepared for further Technical Education and Training in Technical Colleges

and elsewhere or to join Advanced Secondary Schools with Science Subjects in combinations.

The Technical Secondary Education programme also intends to develop persons with multiple science knowledge and technical skills in the fields of Mechanical, Construction, Electrical and Electronics and Communication Engineering for application in various economic sectors. Within these broad aims, this programme intends to develop graduates who will be able to:

(a) demonstrate technical subject matter competencies in Mechanical, Construction, Electrical and Electronics and Communication Engineering fields;

(b) apply acquired technical knowledge and skills for improving work performances in domestic, industry and other economic sectors;

(c) identify and respond to technical needs of their society and nation, and;

(d) demonstrate a sense of nationalism and patriotism in contributing to socio-economic development.

1.2 Rationale for the Technical Education in Secondary Schools

The Tanzania's national and micro education policies such as Tanzania Development Vision 2025, National Strategy for Growth and Reduction of Poverty (NSGRP, 2010), The Tanzania Five Years Development Plan (NFYDP) of 2016/17 to 2020/21 and the 2019 National Curriculum Framework (NCF) aim at transforming the economy and industrial sector into an efficient and effective outcome-based economy. These policies broadly focus on transforming Tanzania into a middle-income and industrialised country. Yet, the achievement of these goals is challenged by a number of issues including the lack of requisite skills and knowledge needed to drive and sustain the industrial economy. For instance, the study on *"The Role of Education for Industrial Development in Tanzania"* revealed that there is inadequately skilled workforce which acts as a major constraint to productivity in many industrial sectors. Reviews from labour market survey also indicate that more than 80 percent of the Tanzanian population is self-employed with minimal skills (World Bank, 2013). These studies indicate the need for developing technical knowledge and skills to people in order to capacitate them to cub the existing gap in technical skills and knowledge in both formal and informal economic sectors.

In realization of these policies (national, macro and micro economic and education policies), the Tanzania Institute of Education (TIE) has revised the 1994 Technical subject syllabi for Secondary Schools. The revision of the syllabi was done by adding new contents, removing old contents, refining the previous contents and integrating cross cutting issues into the syllabi to have relevant contents to learners and society in general. These attempts have been made to include changes of the new developments in science and technology at national and global levels. It is anticipated that, students who are enrolled in this technical programme in the Secondary Schools will have opportunities to learn technical subject content knowledge and practical skills which are relevant for their own benefits, society and the nation.

Therefore, development of these Technical Education syllabi for Secondary Schools reflects the existing local, regional and international socio-cultural contextual policies which include:

(a)   International Education policies and strategies such as:

- Education for All (EFA)

- Education 2030 Framework for Action,

- The 2030 Sustainable Development Goals, especially goal number 9 (industrial, innovation and infrastructure)

(b)   East Africa Community ICT Intergration into Education Strategic plan 2015-2020

(c)   National Strategies and Policies such as:

- Tanzania Development Vision 2025,

- National Strategy for Growth and Reduction of Poverty (NSGRP, 2010),

- Education and Training Policies (ETP, 1995: 2014).

These policies and strategies can be well realized by implementing appropriate Technical subjects in Secondary Schools. Strengthening of vocational and technical training skills and knowledge in Tanzania is the pre-requisite for creation of employment and development of the industrial economy.

It was therefore deemed important to strengthen Technical Secondary Education by revising the Syllabi. The syllabi are now designed in such a way that, they will

enhance students to have multiple skills from the fields of their specializations in Technical subjects. Henceforth, this will enable them to participate effectively and efficiently in developing the industrial economy of the nation.

The development of this framework also reflects the aims and objectives of Education in general, Secondary Education, and Technical Education in Tanzania as stated below.

1.3 Objectives of education in Tanzania

The objectives of education in Tanzania are to:
(a) guide and promote the development and improvement of the personalities of the citizens of Tanzania, their human resources and effective utilization of those resources in bringing about individual and national development;

(b) promote the acquisition and appreciation of culture, customs and traditions of the people of Tanzania;

(c) promote the acquisition and appropriate use of literacy, social, scientific, vocational, technological, professional and other forms of knowledge, skills and attitudes towards the development and improvement of the condition of man and society;

(d) develop and promote self-confidence and inquiring mind, an understanding and respect for human dignity and human rights and readiness to work hard for personal self-advancement and national development;

(e) promote and expand the scope of acquisition, improvement and upgrading of mental, practical, productive and other skills needed to meet the changing needs of industry and the economy;

(f) enable every citizen to understand and uphold the fundamentals of the national constitution as well as protecting human and civic rights, obligations and responsibilities; and

(g) promote love for work, self and wage employment and improved performance in the production and service sectors.

1.4 Objectives of Secondary Education

The objectives of secondary education in Tanzania are to:
(a) consolidate, broaden and develop a deeper understanding of the ideas and concepts acquired at the primary level;

(b) enhance and further develop an appreciation for cultural values including national unity, identity, democracy, ethics, personal integrity, readiness to work, human rights, customs, traditions, civic responsibilities and obligations;

(c) develop linguistic ability and effective use of communication skills in Kiswahili, English, and at least one foreign language;

(d) develop readiness for tertiary and higher education, vocational, technical and professional training;

(e) inculcate a sense and ability for self-study, self-confidence and self advancement in new frontiers of science and technology, academic and occupational knowledge and skills; and

(f) develop readiness to join the world of work.

1.5 Objectives of Technical Education in Secondary Schools

Therefore, objectives of technical education in secondary schools are to:
(a) equip students with enough knowledge and skills for employment in Tanzanian industries;

(b) prepare students for further Technical Education and Training in technical colleges, institutions and elsewhere; and

(c) prepare students for self-employment in the informal technical sectors.

