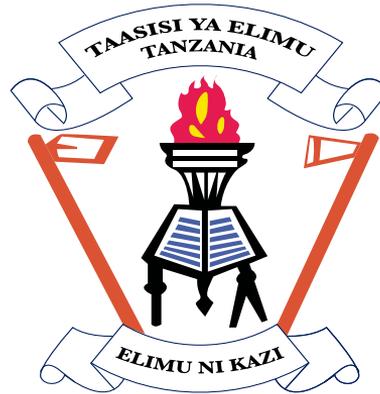


MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

TANZANIA INSTITUTE OF EDUCATION



**CIVIL ENGINEERING SURVEYING
SYLLABUS FOR TECHNICAL SECONDARY
SCHOOLS
FORM I - IV**

© Tanzania Institute of Education, 2019

Published 2019

ISBN: 978-9976-61-777-1

Tanzania Institute of Education

P.O. Box 35094

Dar es Salaam

Tanzania.

Tel: +255 22-2773005/ +255 22 277 1358

Fax: +255 -22 277 4420

E-mail: director.general@tie.go.tz Website: www.tie.go.tz

This document should be cited as: Tanzania Institute of Education. (2019). Civil Engineering Syllabus for Technical Secondary Schools Form I - IV. Dar es Salaam: Tanzania Institute of Education.

All rights reserved. This syllabus may not be reproduced, stored in retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the Tanzania Institute of Education.

DECLARATION

The Civil Engineering Surveying Syllabus is approved for use in Technical Secondary Schools in Tanzania.

Approved by *Dr Lyabwano M. Kitahobwa*
Signature *[Handwritten Signature]*
Date 20 / 09 / 2019

Ag. Commissioner for Education

Ministry of Education, Science and Technology

P.O. Box 10

Dodoma.

Tel. +255 222 110150

+255 222 110179

+255 222 110146

Fax: +255 222 11327

TABLE OF CONTENTS

	Pages
1.0 Introduction	v
2.0 Objectives of Education in Tanzania	v
3.0 Objectives of Secondary Education	vi
4.0 Competencies of the Subject	vi
5.0 Objectives of the Subject	vi
6.0 Structure and Organization of the Syllabus	vii
6.1 Class level competencies	vii
6.2 Class level objectives	viii
6.3 Topics/ sub -topics	viii
6.4 Specific objectives	viii
6.5 Teaching and learning strategies	viii
6.6 Teaching and learning resources.....	ix
6.7 Assessment	ix
6.8 Number of periods	ix
Form I	1
Form II	27
Form III	87
Form IV	137

1.0 Introduction

This Civil Engineering Surveying Syllabus is a revised version of 1993 syllabus. Although, some of the subject contents of the phased out syllabus have been retained, changes have been effected in the arrangement of topics and sub topics, addition of new topics and removal of irrelevant and outdated contents. The revised version has taken into consideration the current social, political, economic, global and technological development as well as emerging cross-cutting issues.

This revised syllabus observed a paradigm shift from content based to competence based pedagogy to give room for the learners to build skills and competencies in Civil Engineering Surveying. It encourages the constructivist approaches to teaching and learning where the learner participates actively in the construction of knowledge, skills and attitude.

The syllabus covers the first four years of secondary school education, i.e. from Form One to Form Four in Tanzania.

2.0 Objectives of Education in Tanzania

Objectives of Civil Engineering Surveying Syllabus reflects the general objectives of education in Tanzania, which 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, 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 the protecting human and civil rights, obligations and responsibilities; and
- g) promote love for work, self and wage employment and improved performance in the production and service sectors.

3.0 Objectives of Secondary Education

Objectives of Civil Engineering Surveying Syllabus reflects the objectives of secondary education in Tanzania, which 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.

4.0 Competencies of the Subject

By the end of the four years course, the student should have developed competencies in;

- a) exploring socio-economic factors in surveying as his/her career and study choice;
- b) ranges of various surveying method and apply the most accurate method of surveying;
- c) using basic skills to conduct chain surveying, fieldwork and plotting both small areas and large areas;
- d) using levelling instruments to perform various fieldwork activities and establishing temporary bench marks and levelling stations;
- e) using surveying instruments to perform transverse in the fieldwork activities; and
- f) using computer aided drawing software to plot the drawing.

5.0 Objectives of the Subject

By the end of the four years course, the student should be able to;

- a) use surveying skills acquired to solve different problems in the industry and other economic and social service sector;
- b) explain ranges of various surveying method and use the most accurate method of surveying in fieldwork activities;
- c) participate in social activities related to surveying field such as settlement planning, earth work etc.;
- d) use levelling instruments in fieldwork, booking data and plotting various levelling plans, sections and establishing temporary bench marks and levelling stations;
- e) use surveying instruments to perform transverse in the fieldwork, setting out of construction works (plan control, height control and vertical alignment excavation control) as well as to conduct calculation for area and volume of earthwork; and
- f) use computer aided drawing software to plot the drawing.

6.0 The Structure and Organization of the Syllabus Content

This syllabus has two parts. The first part comprises class level competencies and class level objectives. The second part is the syllabus content and presented in the matrix. The matrix includes topic, sub-topic and specific objectives to be achieved. It also includes the teaching and learning strategies, teaching and learning resources, assessment criteria/tools and number of period.

6.1 Class level competencies

The class level competencies are general competencies intended to be achieved within a class level. The class level competencies reflect the skills, knowledge and attitudes which the learner should demonstrate within a particular class level. However, these competencies are not discrete but rather continuous. It is possible that a particular competency may require more than one year to be fully developed.

6.2 Class level objectives

The class level objectives are objectives intended to be achieved within a class level. These are specific instructional objectives at a particular class level. The class level objectives in this syllabus are stated in general terms and they have been derived from the competencies. For each competence intended to be achieved, one or more objectives have been stated in order to achieve it.

6.3 Topics/sub-topics

This part describes the subject matter dealt in a subject. The major topics in this syllabus have been derived from the class level competencies and objectives. Every major topic has been divided into several sub-topics. Each sub-topic comprises of a portion of the content of the topic in question. The sub-topics have also been arranged to attain a logical order and facilitate learning process. The horizontal treatment of this syllabus is controlled by the sub-topics. This means that for every sub-topic, there are teaching and learning strategies; teaching and learning resources, assessment strategies and the estimated number of periods.

6.4 Specific objectives

This includes statement that describes results in terms of knowledge, attitude, skills aspiration and behaviour that a student is expected to achieve and perform after attaining the program. They also reflect the process of attaining the specified competencies within the cognitive, affective and psychomotor domains.

6.5 Teaching and learning strategies

Teaching/learning strategies indicate what the teacher and the students are expected to be doing in the process of teaching and learning. The teaching/learning strategies in this syllabus are simply suggestive, i.e. not exhaustive. The teacher is free to use them or design his/ her own. The teacher is expected to work as a facilitator for supporting the students to learn. Participatory and cooperative learning based activities are encouraged for the students to work in groups and participate in learning processes effectively.

6.6 Teaching and learning resources

In the teaching and learning of this syllabus, many resources will be needed. In case the commercial materials needed are not available, the teacher and students should work together to collect or improvise alternative resources available in the school environment.

6.7 Assessment

The suggested assessment strategies in this syllabus are based on the specific instructional objectives. The formative and summative assessment approaches should be geared towards mastering all the competencies and skills developed within the course. Instrument of assessment should ensure that all the levels of cognitive, affective and psychomotor domains are observed.

6.8 Number of periods

The number of periods has been allocated per sub-topic. Some topics with relatively wider content will need more time than others. According to the education circular no. 9 of 2004, there are a total of 194 effective teaching days per year.

FORM I

CLASS LEVEL COMPETENCIES

By the end of Form I, the student should have competencies in:

- a) various types of surveying branches including their functions.
- b) explain the duties of Civil Engineering Surveyor in construction works;
- c) controlling surveying work at the site;
- d) handling and maintaining surveying tools and equipment; and
- e) applying surveying safety managements well for both personal and equipment safety.

CLASS LEVEL OBJECTIVES

By the end of Form I the student should be able to:

- a) explain various types of surveying branches including their functions;
- b) explain the duties of Civil Engineering Surveyor in construction works;
- c) perform surveying practice on the field;
- d) use surveying tools and equipment in surveying practices; and
- e) explain safety management rules and procedures for safety of Surveyor and surveying equipment and tools.

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
1.0 INTRODUCTION	1.1 Objectives, Branches and Types of Surveying	<p>The student should be able to:</p> <p>a) Define the meaning of the term surveying as used in Civil Engineering.</p> <p>b) Explain the objectives of surveying.</p> <p>c) Identify the branches of surveying.</p> <p>d) Identify types of surveying.</p>	<p>i) The teacher to use brainstorming questions to guide students to define the meaning of the term surveying as used in Civil Engineering.</p> <p>ii) The teacher to use questions and answers techniques to guide students to:</p> <ul style="list-style-type: none"> – Explain objectives of surveying. – Identify branches of surveying. – Explain branches of surveying. 	<ul style="list-style-type: none"> • Surveying text books • Posters showing different branches of surveying • Multimedia • TV 	<ol style="list-style-type: none"> 1. Is the student able to explain meaning of the term surveying as used in Civil Engineering? 2. Can the student explain the objectives of surveying? 3. Can the student identify the branches of surveying? 4. Can the student identify types of surveying? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher to organise students in groups and guide them to identify types of surveying. iv) Students to present their responses for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.2 Common Terminologies in Surveying	<p>The student should be able to:</p> <p>a) Identify various terminologies used in surveying.</p> <p>b) Explain each terminology identified.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify various terminologies used in surveying – Explain each terminology identified. <p>ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> • Surveying text books • Posters showing different terminologies in surveying • Multimedia 	<p>1. Is the student able to identify various terminologies used in surveying?</p> <p>2. Is the student able to explain each terminology identified?</p>	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.3 Importance of Surveying	<p>The students should be able to:</p> <p>a) Explain the importance of surveying in a society.</p> <p>b) Explain the purpose of surveying.</p> <p>c) Identify the advantages of surveying.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain the importance of surveying in a society. – Explain the purpose of surveying. – Identify the advantages of surveying. <p>ii) The students to present their responses for sharing and discussion.</p>	<ul style="list-style-type: none"> • Surveying text books • Posters • Multimedia • TV 	<ol style="list-style-type: none"> 1. Is the student able to explain the importance of surveying in a society? 2. Is the student able to Explain the purpose of surveying? 3. Is the student able to Identify the advantages of surveying? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
2.0 CIVIL ENGINEERING Surveyor	2.1 Meaning of Civil Engineer Surveyor	The student should be able to: a) Explain the meaning of Civil Engineering Surveyor. b) Explain the importance of Civil Engineering Surveyor in engineering fields.	i) The teacher to use brainstorming questions to guide students to explain the meaning of Civil Engineering Surveyor. ii) The teacher to organise students in groups and guide them to:	<ul style="list-style-type: none"> • Surveying text books • Posters showing different activities in Engineering field. • Multimedia • TV 	<ol style="list-style-type: none"> 1. Is the student able to explain the meaning of Civil Engineering Surveyor? 2. Is the student able to explain the importance of Civil Engineering Surveyor in Engineering fields? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Explain the importance of Civil Engineering Surveyor in a society.	<ul style="list-style-type: none"> – Explain the importance of Civil Engineering Surveyor in engineering science/fields. – Explain the importance of Civil Engineering Surveyor in a society. iii) The students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in parts (i) and (ii). 		3. Is the student able to explain the importance of Civil Engineering Surveyor in a society?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.2 Duties and Roles of Civil Engineering Surveyor	<p>The student should be able to:</p> <p>a) Identify duties of Civil Engineering Surveyor.</p> <p>b) Identify roles of Civil Engineering Surveyor.</p> <p>c) Explain each duty and role of Civil Engineering Surveyor identified.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify duties of Civil Engineering Surveyor. – Identify roles of Civil Engineering Surveyor. – Explain each duty of Civil Engineering Surveyor. – Explain roles of Civil Engineering Surveyor. 	<ul style="list-style-type: none"> • Surveying text books • Posters showing different roles and duties in engineering field. • Multimedia 	<ol style="list-style-type: none"> 1. Is the student able to identify duties of Civil Engineering Surveyor? 2. Is the student able to identify roles of Civil Engineering Surveyor? 3. Is the student able to explain each duty and role of Civil Engineering Surveyor identified? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="902 252 1157 561">ii) The teacher to organise students in groups and guide them to explain each duty and role of Civil Engineering Surveyor identified. <li data-bbox="902 581 1125 749">iii) The students to present their responses for sharing and discussion. <li data-bbox="902 770 1163 1116">iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.3 Relationship between Surveyor and Civil engineer.	<p>The student should be able to:</p> <p>a) Explain the importance of Surveyor to Civil Engineering fields.</p> <p>b) Describe the relationship between Surveyor and Civil engineer</p> <p>c) Use chart to elaborate the relationship of surveying with other Civil Engineering trades.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain the importance of Surveyor to Civil Engineering fields. – Describe the relationship between Surveyor and Civil engineer. <p>ii) The students to present their responses for sharing and discussion.</p>	<ul style="list-style-type: none"> • Surveying text books • Posters showing different roles and duties in engineering field. • Multimedia • TV • Poster of different Civil Engineering carriers 	<p>1. Is the student able to explain the importance of Surveyor to Civil Engineering fields?</p> <p>2. Is the student able to describe the relationship between Surveyor and Civil engineer?</p>	1

