

**MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY**

**TANZANIA INSTITUTE OF EDUCATION**



**ELECTRICAL ENGINEERING SYLLABUS FOR TECHNICAL**

**SECONDARY SCHOOLS**

**FORM I – IV**

© Tanzania Institute of Education, 2019

Published 2019

ISBN: 978-9976-61-814-3

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

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## DECLARATION

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

Approved by .....  
Signature .....  
Date 20 / 09 / 2019

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## 1.0 Introduction

This Electrical Engineering Syllabus is a revised version of 1993 syllabus for Form One to Four. 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have been effected in the arrangement of topics and sub topics, addition of new topics and removal of irrelevant and outdated contents.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 is in line with the paradigm shift from content based to competence based pedagogy which gives room for the learners to build competencies in Electrical Engineering. It encourages the constructivist approaches to teaching and learning whereas the learner participates actively in the construction of knowledge, skills and attitudes.

## 2.0 Objectives of Education in Tanzania

Objectives of Electrical Engineering 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 Electrical Engineering syllabus reflects the objectives of secondary education, 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 be competent in:

- a) identifying the appropriate hand tools for specific jobs in Electrical Engineering;
- b) demonstrating knowledge of domestic and industrial installation using different wiring systems;
- c) drawing electrical installation layout from a given house plan;
- d) applying basic skills in installing electric machines (transformers, DC and AC motors and generators); and
- e) using basic skills for rewinding AC motors.

### **5.0 Objectives of the Subject**

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

- a) perform needed services for improved performance in industry and other economic sectors;
- b) provide some of the needed services in entrepreneurship and business management;

- c) install electric machines (transformers, DC and AC motors and generators);
- d) draw electrical installation layout from a given house plan; and
- e) use knowledge of domestic and industrial installation using different wiring systems.

## **6.0 Structure and Organisation of the Syllabus**

This syllabus has two parts. The first part comprises class level competencies and class level objectives. The second part is the syllabus content presented in the table to indicate; topic, sub-topics, specific objectives to be achieved, teaching and learning strategies, teaching and learning resources, assessment criteria/tools and number of the periods.

### **6.1 Class level competencies**

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

### **6.2 Class level objectives**

The class level objectives are objectives intended to be achieved within the 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 competency intended to be developed, one or more objectives have been stated in order to achieve such development.

### **6.3 Topics/sub-topics**

This part describes the matter dealt within 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 a portion

of the content of the topic in question. The sub-topics have also been arranged to attain a logical order and facilitate the 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**

The specific objectives describe results in terms of knowledge, attitudes and skills that students are expected to develop and perform after going through the programme. They also reflect the process of developing the specified competencies within the cognitive, affective and psychomotor domains.

#### **6.5 Teaching and learning strategies**

Teaching and learning strategies indicate what the teacher and the students are expected to be doing in the process of teaching and learning. The teaching and learning strategies in this syllabus are simply suggestive but 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 effectively in the learning processes.

#### **6.6 Teaching and learning resources**

In the teaching and learning process, 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. Instruments of assessment should ensure that all the levels of cognitive, affective and psycho-motor domains are taken on board.

## **6.8 Number of periods**

The number of periods has been allocated per sub-topic. Some topics with relatively wider content have 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 the ability to:

- a) explore and recognise job opportunities in the field of Electrical Engineering;
- b) make decisions in electrical career and study choices;
- c) apply safety rules in electrical career;
- d) effectively use different types of electrical tools, accessories and measuring equipments; and;
- e) use engineering drawing knowledge to draw electrical diagrams.