1.6 Competencies for Technical Education in Secondary Schools

The expected competencies to be developed for students from Technical Secondary Schools include ability to:
(a) make considerations in technical/professional career and study choices;

(b) apply safety rules and regulations in construction and mechanical engineering fields;

(c) use effectively different types of engineering tools, instruments, accessories and equipment in construction and engineering works;

(d) draw and interpret engineering drawings;

(e) apply Construction, Mechanical Engineering, Electrical and Electronics and Communication Engineering skills to solve socio-economic problems; and

(f) communicate effectively using English and Kiswahili languages in addressing technical issues to various stakeholders.

1.7 Vision and mission of the Technical Secondary Education programme

The Vision and mission of Technical Secondary Education in Tanzania are drawn from Tanzania education and training policy, hence stated below as follows.

Vision

To have efficient, effective and dynamic Technical Secondary School students capable of demonstrating technical skills in various workplaces.

Mission

To prepare Secondary School students who are qualified and committed to practice technical skills.

CHAPTER TWO

PROGRAMME STRUCTURE

2.0 Introduction

This chapter presents the programme structure for Technical subjects in Technical Secondary Schools.

2.1 Programme structure

Students who are studying Technical subjects in Technical Secondary Schools will take both Technical and non-Technical subjects. The Technical subjects will include Engineering Science which shall be compulsory to all students. In addition, the students will have to specialize in the fields of either Mechanical, Construction, Electrical, or Electronics and Communication Engineering fields.

There will be the following subjects within the specialized fields of study. In Construction fields, there will be the following subjects; Building Construction, Civil Engineering Survey, Architectural Draughting and Woodwork and Painting. In Mechanical Engineering field, there will be Manufacturing Engineering and Automotive Engineering. In Electrical Engineering fields, there will be Electrical Engineering and Electronics and Communication Engineering.

Students will be required to select subjects from either Construction, Mechanical or Electrical Engineering fields in combination with non-Technical subjects. Non-Technical subjects will include all common subjects (i.e. Mathematics, English, Kiswahili, Biology, Civics, Chemistry, Geography, History, Physics, and other option subjects) taught in all secondary schools.

2.2 Duration of the programme

The students shall undertake Technical Secondary Education for four years as stipulated in Education and Training Policy, 2004. The effective teaching days shall be 194 days per year as stipulated in Education Circular no. 9 of 2004.

2.3 Technical subject specialization

The students studying in Technical Secondary Schools apart from taking non-Technical subjects, shall take Technical subjects of their choices. In

addition, Engineering Science subject shall be compulsory to all students who are studying Technical subjects. The summary of the subjects which shall be chosen by the students from Form I to Form IV is presented in Table 1.

Table 1: *Technical subjects to be taught from Form I to Form IV with their corresponding number of periods*

S/N	Form I — Subjects	No. of periods per week	S/N	Form II — Subjects	No. of periods per week	S/N	Form III and Form IV — Subjects	No. of periods per week
1	Engineering Science (Compulsory for all)	3	1	Engineering Science (Compulsory for all)	3	1	Engineering Science (Compulsory for all)	4
2	Building Construction (Compulsory for all)	2	2	Building Construction (Compulsory for CF)	8	2	Building Construction (Compulsory for CF)	8
3	Civil Engineering Surveying (Compulsory for all)	2	3	Civil Engineering Surveying (Elective for CF)	8	3	Civil Engineering Surveying (Elective for CF)	8
4	Architectural Draughting (Compulsory for all)	2	4	Woodwork and Painting (Elective for CF)	8	4	Woodwork and Painting (Elective for CF)	8
5	Woodwork and Painting (Compulsory for all)	2	5	Architectural Draughting (Compulsory for CF)	8	5	Architectural Draughting (Compulsory for CF)	8
6	Mechanical Engineering (Compulsory for all)	2	6	Mechanical Engineering (Compulsory for ME)	8	6	Manufacturing Engineering (Elective for ME)	8
7	Electrical Engineering (Compulsory for all)	2	7	Electrical Engineering (Elective for EECE)	8	7	Automotive Engineering (Elective for ME)	8
8	Electronics and Communication Engineering (Compulsory for all)	2	8	Electronics and Communication Engineering (Elective for EECE)	8	8	Electrical Engineering (Elective for EECE)	8
						9	Electronics and Communication Engineering (Elective for EECE)	8

KEY **ME**: Mechanical Engineering; **CF**: Construction Fields; **EECE**: Electrical, Electronics and Communication Engineering

The detailed presentations of the subjects in the respective levels (Form I to Form IV) are given in Figure 1.