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should use questioning strategies (what, why and how questions) to guide students to explain relationship of Surveyor with other trades. iv) The teacher should design activities and guide students to use chart to elaborate the relationship of surveying with other trades.		3. Is the student able to use chart to elaborate the relationship of surveying with other Civil Engineering trades?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i), (ii) and (iii)			
3.0 SURVEYING PRACTICE	3.1 Introduction to Surveying Practice	The student should be able to: a) Identify different surveying methods/ practices used in Civil Engineering. b) Explain the purposes of surveying practice. c) Identify the different steps of surveying.	i) The teacher to organise students in groups and guide them to: – Identify different surveying methods/ practices used in Civil Engineering. – Explain the purposes of surveying methods/ practices.	<ul style="list-style-type: none"> • Chalkboard • Manila sheet • Multimedia projector. • White board • White board markers • Chalks • Surveying text books 	1. Is the student able to identify different surveying methods/ practices used in Civil Engineering?	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Mention the objectives of each surveying practice. ii) Students to present their responses for sharing and discussion. iii) The teacher to use questioning strategies (what, why and how questions) to guide students to identify different steps to be followed in surveying (i.e. setting of instrument, station monumentation, data acquisition book etc). 		<ul style="list-style-type: none"> 2. Is the student able to Explain the purposes of surveying practice? 3. Is the student able to identify different steps of surveying? 	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	3.2 Methods and Advantages of Surveying Practical	The student should be able to: a) Explain the methods of surveying practical. b) List the advantages and disadvantage on each method of surveying practical.	i) The teacher to guide students in pair to think and share the methods of surveying practical. ii) The teacher to organise students in groups and guide them to: – List the advantages and disadvantages on each method of surveying practical.	<ul style="list-style-type: none"> • Manila sheet • Flip chart • Multimedia projector • Posters • Surveying tools • Surveying equipment • Markers 	<ol style="list-style-type: none"> 1. Can the student explain the methods of surveying practical? 2. Is the student able to list the advantages and disadvantages on each method of surveying practical? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Explain the procedures of each method of surveying practical.	<ul style="list-style-type: none"> – Explain the procedures of each method of surveying practical. iv) Students to present their responses for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in parts (i) and (ii) 		3. Is the student able to explain the procedures of each method of surveying practical?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 SURVEYING TOOLS AND EQUIPMENT	4.1 Tools and Equipment	<p>The student should be able to:</p> <p>a) Identify various tools used in surveying.</p> <p>b) Explain uses of various tools and equipment used in surveying.</p> <p>c) Explain the importance of tools and equipment used in surveying.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify various tools used in surveying. – Identify various equipment used in surveying. <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain uses of various tools and equipment used in surveying. – Explain the importance of tools and equipment used in surveying. 	<ul style="list-style-type: none"> • White/ black board • Manila sheet • Flip chart • Multimedia projector • Poster of different carriers • Surveying tools • Surveying equipment • White board markers 	<p>1. Can the student identify various tools used in surveying?</p> <p>2. Can the student identify various equipment used in surveying?</p> <p>3. Is the student able to explain uses of various tools and equipment used in surveying?</p>	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) Students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i) and (ii).		4. Is the student able to explain the importance of tools and equipment used in surveying?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.2 Tools and Equipment Management	<p>The student should be able to:</p> <p>a) Set and maintain the various surveying equipment such as levelling instruments, Theodolite etc.</p> <p>b) Explain causes of errors in equipment.</p> <p>c) Explain how to minimize each error in equipment.</p>	<p>i) The teacher to create activities for students to set, assemble and disassemble and maintain surveying equipment.</p> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p> <p>iii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Identify the causes of errors in equipment. – Explain causes of errors in equipment. 	<ul style="list-style-type: none"> • White/ black board • Manila sheet • Flip chart • Multimedia projector • Poster of different carriers • Surveying tools • Surveying equipment • White board markers/chalks 	<ol style="list-style-type: none"> 1. Can the student set and maintain the various surveying equipment? 2. Can the student explain causes of errors in equipment? 3. Can the student explain how to minimize each error in equipment? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="942 252 1130 387">– Explain how to minimize each error in equipment. <li data-bbox="904 407 1100 575">iv) Students to present their responses for sharing and discussion. <li data-bbox="904 595 1163 940">v) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i) - (iii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.3 Use of Surveying Tools and Equipment	<p>The student should be able to:</p> <p>a) Describe the use of different surveying tools and equipment.</p> <p>b) Use different surveying tools and equipment to perform simple tasks.</p>	<p>i) The teacher to organise students in groups and guide them to describe the use of different surveying tools and equipment.</p> <p>ii) Students to present their responses for sharing and discussion.</p> <p>iii) The teacher to create activities and guide students in groups to use different surveying tools and equipment to perform simple tasks.</p>	<ul style="list-style-type: none"> • White/ black board • Manila sheet • Flip chart • Multimedia projector • Surveying tools • Surveying equipment • White board markers/chalk 	<p>1. Can the student describe the use of different surveying tools and equipment?</p> <p>2. Can the student use different surveying tools and equipment to perform simple tasks?</p>	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i) and (iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
5.0 SAFETY MANAGEMENT AND RULES	5.1 Safety Management Rules and Procedures in Surveying	The student should be able to: a) Identify rules and procedures of safety management in Civil Engineering surveying. b) Explain safety management rules of a surveying equipment and tools.	i) The teacher to organise students in groups and guide them to: – Identify rules and procedures of safety management in Civil Engineering surveying. – Explain safety management rules of surveying and surveying equipment. ii) Students to present their responses for sharing and discussion.	<ul style="list-style-type: none"> • Surveying text books • Surveying equipment and tools • Black/ white board • Chalks/ markers • Projector • Posters 	1. Is the student able to identify rules and procedures of safety management in Civil Engineering surveying? 2. Is the student able to explain safety management rules of surveying tools and equipment?	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i).			
	5.2 Personal Safety Rules and Management	The student should be able to: a) Identify personal rules and safety in Civil Engineering surveying. b) Explain safety management rules of a Surveyor.	i) The teacher should use questions to guide students to: – Identify personal rules and safety in Civil Engineering surveying. – Explain safety management rules of a Surveyor.	<ul style="list-style-type: none"> • Surveying text books • Surveying equipments and tools • Black/ white board • Chalks/ markers • Projector • Posters 	<ol style="list-style-type: none"> 1. Is the student able to identify personal rules and safety in Civil Engineering surveying? 2. Is the student able to explain safety management rules of a Surveyor? 	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Explain the importance of safety management rules of a Surveyor.	ii) The teacher to organise students in groups and guide them to explain the importance of safety management rules of a Surveyor. iii) Students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i) and (ii).		3. Is the student able to explain the importance of safety management rules of a Surveyor?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	5.3 Importance of Safety Management and Rule	<p>The student should be able to</p> <p>a) Explain the importance of safety management and rule in Civil Engineering surveying.</p> <p>b) Explain the importance of following procedures in Civil Engineering surveying work/practices.</p> <p>c) Explain the effects of ignoring safety procedures in Civil Engineering surveying work/practices.</p>	<p>i) The teacher to use questioning strategies (what, why and how questions) to guide students to explain the importance of safety management, rule and procedures in Civil Engineering surveying.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <p>– Explain the importance of following procedures in Civil Engineering surveying work/practices.</p>	<ul style="list-style-type: none"> • Surveying text books • Surveying equipments and tools • Black/ white board • Chalks/ markers • Projector • Posters 	<p>1. Is the student able to explain the importance of safety management and rule in Civil Engineering surveying?</p> <p>2. Is the student able to explain the importance of following procedures in Civil Engineering surveying work/ practices?</p>	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="942 252 1157 525">– Explain the effects of ignoring procedures in Civil Engineering surveying work/practices. <li data-bbox="904 545 1100 713">iii) Students to present their responses for sharing and discussion. <li data-bbox="904 733 1157 1076">iv) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i) and (ii). 		<p data-bbox="1424 252 1633 628">3. Is the student able to explain the effects of ignoring procedures in Civil Engineering surveying work/ practices?</p>	

FORM II

CLASS LEVEL COMPETENCIES

By the end of Form II, the student should have competence in:

- a) applying basic knowledge, skills and principles in using chain surveying tools in performing chain survey, fieldwork, and plotting.
- b) assembling, setting and using various surveying equipment in surveying practices;
- c) performing surveying monumentation on the various area; and
- d) conducting surveying work on both cleared sites and sites which have the obstacles.

CLASS LEVEL OBJECTIVES

By the end of Form II, the student should be able to:

- a) use basic surveying knowledge, skills and principles in performing Civil Engineering fieldworks;
- b) use chain surveying tools in performing chain surveying and other fieldwork;
- c) perform surveying monumentation on the various area; and
- d) conduct surveying work on both cleared sites and sites which have the obstacles.