## CLASS LEVEL OBJECTIVES

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

- a) investigate the diversity of jobs according to economic sectors, as well as work settings and form of activities in Electrical Engineering;
- b) explain the duties and importance of Electrical Engineers in the society;
- c) identify Electrical Engineering workshops rules and regulations as related to other workshops;
- d) explain safety management's rules and procedures regarding Electrical Engineering;
- e) identify tools, equipment and materials used in Electrical Engineering workshops; and
- f) explain different types of electrical instruments.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
<b>1.0 ELECTRICAL ENGINEERING, SCIENCE AND TECHNOLOGY</b>	1.1 Introduction to Electrical Engineering	<p>The student should be able to:</p> <p>a) Explain the meaning of term Electrical Engineering.</p> <p>b) Explain the importance of Electrical Engineering field in society.</p> <p>c) Differentiate Electrical Engineering from other fields of engineering.</p> <p>d) Identify opportunities obtained in the field of Electrical Engineering.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Explain the meaning of Electrical Engineering .</li> <li>– Explain importance of Electrical Engineering field in society.</li> </ul> <p>ii) The teacher to organise group discussions for students to:</p> <ul style="list-style-type: none"> <li>– Differentiate Electrical Engineering from other fields of engineering.</li> </ul>	<ul style="list-style-type: none"> <li>• Sample Electrical Engineering drawings</li> <li>• Multimedia, TV, Computer</li> <li>• Reading texts</li> <li>• Chalk board</li> <li>• Manila sheet</li> <li>• Chalk</li> </ul>	<p>1. Is the student able to explain the meaning of the term Electrical Engineering ?</p> <p>2. Is the student able to explain the importance of Electrical Engineering field in society?</p> <p>3. Is the student able to differentiate Electrical Engineering from other fields of engineering?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		e) Explain the essence of studying Electrical Engineering.	<ul style="list-style-type: none"> <li>– Identify opportunities obtained in the field of Electrical Engineering.</li> <li>iii) The teacher to use questioning strategies to guide students to explain the essence of studying Electrical Engineering.</li> <li>iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).</li> </ul>		<ul style="list-style-type: none"> <li>4. Is the student able to identify opportunities obtained in the field of Electrical Engineering ?</li> <li>5. Is the student able to explain the essence of studying Electrical Engineering?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.2 Relationship between Science, Electrical Engineering and Technology	<p>The student should be able to:</p> <p>a) Define the term science, engineering and technology.</p> <p>b) Explain the relationship among science, Electrical Engineering and technology.</p> <p>c) Differentiate science, Electrical Engineering and technology.</p> <p>d) Explain application of science, Electrical Engineering and technology in daily life.</p>	<p>i) The teacher to use brainstorming questions to guide students to define the term science, engineering and technology.</p> <p>ii) The teacher to organise group discussions and guide students to:</p> <p>– Explain the relationship among science, Electrical Engineering and technology.</p> <p>– Differentiate Science, Electrical Engineering and technology.</p>	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Manila sheet</li> <li>• Multimedia projector</li> <li>• Poster of different scenarios of science, engineering and technology work in action</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<p>1. Can the student define the term science, engineering and technology?</p> <p>2. Can the student explain the relationship among science, Electrical Engineering and technology?</p> <p>3. Can the student differentiate between Science, Electrical Engineering and technology?</p>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		e) Explain the application of science and technology in Electrical Engineering.	iii) Students to present their responses for sharing and discussion. iv) The teacher to use questioning strategies (i.e. what, why or how questions) to guide students to: <ul style="list-style-type: none"> <li>– Explain application of science, Electrical Engineering and technology in daily life.</li> <li>– Explain the application of science and technology in Electrical Engineering.</li> </ul>		4. Can the student explain the application of science, Electrical Engineering and technology in daily life? 5. Can the student explain the application of science and technology in Electrical Engineering?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iv).			
	1.3 Types of Electrical Engineering Occupations	The student should be able to: a) Identify Electrical Engineering occupations. b) Describe different Electrical Engineering occupations. c) Investigate the diversity of jobs in the economic sector.	i) The teacher to use brainstorming questions to guide students to: – Identify types of Electrical Engineering occupations.	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Poster of different career</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student identify engineering occupations?</li> <li>2. Can the student describe the different Electrical Engineering occupations?</li> <li>3. Can the student investigate the diversity of jobs in the economic sector?</li> </ol>	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="986 252 1182 633">– Describe different Electrical Engineering occupations of artisans, crafts persons, technicians, engineers and their qualifications.</li> <li data-bbox="934 655 1207 964">ii) The teacher to use questioning strategies (i.e. what, why or how questions) to guide students to explore the diversity of jobs in the economic sector.</li> </ul>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			
	1.4 Duties and Responsibilities of Electrical Engineering Personnel	The student should be able to explain duties and responsibilities of Electrical Engineering personnels	i) The teacher to organise students in groups and guide them to explain duties and responsibility of engineering personnels (i.e., Artisan, Craftsman, Technician and Engineer etc.)	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Posters showing duties and responsibilities of Electrical Engineering personnels</li> <li>• Chalk/white board</li> <li>• Chalk</li> </ul>	Can the student explain duties and responsibilities of Electrical Engineering personnels?	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) Students to present their responses for sharing and discussion.  iii) The teacher should give feedback and use students' responses as guide to support students in explaining duties and responsibilities of engineering personnels.	<ul style="list-style-type: none"> <li>• Marker pens</li> <li>• Reading texts</li> </ul>		