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                        │   Programme Structure   │
                        └─────────────────────────┘
                                    │
        ┌───────────────────┬───────────────┬────────────────────┐
   ┌─────────┐        ┌─────────┐                      ┌──────────────┐
   │ Form I  │────────│ Form II │──────────────────────│ Form III & IV│
   └─────────┘        └─────────┘                      └──────────────┘
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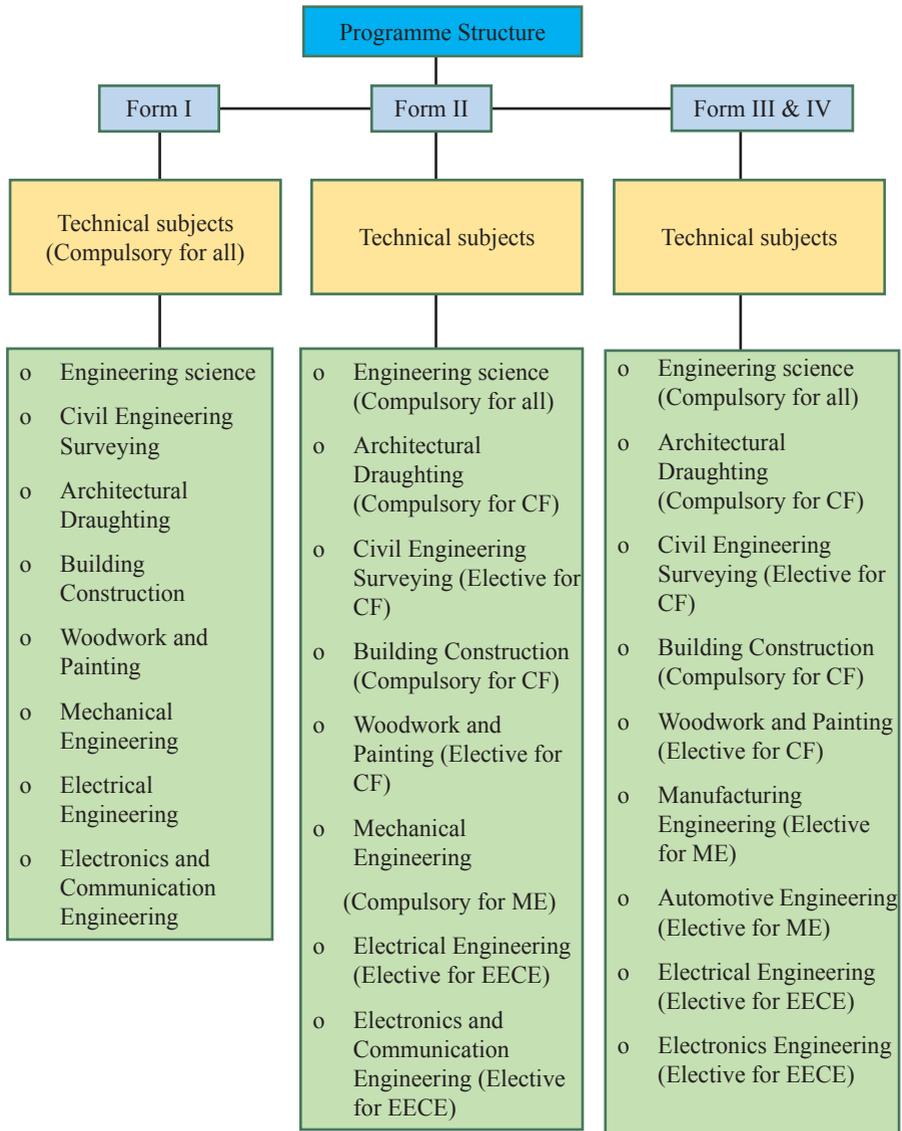| Technical subjects (Compulsory for all)	Technical subjects	Technical subjects
o Engineering science o Civil Engineering Surveying o Architectural Draughting o Building Construction o Woodwork and Painting o Mechanical Engineering o Electrical Engineering o Electronics and Communication Engineering	o Engineering science (Compulsory for all) o Architectural Draughting (Compulsory for CF) o Civil Engineering Surveying (Elective for CF) o Building Construction (Compulsory for CF) o Woodwork and Painting (Elective for CF) o Mechanical Engineering (Compulsory for ME) o Electrical Engineering (Elective for EECE) o Electronics and Communication Engineering (Elective for EECE)	o Engineering science (Compulsory for all) o Architectural Draughting (Compulsory for CF) o Civil Engineering Surveying (Elective for CF) o Building Construction (Compulsory for CF) o Woodwork and Painting (Elective for CF) o Manufacturing Engineering (Elective for ME) o Automotive Engineering (Elective for ME) o Electrical Engineering (Elective for EECE) o Electronics Engineering (Elective for EECE)

Figure 1: The detailed presentations of the subjects in the respective levels (Form I to Form IV)

ME: Mechanical Engineering; **CF**: Construction Fields; **EECE**: Electrical, Electronics and Communication Engineering

2.4 Teaching and learning modality for Technical subjects

Students in Technical Secondary Schools shall learn the Technical subjects by adhering to the following modality:

(a) **Form I:** It is an orientation year and therefore, all Technical subjects shall be introduced to all students.

(b) **Form II**: Each student will be required to join at least one Technical subject of specialization. The Technical subjects are based on the following main fields; (1) Mechanical Engineering, (2) Construction, and (3) Electrical Engineering and Electronics and Communication Engineering.

  i. Electrical Engineering and Electronics and Communication Engineering field will have two subjects, namely Electrical Engineering, and Electronics and Communication Engineering.

  ii. Construction field will have four subjects, which are Building Construction, Civil Engineering Surveying, Architectural Draughting, and Woodwork and Painting.

  iii. Mechanical Engineering field will have two subjects, namely Manufacturing and Automotive Engineering.

The student will have to opt for one of the following fields; (1) *Mechanical Engineering*, (2) *Electrical Engineering and Electronics and Communication Engineering*, or (3) *Construction*.

(a) **Mechanical Engineering fields**; students who will opt to study in this field will continue to learn the same content in Form II and will opt to take either Automotive Engineering or Manufacturing Engineering subjects in Form III.

(b) **Electrical Engineering and Electronics and Communication Engineering fields**; the student will opt to take either Electrical Engineering or Electronics and Communication Engineering subject in Form II.

(c) **Construction fields**; all students shall take Building Construction and Architectural Draughting as compulsory subjects. In addition, the students will have to take either Civil Engineering Surveying or Woodwork and Painting as an elective subject in Form II.

Form III & IV: The students will continue taking the subjects of specialization as per their choice in **Form II**, except in Mechanical Engineering fields where the student will decide to take either Manufacturing Engineering or Automotive Engineering from **Form III.**

CHAPTER THREE

TEACHING AND LEARNING METHODS AND STRUCTURE

3.0 Introduction

This chapter presents teaching and learning methods and structure of the programme for the Technical subjects in Technical Secondary Schools.