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
1.0 INTRODUCTION SURVEYING METHODS	1.1 Basic Surveying Methods	<p>The student should be able to:</p> <p>a) Identify chain surveying methods.</p> <p>b) Explain the surveying processes.</p> <p>c) Explain uses of chain surveying methods.</p> <p>d) Use chain surveying methods.</p>	<p>i) The teacher to arrange students in groups and guide them to:</p> <ul style="list-style-type: none"> – Identify chain surveying methods – Explain the surveying processes. – Explain uses of chain surveying methods. <p>ii) The teacher to use “questions and answers” techniques to guide the students explain the process of surveying (i.e., chain, traverse, triangulation tachometric surveying, plane table etc).</p>	<ul style="list-style-type: none"> • Surveying text books • Posters showing chains, offset, traverse and triangulation • Multimedia, TV • Chain 	<ol style="list-style-type: none"> 1. Can the student identify chain surveying methods? 2. Can the student explain the surveying processes? 3. Can the student explain uses of chain surveying methods? 4. Is the student able to use chain surveying methods? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iii) The teacher to create activities for students to use chain in surveying methods (i.e., offsetting, traverse and triangulation methods).</p> <p>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p> <p>v) With the aid of prepared assessment guideline, the teacher to guide students to use the guideline to assess the activities done on part (iii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) Students to present their responses for sharing and discussion. vii) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i-iii).			
	1.2 Process of Surveying	The student should be able to: a) Describe surveying methods. b) State the process of surveying.	i) The teacher to use questioning strategies (what, why and how questions) to guide students to:	<ul style="list-style-type: none"> • Blackboard and chalk. • Surveying text books • Video, video tapes. • Surveying equipment and tools. 	1. Can the student describe surveying methods? 2. Can the student state the process of surveying?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Use surveying methods in surveying work. d) Use surveying processes in surveying work.	<ul style="list-style-type: none"> – Describe surveying methods (i.e., using chain, traverse, triangulation, tachometric, plane table hydrographic and aerial techniques etc.). – State surveying processes in surveying work (i.e., taking general view, measurement, observation, presentation, feedback etc.). 		3. Can the student use surveying methods in surveying work? 4. Can the student use surveying processes in surveying work?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher to organise students in groups and guide them to discuss on how to use surveying processes in surveying work. iii) The teacher to create activities and guide students to: <ul style="list-style-type: none"> – Collect data from ground and apply them in maps or plans. – Use surveying processes in surveying work iv) The teacher uses questions to guide students to describe the process they used to apply data in a map.			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p> <p>vi) With the aid of preprepared assessment guideline,the teacher should guide students to assess the activities done on part (iv).</p> <p>vii) The teacher should give feedback and use students' responses as a feedback to support students in performing the tasks given in part (i-iv).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.3 Role of Surveyor	<p>The student should be able to:</p> <p>a) Identify duties of Surveyor in the fieldwork.</p> <p>b) Describe duties of a Surveyor in the fieldwork.</p> <p>c) Explain the importance and role of a Surveyor in Civil Engineering fields.</p>	<p>i) The teacher to use questions to guide students to:</p> <p>– Identify duties of a Surveyor in the field work (i.e., in locating plots and boundaries, setting up engineering works and pick details from the ground).</p> <p>– Describe duties of Surveyor in a field.</p>	<ul style="list-style-type: none"> • Blackboard or white board • Chalk, or markers • Display cards • Surveying text books • Posters 	<ol style="list-style-type: none"> 1. Can the student identify duties of Surveyor in the fieldwork? 2. Can the student describe duties of a Surveyor in the fieldwork? 3. Can the student explain the importance and role of a Surveyor in Civil Engineering fields? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher to organise students in groups and guide them to explain the importance and role of a Surveyor in a Civil Engineering fieldwork. iii) The teacher should give feedback and use students' responses as feedback to support students in identifying and describing duties of Surveyor in a field.			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
2.0 CHAIN SURVEYING AND LINEAR MEASUREMENT	2.1 Introduction	<p>The student should be able to:</p> <p>a) Explain the function of chain surveying.</p> <p>b) Identify the use of linear measurements.</p> <p>c) Use chain surveying instruments in surveying.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain function of chain surveying. – Identify the use of linear measurements <p>ii) Students to present their responses for sharing and discussion.</p> <p>iii) The teacher to create activities for students to use chain surveying instruments in conducting surveying.</p>	<ul style="list-style-type: none"> • Black board or white board • Chalk or markers • Surveying text books • Chain • Chaining pins • Tape measure • Field book • Pencil • Drawing tools, equipment and materials. 	<p>1. Can the student explain the function of chain surveying?</p> <p>2. Is the student able to identify the use of linear measurements?</p> <p>3. Is the student able to use chain surveying instruments in surveying?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should monitor and facilitate students in performing the tasks given in part (ii). v) With the aid of preprepared assessment guideline, the teacher should guide students to assess the activities done on part (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.2 Surveying Stations	<p>The student should be able to:</p> <p>a) Explain the procedures of selecting proper chain surveying stations.</p> <p>b) Locate surveying stations to permanent features.</p> <p>c) Differentiate permanent surveying features from temporary surveying station.</p>	<p>i) The teacher to use questioning strategies (what, why and how questions) to guide students to:</p> <ul style="list-style-type: none"> - Explain procedures of selecting proper chain surveying stations. - Describe how to locate surveying stations. - Differentiate permanent surveying features from temporary surveying station. 	<ul style="list-style-type: none"> • Black board or white board • Chalk or markers • Surveying text books • Surveying tools such as chains, tape, poles, pins, etc 	<ol style="list-style-type: none"> 1. Is the student able to explain the procedures of selecting proper chain surveying stations? 2. Can the student allocate surveying stations to permanent features? 3. Is the student able to differentiate permanent surveying features from temporary surveying station? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher to create activities for students to locate surveying station by using proper procedure. iii) With the use of prepared assessment guideline, the teacher should guide students to assess the activities performed in part (iii). iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.3 Surveying Tools and Instruments	<p>The student should be able to:</p> <p>a) Identify chain surveying instruments.</p> <p>b) Identify limitations of chain surveying instruments.</p> <p>c) Use surveying tools and instruments.</p> <p>d) Handle and store chain surveying instruments properly.</p>	<p>i) The teacher to use brainstorming questions to guide students to identify chain surveying instruments.</p> <p>ii) The teacher to use questioning strategies (what, why and how questions) to guide students to identify limitations of chain surveying instruments.</p> <p>iii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Use surveying tools and instruments. 	<ul style="list-style-type: none"> • Black board or white board • Chalk or markers • Surveying text books • Surveying tools and equipment (Theodolite, Chains, Tape levels, Arrows, Staffs, etc) 	<ol style="list-style-type: none"> 1. Is the student able to identify chain surveying instruments? 2. Can the student identify limitations of chain surveying instruments? 3. Is the student able to use surveying tools and instruments properly? 4. Can the student handle and store chain surveying instruments? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Store chain surveying instruments properly. – Demonstrate the proper handling of surveying tools and equipment (i.e. tapes, chains, arrows, Theodolites, levels, compasses, ranging poles, tripod stands, staffs, umbrella, etc.). <p>iv) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) With the aid of prepared assessment guideline, the teacher should guide students to assess the activities done on part (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.4 Procedure of Fieldwork for chain surveying	<p>The student should be able to:</p> <p>a) Conduct reconnaissance surveying.</p> <p>b) Conduct fieldwork.</p> <p>c) Plot surveying work after fieldwork.</p>	<p>i) The teacher to take students in a field and guide them to:</p> <ul style="list-style-type: none"> – Locate positions of surveying stations. – Conduct fieldwork by using surveying tools. – Take linear measurements and offsets. <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> • Black board or white board • Chalk or markers • Surveying text books • Surveying tools such as: tapes, chains, poles, arrows, and offsetting tools e.g. cross staff double prism etc • Drawing tools equipment and materials. 	<ol style="list-style-type: none"> 1. Can the student conduct reconnaissance surveying? 2. Is the student able to conduct fieldwork? 3. Is the student able to plot surveying work after fieldwork? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) With the aid of prepared assessment guideline, the teacher should guide students to assess the activities done on part (i). iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.5 Linear Measurements	<p>The student should be able to:</p> <p>a) Explain the meaning of linear measurements.</p> <p>b) Distinguish linear measurements form angular measurements.</p> <p>c) Conduct linear measurements</p> <p>d) Take offsets.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain the meaning of linear measurements. – Distinguish linear measurements form angular measurements. <p>ii) The teacher to organise a fieldwork for students</p> <ul style="list-style-type: none"> – Conduct linear measurements – Take offsets using proper tools ie optical square and levelling instruments etc. 	<ul style="list-style-type: none"> • Surveying tools (i.e., tapes, chains, poles, arrows pegs, hammer) • Offsetting tools (i.e., poles, tapes, chains, arrows, pegs, double prism, optical square • Booking sheets • Pencil 	<ol style="list-style-type: none"> 1. Is the student able to explain the meaning of linear measurements? 2. Is the student able to distinguish linear measurements from angular measurements? 3. Can the student conduct linear measurements? 4. Can the student take offsets? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> iii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iv) With the aid of preprepared assessment guideline, the teacher should guide students to assess the activities done on part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.6 Field Data Acquisition	<p>The student should be able to:</p> <p>a) Explain the meaning and activities involved in field data acquisition.</p> <p>b) Identify the procedures of field data acquisition.</p> <p>c) Carry out field data acquisition.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain the meaning and activities involved in field data acquisition. – Identify the procedures of field data acquisition. <p>ii) Students to present their work for sharing and discussion.</p>	<ul style="list-style-type: none"> • Black board or white board • Chalk or makers • Surveying text books • Field Notebook/ booksheet • Pencil • Surveying tools and equipment 	<ol style="list-style-type: none"> 1. Can the student explain the meaning and activities involved in field data acquisition? 2. Can the student identify the procedures of field data acquisition? 3. Can the student carry out field data acquisition? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher to create activities for students to carry out field data acquisition (such as: length between two stations, distance from surveying line to an offset, etc.) iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the aid of prepared assessment guideline, the teacher should guide students to assess the activities done on part (iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (iii).			
	2.7 Obstacle and Correction in Chaining	The student should be able to: a) Identify obstacle in chaining and ranging. b) Describe various obstacles in chaining and ranging. c) Identify ways of overcoming obstacles.	i) The teacher to arrange students in groups and guides them to; – Identify obstacles in chaining and ranging. – Describe obstacles in chaining and ranging. – Identify logical obstacles.	<ul style="list-style-type: none"> • Chain surveying tools (i.e., chains, tapes, pegs, hammer, arrows, etc) • Homework • Field exercise 	<ol style="list-style-type: none"> 1. Is the student able to identify obstacles in chaining and ranging? 2. Is the student able to describe various obstacles in chaining and ranging? 	7