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.5 The importance of Electrical Engineering Field in the Society	<p>The student should be able to:</p> <p>a) Explain the importance of Electrical Engineering in the society.</p> <p>b) Identify Electrical Engineering opportunities in the society.</p>	<p>i) The teacher to use questioning strategies (i.e. what, why or how questions) to guide students to:</p> <ul style="list-style-type: none"> <li>– Explain the importance of Electrical Engineering field in the society.</li> <li>– Identify Electrical Engineering opportunities in the society.</li> </ul> <p>ii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Posters showing duties and responsibilities of Electrical Engineering personnels</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain the importance of Electrical Engineering in the society?</p> <p>2. Can the student identify Electrical Engineering opportunities in the society?</p>	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
<b>2.0 ELECTRICAL WORKSHOP ORIENTATION</b>	2.1 Introduction to Electrical Workshops	The student should be able to identify different Electrical workshops.	i) The teacher to use questions to guide students to: <ul style="list-style-type: none"> <li>– Identify different Electrical Workshops.</li> <li>– List various types of Electrical Workshops.</li> </ul> ii) The teacher should give feedback and use students’ responses as guide to support students in performing the tasks given in part (i).	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Computer</li> <li>• TV Set</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> <li>• Winding wire/ conductor</li> </ul>	Can the student identify different Electrical Engineering Workshops?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.2 Safety Management in Electrical Engineering Workshops	<p>The student should be able to:</p> <p>a) Identify the rule of personal safety in working in Electrical Engineering Workshops.</p> <p>b) Explain safety rules in the electrical workshops.</p> <p>c) Describe workshop safety rules of Electrical Engineering equipment.</p> <p>d) Explain the main causes of accidents in electrical workshops.</p> <p>e) Prevent accident in the Electrical Engineering workshop.</p>	<p>i) The teacher to use questioning strategies (i.e. what, why or how questions) to guide students to:</p> <ul style="list-style-type: none"> <li>– Identify the safety rules of working in the electrical workshops.</li> <li>– Explain safety rules in Electrical Workshops.</li> <li>– Identify workshop safety rules in using Electrical Engineering equipment and tools.</li> </ul>	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Fire extinguisher</li> <li>• DVD/VCD</li> <li>• Computer</li> <li>• Poster/ pictures with different safety symbols.</li> <li>• Chalk</li> <li>• White board</li> <li>• Marker pen</li> <li>• First aid kit</li> <li>• Reading text</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student identify the rule of personal safety in working in Electrical Engineering workshops?</li> <li>2. Can the student explain safety rules in electrical workshops?</li> <li>3. Can the student describe workshop safety rule of Electrical Engineering equipment?</li> </ol>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		f) Provide first aid in the Electrical Engineering Workshop.	ii) The teacher to organise group discussion and guide students to: <ul style="list-style-type: none"> <li>– Identify the rule of personal safety in working in the electrical in workshops</li> <li>– Explain main causes of accidents in Electrical Engineering workshops.</li> </ul> iii) Students to present their responses for sharing and discussion.		4. Can the student explain the main causes of accidents in Electrical Engineering Workshops? 5. Can the student provide first aid in the Electrical Engineering Workshop? 6. Can the student provide first aid in the Electrical Engineering Workshop?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<p>iv) The teacher should use role play methods to guide students to carry demonstration on how to;</p> <ul style="list-style-type: none"> <li>– Prevent accident in the Electrical Engineering Workshop.</li> <li>– Carry out first aid for a person with physiological effect in Electrical Engineering workshop.</li> </ul> <p>v) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p> <p>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i), (ii) and (iv).</p>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.3 Electrical Workshop Tools and Equipment	<p>The student should be able to:</p> <p>a) Identify tools and equipment used in Electrical Engineering workshops.</p> <p>b) Explain the use of tools and equipment in Electrical Engineering workshop.</p> <p>c) Handle tools and equipment in Electrical Engineering workshops.</p>	<p>i) The teacher to divide students in groups and guide them to:</p> <p>– Identify tools and equipment used in Electrical Engineering workshops.</p> <p>– Explain the use tools and equipment in Electrical Engineering workshop.</p>	<ul style="list-style-type: none"> <li>• Different types of Electrical Workshops.</li> <li>• Manila sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Marker pens</li> <li>• Poster with different types of tools and equipment</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Reading texts</li> </ul>	<p>1. Can the student identify tools and equipment used in Electrical Engineering workshops?</p> <p>2. Can the student explain the use of tools and equipment used in Electrical Engineering workshops?</p> <p>3. Can the student handle tools and equipment in Electrical Engineering workshops?</p>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li data-bbox="925 252 1220 602">ii) The teacher to create practical activities for students to demonstrate handling of tools and equipment in Electrical Engineering workshops.</li> <li data-bbox="925 615 1220 897">iii) The teacher should monitor and facilitate students in handling tools and equipment in Electrical Engineering workshop.</li> <li data-bbox="925 911 1220 1193">iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).</li> </ul>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
<b>3.0 ELECTRICAL DRAUGHTING</b>	3.1 Introduction to Electrical Draughting	Student should be able to: <ol style="list-style-type: none"> <li>a) Define the term electrical draughting as universal language in Electrical Engineering industry.</li> <li>b) Explain the meaning of electrical symbols.</li> <li>c) Identify electrical symbols.</li> <li>d) Identify different types of electrical drawings.</li> <li>e) Explain the term draughtsmanship.</li> <li>f) Draw electrical symbols in electrical drawings.</li> </ol>	i) The teacher to use questions to guide students to: <ul style="list-style-type: none"> <li>– Define the term electrical draughting as a universal language in Electrical Engineering.</li> <li>– Explain the meaning of electrical symbols.</li> <li>– Identify electrical symbols.</li> <li>– Identify different types of electrical drawings.</li> <li>– Explain the term draughtsmanship.</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing instruments</li> <li>• Manila sheet at different kinds of drawings</li> <li>• Drawing room</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term electrical draughting as universal language in Industry?