3.1 Teaching time table for Technical subjects

Technical subjects will have theory and practical sessions. The recommended distribution of periods per week for theory and practical sessions from Form I to Form IV are shown in Table 2 and Table 3.

Table 2: *Distribution of periods for theory and practical sessions for Form I and II per week.*

	Form I				Form II		
S/N	Subjects	Number of periods		S/N	Subjects	Number of periods	
		Theory	Practical			Theory	Practical
1	Engineering Science	1	2	1	Engineering Science	1	2
2	Building Construction	1	2	2	Building Construction	2	6
3	Civil Engineering Surveying	1	2	3	Civil Engineering Surveying	2	6
4	Architectural Draughting	1	2	4	Woodwork and Painting	2	6
5	Woodwork and Painting	1	2	5	Architectural Draughting	2	6
6	Mechanical Engineering	1	2	6	Mechanical Engineering	2	6
7	Electrical Engineering	1	2	7	Electrical Engineering	2	6
8	Electronics and Communication Engineering	1	2	8	Electronics and Communication Engineering	2	6
	Total	8	16		Total	15	44

Table 3: *Distribution of periods for theory and practical sessions for Form III and Form IV*

	Form III & Form IV		
S/N	Subjects	Theory	Practical
1	Engineering Science	1	3
2	Building Construction	2	6
3	Civil Engineering Surveying	2	6
4	Woodwork and Painting	2	6
5	Architectural Draughting	2	6
6	Mechanical Engineering • Manufacturing Engineering • Automotive Engineering	2	6
7	Electrical Engineering	2	6
8	Electronics and Communication Engineering	2	6
	Total	**15**	**45**

The practical sessions have more time than the theory sessions. Since, the Technical syllabi observed a paradigm shift from content to competence-based pedagogy, learners need more and enough time to build skills and competencies in Technical subjects. The time allocated for practical sessions will allow learners to engage in practical activities in order to practice the skills and knowledge they have learnt.

3.2 Teaching and learning strategies

The teaching and learning process for Technical subjects shall focus on learner-centred pedagogies to give room for the learners to build their skills and competencies in Construction, Electrical Engineering, Electronics and Communication Engineering and Mechanical Engineering Fields.

3.3 Instructional delivery methods

Like any other programmes taught through conventional modes, this programme will involve a range of delivery means in order to enhance flexibility of both teachers and learners during teaching and learning processes. The use of ICT and other related electronic media shall be employed in classrooms to facilitate

teaching and learning practices. Technical teaching and learning programme shall emphasize learner-centered pedagogies and other interactive teaching and learning approaches. Teaching and learning processes shall emphasize on teaching practices/approaches that:

(a) engage students in active learning processes;

(b) set high and meaningful student learning expectations;

(c) provide regular and timely feedback;

(d) provide constructive and educative feedback;

(e) recognize and respond to different student learning styles that promote the development of multiple intelligences;

(f) create opportunities for learners to apply the knowledge and skills learnt in their real lives;

(g) consider and apply different techniques of assessment (i.e. formative assessment for learning and summative assessments);

(h) create opportunities for teacher-student, student-teacher and student-student interactions; and

(i) create opportunities for students to engage in learning processes and practical activities.

Teachers shall not be the sole sources of knowledge but act as facilitators who provide a broad range of learning experiences and engage students in learning processes. The students will be encouraged to assume more responsibilities for their own learning.

The following practices constitute the main instructional delivery means:

(a) learner-centered pedagogies;

(b) routine teacher-student classroom interaction;

(c) self-assessment, peer-assessment and peer-tutoring assessment practices;

(d) workshop and laboratory practical sessions;

(e) library assignments;

(f) field visits and practices; and

(g) project works.

CHAPTER FOUR

PROGRAMME ASSESSMENT STRUCTURE

4.0 Introduction

This chapter presents the programme assessment structure for the Technical subjects in Technical Secondary Schools.

4.1 Assessment methods and mode

The assessment of the Technical subjects shall be done at school and national levels. The assessment of Technical subjects shall base on both formative and summative assessment methods to ensure maximum achievement *of* and *for* learning competencies.

At school level, there will be formative assessment practices, which shall include classroom formative assessment practices (i.e. use of questioning strategies, assignments, portfolios, exercises, homework etc.) and summative assessment (i.e. school based tests and examinations). Classroom based formative assessment practices shall be an integral part of teaching and learning processes, whereas, the teacher shall use different assessment strategies/methods during teaching and learning processes to assess (a) students' background (prior) knowledge of the content to be taught (b) students' progress in learning (c) students' understanding of the content. The teacher shall use the assessment information as a source of feedback for diagnosing and improving teaching and learning instructions and materials used. The students also should be given the feedback so as to support them in achieving the learning intents and building competencies.

Summative school based tests and examinations will be done at the end of the week, month, term or a year to assess students' achievement of learning. The teacher shall use marks of tests and examinations for improving teaching, learning and performance at school level.

At the national level there shall be summative assessment (the National Examinations). The National Examinations Council of Tanzania (NECTA) shall be responsible for assessing the achievement in Technical subjects at the national level. NECTA shall use syllabi of the Technical subjects to develop the National Examinations format for assessing the Technical subjects and for certification purposes. Final National Examinations will constitute students' marks obtained

from the Final National Examinations and Continuous Assessment (CA) marks collected from school level (as indicated in part 4.1 and Table 4 to 7). Final National Examination (FE) marks shall constitute 50 percent and Continuous Assessment (CA) marks shall constitute 50 percent. Marks distribution in FE and CA must be 50:50 because Technical education requires practical works to master the subject content.