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		d) Identify the errors in chaining. e) Explain ways of overcoming errors in chaining. f) Locate and overcome obstacle in chaining surveying fieldwork.	<ul style="list-style-type: none"> – Identify ways of overcoming obstacles. ii) Use questioning strategies (i.e., why and how questions) to guide students to: <ul style="list-style-type: none"> – Identify the errors in chaining such as sagging etc. – Explain ways of overcoming the identified errors – Identify various obstacles in chaining and ranging. 		3. Is the student able to identify ways of overcoming obstacles? 4. Is the student able to identify the errors in chaining? 5. Is the student able to explain ways of overcoming errors in chaining? 6. Can the student locate and overcome obstacle in chaining surveying fieldwork?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should arrange fieldwork activities and guide students to: <ul style="list-style-type: none"> – Demonstrate the application of various corrections of chaining. – Locate and overcome obstacle in chaining surveying fieldwork. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) With the aid of prepared assessment guideline, the teacher should guide students to assess the activities done on part (iii).</p> <p>vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (iii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.8 Accuracy and Errors	<p>The students should be able to:</p> <p>a) Identify types of errors in surveying.</p> <p>b) Identify source of errors in surveying.</p> <p>c) Distinguish errors and discrepancies.</p> <p>d) Explain factors affecting the accuracy of surveying work.</p>	<p>i) The teacher should use questioning strategies (i.e., what, why and how questions) in guiding students to:</p> <ul style="list-style-type: none"> – Identify types of errors in surveying. – Identify source of errors in surveying. <p>ii) The teacher should organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Distinguish errors and discrepancies. – Explain factors affecting the accuracy of surveying work. 	<ul style="list-style-type: none"> • Chain surveying tools, chains, tapes, pegs, hammer, arrows, etc • Homework • Field exercise 	<ol style="list-style-type: none"> 1. Can the student identify types of errors in surveying? 2. Can the student identify source of errors in surveying? 3. Can the student distinguish errors and discrepancies? 4. Can the student explain factors affecting the accuracy of surveying work? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) Students present their responses for sharing and discussion. iv) The teacher should use students' responses as a feedback to support students in identifying types and sources of errors in surveying.			
3.0 COMPASS SURVEYING	3.1 Introduction	The student should be able to: a) Define the term compass surveying. b) Identify tools for direct measurements of angles.	i) The teacher to use brainstorming questions to guide students to define the term compass surveying. ii) The teacher to use questions in guiding students to:	<ul style="list-style-type: none"> • Surveying text book diagrams of compasses on a manila-sheet. • Posters • White/black boards • Chalks/ markers 	1. Can the student define the term compass surveying? 2. Can the student identify tools for direct measurements of angles?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Identify different types of compasses. d) Explain the uses of compass surveying. e) Differentiate between chain surveying and compass surveying. f) Differentiate types of compass and other tools for direct measurements of angles.	<ul style="list-style-type: none"> – Identify tools for direct measurements of angles. – Identify different types of compasses. iii) The teacher to organise students in groups and guide them to: <ul style="list-style-type: none"> – Explain the uses of compass surveying. – Differentiate between chain surveying and compass surveying. iv) Students to present their responses for sharing and discussion.	<ul style="list-style-type: none"> • Multimedia TV 	3. Can the student identify different types of compasses? 4. Can the student explain the uses of compass surveying? 5. Can the student differentiate chain surveying and compass surveying? 6. Can the student identify and differentiate types of compass and other tools for direct measurements of angles?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) The teacher to use questioning strategies (what, why and how questions) to guide students to differentiate types of compass and other tools for direct measurements of angles.</p> <p>vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-v).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.2 Bearings and Meridians	<p>The student should be able to:</p> <p>a) Explain the terms bearing and meridian.</p> <p>b) Identify different types of bearings and meridians.</p> <p>c) Distinguish meridians from bearings.</p> <p>d) Explain the purpose of bearings and meridians.</p>	<p>i) The teacher to use questions to guide students explain terms bearing and meridian.</p> <p>ii) The teacher to use questioning strategies to guide students to:</p> <ul style="list-style-type: none"> – Identify different types of bearings and meridians. – Explain the purpose of bearings and meridians. <p>iii) The teacher should give feedback and use students’ responses as feedback to support students in performing the tasks given in part (i) and (ii).</p>	<ul style="list-style-type: none"> • Surveying instruments • Compasses and ranging Rods etc • Tape 	<ol style="list-style-type: none"> 1. Is the student able to explain terms bearings and meridian? 2. Is the student able to identify different types of bearings and meridians? 3. Is the student able to distinguish meridians from bearings? 4. Is the student able explain the purpose of bearings and meridians? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.3 Theory of Compasses	<p>The student should be able to:</p> <p>a) Use the common systems of notation of bearings.</p> <p>b) Calculate angles from bearings and bearings from angles.</p> <p>c) Use theory of magnetic compass, prismatic compass and Surveyor's compass to get angle and direction.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Use compass to get a bearing angle between two bearings. – Calculate angles from bearings and bearings from angles. – Use theory of magnetic compass, prismatic compass and Surveyor's compass to get angle and direction. 	<ul style="list-style-type: none"> • Surveying text books • Surveying tools • Compasses and ranging rods tapes, etc • Black board or white boards • Chalks or markers 	<ol style="list-style-type: none"> 1. Is the student able to identify and use the common systems of bearings notation? 2. Can the student calculate angles from bearings and bearings from angles? 3. Can the student make use of theory of compasses prismatic compass and Surveyor's compass to get angle and direction? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iii) With the aid of preprepared assessment guideline, the teacher should guide students to assess the activities done on part (i). iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.4 Magnetic Declination	<p>The student should be able to:</p> <p>a) Explain the meaning of magnetic declination.</p> <p>b) Differentiate between true meridian and magnetic meridian.</p> <p>c) Explain isogonic and agonic lines.</p>	<p>i) The teacher to use brainstorming questions to guide students to explain the meaning of magnetic declination (i.e., magnetic meridian and true meridian).</p> <p>ii) The teacher to use questioning strategies (i.e. what, why and how questions) to guide the students to differentiate between true meridian and magnetic meridian.</p>	<ul style="list-style-type: none"> • Surveying text books • Surveying tools (i.e., compasses, ranging poles tapes, etc) • Black board or white boards • Chalks or markers • Sketches of magnetic declination 	<ol style="list-style-type: none"> 1. Can the student explain the meaning of magnetic declination? 2. Can the student differentiate true meridian from magnetic meridian? 3. Is the student able to explain isogonic and agonic lines? 	5

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher to use questions and answer methods to guide students to explain terms isogonic and agonic lines. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.5 Local Attraction determination and correction	<p>The student should be able to:</p> <p>a) Define the term local attraction.</p> <p>b) Identify the sources of local attraction.</p> <p>c) Use a compass and metallic materials to locate local attraction.</p> <p>d) Describe ways of eliminating local attraction.</p> <p>e) Use a compass and metallic materials to eliminate local attraction.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Define the term local attraction. – Identify the sources of local attraction. <p>ii) The teacher to guide students to use a compass and metallic materials to:</p> <ul style="list-style-type: none"> – Locate local attraction. – Eliminate local attraction. <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p>	<ul style="list-style-type: none"> • Surveying textbooks • Posters • Black board or white boards • Chalks or markers • Compasses and ranging rod, tapes etc. 	<ol style="list-style-type: none"> 1. Is the students able to define the term local attraction? 2. Is the students able to identify the sources of local attraction? 3. Can the student use a compass and metallic materials to locate local attraction? 4. Is the students able to describe ways of eliminating local attraction? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher to use questioning strategies (i.e. what, why and how questions) to guide the students to describe ways of eliminating local attraction. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).		5. Is the student able to use a compass and metallic materials to eliminate local attraction?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.6 Practice	<p>The student should be able to:</p> <p>a) Apply the compass in the field</p> <p>b) Use compasses to get bearings.</p> <p>c) Use compass to locate different angles.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Practice using compasses to get bearings. – Practice using compasses to Locate different angles. <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p>	<ul style="list-style-type: none"> • Surveying tools • Compasses, ranging poles tapes, etc • Field book/ booksheet • Pencil • Tape 	<ol style="list-style-type: none"> 1. Can the student apply the compass in the field? 2. Can the student Use compasses to get bearings? 3. Can the student Use compass to locate different angles? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) With the use of assessment guideline, the teacher should use the guideline to assess the activities performed in part (i). iv) Students to present their work for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 SURVEYING TECHNIQUES FOR SMALL AREAS	4.1 Introduction	<p>The student should be able to;</p> <p>a) Explain the procedure for surveying small areas using chain.</p> <p>b) Surveying small areas using chain surveying.</p>	<p>i) The teacher should organise students in groups and guide them to explain the procedure for surveying small areas using chain.</p> <p>ii) Students present their work for sharing and discussion.</p> <p>iii) Teacher organise field visit and guide students to survey small area using chain surveying.</p> <p>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p>	<ul style="list-style-type: none"> • Black board or white boards • Chalks • Markers • Surveying text books • Surveying tools such as chains, tape, poles, pins etc. 	<ol style="list-style-type: none"> 1. Can the student explain the procedure for surveying small areas using chain? 2. Can the student survey small area using chain surveying? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) With the use of assessment guideline, the teacher should use the guideline to assess the activities performed in part (iii).</p> <p>vi) The teacher should give feedback and use students' responses as feedback to support students in performing tasks given in part (i-iv).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.2 Typical Measuring Surveying Tools	<p>The student should be able to:</p> <p>a) Identify various typical measuring surveying tools.</p> <p>b) Explain the proper use of typical surveying tools in measuring small area.</p> <p>c) Use typical surveying tools to measure small areas.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Identify various typical measuring surveying tools. – Explain proper use of typical surveying tools in measuring small areas. <p>ii) Students present their responses for sharing and discussion.</p> <p>iii) Teacher organise field visit and guide students to use typical surveying tools to measure small area.</p>	<p>Surveying tools and Equipment such as tapes, chains, arrows, pegs, hammer, poles, offsetting tools, etc</p>	<ol style="list-style-type: none"> 1. Can the student identify various typical measuring surveying tools.? 2. Can the student explain the proper use of typical surveying tools in measuring small areas? 3. Can the student use typical surveying tools to measure small areas? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the use of assessment guideline, the teacher should use the guideline to assess the activities performed in part (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-v).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.3 Fieldwork Procedures	<p>The student should be able to:</p> <p>a) Explain procedures to conduct chain surveying.</p> <p>b) Follow fieldwork procedures in conducting chain surveying.</p> <p>c) Record field data in field notebook/ booksheets.</p>	<p>i) The teacher to arrange students in groups and guide them to explain procedures to conduct chain surveying.</p> <p>ii) Students present their responses for sharing and discussion.</p> <p>iii) The teacher to organise a field visit and guide the students in the field to:</p> <p>– Carry out field practical on chaining by using proper fieldwork procedures.</p>	<ul style="list-style-type: none"> • Surveying tools (i.e., chains, tapes, arrows, pegs, hammer etc) • Field notebook/ booksheets • Pencil 	<ol style="list-style-type: none"> 1. Can the student explain procedures to conduct chain surveying? 2. Can the student follow fieldwork procedures conducting chain surveying? 3. Can the student record activities in the notebook/ booksheets? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Book and record activities in the field notebook/ booksheets. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
5.0 SURVEYING TECHNIQUES (PRACTICE)	5.1 Field Practice	The student should be able to; a) Explain proper procedures of carrying out surveying field practices. b) Carry out practicals in the field on chain surveying using proper procedures.	i) The teacher to organise students in groups and guide them to explain proper procedures of carrying out surveying field practices. ii) Students present their responses for sharing and discussion.	Surveying tools (i.e., ranging poles, arrow, pins, pegs, hammer, tapes, chains, etc)	1. Is the student able to explain proper procedures of carrying out surveying field practices? 2. Is the student able to carry out practicals in the field on chain surveying?	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher to organise a field visit and guide the students in the field to carry out practicals using chain surveying. iv) The teacher should monitor and facilitate students in carrying out practicals using chain surveying. v) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii)			
	5.2 Plotting	The student should be able to: a) Explain proper procedures of plotting chain surveying data after fieldwork. b) Plot chain surveying data after fieldwork.	i) The teacher to organise students in groups and guide them to explain the proper procedures of plotting chain surveying data after fieldwork ii) Students present their work for sharing and discussion.	<ul style="list-style-type: none"> • Data acquired from the field • Field notebook • Pencil • Drawing sheet 	<ol style="list-style-type: none"> 1. Is the student able to explain proper procedures of plotting chain surveying data after fieldwork? 2. Is the student able to plot chain surveying data after fieldwork? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iii) The teacher to design activities for students to plot chain surveying using field data acquired</p> <p>iv) The teacher should monitor and facilitate students in plotting chain surveying data using field data acquired.</p> <p>v) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	5.3 Draughting Equipment	The student should be able: a) Identify draughting equipment. b) Explain the use of draughting equipment. c) Use draughting equipment in plotting fieldwork data.	i) The teacher to use questions to guide students to: – Identify the draughting equipment. – Explain the use of draughting equipment. ii) The teacher to design activities for students to: – Use draughting equipment in plotting fieldwork data.	Surveying office and drawing room draughting equipment and drawing sheets	1. Can the student identify draughting equipment? 2. Can the student explain the use of draughting equipment? 3. Can the student use draughting equipment in plotting fieldwork data?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		d) Use draughting equipment in drawing fieldwork data.	<ul style="list-style-type: none"> – Use draughting equipment in drawing fieldwork data. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (ii). 		4. Can the student use draughting equipment in drawing fieldwork data?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	5.4 Plotting the Framework	<p>The student should be able to:</p> <p>a) Explain proper procedures of plotting framework by using draughting equipment.</p> <p>b) Plot framework by using draughting equipment.</p>	i) The teacher to use questions to guide students to explain proper procedures of plotting framework correctly by using draughting equipment.	<ul style="list-style-type: none"> • Draughting equipment and surveying office or drawing room • Drawing sheets 	<ol style="list-style-type: none"> 1. Can the student explain proper procedures of plotting framework by using draughting equipment? 2. Can the student plot framework by using draughting equipment? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Make correct use of draughting equipment in plotting framework.	ii) The teacher to design activities for students to make correct use of draughting equipment in plotting framework. iii) The teacher should monitor and facilitate students in plotting framework using draughting equipment. iv) Students present their work for sharing and discussion.		3. Can the student make correct use of draughting equipment in plotting framework?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) With the use of assessment guidelines, the teacher should guide the students to use the guideline to assess the activities performed in part (ii).</p> <p>vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	5.5 Symbols	<p>The student should be able to:</p> <p>a) Identify proper symbols used in plotting data in a graph.</p> <p>b) Make proper use of symbols in plotting graph.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify proper symbols used in plotting data in a graph. – Explain the proper use of symbols in plotting graph. <p>ii) The teacher to create activities for students to use symbols properly in plotting graph.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>	<ul style="list-style-type: none"> • Draughting equipment • Drawing sheets 	<ol style="list-style-type: none"> 1. Can the student identify the proper symbols used in plotting graph? 2. Can the student make proper use of symbols in plotting graph? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) Students present their work for sharing and discussion. v) With the use of assessment guidelines, the teacher should guide students to assess the activities performed in part (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
6.0 SURVEYING TECHNIQUES FOR SMALL AREAS (PRACTICE)	6.1 Fieldwork Surveying Procedures	The student should be able to: a) Identify tools used in Surveying. b) Explain the procedures for carrying out surveying fieldwork. c) Explain do and don't in surveying fieldwork.	i) The teacher to organise students in groups and guide them to: – Identify tools used in Surveying. – Explain the procedures for carrying out surveying fieldwork. ii) Students present their work for sharing and discussion. iii) The teacher should use questioning strategies to guide students to explain do and don't in surveying fieldwork.	<ul style="list-style-type: none"> • Surveying instruments (i.e, chains, tapes, ranging, hammers, offsetting tools, cross staff, double prism optical square) 	1. Is the student able to identify tools used in Surveying? 2. Is the student able to explain the procedures for carrying out surveying fieldwork? 3. Is the student able to explain do and don't in surveying fieldwork?	2