</li> <li>2. Can the student explain the meaning of electrical symbols?</li> <li>3. Can the student identify electrical symbols?</li> <li>4. Can the student identify different types of electrical drawings?</li> <li>5. Can the student explain the term draughtmanship?</li> </ol>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher to create activities for students to draw electrical symbols in electrical drawings.  iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).		6. Can the student draw electrical symbols in electrical drawings?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.2 International Organization for Standardization (ISO) Sheet Layout and Sketching	<p>The student should be able to:</p> <p>a) Define the term ISO.</p> <p>b) Identify types of drawing sheet sizes used in Electrical Engineering drawings.</p> <p>c) Make layouts of drawing sheets for Electrical Engineering drawings.</p> <p>d) Make sketches of drawing layout.</p>	<p>i) The teacher to guide students in groups to</p> <ul style="list-style-type: none"> <li>– Define the term ISO.</li> <li>– Identify different types of drawing sheet sizes used in Electrical Engineering drawings.</li> </ul> <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Make drawing layouts used for Electrical Engineering drawings.</li> <li>– Produce a sketch of layout</li> </ul>	<ul style="list-style-type: none"> <li>• Standard drawing</li> <li>• Drawing sheets</li> <li>• Drawing board</li> <li>• Drawing instruments</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term ISO?</li> <li>2. Can the student identify types of drawing sheet sizes used in Electrical Engineering drawings?</li> <li>3. Can the student make layout of drawing sheet for Electrical Engineering drawings?</li> <li>4. Can the student make a sketch of drawing layout?</li> </ol>	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 WORKSHOP PRACTICE	4.1 Tools and Accessories	<p>The student should be able to:</p> <p>a) Apply safety procedures and regulations using tools and accessories in Electrical Engineering workshops.</p> <p>b) Use workshop tools and accessories to perform simple electrical tasks.</p> <p>c) Use properly Electrical Workshop tools, accessories to perform different tasks in Electrical Engineering workshop.</p>	<p>i) The teacher to create practical activities for student to:</p> <p>– Apply safety procedures and regulations using tools and accessories in the Electrical Engineering Workshops.</p> <p>– Demonstrate proper use of Electrical Workshop tools and accessories to perform different tasks in the Electrical Engineering workshop.</p>	<ul style="list-style-type: none"> <li>• Tools and accessories</li> <li>• Poster showing tools and accessories</li> <li>• Multimedia</li> <li>• TV set</li> <li>• Computer</li> <li>• VHS/CD/ VCD /DVD</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Wooden board for single phase AC electrical wiring demo</li> <li>• Digital multimeter</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student apply safety procedures and regulations using tools and accessories in the Electrical Engineering workshops?</li> <li>2. Can the student use workshop tools and accessories to perform simple electrical tasks?</li> <li>3. Can the student use properly electrical workshop tools, accessories to perform different tasks in the Electrical Engineering workshop.</li> </ol>	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		<p>d) Use multimeter to perform measurements.</p> <p>e) Use workshop tools and accessories in measuring, holding, cutting, stripping, etc.</p> <p>f) Use tools and accessories to make and test temporary single phase AC electrical wiring of lamp, switch and socket on wooden board for demonstration.</p>	<p>– Use workshop tools and accessories to perform simple electrical tasks (wire stripping, conduit bending, etc).</p> <p>– Use tools and accessories to make and test temporary single phase AC electrical wiring of lamp, switch and socket on wooden board for demonstration.</p>	<ul style="list-style-type: none"> <li>• Analogy multimeter</li> <li>• Reading texts</li> </ul>	<p>4. Can the student use multimeter to perform measurements?</p> <p>5. Is the student able to use workshop tools and accessories in measuring, holding, cutting, stripping, etc?</p> <p>6. Can the student use tools and accessories to make and test temporary single phase AC electrical wiring of lamp, switch and socket on wooden board for demonstration?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li>– Use workshop tools and accessories in measuring, holding, cutting, stripping, etc.</li> <li>– Use multimeter to perform measurements.</li> <li>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</li> <li>iii) With the help of preprepared assessment guideline, the teacher should guide students to use the checklist to assess the activities performed in part (i).</li> </ul>		<ul style="list-style-type: none"> <li>5. Can the student use workshop tools and accessories in measuring, holding, cutting, stripping?</li> <li>6. Can the student use multimeter to perform measurements?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) .			
	4.2 Equipment and Materials	The student should be able to: a) Apply safety procedures and regulations in using tools and accessories in the Electrical Engineering workshops. b) Use workshop equipment to perform electrical tasks.	i) The teacher to create practical activities for student to: – Use properly Electrical workshop equipment to perform different tasks in the Electrical Engineering workshop.	<ul style="list-style-type: none"> <li>• Equipment</li> <li>• Poster showing equipment</li> <li>• Multimedia</li> <li>• TV set</li> <li>• Computer</li> <li>• VHS/CD/ VCD /DVD</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> </ul>	1. Can the student apply safety procedures and regulations using tools and accessories in Electrical Engineering workshops?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		<p>c) Use different types of electrical materials to perform Electrical Engineering tasks.</p> <p>d) Use workshop equipment in measuring, holding, cutting, stripping, etc.</p> <p>e) Use properly electrical workshop equipment to perform different tasks in Electrical Engineering.</p>	<p>– Apply safety procedures and regulations using tools and accessories in Electrical Engineering workshops.</p> <p>– Use different types of electrical workshop materials (conductors, insulators and cables) to perform Electrical Engineering workshop</p>	<ul style="list-style-type: none"> <li>• Wooden board for single phase AC electrical wiring demo</li> <li>• Digital multimeter</li> </ul>	<p>2. Can the student use workshop equipment to perform electrical tasks?</p> <p>3. Can the student use different types of electrical workshop materials to perform Electrical Engineering tasks?</p> <p>4. Can the student use workshop equipment in measuring, holding, cutting, stripping, etc?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			<ul style="list-style-type: none"> <li>– Use workshop equipment to perform electrical tasks (i.e., Make and test temporary single phase AC electrical wiring on wooden board).</li> <li>– Use workshop equipment in measuring, holding, cutting, stripping, etc.</li> </ul> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p>		5. Can the student use properly electrical workshop equipment to perform different tasks in the Electrical Engineering workshop?	