4.2 Continuous Assessment marks

Continuous Assessment is inbuilt, school-based assessment system done by subject teachers and it constitutes practicals, project works, terminal and annual examinations. All these will form a **Continuous Assessment Component**. The weights of the components in the Continuous Assessment differ from one level to another as shown in Table 4 to Table 7.

Table 4: *Components of Continuous Assessment for Form I.*

Technical subjects	Assessment Tools	Frequency of Assessment Tools for Form I		
		Term I	Term II	Weight in %
• Engineering Science	Practical	4	4	**25**
• Building Construction	Mid Term Tests	1	1	**5**
• Civil Engineering Surveying	Terminal Examination	1	-	**10**
• Architectural Draughting	Annual Examination	-	1	**10**
• Woodwork and Painting				
• Mechanical Engineering				
• Electrical Engineering				
• Electronics and Communication Engineering				
Total		**6**	**6**	**50**

Table 5: *Components of Continuous Assessment for Form II.*

Technical subjects	Assessment Tools	Frequency of Assessment Tools for Form II		
		Term I	Term II	Weight in%
• Engineering Science	Practical	2	2	**25**
• Building Construction	Mid Term Tests	1	1	**5**
• Civil Engineering Surveying	Terminal Examination	1	-	**10**
• Architectural Draughting	Annual Examination	-	1	**10**
• Woodwork and Painting				
• Mechanical Engineering				
• Electrical Engineering				
• Electronics and Communication Engineering				
Total		**4**	**4**	**50**

Table 6: *Components of Continuous Assessment for Form III.*

Technical subjects	Assessment Tools	Frequency of Assessment Tools for Form III		
		Term I	Term II	Weight in%
• Engineering Science	Practical	2	2	**25**
• Building Construction	Mid Term Tests	1	1	**5**
• Civil Engineering Surveying	Terminal Examination	1	-	**10**
• Architectural Draughting	Annual Examination	-	1	**10**
• Woodwork and Painting				
• Mechanical Engineering				
− Manufacturing Engineering				
− Automotive Engineering				
• Electrical Engineering				
• Electronics and Communication Engineering				
Total		**4**	**4**	**50**

In Form IV, the student has to undertake a project work as part of the Continuous Assessment. Table 7 shows the assessment for Form IV.

Table 7: *Components of Continuous Assessment for Form IV*

Technical subjects	Assessment Tools	Frequency of Assessment Tools for Form IV		
		Term I	Term II	Weight in%

• Engineering Science
• Building Construction
• Civil Engineering Surveying
• Architectural Draughting
• Woodwork and Painting
• Mechanical Engineering
  − Manufacturing Engineering
  − Automotive Engineering
• Electrical Engineering
• Electronics and Communication Engineering
	Practical	2	2	**25**

	Mid Term Tests	1	1	**5**
	Terminal Examination	1	-	**10**
	Project work	-	1	**10**
	Annual Examination	-	-	**-**
Total		**4**	**4**	**50**

4.3 Final National Examinations

There will be different final national examination papers per each field. These papers will determine the content of the syllabus including the practical component of the subject.

4.3.1 National Examinations marks for the Construction fields

All candidates for Construction fields shall have to sit for Building Construction and Architectural Draughting National Examination papers as compulsory subjects. In addition, they shall have to sit either for Civil Survey Engineering Survey or Woodwork and Painting as specialization subject.

The National Examinations mark for Construction field subjects (i.e. Building Constructions, Architectural Draughting, Woodwork and Painting and Civil (survey) Engineering) shall be obtained from three sets of the National Examination papers namely Paper 1, Paper 2 and Paper 3 and from Continuous Assessment. Paper 1 shall be theory examination and Paper 2 shall be practical examination and Paper 3 shall be engineering drawing and AutoCAD practical examinations.

These three sets of examination papers shall contribute 50% to the Final National Examinations Marks (FE) and the Continuous Assessment (CA) shall

contribute 50%. The distribution of marks per each paper and the components of the Continuous Assessment are shown in Table 8.

Table 8: *Components of the Final National Examinations marks for Construction fields*

Technical subjects	Types of Assessment	Assessment Component	Weight in %
• Engineering Science • Building Construction • Architectural Draughting • Woodwork and Painting • Civil Engineering Surveying	**Continuous Assessment Marks Categories**	Form Two Continuous Assessment or Form Two National Assessment (FTNA)	**15**
		Form Three Continuous Assessment	**15**
		Form Four Continuous Assessment or Mock Examination	**10**
		Project work	**10**
Continuous Assessment	**Total marks for Continuous Assessment**		**50**
National Examinations Marks	National Examination Paper 1 (Theory)		**20**
	National Examination Paper 2 (Practical)		**20**
	National Examination Paper 3 (Engineering Drawing +AutoCAD).		**10**
	Total National Examinations marks		**50**
Final National Examinations (Continuous Assessment marks + National Examinations marks)			**100**

4.3.2 Final National Examinations marks for the Electrical and Electronics and Communication Engineering fields

The candidates from Electrical Engineering, and Electronics and Communication Engineering fields shall have to sit either for Electrical Engineering or Electronics and Communication Engineering examinations as per their specialization subjects. The Final National Examinations marks for these fields shall be obtained from three sets of the National Examination papers namely Paper 1, Paper 2, Paper 3 plus Continuous Assessment marks. Paper 1 shall be theory examination, Paper 2 shall be practical examination and Paper 3 shall be either electrical Draughting or Electronic drawing examination.

These three sets of examination papers shall contribute 50% to the Final National Examinations mark (FE) and Continuous Assessment (CA) marks shall contribute 50%. The distribution of marks per each paper and the components of the Continuous Assessment are shown in Table 9.