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (iii).			
	6.2 Field Practice	The student should be able to: a) Use various chain surveying tools to conduct fieldwork. b) Perform chaining and ranging to overcome obstacles.	i) The teacher to organise fieldwork activities for students to: – Use various chain surveying tools to conduct fieldwork. – Perform both ranging and chaining to overcome obstacles.	• Surveying instrumen (i.e., chains, tapes, ranging, hammers, offsetting tools, cross staff, double prism optical square)	1. Can the student use various chain surveying tools to conduct fieldwork? 2. Can the student perform both ranging and chaining to overcome obstacles?	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Use offsetting tools in surveying. d) Take readings, book and record in the fieldwork notebook/ booksheets.	<ul style="list-style-type: none"> – Use offsetting tools in surveying – Take readings, book and record in the fieldwork notebook/ booksheets . ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) With the use of assessment guidelines, the teacher should guide the students to use the guidelines to assess the activities performed in part (i). 		3. Is the student able to use offsetting tools in surveying? 4. Can the student read and record data in the field notebook/ booksheets?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) Students present their work for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			

FORM III

CLASS LEVEL COMPETENCIES

By the end of Form III, the student should have ability to:

- a) use levelling instruments to perform fieldwork, routine error adjustment, booking data and plotting various levelling plans, sections and establishment of temporary bench marks and levelling stations; and
- b) use theodolites in acquiring data for angular measurements and plotting.

CLASS LEVEL OBJECTIVE

By the end of Form III, the student should be able to:

- a) apply levelling tools and instruments to conduct fieldwork levelling; and
- b) use theodolites to collect data relating to angular measurements and use the information for plotting.