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

## FORM II

### CLASS LEVEL COMPETENCIES

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

- a) apply Ohm's laws in Electrical Engineering;
- b) use measuring instruments to perform different tasks;
- c) describe cell and batteries;
- d) describe the difference between electromotive force and potential difference;
- e) describe magnetism and electromagnetism;
- f) demonstrate the production of electricity by using various sources; and
- g) make a simple DC circuit.

### CLASS LEVEL OBJECTIVES

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

- a) define basic unit in Electrical Engineering;
- b) draw series and parallel circuits;
- c) apply Ohm's laws for solving problems;
- d) explain principles of operations of cells and batteries; and
- e) explain the concept of magnetism and electromagnetism.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>1.0 ELECTRICITY</b>	1.1 Nature of Electricity	<p>The student should be able to:</p> <p>a) Define the term matter.</p> <p>b) List three classes of matter.</p> <p>c) Explain the term electron mobility.</p> <p>d) Explain the structure and composition of an atom.</p> <p>e) Identify first twenty elements in the periodic table.</p> <p>f) Explain the concepts of conventional current and electron flow.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define the term matter?</li> <li>– List three classes of matter.</li> <li>– Explain the term electron mobility.</li> </ul> <p>ii) The teacher to organise group discussion for students to:</p> <ul style="list-style-type: none"> <li>– Explain the structure and composition of an atom.</li> <li>– Identify first twenty elements in the periodic table.</li> <li>– Explain the concepts of conventional current and electron flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia</li> <li>• Poster showing periodic table</li> <li>• TV set</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Computer</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term matter?</li> <li>2. Can the student list three classes of matter?</li> <li>3. Can the student explain the term electron mobility?</li> <li>4. Can the student explain the structure and composition of an atom?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Differentiate between conductors, insulators and semiconductors. h) Describe metal and non metal elements. i) Draw atomic structure and explain its composition.	iii) The teacher to use questioning strategies (what, why and how questions) to guide students to: – Differentiate conductors, insulators and semiconductors. – Describe metal and non metal elements. iv) The teacher to create activities for students to draw atomic structure and explain its composition. v) The teacher should monitor and facilitate students in performing the tasks given in part (i).		5. Can the student identify first twenty elements in the periodic table? 6. Can the student explain the concepts of conventional current and electron flow? 7. Can the student differentiate between conductors, insulators and semi-conductors?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iv).		8. Can the student describe metal and non metal elements?  9. Can the student draw atomic structure and explain its composition?	
	1.2 Methods of Producing Electricity	The student should be able to: a) Analyse basic methods of producing electricity.	i) The teacher to organise group discussion and guide students to:  – Analyse the basic methods of producing electricity such as; magnetism, friction, light, heat, pressure and chemicals.	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia</li> <li>• Poster showing methods of producing electricity</li> <li>• TV set</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Computer</li> <li>• Chalk/white board</li> </ul>	1. Can the student analyse basic methods of producing electricity?  2. Can the student explain the effects of electric current?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>b) Explain the effects of an electric current (i.e., magnetic effect, heating effect and chemical effect.</p> <p>c) Describe the formula and symbols for current, p.d. or e.m.f and resistance.</p> <p>d) Explain quantities of electricity and their units.</p>	<p>– Explain the effects of electric current, including magnetic, heating and chemical effect.</p> <p>– Describe the formula and symbols for current, p.d. or e.m.f and resistance.</p> <p>– Explain quantities of electricity and their units.</p> <p>ii) Students to present their responses for sharing and discussion.</p> <p>iii) The teacher should give feedback and use students’ responses as guide to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> <li>• Marker pens</li> <li>• Chalk</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<p>4. Can the student describe the formula and symbols for current, p.d. or e.m.f and resistance?</p> <p>5. Can the student explain quantities of electricity and their units?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.3 Sources of electricity	<p>The student should be able to:</p> <p>a) Explain different sources of energy (hydro, solar, wind, fossil fuel).</p> <p>b) Identify sources of electricity.</p> <p>c) Identify methods of harvesting energy from various sources.</p> <p>d) Describe ways of storing energy from various energy sources.</p> <p>e) Explain the concept of energy storage.</p>	<p>i) The teacher to use brainstorming questions to guide students to;</p> <p>– Explain different sources of energy (hydro, solar, wind, fossil fuel).</p> <p>– Identify sources of electricity.</p> <p>ii) The teacher to organise group discussion and guide students to:</p> <p>– Identify methods of harvesting energy from various sources.</p> <p>– Describe ways of storing energy from various energy sources.</p> <p>– Explain the concept of energy storage.</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Marker pen</li> <li>• Solar panel</li> <li>• TV, Computer</li> <li>• VHS/CD/ VCD/ DVD</li> <li>• Text book</li> <li>• Models of various energy sources</li> <li>• Models of various energy storage systems</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Other reading texts (e.g journal articles)</li> </ul>	<p>1. Can the student explain different sources of energy?</p> <p>2. Can the student identify sources of electricity?</p> <p>3. Can the student identify methods of harnessing energy from various sources?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) Students should present their responses for sharing and discussion.  v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).		4. Can the student describe ways of storing energy from various energy sources?  5. Can the student explain the concept of energy storage?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.4 Energy Conversion	<p>The student should be able to:</p> <p>a) List devices used to convert various forms of energy into electricity.</p> <p>b) Describe principles of converting forms of energy into electricity.</p> <p>c) Explain how various devices are used to convert energy into electricity.</p>	<p>i) The teacher to organise group discussion and guide students to:</p> <ul style="list-style-type: none"> <li>– List the devices used to convert various forms of energy into electricity.</li> <li>– Describe science involved in converting forms of energy into electricity.</li> <li>– Explain how various devices are used in energy conversion.</li> </ul> <p>ii) The teacher to use questioning strategies (what, why and how questions) to guide students to:</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Marker pens</li> <li>• TV, Computer</li> <li>• Models of various energy conversion systems into electricity VHS/CD/ VCD/ DVD</li> <li>• Text book</li> <li>• Chalk/white board</li> <li>• Reading texts</li> <li>• Chalk</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student list the devices used to convert various forms of energy into electricity?</li> <li>2. Can the student describe the principles of converting various forms of energy into electricity?</li> <li>3. Can the student explain how various devices are used to convert energy into electricity?</li> </ol>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>– Describe principles of converting energy into electricity.</li> <li>– Describe how various devices convert energy into electricity.</li> </ul> iii) The teacher should give feedback and use students’ responses as guide to support students in performing the tasks given in part (i) and (ii).			
	1.5 Electric Heating	The students should be able to: <ul style="list-style-type: none"> <li>a) Define the term heat.</li> <li>b) Define the term temperature.</li> <li>c) Explain the quantity of heat.</li> </ul>	i) The teacher to use questions to guide the students to: <ul style="list-style-type: none"> <li>– Define the term heat.</li> <li>– Define the term temperature.</li> <li>– Explain the quantity of heat.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip Chart</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Chalk/white board</li> <li>• Reading texts ( e.g books and articles)</li> </ul>	1. Can the student define the term heat? 2. Can the student define the term temperature?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) List specific heat capacity of different materials. e) Explain ways in which heat is transferred. f) Calculate the heat energy. g) Convert electricity to heat.	<ul style="list-style-type: none"> <li>– List specific heat capacity of different materials.</li> <li>– Explain ways in which heat is transferred.</li> </ul> ii) The teacher to create activities for students to: <ul style="list-style-type: none"> <li>– Calculate the heat energy.</li> <li>– Convert electricity to heat.</li> </ul> iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		3. Can the student explain the quantity of heat? 4. Can the student list specific heat capacity of different materials? 5. Can the student explain ways in which heat is transferred? 6. Can the student calculate the heat energy?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>vii) With the help of preprepared assessment checklist, the teacher should guide students to use the checklist to assess the activities performed in part (ii).</p> <p>v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii) .</p>		7. Can the student convert electricity to heat?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>2.0 UNITS</b>	2.1 Basic Units of Measurements	The student should be able to: a) Define the term electrical units. b) List basic units of electrical quantities. c) Assess and correct the basic units of electrical quantities.	i) The teacher to use questions to guide students to: – Define the concept of electrical units and quantities such as resistance, voltage and current. – List basic units of electrical quantities. ii) The teacher to create activities for students to assess and correct the basic units of electrical quantities. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia</li> <li>• Poster</li> <li>• TV set</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Computer</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	1. Can the student define the term electrical units? 2. Can the student List basic units of electrical quantities? 3. Can the student assess and correct the basic units of electrical quantities?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher should give feedback and use students' responses as guide to support students in assessing and correcting the basic units of electrical quantities.			