Table 9: *Components of the Final National Examinations marks for Electrical and Electronics and Communication Engineering fields*

Technical subjects	Types of Assessment	Assessment Component	Weight in %
• Engineering Science • Electrical Engineering • Electronics and Communication Engineering	**Continuous Assessment Marks Categories**	Form Two Continuous Assessment or Form Two National Assessment (FTNA)	**15**
		Form Three Continuous Assessment	**15**
		Form Four Continuous Assessment or Mock Examination	**10**
		Project work	**10**
Continuous Assessment	**Total marks for Continuous Assessment**		**50**
National Examinations Marks	National Examination Paper 1 (Theory)		**25**
	National Examination Paper 2 (Practical)		**15**
	National Examination Paper 3 (Electrical Draughting/ Electronic Drawing).		**10**
	Total National Examinations marks		**50**
Final National Examinations (Continuous Assessment marks + National Examinations marks)			**100**

4.3.3 Final National Examinations mark for the Mechanical Engineering fields

The candidate from Mechanical Engineering fields shall have to sit either for Manufacturing or Automotive Engineering as specialization subject. These subjects shall have three sets of National Examination papers namely Paper 1, Paper 2 and Paper 3. Paper 1 shall be theory examination paper, Paper 2 shall be practical examination and Paper 3 shall base on engineering drawing practices. The components of the Continuous Assessment shall come from Form II to IV as shown in Table 10.

Table 10: *Components of the Final National Examinations marks for Mechanical Engineering fields*

Technical subjects	Types of Assessment	Assessment Component	Weight in %

• Engineering Science
• Mechanical Engineering
  – Manufacturing Engineering
  – Automotive Engineering
	Continuous Assessment Marks Distributions	Form Two Continuous Assessment or FTNA	15

		Form Three Continuous Assessment	15
		Form Four Continuous Assessment or Mock Examination	10
		Project work	10
Total Continuous Assessment (CA)	Total marks for Continuous Assessment		50
National Examinations Marks	National Examination Paper 1 (Theory)		15
	National Examination Paper 2 (Practical)		20
	National Examination Paper 3 (Technical Engineering + Auto-Card Drawing)		15
	Total National Examinations marks		50
Final National Examinations (Continuous Assessment marks + National Examinations marks)			100

4.4 Grading system

The grading system for Technical subjects shall base on NECTA's grading system of Certificate of Secondary Education Examinations (CSEE).

CHAPTER FIVE

PROGRAMME BENCHMARKING

5.0 Introduction

This chapter presents the programme benchmarking structure for the Technical subjects in Technical Secondary Schools.

5.1 Programme benchmarking

Benchmarking for Technical Secondary Education is necessary as it seeks to get good quality persons who are capable to work in various technical and economic sectors. The following are key benchmarking of the four years Technical Secondary Education programme.

5.1.1 Entry qualifications

This programme is to be undertaken for four years in Technical Secondary Education programme and is streamed and offered along with specialization in Mechanical Engineering, Construction, Electrical Engineering, and Electronics and Communication Engineering. This programme shall be open to qualified Standard Seven candidates interested in pursuing Technical Secondary School Education. For a candidate to qualify to enrol in this programme, he/she must have passed the Primary School Leaving Examinations (PSLE).

5.2 Programme outcomes

On completion of the programme, the graduates will demonstrate the following in their areas of specialization:

(a) Technical subject matter competencies in Mechanical, Construction, Electrical, and Electronics and Communication Engineering fields;

(b) technical knowledge and skills for improving performances in domestic, industry and other economic sectors;

(c) skills and knowledge of identifying and responding to technical needs of their society and the nation as a whole;

(d) capability of making considerations in professional career and study choices;

(e) ability of applying safety rules and regulations in construction and mechanical fields;

(f) ability of using effectively different types of engineering tools, instruments accessories and equipment in engineering works;

(g) competencies of drawing and interpreting construction and engineering drawings;

(h) knowledge of applying construction and mechanical skills to solve socio-economic problems;

(i) skills in conducting technical practice;

(j) communication skills of using English and Kiswahili languages effectively in addressing technical issues to various stakeholders; and,

(k) sense of nationalism and patriotism in contributing to national economic development.

5.3 Criteria for successful completion of the programme

The candidate shall be considered to have passed Technical Secondary School Education after fulfilling all conditions as stated below;

(a) The candidate shall have sat and passed Technical subjects in his/her specialization in Form Four National Examinations administered by NECTA together with at least seven (7) non-technical subjects.

(b) The candidate shall have passed at least D grade in Technical subjects and non-Technical subjects in Form Four National Examinations administered by NECTA.

(c) The candidate will be considered to have failed if he/she shall not meet the criteria 5.3 (a & b).

5.4 Exit and pass for the programme

Conditions for registration and deregistration are as follows:

(a) The candidate shall in any case not be allowed to postpone or deregister the programme without justifiable reasons.

(b) A candidate shall be awarded Certificate of Secondary Education upon passing the Secondary Education Examinations (CSEE) as per criteria in 5.3 (a & b).

CHAPTER SIX

QUALITY ASSURANCE, SUPERVISION AND MONITORING

6.0 Introduction

This chapter presents the criteria for quality assurance, supervision and monitoring of the technical education programme**.** During the implementation of the syllabi, quality assurance and supervision will be done to ensure that the syllabi are implemented as per set guidelines.

6.1 Quality assurance

The task of ensuring quality during implementation of the syllabus is mainly the responsibility of the Zonal School Quality Assurance Department. In order to ensure quality in the provision of education in Tanzania, the Education Act No. 25 of 1978 and its amendment No. 10 of 1995 demands secondary schools' quality assurers to assess the provision of education in the schools and provide appropriate advice to rectify any abnormalities observed.