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
1.0 LEVELLING	1.1 Introduction	<p>The student should be able to:</p> <p>a) Define the term levelling.</p> <p>b) Describe terms used in levelling works.</p> <p>c) Explain the importances of levelling in construction works.</p>	<p>i) The teacher to use questions to guide the students to:</p> <ul style="list-style-type: none"> – Define the term levelling – Describe terms used in levelling works (i.e. benchmark, back sight, intermediate sight, fore sight, change point, datum level, height of instruments, reduced levels etc). 	<ul style="list-style-type: none"> • Surveying text books • Levelling instruments (i.e., dumpy level, automatic level theodolite etc) • Black/white boards • Chalks/ markers 	<ol style="list-style-type: none"> 1. Can the student explain the concept of levelling? 2. Can the student describe different terms used in levelling? 3. Is the student able to explain the importance of levelling in construction works? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher to use questioning strategies (what, why and how questions) to guide students to explain the importance of levelling. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.2 Levelling Instruments and Tools	<p>The student should be able to:</p> <p>a) Identify various levelling instruments and tools.</p> <p>b) Explain the uses of various levelling instruments and tools.</p>	<p>i) The teacher to use questions to guide the students to:</p> <ul style="list-style-type: none"> – Identify various levelling instruments and tools. – Explain the uses of each levelling instrument and tool identified. <p>ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> • Black/white boards • Chalks or markers • Surveying text books • Surveying instruments and tools ie levels, tripod, staff etc 	<p>1. Is the student able to identify various levelling instruments and tools?</p> <p>2. Can the student explain the uses of various levelling instruments and tools?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.3 Levelling Staff	<p>The student should be able to:</p> <p>a) Describe various types of levelling staff.</p> <p>b) Explain how to take readings on different levelling staff.</p> <p>c) Take correct readings using cross-hairs.</p>	<p>i) The teacher to use brainstorming questions to guide students to describe various types of levelling staff.</p> <p>ii) The teacher to create activities for students to:</p> <p>– Demonstrate on how to take readings on different levelling staff,</p> <p>– Take correct readings using cross-hairs.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>	<ul style="list-style-type: none"> • Surveying text book • Levelling staffs (staff) • Levels • Black/white boards • Chalks/ markers 	<p>1. Can the student describe types of levelling staff?</p> <p>2. Can the student explain how to take readings on different levelling staff?</p> <p>3. Can the student take correct readings using cross-hairs?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (ii). v) Students to present their responses for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.4 The Level	<p>The student should be able to:</p> <p>a) Describe different types of levels.</p> <p>b) Differentiate types of levels.</p> <p>c) Explain how to use different types of levels.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Describe different types of levels. – Differentiate types of levels. – Explain how to use different types of levels. <p>ii) Students to present their responses for sharing and discussion.</p>	<ul style="list-style-type: none"> • Surveying text books • Levels • Levelling staff. • Black/white boards • Chalks markers 	<ol style="list-style-type: none"> 1. Is the student able to describe different types of levels? 2. Is the student able to differentiate types of levels? 3. Is the student able to explain how to use different types of levels? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
	1.5 Field Practice (Temporary Adjustment)	The student should be able to: a) Explain the process of conducting a levelling practice by using a level, tripod, and levelling staff.	i) The teacher to use questions to guide students to explain the process of conducting a levelling practice by using a level, tripod, and levelling staff. ii) The teacher to use role play method for students to demonstrate how to:	<ul style="list-style-type: none"> • Levelling tool (i.e., ripod level staffs, staff bubbles, levels, field notebook/ booksheets) • Pencil • Chain or tape 	1. Can the student explain the process of conducting a levelling practice by using a level machine, tripod, and levelling staff?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Conduct a levelling practice by using a level, tripod, and levelling staff.	<ul style="list-style-type: none"> – Use a level to take observations. – Conduct a levelling practice by using tripod and levelling staff. iii) The teacher to organise fieldwork practices and guide students to <ul style="list-style-type: none"> – Conduct a levelling practice by using a level, tripod, and levelling staff. 		2. Can the student conduct a levelling practice by using a level tripod, and levelling staff?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (iii). vi) Students to present their responses for sharing and discussion.			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	1.6 Field Practice (Permanent Adjustment) Two Peg test/ Method	The student should be able to: a) Set the level at required necessary positions. b) Conduct a two peg practical.	i) The teacher to use role play method for students to: – Set the level at required necessary positions – Carry out a two peg practical.	<ul style="list-style-type: none"> • Levelling tools e.g. Levels staffs, tripod, taped pegs, hammer levels etc • Field notebook/ booksheets • Pencil 	<ol style="list-style-type: none"> 1. Is the student able to set the level at required necessary positions? 2. Is the student able to conduct a two peg practical? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (i). iv) Students present their work for sharing and discussion.			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
2.0 FIELDWORK (LEVELLING)	2.1 Fieldwork Routines	The student should be able to: a) Explain the fieldwork routines. b) Identify things to prepare for fieldwork routines. c) Explain do and don't for fieldwork routines.	i) The teacher to organise students in groups and guide them to: – Explain the fieldwork routines. – Identify things to prepare for fieldwork routines. – Explain do and don't for fieldwork routines.	Surveying tools and instrument e.g. Levels, tripod, staffs, taped pegs hammer, umbrella etc	1. Can the student explain the fieldwork routines? 2. Can the student identify things to prepare for fieldwork routines?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) Students present their responses for sharing and discussion. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).		3. Can the student explain do and don't for fieldwork routines?	
	2.2 Method of Booking	The student should be able to: a) Explain the process of booking and entering acquired data into the field notebook/ booksheets.	i) The teacher to organise students in groups and guide them to explain the process of booking and entering acquired data into the field notebook/ booksheets.	<ul style="list-style-type: none"> • Surveying text books • Levelling tools • Field books • Pencils 	1. Is the student able to explain the process of booking and entering acquired data into the field notebook/ booksheets?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Book and enter surveyed data into the field book.	ii) The teacher to create activities for students to “record and enter acquired data into the field notebook/ booksheets. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (ii).		2. Is the student able to book and enter surveyed data into the field book?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) Students present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	2.3 Methods of Computing reduced levels	The student should be able to: a) Identify methods of computing reduced levels from booked levelling data.	i) The teacher to organise students in groups and guide them to Identify methods of computing reduced levels.		1. Can the student identify methods of computing reduced levels from booked levelling data?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Compute reduced levels using rise and fall method. c) Compute reduced levels using height of instrument method.	ii) The teacher to create activities for students to: <ul style="list-style-type: none"> – Compute reduced levels using rise and fall method. – Compute reduced levels using height of instrument method. – Compute reduced levels from booked levelling data. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		2. Can the student compute reduced levels using rise and fall method? 3. Can the student compute reduced levels using height of instrument methods?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iv) With the use of assessment guidelines, the teacher should guide students to assess the activities performed in part (ii).</p> <p>v) Students should present their responses for sharing and discussion.</p> <p>vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.4 Errors and Adjustments in levelling	<p>The student should be able to:</p> <p>a) Identify sources of errors in levelling.</p> <p>b) Identify types of errors in levelling.</p> <p>c) Make necessary adjustment to minimize the errors in levelling.</p> <p>d) Take precautions to minimize the errors in levelling.</p> <p>4. Eliminate parallax error</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Identify sources of errors in levelling. – Identify types of errors in levelling. <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Make necessary adjustments (temporary and permanent adjustments) e.g. focusing, centering in minimizing errors in levelling. 	<ul style="list-style-type: none"> • Surveying tools such as levels, tripod staff, tape, pegs, hammer etc • Surveying text books 	<ol style="list-style-type: none"> 1. Can the student identify sources of errors in levelling? 2. Can the student identify types of errors in levelling.? 3. Can the student make necessary adjustments to minimize the errors in levelling? 4. Can the student take precautions to minimize the errors in levelling? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Take precautions to minimize the errors in levelling. – Carry out practices for eliminating parallax error. <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p> <p>iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (ii).</p>		5. Can the student eliminate parallax error?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) Students present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
3.0 LINE LEVELLING	3.1 Theory of Direct Levelling	<p>The student should be able to:</p> <p>a) Identify methods of direct levelling.</p> <p>b) Use various methods of direct levelling.</p>	<p>i) The teacher to use questions to guide students to identify methods of direct levelling.</p> <p>ii) The teacher to create activities for students to carry out direct levelling using the various methods.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p>	<ul style="list-style-type: none"> • Surveying text book • Surveying tools: i.e levels, tripod, tape, pegs etc • Black/white boards • Chalks / markers 	<p>1. Can the student identify methods of direct levelling?</p> <p>2. Can the student use various methods of direct levelling?</p>	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (iii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.2 Longitudinal and Cross- Sections	<p>The student should be able to:</p> <p>a) Define terms longitudinal and cross sections.</p> <p>b) Differentiate longitudinal section from cross section.</p> <p>c) Explain uses of profile longitudinal and cross sections in surveying.</p> <p>d) Describe how to plot profile longitudinal levels.</p> <p>e) Plot profile longitudinal levels.</p>	<p>i) The teacher to use brainstorming questions to guide the students to define terms longitudinal and cross sections.</p> <p>ii) The teacher to organise students in groups and guide students to:</p> <ul style="list-style-type: none"> – Differentiate longitudinal section from cross section. – Explain uses of profile longitudinal and cross sections in surveying. – Describe how to plot profile longitudinal levels. 	<ul style="list-style-type: none"> • Surveying tools • Surveying text books • Surveying office and • Draughting instruments 	<p>1. Can the student define terms longitudinal and cross section?</p> <p>2. Is the student able to differentiate longitudinal section from cross section?</p> <p>3. Is the student able to explain uses of profile longitudinal and cross sections in surveying?</p> <p>4. Is the student able to describe how to plot profile longitudinal levels?</p>	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		f) Determine the cross section of a surface. g) Draw a profiles to a suitable scale.	iii) Students to present their responses for sharing and discussion. iv) The teacher to create activities for students to: <ul style="list-style-type: none"> – Plot longitudinal profile. – Determine the cross section of a surface. – Draw a profiles to a suitable scale. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv).		5. Is the student able to plot profile longitudinal levelling? 6. Is the student able to determine the cross section of a surface? 7. Is the student able to draw a profile to a suitable scale?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (iv). vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.3 General Procedures	<p>The student should be able to:</p> <p>a) Give description how to book and plot cross and longitudinal sections.</p> <p>b) Conduct longitudinal or profile levelling.</p> <p>c) Conduct cross-sections levelling.</p> <p>d) Book and plot longitudinal section.</p> <p>e) Book and plot cross section.</p>	<p>i) The teacher to organise students in groups and guide them to give description on how to book and plot cross and longitudinal sections.</p> <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Conduct longitudinal or profile levelling. – Conduct cross-sections levelling. – Book and plot longitudinal section. – Book and plot cross section. 	Surveying tools for levelling ie levels, staffs, etc	<p>1. Can the student give description on how to book and plot cross and longitudinal sections?</p> <p>2. Can the student conduct longitudinal or profile levelling?</p> <p>3. Can the student conduct cross-section levelling?</p> <p>4. Can the student book and plot longitudinal section?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the use of assessment guidelines, the teacher guides the students to use the guidelines to assess the activities performed in part (ii). v) Students to present their responses for sharing and discussion.		5. Can the student book and plot cross section?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	3.4 Field Practice (Profile Levelling and Plotting)	The student should be able to: a) Conduct profile levelling around a specific area in the school. b) Plot what they have been surveying in the field.	i) The teacher to organize a fieldwork and guide students in groups to: – Conduct profile levelling around a specific area in the school	Surveying tools and instrument i.e levels, tripod stand staffs pegs hammer, etc	1. Can the student conduct profile levelling? 2. Can the student plot the surveyed data?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Conduct levelling: one group starts with longitudinal (profile) levelling the other group with cross-sectioning, later exchange. – Plot the acquired field data. <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iii) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (i).</p> <p>iv) Students present their work for sharing and discussion.</p> <p>v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 CONTOURING	4.1 Introduction	<p>The student should be able to:</p> <p>a) Define terms: contour, contour interval and horizontal equivalent.</p> <p>b) Describe the purpose of contouring.</p> <p>c) Describe the characteristics of contours.</p>	<p>i) The teacher to use brainstorming questions to guide students to explain terms: contour, contour intervals and horizontal equivalent.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> - Describe the purpose of contouring. - Describe the characteristics of contours. 	<ul style="list-style-type: none"> • Surveying text book • Levels, theodolite, staff, tripod, hammer etc • Sketches of contours 	<p>1. Can the student define terms: contour, contour interval and horizontal equivalent?</p> <p>2. Can the students describe the purpose of contouring?</p> <p>3. Can the students describe the characteristics of contours?</p>	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher to use questioning strategies (what, why and how) to guide the students to describe the purpose of contouring. iv) Students present their work for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.2 Methods of Contouring	<p>The student should be able to:</p> <p>a) Identify a methods of contouring.</p> <p>b) Describe methods of contouring</p> <p>c) Demonstrate different methods of locating contours.</p> <p>d) Use direct and indirect methods to locate contours in the fields</p>	<p>i) The teacher to arrange students in groups and guide them to:</p> <ul style="list-style-type: none"> – Identify methods of contouring. – Describe methods of contouring. <p>ii) Students present their responses for sharing and discussion.</p> <p>iii) The teacher to use role play to guide students to demonstrate different methods of locating contours:</p> <ul style="list-style-type: none"> – Direct method – Indirect method (spot level). 	<ul style="list-style-type: none"> • Surveying text books • Black/white boards • Chalks/ markers 	<p>1. Is the student able to identify contouring methods?</p> <p>2. Is the student able to describe methods of contouring?</p> <p>3. Is the student able to demonstrate different methods of locating contours?</p> <p>4. Is the student able to use direct and indirect methods to locate contours in the fields?</p>	12