	2.2 Multiples and Sub-multiples of Basic Electrical Units	The student should be able to: a) Describe multiples and sub-multiples of basic electrical units. b) Convert basic units into multiple and sub-multiples.	i) The teacher to organise group discussion and guide students to describe multiples and sub-multiples of basic electrical units. ii) Students to present their work for sharing and discussion. iii) The teacher to create activities for students to:	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia</li> <li>• Poster showing basic electrical quantities</li> <li>• TV set</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student describe multiples and sub-multiples of basic electrical units?</li> <li>2. Can the student convert basic units into multiple and sub-multiples?</li> </ol>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>– Perform simple calculation of basic electrical units.</li> <li>– Convert basic units into multiple and sub-multiple.</li> <li>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</li> <li>v) The teacher should give feedback and use students’ responses as guide to support students in performing the tasks given in part (i) and (iii).</li> </ul>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>3.0 DC CIRCUITS</b>	3.1 Electric Circuit	<p>The student should be able to:</p> <p>a) Define the term electric circuit.</p> <p>b) Identify parts of an electric circuit.</p> <p>c) Explain behaviour of circuit elements.</p> <p>d) Describe active and passive circuit elements.</p> <p>e) Differentiate active circuit elements from passive circuit elements.</p> <p>f) Explain the units of resistance, inductance and capacitance.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define electric circuit</li> <li>– Identify parts of an electric circuit.</li> <li>– List the circuit components.</li> <li>– Explain behaviour of circuit elements.</li> </ul> <p>ii) The teacher to organise group discussion and guide students to:</p> <ul style="list-style-type: none"> <li>– Describe active and passive circuit elements.</li> <li>– Differentiate active circuit elements from passive circuit elements.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• DC Power supply</li> <li>• Different types of resistors</li> <li>• Connecting leads/wires</li> <li>• Matrix board</li> <li>• Multimedia projector</li> <li>• TV set</li> <li>• Text book</li> <li>• Computer</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Resistor, capacitor and inductor</li> <li>• Reading texts</li> <li>• Marker pens</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term electric circuit.</li> <li>2. Can the student identify parts of an electric circuit?</li> <li>3. Can the student explain behaviour of circuit elements?</li> <li>4. Can the student describe active and passive circuit elements?</li> </ol>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Draw electric circuit which contain passive and active circuit elements.	<ul style="list-style-type: none"> <li>– Explain the units of resistance, inductance and capacitance.</li> <li>iii) The teacher to create activities for students to draw the electric circuit.</li> <li>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</li> <li>v) Students to present their work for sharing and discussion.</li> <li>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).</li> </ul>		<ul style="list-style-type: none"> <li>5. Can the student differentiate active circuit elements from passive circuit elements?</li> <li>6. Can the student explain the units of resistance, inductance and capacitance?</li> <li>7. Can the student draw electric circuit?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.2 Current, Voltage and Resistance	<p>The student should be able to:</p> <p>a) State Ohms law.</p> <p>b) Describe series circuit.</p> <p>c) Describe parallel circuit.</p> <p>d) Draw series circuit.</p> <p>e) Draw parallel circuit.</p> <p>f) Calculate electrical quantities in series and parallel circuits.</p> <p>g) Perform an experiment on series and parallel circuits.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– State ohms law.</li> <li>– Describe series circuit.</li> <li>– Describe parallel circuit.</li> </ul> <p>ii) The teacher to design activities for students to:</p> <ul style="list-style-type: none"> <li>– Draw series circuit.</li> <li>– Draw parallel circuit.</li> <li>– Calculate electrical quantities in series and parallel circuits.</li> <li>– Perform an experiment on series and parallel circuits.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• DC Power supply</li> <li>• Different types of resistors</li> <li>• Connecting leads/wires</li> <li>• Matrix board</li> <li>• Multimedia projector</li> <li>• TV set</li> <li>• Computer</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Chalk/white board</li> <li>• Marker pens</li> <li>• Chalk</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student state ohms law?</li> <li>2. Can the student describe series circuit?</li> <li>3. Can the student describe parallel circuit?</li> <li>4. Can the student draw series circuit?</li> <li>5. Can the student draw parallel circuit?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</li> <li>iv) With the help of pre-prepared assessment checklist, the teacher should guide students to use the checklist to assess the activities performed in part (ii).</li> <li>v) Students to present their work for sharing and discussion.</li> <li>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii) .</li> </ul>		<ul style="list-style-type: none"> <li>6. Can the student calculate electrical quantities in series and parallel circuits?</li> <li>7. Can the student perform an experiment on series and parallel circuits?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
4.0 INSTRUMENTS AND MEASUREMENTS	4.1 Basic Measuring Instrument	<p>The student should be able to:</p> <p>a) Define the term measuring instruments.</p> <p>b) Describe various types of measuring instruments.</p> <p>c) Use basic measuring instruments.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define the term measuring instruments.</li> <li>– Describe various types of measuring instrument.</li> </ul> <p>ii) The teacher to design activities for students to use basic measuring instruments.</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"> <li>• Flip charts</li> <li>• Marker pens</li> <li>• Ammeter</li> <li>• Voltmeter</li> <li>• Multimeter</li> <li>• Ohmmeter</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term measuring instruments?</li> <li>2. Can the student describe various types of measuring instruments?</li> <li>3. Can the student use basic measuring instruments?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			
	4.2 Construction and Operations of Moving Coil Instruments	The student should be able to: a) Describe construction and operations of moving coil instruments. b) Describe control and damp devices. c) Connect meter to read voltage, current and resistance.	i) The teacher to organise students in group and guide them to: – Describe construction and operations of moving coil instruments. – Describe control and damp devices. ii) Students to present their responses for sharing and discussion.	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• Voltmeter</li> <li>• Ammeter</li> <li>• Multimeter</li> <li>• Ohmmeter</li> <li>• Marker pens</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student describe construction and operations of moving coil instruments?</li> <li>2. Can the student describe control and damp devices?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Use measuring Instruments.	iii) The teacher to design activities for students to: <ul style="list-style-type: none"> <li>– Connect multimeter to read voltage, current and resistance.</li> <li>– Use measuring Instruments.</li> </ul> iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the help of pre-prepared assessment guideline, the teacher should guide students to use the guideline to assess the activities performed in part (iii).		3. Can the student connect meters to read voltage, current and resistance? 4. Can the student use measuring Instruments?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) Students to present their work for sharing and discussion.  vii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii) .			
<b>5.0 CELLS AND BATTERIES</b>	5.1 Cells	The student should be able to: a) Describe electric cell. b) Differentiate types of cells. c) Identify the properties of dry cells. d) Identify the properties of wet cells.	i) The teacher to use brainstorming question to guide students to define the term "cell".  ii) The teacher to use questions to guide students to: – Differentiate the types of cells.	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Marker pens</li> <li>• Dry cells</li> <li>• Lead-acid battery</li> <li>• TV-set</li> <li>• Computer</li> <li>• Multimedia projector</li> <li>• VHS/VCD/ CD/ DVD</li> </ul>	1. Can the student describe electric cell?  2. Can the student differentiate the types of cells?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>e) Calculate voltage for the combination of cells in series and parallel.</p> <p>f) Draw symbols of cells.</p> <p>g) Draw symbol of combination of cell in series and in parallel.</p>	<p>– Identify the properties of dry cells.</p> <p>– Identify the properties of wet cells.</p> <p>iii) The teacher to create activities for students to:</p> <p>– Calculate the voltage for the combination of cells in series and parallel.</p> <p>– Draw a symbol of cells.</p> <p>– Draw a symbol of cells for combination of cell in series and parallel.</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"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<p>3. Can the student identify the properties of dry cells?</p> <p>4. Can the student identify the properties of wet cells?</p> <p>5. Can the student draw symbols of cells and combination of cells in series and parallel?</p> <p>6. Is the student able to draw symbols of cells?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) Students to present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).		7. Can the student calculate the voltage for the combination of cells in series and parallel?	
	5.2 Batteries	The students should be able to: a) Identify different types of batteries. b) Explain different methods of charging batteries. c) Calculate e.m.f, p.d and internal resistance.	i) The teacher to use questions to guide students to: – Identify different types of batteries (primary and secondary batteries). – Explain different methods of charging batteries.	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Chalk/white board</li> <li>• Different types of primary batteries.</li> <li>• Different types of secondary batteries.</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	1. Can the student identify the different types of batteries? 2. Can the student explain different methods of charging batteries?	20