The secondary school Quality Assurance in the Zonal Offices shall be responsible to orient teachers and instructors on:

(a) how to use the syllabi, guidelines, manuals and reference books in teaching/ learning processes;

(b) how to prepare and use lesson plans and schemes of work;

(c) selecting, preparing, using, handling and storing teaching and learning aids and materials properly;

(d) using participatory/interactive and other learner-centred pedagogies in teaching/learning Technical subjects;

(e) assessing students' achievement of learning;

(f) using classroom assessment information as feedback on supporting students to build their competencies in Technical subjects; and

(g) how to use the school-based tests and examinations (assessment) results to improve teaching and student performances.

For monitoring and tracking the teaching/learning processes, the school shall be inspected at least once a year.

6.2 Supervision

Supervision during implementation of the Technical Secondary Education programme shall be done at school, district, regional and ministerial levels.

6.2.1 Ministerial level

The Commissioner for Education shall be the chief supervisor for all issues concerning curriculum implementation, including that of the syllabi of the Technical Secondary Education. Moreover, the Division of Technical Vocational Education and Training Development in the MoEST shall be responsible for overseeing syllabus implementation nationwide. Specifically, this division shall make sure that implementation of the syllabi start and continue smoothly by accomplishing the following tasks:

(a) ensuring that Technical schools have enough teachers with the required qualifications;

(b) ensuring that Technical Secondary Schools have adequate buildings, furniture, laboratories, and workshop equipment, and teaching/learning materials;

(c) recommending the content to be included in the revised syllabi according to identified needs and also how the syllabi should be implemented and supervised;

(d) coordinating and working closely with the Secondary School Quality Assurance officers and Regional and District Education Officers so as to ensure that:

i. implementation of the Technical Secondary Education programme curriculum is conducted smoothly and that any emerging problems are solved timely;

ii. teaching and quality control in Technical Secondary Schools are done effectively;

iii. the standards set by MoEST on various aspects of Technical Secondary School Education provision in the country are followed;

iv. suggestions/recommendations on how to improve the Technical Secondary School Education are implemented; and

v. the Commissioner for Education accesses the most effective technical advice and strategies of implementing Technical Secondary School curriculum.

6.2.2 Zonal/Regional/District level

The Education Officers in the Zone, Region, District and Council Headquarters shall be responsible for supervising all activities in the implementation of the curriculum in collaboration with other departments in the district. The other departments include: The Quality Assurance Department, District Planning Office, District Executive Director, and other Region/District offices. In each Region/District, apart from the Education Officers, the academic officers will ensure efficient syllabi implementation in their respective regions or districts.

6.2.3 School level

The head of school in collaboration with the school academic master/mistress shall be responsible for supervising all activities in the implementation of the syllabi for Technical subjects in their schools.

6.3 Monitoring

The implementation of the syllabi shall be monitored nationally to track performance continuously against what was planned by collecting and analysing data on the established indicators. Monitoring should be done regularly in a year and the identified gaps should be addressed. Different monitoring agencies will have different roles as shown in Table 11.

Table 11: *Monitoring agencies and their roles*

S/N	Agency	Roles
1	Quality Assurer	Monitor curriculum implementation.
2	NECTA	Assessment and certification
3	TIE	Monitor and evaluate the curriculum implementation and curriculum supporting materials.
4	MoEST	Administration, management and supervision of the overall technical education activities at the national level
5	Professional (subject) Association	Make an impact on their respective subjects by setting standards to be met.
6	School Boards	Ensure smooth running and implementation of the syllabi at the school level.

6.4 Evaluation

The evaluation of the Technical Secondary Education syllabi shall be done by the MoEST in collaboration with TIE or TIE in collaboration with other

stakeholders. Other education institutions, non-state actors, individuals and external agencies can also conduct curriculum evaluation after being granted permission by the Government. There shall be two types of curriculum evaluation. These are formative evaluation and summative evaluation

6.4.1 Formative evaluation

Formative evaluation shall be done to examine the processes of implementation of the programme to determine what is going on and/or what is not going on and why it is not going on as planned. This evaluation basically will focus on examining and evaluating the effectiveness of the ongoing programme. Formative evaluation shall be done internally at the school level or by external evaluators. Internally, the Heads of Schools in collaboration with academic masters/mistresses and Heads of Departments shall be responsible for conducting formative evaluation at the school level. Externally, TIE Officers, Quality Assurance Officers and MoEST Officers shall be responsible for evaluation at the national level. The purposes of this evaluation shall be to identify the efficiencies and deficiencies of the programme in order to do interventions that aim to improve the Technical subjects programme for optimum achievement. Therefore, formative evaluation will basically focus on judging how well the:

(a) instructional goals and objectives are met;

(b) teaching and learning strategies are used in teaching and learning processes;

(c) assessment practices are integrated during teaching and learning processes;

(d) practical activities are implemented;

(e) materials are used and integrated during teaching and learning processes;

(f) learning process is taking place; and,

(g) assessment is done.

Formative evaluation shall also focus on analysing the students' achievements and teachers' effectiveness to ensure maximum implementation of technical education programme.

6.4.2 Summative evaluation

Summative evaluation shall be external oriented. The focus of summative evaluation is to judge the achievement of the technical education programme. This evaluation will basically be done at the end of the course programme

(that's when students have completed Form Four education). The focus of this evaluation will be outcome based. Therefore, the National Examinations results announced by the National Examinations Council of Tanzania (NECTA) will be used as a basis for summatively evaluating the efficiency and effectiveness of the technical education programme. NECTA's examinations results shall be used as a basis of the summative evaluation because it captures a large area and sample of the graduates in the country.