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher to create activities for students to use direct and indirect methods to locate contours in the fields. v) The teacher should monitor and facilitate students in performing the tasks given in part (iii) and (iv). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-v).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.3 Interpolation and Plotting of Contours	<p>The student should be able to:</p> <p>a) Use various ways of interpolating contours.</p> <p>b) Plot different contours from field of different topographies.</p> <p>c) Use estimation methods in plotting contours.</p> <p>d) Use interpolation methods and graphical method to plot contours.</p>	<p>i) The teacher to create activities for the students to:</p> <ul style="list-style-type: none"> – Use various way of interpolation. – Plot different contour from field of different topographies. <p>ii) The teacher to use role play methods to guide students demonstrate how to:</p> <ul style="list-style-type: none"> – Use estimation methods in plotting contours. 	<ul style="list-style-type: none"> • Surveying text book • Graph papers • Black/white boards • Chalks • White board markers 	<ol style="list-style-type: none"> 1. Can the student use various ways of interpolating contours? 2. Can the student plot contours from data of different topographies? 3. Can the student use estimation methods in plotting contours? 4. Can the student use interpolation methods and graphical method to plot contours? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="921 252 1134 454">– Use interpolation methods and graphical method to plot contours. <li data-bbox="887 475 1106 717">iii) The teacher should monitor and facilitate students in performing the tasks given in part (i) and (ii). <li data-bbox="887 739 1138 1083">iv) With the use of assessment guidelines, the teacher guides the students to use the guidelines to assess the activities performed in part (i) and (ii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) Students to present their responses for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	4.4 Field Practice (Locating contours)	The student should be able to: a) Describe the uses of contour maps b) Use contours to locate different things in a map.	i) The teacher to use questions and answers method to guide the students to describe the uses of contour maps etc.	<ul style="list-style-type: none"> • Surveying text books • Surveying tools levels, tripod, staffs, pegs hammer, etc 	1. Can the student describe the uses of contour maps? 2. Can the student use contours to locate different things in a map?	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Locate contours in the field. d) Use contour maps in various Civil Engineering works.	ii) The teacher to create activities for the students to: <ul style="list-style-type: none"> – Use contours to locate different things (i.e. hills, mountains, valleys etc.) in map. – Locate contours in the field. – Use contour maps in various Civil Engineering works. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		3. Can the student Locate contours in the field? 4. Can the student Use contour maps in various Civil Engineering works?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (ii). v) Students to present their responses for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
5.0 THEODOLITE SURVEYING	5.1 Introduction	<p>The student should be able to:</p> <p>a) Define the term Theodolite.</p> <p>b) Identify Theodolite parts.</p> <p>c) Explain terms used in Theodolite surveying.</p> <p>d) Explain different functions of a Theodolite.</p>	<p>i) The teacher to use questions and answer method to guide students to:</p> <ul style="list-style-type: none"> – Define the term Theodolite. – Explain terms used in Theodolite surveying. – Identify Theodolite parts. <p>ii) The teacher to use questioning strategies to guide the students to explain different functions of a Theodolite.</p>	<ul style="list-style-type: none"> • Surveying text book • Black/white boards • Chalks • White boards • Theodolite 	<ol style="list-style-type: none"> 1. Can the student define the term Theodolite? 2. Can the student identify Theodolite parts? 3. Can the student explain the terms used in Theodolite surveying? 4. Can the student explain different functions of a Theodolite? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	5.2 Theodolite Operation	The student should be able to: a) Handle and store Theodolites. b) Demonstrate operations of a Theodolite.	i) The teacher to create activities for students to handle and store Theodolites. ii) The teacher to use role play method to guide students to demonstrate operations of a Theodolite.	<ul style="list-style-type: none"> • Staff • Theodolite • Tripod 	<ol style="list-style-type: none"> 1. Is the student able to handle and store Theodolites? 2. Can the student demonstrate operations of a Theodolite? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should monitor and facilitate students in performing the tasks given in part (i) and (ii). iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	5.3 Setting Out	The student should be able to: a) Set up Theodolite over a station and make temporary adjustments (i.e., centering, levelling, and focusing).	i) The teacher to use role play method to guide students to: – Set up a Theodolite over a station and make temporary adjustments (i.e., centering, levelling and focusing).	<ul style="list-style-type: none"> • Staff • Theodolite • Tripod 	<ol style="list-style-type: none"> 1. Can the student set up a Theodolite and make temporary adjustments? 2. Can the student use Theodolite to set out different things? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		<p>b) Use Theodolite to set out different things.</p>	<p>– Use Theodolite to set out different things.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (i)</p> <p>iv) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (i).</p> <p>v) Students present their work for sharing and discussion.</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
	5.4 Errors Adjustment in Theodolite Surveying	The student should be able to: a) Explain sources of temporary and permanent errors in Theodolite work. b) Make adjustments to temporary and permanent errors using a Theodolite.	i) The teacher to organise students in groups and guide them to explain sources of temporary and permanent errors in Theodolite work. ii) Students to present their responses for sharing and discussion.	<ul style="list-style-type: none"> • Staff • Theodolite • Tripod 	<ol style="list-style-type: none"> 1. Can the student explain sources of temporary and permanent errors in Theodolite work? 2. Can the student make adjustment of temporary and permanent errors using a Theodolite? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iii) The teacher to create activities for students to make adjustment of temporary and permanent errors using a Theodolite.</p> <p>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii)</p> <p>v) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	5.5 Practice (Fieldwork)	The student should be able to: a) Describe the procedure for conducting angular measurements in the field using a Theodolite b) Conduct angular measurements in the field using Theodolite.	i) The teacher should organise students in groups and guide them to describe the procedure for conducting angular measurements in the field using a Theodolite.	<ul style="list-style-type: none"> • Surveying instruments • Theodolite • Tripod • Staff • Tape 	1. Is the student able to describe the procedure for conducting angular measurements in the field using a Theodolite?	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) Students to present their responses for sharing and discussion. iii) The teacher to create activities and guide the student in groups to conduct angular measurement in the field using a Theodolite. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		2. Is the student able to conduct angular measurements in the field using a Theodolite?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iii).</p> <p>vi) Students present their work for sharing and discussion.</p> <p>vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).</p>			

FORM IV

CLASS LEVEL COMPETENCIES

By the end of form IV, the student should have ability to:

- a) perform estimates and costing of materials and manpower requirements to perform fieldwork;
- b) develop basic knowledge and skills in using traverse instrument to perform fieldwork;
- c) set out construction works (plan control, height control, and vertical alignment excavation control) as well as to conduct calculation for area and volume of earthworks; and
- d) use CAD software to plot the booked data in a computer.

CLASS LEVEL OBJECTIVES

By the end of form IV, the student should be able to:

- a) use knowledge of estimates and costing to determine materials and manpower requirements for fieldwork;
- b) apply traverse surveying instruments to perform all traverse survey fieldwork;
- c) set out of construction works (such as control plans, heights, vertical alignment and excavation control);
- d) calculate areas and earth volumes; and
- e) apply CAD to draw the area of control points.

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
1.0 TRAVERSE SURVEYING	1.1 Introduction	<p>The student should be able to:</p> <p>a) Define the term traverse.</p> <p>b) Explain types of traverse surveying.</p> <p>c) Differentiate open and closed traverses.</p> <p>d) Explain where each type of traverse surveying is suitably applied.</p> <p>e) Give description on procedures of closed traverse and practice.</p>	<p>i) The teacher to use brainstorming questions to guide students to define the term traverse</p> <p>ii) The teacher to use questions to guide the students to:</p> <ul style="list-style-type: none"> – Identify types of traversing in surveying and traverse surveying. – Explain each type of traverse surveying. – Differentiate open and closed traverses. <p>iii) The teacher to use questioning strategies (what, why and how questions) to guide students to:</p>	<ul style="list-style-type: none"> • Surveying text books • Simple traversing tools for familiarisation e.g. compass • Theodolite staff, tripod. • Tape, etc 	<ol style="list-style-type: none"> 1. Can the student define the term traverse? 2. Can the student explain types of traverse surveying? 3. Can the student differentiate open and closed traverses? 4. Can the student explain where each type of traverse surveying is suitably applied? 	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Explain the applications of each type of traverse surveying. – Give description of procedures of closed traverse and practice. <p>iv) The teacher to use role play to guide students to demonstrate the procedures on closed traverse practice.</p> <p>v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).</p>		5. Can the student give description of procedures of closed traverse and practice.?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.2 Closing Error	<p>The student should be able to:</p> <p>a) Explain the term closing error.</p> <p>b) Give description on how to adjust a closing error.</p> <p>c) Explain principal methods of traversing in surveying.</p> <p>d) Transit tape traversing.</p>	<p>i) The teacher to use brainstorming questions to guide students to explain the term “closing error”.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Give description of how to adjust a closing error. – Explain principal methods of traversing in surveying. <p>iii) Students present their work for sharing and discussion.</p> <p>iv) The teacher to use role play method to guide students to:</p>	<ul style="list-style-type: none"> • Theodolite • Staff, tripod • Tape etc • Posters 	<p>1. Can the student explain the term closing error?</p> <p>2. Can the student give description on how to adjust a closing error?</p> <p>3. Is the student able to explain principal methods of traversing in surveying?</p> <p>4. Can the student transit tape traversing?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Demonstrate how to use graphical method or graphical adjustments of closing error. – Adjust errors” using the graphical method. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) With the use of assessment guideline, the teacher should guide students to assess the activities performed in part (iv). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv)			
	1.3 Inclined Angle Theodolite Traverse and Angular Measurement	The student should be able to: a) Set out a Theodolite over a station and make temporary adjustments. b) Measure direct angles and deflection angles. c) Demonstrate on how to make angular measurements.	i) The teacher to organise students in groups and guide them to give description on how to: – Set up a Theodolite over a survey station. – Measure direct angles and deflection angles. ii) The teacher to create activities for students to:	<ul style="list-style-type: none"> • Theodolite staff, tripod, tape, etc • Field books • Pencil 	<ol style="list-style-type: none"> 1. Can the student set out a Theodolite over a station and make temporary adjustments? 2. Can the student measure direct angles and deflection angles? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		<p>d) Set out a Theodolite over a station and make temporary adjustments.</p> <p>e) Prolong a line and record the angle in a field book.</p>	<ul style="list-style-type: none"> – Demonstrate centering, levelling and focusing. – Measure deflection angles. – Set out a Theodolite over a station and make temporary adjustments. – Measure: direct angles and deflection angles. – Demonstrate on how to make the angular measurements. – Prolong a line and record the angle in a field book. 		<p>3. Can the student demonstrate on how to make angular measurements?</p> <p>4. Can the student set out a Theodolite over a station and make temporary adjustments?</p> <p>5. Can the student prolong a line and record the angle in filed work?</p>	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="915 252 1163 489">– Record direct angles, deflection angles, vertical and horizontal angles, prolongation of lines etc. <li data-bbox="877 512 1163 748">iii) The teacher to organise students in groups and guide them to explain how to record different angles in a field book. <li data-bbox="877 771 1163 977">iv) The teacher should monitor and facilitate students in performing the tasks given in part (ii). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>v) With the use of assessment guidelines, the teacher should guide students to use the guidelines to assess the activities performed in part (ii).</p> <p>vi) Students present their work for sharing and discussion.</p> <p>vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.4 Fieldwork	<p>The student should be able to:</p> <p>a) Use Theodolite to carry out traversing in the field.</p> <p>b) Plotting a Traverse surveying.</p> <p>c) Traverse by observing angle.</p>	<p>i) The teacher to organize a fieldwork and guide student to use theodolite in the field to:</p> <ul style="list-style-type: none"> – Measure open traverse and closed traverse. – Locate point of intersection of two straight lines. – Demonstrate on how to lay off a horizontal angle by repetition method. <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> – Plot a traverse surveying. – Demonstrate the fast needle method. 	Theodolite Staff, tripod Pegs, hammer, etc	<p>1. Can the student use Theodolite to carry out traversing in the field?</p> <p>2. Is the student able to plot traverse surveying data?</p> <p>3. Is the student able to traverse by observing angle?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="915 252 1130 422">– Demonstrate traversing in surveying by observation of angles. <li data-bbox="877 440 1150 646">iii) The teacher should monitor and facilitate students in performing the tasks given in part (i) and (ii). <li data-bbox="877 665 1150 978">iv) With the use of assessment guidelines, the teacher guides the students to use the guidelines to assess the activities performed in part (i) and (ii). <li data-bbox="877 997 1119 1139">v) Students present their work for sharing and discussion. 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
2.0 SETTING OUT FOR CONSTRUCTION WORK	2.1 Introduction	The student should be able to: a) Explain the term setting out in surveying. b) Explain the term setting out in construction work.	i) The teacher to use brainstorming questions to guide students to: – Explain the term setting out in surveying. – Explain the term setting out in construction work.	<ul style="list-style-type: none"> • Surveying text books • Surveying tools Theodolite staff, Tripod, peg, hammer, etc • Black/white boards • Chalks or markers • Posters 	<ol style="list-style-type: none"> 1. Can the student explain the term setting out in surveying? 2. Can the student explain the term setting out in construction work? 	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		<p>c) Explain the standard operations used in setting out of construction work.</p> <p>d) Explain the standard operations used in setting out of surveying work.</p>	<p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Explain the standard operations used in setting out of construction work. – Explain the standard operations used in setting out of surveying work. <p>iii) Students present their work for sharing and discussion.</p>		<p>3. Is the student able to explain the standard operations used in setting out of construction work?</p> <p>4. Is the student able to explain the standard operations used in setting out of surveying work?</p>	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	2.2 Planning Control	The student should be able to: a) Explain various requirements in setting out. b) Explain the accuracy in setting out.	i) The teacher to organise students in groups and guide them to: – Explain the standard operations in setting out: such as plan control. – Explaining the accuracy in setting out. ii) Students present their work for sharing and discussion.	<ul style="list-style-type: none"> • Surveying texts books • Surveying tools such as (Theodolite Tripod, staff, Pegs, Hammer etc) • Black/white boards • Chalks/ markers. 	<ol style="list-style-type: none"> 1. Can the student explain various requirements in setting out? 2. Can the student explain the accuracy in setting out? 	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
	2.3 Height Control	The student should be able to: a) Define the term height control. b) Explain how to control height.	i) The teacher to use questions to guide students to: – Define the term height control. – Explain how to control height. ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).	<ul style="list-style-type: none"> • Surveying texts books • Surveying tools such as: (Theodolite, Tripod, staff, Pegs, Hammer etc) 	<ol style="list-style-type: none"> 1. Can the student define the term height control? 2. Can the student explain how to control height? 	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.4 Vertical Alignment Control	<p>The student should be able to:</p> <p>a) Define the term vertical alignment control.</p> <p>b) Describe vertical alignment control.</p>	<p>i) The teacher to use questions to guide students to define the term vertical alignment control.</p> <p>ii) The teacher to organise students in groups and guide them to describe vertical alignment control.</p> <p>iii) Students present their responses for sharing and discussion.</p> <p>iv) The teacher should give feedback and use students' responses as a feedback to support students in explaining vertical alignment control.</p>	<p>Surveying texts books Surveying tools such as: (Theodolite, Tripod, staff, Pegs, Hammer etc)</p>	<p>1. Can the student define the term vertical alignment control?</p> <p>2. Can the student describe vertical alignment control?</p>	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.5 Excavation Control	<p>The student should be able to:</p> <p>a) Define the term excavation control.</p> <p>b) Explain the accuracy in setting out for construction work using surveying.</p> <p>c) Explain excavation control.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Define the term excavation control. – Explain the accuracy in setting out for construction work using surveying. – Explain excavation control. <p>ii) The teacher should give feedback and use students’ responses as feedback to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> • Surveying texts books • Surveying tools such as: (Theodolite, Tripod, staff, Pegs, Hammer etc) 	<ol style="list-style-type: none"> 1. Is the student able define the term excavation control? 2. Can the student explain the accuracy in setting out for construction work using surveying? 3. Can the student explain excavation control? 	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.6 Movement Measurement	<p>The student should be able to:</p> <p>a) Identify movement measurement.</p> <p>b) Describe movement measurement.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify movement measurement. – Describe movement measurement. <p>ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> • Surveying texts books • Surveying tools 	<p>1. Is the student able to Identify movement measurement?</p> <p>2. Is the student able to describe movement measurement?</p>	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.7 Field Practice	<p>The student should be able to:</p> <p>a) Explain how to conduct setting out in the field.</p> <p>b) Demonstrate setting out in the field.</p> <p>c) Carryout setting out in the field.</p>	<p>i) The teacher to arrange students in groups and guide them to explain on how to conduct setting out in the field.</p> <p>ii) Students to present their responses for sharing and discussion.</p> <p>iii) The teacher to organize a fieldwork and guide students to do demonstration on setting out construction work using four standard operations:</p> <ul style="list-style-type: none"> – Plan control. – Height control. – Vertical alignment control. 	<ul style="list-style-type: none"> • Surveying tools tape, tripod • Theodolite, traveling staff pegs, hammer etc • Field notebook • Pencil 	<ol style="list-style-type: none"> 1. Can the student explain how to conduct setting out in the field? 2. Can the student demonstrate setting out in the field? 3. Can the student carryout setting out in the field? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> – Excavation control. iv) The teacher to create activities for students to carryout setting out in the field. v) The teacher should monitor and facilitate students in performing the tasks given in part (iii) and (iv). vi) With the use of assessment guideline, the teacher should guide students to use the guidelines to assess the activities performed in part (iii) and (iv). 			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			
3.0 AREAS AND VOLUMES	3.1 Areas	The student should be able to: a) Differentiate between Regular and irregular figures. b) Find areas of figures. c) Write various formula used in calculating areas of regular figures.	i) The teacher to organise students in groups and guide them to differentiate regular and irregular figures. ii) The teacher to create activities for the students to: – Find areas of various regular and irregular figures.	<ul style="list-style-type: none"> • Surveying text books • Surveying tools levels • Theodolites staffs, tripod, tapes, etc • Black/white boards • Chalks or markers • Sketches of areas and volume of regular figures. 	<ol style="list-style-type: none"> 1. Can the student differentiate regular and irregular figures? 2. Can the student find area of figures? 	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		d) Write various methods of calculating areas of irregular figure (Trapezoidal rule and Simpson's rule).	<ul style="list-style-type: none"> – Write various formula used in calculating areas of regular figures. – Write various methods of calculating areas of irregular figure (Trapezoidal rule and Simpson's rule). iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		3. Can the student write various formula used in calculating areas of regular figures? 4. Can the student write various methods of calculating areas of irregular figure (Trapezoidal rule and Simpson's rule)?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) With the use of assessment guideline, the teacher should guide students to use the guidelines to assess the activities performed in part (ii). v) Students to present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.2 Areas by Plan Meter	<p>The student should be able to:</p> <p>a) Explain the concept of plan meter.</p> <p>b) Estimate area of different figures using a plan meter.</p>	<p>i) The teacher to use questions to guide the students to explain the concept of plan meter.</p> <p>ii) Teacher to create activities for students to estimate area of different figures using a plan meter.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p> <p>iv) With the use of assessment guideline, the teacher should guide students to use the guidelines to assess the activities performed in part (ii).</p>	<ul style="list-style-type: none"> • Surveying text books • Surveying tools levels • Theodolites staffs, tripod, tapes, etc 	<p>1. Can the student explain the concept of plan meter?</p> <p>2. Can the student estimate area using a plan meter?</p>	3