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Conduct experiment on e.m.f., p.d and internal resistance.	ii) The teacher to create activity for students to: <ul style="list-style-type: none"> <li>– Calculate e.m.f, p.d and internal resistance.</li> <li>– Perform experiment on e.m.f., p.d and internal resistance.</li> </ul> iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) Students to present their work for sharing and discussion.		3. Can the student calculate e.m.f, p.d and internal resistance? 4. Can the student conduct experiment on e.m.f., p.d and internal resistance?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>6.0 MAGNETISM AND ELECTRO-MAGNETISM</b>	6.1 Permanent Magnet	<p>The student should be able to:</p> <p>a) Define the concept of permanent magnet.</p> <p>b) Identify the characteristic of permanent magnet.</p> <p>c) Show poles of permanent magnet.</p> <p>d) Explain the behaviour of like and unlike poles.</p> <p>e) Describe the characteristics of magnetic materials.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define the concept of permanent magnet.</li> <li>– Identify the characteristic of permanent magnet.</li> </ul> <p>ii) The teacher to organise group discussion and guide students to:</p> <ul style="list-style-type: none"> <li>– Show poles of permanent magnet.</li> <li>– Explain the behaviour of like and unlike poles.</li> <li>– Describe the characteristics of magnetic materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Bar magnet</li> <li>• Magnetic fields</li> <li>• Electromagnetic fields</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the concept of permanent magnet?</li> <li>2. Can the student identify the characteristic of permanent magnet?</li> <li>3. Can the student show the poles of permanent magnet?</li> <li>4. Can the student explain the behaviour of like and unlike poles?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).		5. Can the student describe the characteristics of magnetic materials?	
	6.2 Magnetic Induction	The student should be able to: a) Define the term magnetic induction. b) Identify the properties of magnetic inductions. c) Draw sketches of magnetic fields.	i) The teacher to use questions to guide students to define the term magnetic induction. ii) The teacher to use questioning strategies (what and why and how questions) to guide students to: – Identify the properties of magnetic inductions.	<ul style="list-style-type: none"> <li>• Permanent magnet</li> <li>• Magnetic fields</li> <li>• Iron nails</li> <li>• Small Piece of paper</li> <li>• Reading texts</li> </ul>	1. Can the student define the term magnetic induction? 2. Can the student identify the properties of magnetic inductions? 3. Can the student draw sketches of magnetic fields?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>– Explain the properties of linear magnetic flux.</p> <p>iv) The teacher to create activities for students to draw sketches of magnetic fields.</p> <p>v) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p> <p>vi) Students to present their work for sharing and discussion.</p> <p>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).</p>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	6.3 Electro-magnetism	<p>The student should be able to:</p> <p>a) Define the concept of electro-magnetism.</p> <p>b) Describe how a magnetic field is created.</p> <p>c) Identify electromagnetic forces.</p> <p>d) Describe the characteristics of electromagnetic forces.</p> <p>e) Explain the relation between magnetic forces and electricity.</p>	<p>i) The teacher to use questions to guide students to define the concept of electromagnetism.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> <li>– Describe how a magnetic field is created.</li> <li>– Identify electromagnetic forces.</li> <li>– Describe the characteristics of electromagnetic forces.</li> <li>– Explain the relation between magnetic forces and electricity.</li> </ul>	<ul style="list-style-type: none"> <li>• Conductors</li> <li>• Current source (Battery)</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the concept of electro-magnetism?</li> <li>2. Can the student describe the creation of magnetic field?</li> <li>3. Can the student identify electro-magnetic forces?</li> <li>4. Can the student describe the characteristics of electro-magnetic forces?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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 guide to support students in performing the tasks given in part (i) and (ii).		5. Can the student explain the relation between magnetic forces and electricity?	