CHAPTER SEVEN

PROGRAMME RESOURCES

7.0 Introduction

This chapter presents resources which are required for the implementation of the Technical subjects programme. Resources for the implementation of the Technical subjects programme include physical and human resources.

7.1 Human resources

In the Technical Secondary Schools, the key human resources for the implementation are heads of schools, teachers, students and workshop personnel. The following will be key indicators of human resources for the successful implementation of this programme.

7.1.1 Head of the Technical Secondary School

There shall be the Head of the Technical Secondary School. He/she shall have the following leadership qualities:

i.   be a trained teacher with a working experience of not less than five (5) years with at least a Bachelor degree in education;

ii.   have high ability and capability to foresee and plan positively for the betterment of the school and the government at large;

iii. be responsible and accountable for in his/her position;

iv.   demonstrate good command and communicative ability in public relations;

v.   have enough knowledge of organization operational procedures;

vi.   be one who makes sound decision for the benefit of the people;

vii. be one who can exploit employees' talents, skills and innovativeness for organizational improvements;

viii. be able to mobilize different resources for the school performance;

ix.   be one who encourages team spirit;

x.   possess ability to attract people who are committed, dynamic, caring, and who can work with every staff/trainee cadre;

xi. have ability to analyse education policies, documents, regulations, and apply them appropriately for the health of the school; and

xii. demonstrate trust and integrity.

7.1.2 Teaching staff qualifications

Teachers for the Technical Secondary schools have to at least hold a Diploma in Technical Education (DTE) or its equivalent. In summary, technical education teachers' qualifications shall include:

(a) academic knowledge and skills in Technical subjects;

(b) he/she shall be committed to the job;

(c) adequate professional qualifications to participate in technical teaching practice;

(d) commitment to professional development activities which may include: short- and long-term courses, and;

(e) competence in technical education research.

7.1.3   Workshop personnel (attendants)

Workshop personnel (attendants) for the Technical Secondary schools have to at least hold a Diploma in Technical Education (DTE) or its equivalent. In summary, technical workshop attendants' qualifications shall include:

(a) academic knowledge and skills in Technical subjects;

(b) commitment to the job;

(c) adequate professional qualifications to participate in technical workshop activities or practices;

(d) commitment to workshop activities which may include overseeing all activities in a respective engineering field; and

(e) knowledge, skills and ability to mobilize different resources for the engineering workshop preparation.

7.2 Physical resources

For effective implementation of technical education to Technical Secondary Schools, physical resources shall be availed in schools. These shall include

the access to standard infrastructure, facilities, equipment, tools, instructional materials and technical workshops for optimum and effective use for the implementation of the technical syllabi. The school administration shall be responsible in making sure that the resources are available and properly utilized. In particular, the teaching facilities for Technical subjects shall be identified by respective departments. However, the following are general facilities that need to be available.

7.2.1 School infrastructures

The following school infrastructures are necessary for ensuring effective implementation of this programme:

(a) enough classrooms;

(b) staff quarters;

(c) good drainage systems;

(d) water supply;

(e) power supply facilities;

(f) pavements;

(g) transport facilities;

(h) services and maintenance workshops;

(i) toilets;

(j) hall with good ventilation, adequate lighting, chairs and public address systems;

(k) office for teachers and instructors;

(l) workshops and laboratories for Technical and science subjects;

(m) dormitories with enough space, fire exits, enough lavatory, water supply, power supply and fire extinguishers;

(n) adequate playgrounds for different indoor and outdoor games;

(o) equipment for sports, games and recreational activities; and

(p) adequate sports and recreational facilities and other appropriate equipment for students with special needs.

7.2.2 Health and safety

Health and safety resources have to be taken into account as per OSHA guidelines, these shall include the following:

(a) adequate, clean and working toilets including those suitable for students with special needs;

(b) good and reliable drainage systems;

(c) hygiene and safety teaching facilities;

(d) reliable fire extinguishers and detectors;

(e) reliable fire exits;

(f) availability of permanent clean and safe water;

(g) availability of reliable and permanent first aid facilities;

(h) adequate and permanent dispensary facilities; and

(i) posted workshop/laboratory safety rules and regulations.

7.3 Teaching and learning materials

The teaching and learning materials should address the requirements of all learners including those with special needs and should also be relevant to the Tanzanian context. The Ministry of Education, Science and Technology should provide criteria and guidelines for evaluating teaching and learning materials and for procuring textual and non- textual materials. The following are textual and non-textual teaching and learning materials required:

7.3.1 Textual materials

Textual materials shall include the following:

(a) textbooks;

(b) syllabi;

(c) modules and manuals;

(d) reference books;

(e) subject/teachers' guides;

(f) encyclopaedia;

(g) charts and maps;

(h) newspapers, journals and relevant cuttings;

(i) software manuals and instructional resources;

(j) computerized library (e.g. digital library); and

(k) engineering tools, machines and equipment.

7.3.2 Non-textual materials

Non-textual materials shall include the following:

(a) training kit;

(b) prototypes;

(c) weather stations/centres;

(d) ecological/nature study sites;

(e) sample of actual materials;

(f) writing boards;

(g) illustration materials and photographs;

(h) posters, fliers and fact sheets;

(i) ICT and other electronic resources;

(j) secondary school website;

(k) overhead projectors; and,

(l) versatile writing boards (different appropriate writing boards).

7.3.3 Facilities for students with special needs

Facilities for students with special needs shall include the following:

(a) braille, white cane, lenses for visually impaired;

(b) wheel chairs for physically handicapped;

(c) u-shaped class – loss of hearing and deaf;

(d) wide doors;

(e) pavement friendly to disabled;

(f) resource rooms;

(g) special toilets;

(h) special game pitches;

(i) soundproof rooms, and;

(j) minimized stair cases.

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