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	3.3 Volumes	<p>The student should be able to:</p> <p>a) Describe the processes of calculating volumes of various figures.</p> <p>b) Calculate volumes of various figures.</p>	<p>i) The teacher to organise students in groups and guide them to describe the processes of calculating volumes of various figures.</p> <p>ii) The teacher to create activities for students to calculate volumes of regular and irregular figure using cross section, spot levelling, contouring, prismatic and trapezoidal rules.</p>	Levels, Theodolites, staff, tripod, tapes, etc	<p>1. Is the student able to describe the processes of calculating volumes of various figures?</p> <p>2. Can the student calculate volumes of various figures?</p>	4

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p> <p>iv) With the use of assessment guideline, the teacher should guide students to use the guidelines to assess the activities performed on calculating volumes of various figures.</p> <p>v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).</p>			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.4 Field Practice	<p>The student should be able to:</p> <p>a) Describe procedures of carrying out fieldwork using a level or Theodolite in order to find areas of regular figures.</p> <p>b) Find areas of regular figures using a level or Theodolite.</p>	<p>i) The teacher to arrange students in groups and guide them to describe procedures of carrying out fieldwork using a level or Theodolite in order to find areas of regular figures.</p> <p>ii) The teacher to organize fieldwork and guide students to find areas of regular figures using a level or Theodolite.</p> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>	Levels, Tripod stand Theodolite, Tapes, staff etc	<p>1. Can the student describe procedures of carrying out fieldwork using a level or Theodolite in order to find areas of regular figures?</p> <p>2. Can the student find areas of regular figures using a level or Theodolite?</p>	9

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) With the use of assessment guideline, the teacher should guide students to use the guidelines to assess the activities performed on finding areas of regular figures using a level or Theodolite. v) Students should present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 INTRODUCTION TO COMPUTER AIDED DRAUGHTING (CAD)	4.1 Introduction to CAD	<p>The student should be able to:</p> <p>a) Explain the concept of computer Aided Draughting.</p> <p>b) Identify software used in CAD.</p> <p>c) Describe hardware of CAD system and CAD software.</p> <p>d) Describe CAD system.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Explain the concept of CAD. – Identify five (5) computer hardwares. <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Describe hardware of CAD system and CAD software. – Describe the CAD system. <p>iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).</p>	<ul style="list-style-type: none"> • Posters with pictures of objects drawn using CAD • Posters with pictures of computer inputs and output devices • CAD package • CAD software (CorelDraw, Page Maker, Microsoft Office, Auto CAD, Paint, Corel CAD etc) • Manila sheet • Mark pen • Computer loaded with CAD software • Projector 	<ol style="list-style-type: none"> 1. Can the student explain the concept of CAD? 2. Can the student identify software used in CAD? 3. Can the student describe hardware of CAD system and CAD software? 4. Can the student Describe CAD system? 	18

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.2CAD Application	<p>The students should be able to:</p> <p>a) Identify types of projections and geometrical modeling.</p> <p>b) Describe elements of drawing using CAD.</p> <p>c) Explain the area of application of CAD in Surveying.</p> <p>d) Use CAD software</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> – Identify types of projections and geometrical modeling. – Describe elements of drawing using CAD <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> – Describe drawing environment and elements of drawing. – Explain the area of application of CAD in Surveying. 	<ul style="list-style-type: none"> • Posters with pictures of objects drawn using CAD • Posters with pictures of computer inputs and output devices • CAD package • CAD software (CorelDraw, Page Maker, Microsoft Office, Auto CAD, Paint, Corel CAD etc) • Manila sheet • Markes pen • Computer loaded with CAD software • Projector 	<ol style="list-style-type: none"> 1. Is the student able to Identify types of projections and geometrical modeling. 2. Is the student able to describe elements of drawing using CAD? 3. Is the student able to explain the area of application of CAD in Surveying? 4. Is the student able to use CAD software? 	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) Students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	4.3 CAD Practice.	The students should be able to: a) Explain processes of making layout and sketches using CAD. b) Use CAD software in surveying. c) Sketch layout using CAD.	i) The teacher to organise students in groups and guide them to explain processes on how to make layout and sketches using CAD. ii) Students to present their responses for sharing and discussion.	<ul style="list-style-type: none"> • Posters with pictures of objects drawn using CAD • Posters with pictures of computer inputs and output devices • CAD package 	1. Is the student able to explain processes of making layout and sketches using CAD? 2. Is the student able to use CAD software in surveying?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		d) Draw different objects in Civil Engineering using CAD.	iii) The teacher to create activities for students to use CAD to: <ul style="list-style-type: none"> – Draw different sketches and layout in surveying work. – Draw objects in Civil Engineering. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the use of assessment guideline, the teacher should guide students to assess the activities performed on part (iii).	<ul style="list-style-type: none"> • CAD software (CorelDraw, Page Maker, Microsoft Office, Auto CAD, Paint, Corel CAD etc) • Manila sheet • Mark pen • Computer loaded with CAD software • Projector 	3. Is the student able to sketch layout using CAD? 4. Is the student able to draw different objects in Civil Engineering using CAD?	

TOPIC	SUB-TOPIC	SPECIFIC OBJECTIVE	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			