## FORM III

### CLASS LEVEL COMPETENCIES

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

- a) use laws of permanent and temporary magnetism in calculating force in the conductor;
- b) use single phase circuits to calculate electrical quantities (voltage, current and power);
- c) use transformers for stepping up and down of electrical quantities;
- d) apply Kirchoff's law to solve electrical problems; and
- e) extend range of electric meters.

### CLASS LEVEL OBJECTIVES

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

- a) explain magnetic field, magnetic flux density, force on current carrying conductor, magnetic induction and electromotive force induced in a conductor;
- b) calculate current, voltage, power and power factor in series single phase AC circuits;
- c) analyse Kirchoff's law for solving problems; and
- d) describe electric principles of operating meters.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>1.0 MEASUREMENTS AND MEASURING INSTRUMENTS</b>	1.1 Moving Coil and Moving Iron Instruments	<p>The student should be able to:</p> <p>a) Explain the concept of construction of moving coil instruments.</p> <p>b) Explain the construction of moving iron instruments.</p> <p>c) Explain the principles of operation of moving iron and moving coil instruments.</p> <p>d) Use LCR meter to measure resistance, inductance and capacitance.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <p>– Explain the concept of construction of moving coil instrument.</p> <p>– Describe the construction of moving coil and moving iron instruments.</p> <p>ii) The teacher to use questioning strategy (i.e. what, why and how question) guide students to explain the principles of operation of moving iron and moving coil instruments.</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Moving coil instrument (galvanometer)</li> <li>• Moving iron instrument (voltmeter and ammeter)</li> <li>• Multimedia</li> <li>• TV</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Text book</li> <li>• Computer</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Digital LCR meter</li> <li>• Reading texts</li> </ul>	<p>1. Can the student describe the construction of moving coil instruments?</p> <p>2. Can the student describe the construction of moving iron instruments?</p> <p>3. Can the student explain the principles of operation of moving iron and moving coil instruments?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher to design activities for students to: <ul style="list-style-type: none"> <li>– Demonstrate the construction of moving coil and moving iron instruments.</li> <li>– Use LCR meter to measure resistance, inductance and capacitance.</li> </ul> iv) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		4. Can the student use LCR meter to measure resistance, inductance and capacitance?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).			
	1.2 Extension of Meter Range	<p>The student should be able to:</p> <p>a) Explain the principle of converting an ammeter to read higher values of current.</p> <p>b) Explain the principle of converting a voltmeter to read higher values of voltage.</p> <p>c) Convert the meter for higher readings.</p>	<p>i) The teacher to use questioning strategy ( i.e. what, why and how question) to guide students to:</p> <p>– Explain the principle of converting an ammeter to read higher values of current.</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Moving iron instrument (voltmeter and ammeter)</li> <li>• Multimedia</li> <li>• TV</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Computer</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain the principle of converting an ammeter to read higher values of current?</p> <p>2. Can the student explain the principle of converting a voltmeter to read higher values of voltage?</p>	16

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Perform experiment on extension of meter for high readings.	<ul style="list-style-type: none"> <li>– Explain the principle of converting a voltmeter to read higher values of voltage.</li> <li>ii) The teacher to design activities for students to:               <ul style="list-style-type: none"> <li>– Calculate resistance for extension of range of meter.</li> <li>– Perform experiment on extension of meter for high readings.</li> </ul> </li> <li>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</li> </ul>		<ul style="list-style-type: none"> <li>4. Can the student convert the meter for higher readings?</li> <li>5. Can the student perform experiment on extension of meter for high readings?</li> </ul>	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.3 Application	<p>The student should be able to:</p> <p>a) Calculate the value multiplier and shunt resistance.</p> <p>b) Perform laboratory experiment for measuring current and voltage.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Calculate the value of multiplier and shunt resistance,</li> <li>– Perform laboratory experiment for measuring current and voltage.</li> </ul> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Marker pens</li> <li>• Moving iron instrument (voltmeter and ammeter)</li> <li>• Multimedia</li> <li>• TV</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Computer</li> <li>• Reading texts</li> </ul>	<p>1. Can the student calculate the value multiplier and shunt resistance?</p> <p>2. Can the student perform laboratory experiment for measuring current and voltage?</p>	4

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.4 Digital and Analogy Instruments	<p>The students should be able to:</p> <p>a) Define the term analogy.</p> <p>b) Define the term digital.</p> <p>c) Identify analogy and digital instruments.</p> <p>d) Differentiate analogy and digital instruments.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define the term analogy.</li> <li>– Define the term digital.</li> <li>– Identify analogy and digital instruments.</li> <li>– Differentiate analogy and digital instruments.</li> </ul> <p>ii) The teacher should give feedback and use students’ responses as guide to support students in performing the tasks given in part (i).</p>	<ul style="list-style-type: none"> <li>• Digital instruments</li> <li>• Analogy instruments</li> <li>• Oscilloscope</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term analogy?</li> <li>2. Can the student define the term digital?</li> <li>3. Can the student identify analogy and digital instruments?</li> <li>4. Can the student differentiate analogy and digital instruments?</li> </ol>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>2.0 ELECTRO MAGNETISM AND MAGNETIC CIRCUIT</b>	2.1 Magnetism and Magnetic Circuit	<p>The student should be able to:</p> <p>a) Define the term magnetic flux, magnetic flux density, magnetomotive force and magnetic field strength.</p> <p>b) Explain the relationship between magnetic flux, magnetic flux density and magnetic field strength.</p> <p>c) Identify symbols, units of magnetic flux, magnetic flux density and magnetic field strength.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> <li>– Define the general concepts of magnetism and magnetic circuit.</li> <li>– Explain the relationship between magnetic flux, magnetic flux density and magnetic field strength.</li> <li>– Explain expressions and units of magnetic flux density, magnetic flux and magnetic field strength.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Text books</li> <li>• Coil of the conductor</li> <li>• Magnetic materials</li> <li>• Permanent magnets</li> <li>• Straight conductors</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<p>1. Can the student define magnetic flux, magnetic flux density, magnetomotive force and magnetic field strength?</p> <p>2. Can the student explain the relationship between magnetic flux, magnetic flux density and magnetic field strength?</p>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain expressions and units of magnetic flux density, magnetic flux and magnetic field strength.	<ul style="list-style-type: none"> <li>– Explain expressions and units of magnetic flux density, magnetic flux and magnetic field strength.</li> <li>ii) Students to present their responses for sharing and discussion.</li> <li>iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).</li> </ul>		<ul style="list-style-type: none"> <li>3. Can the student identify symbols, units of magnetic flux, magnetic flux density and magnetic field strength?</li> <li>4. Can the student explain expressions and units of magnetic flux density, magnetic flux and magnetic field strength?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	2.2 Electro Magnetism and Electro-magnetic Induction	<p>The student should be able to:</p> <p>a) Explain the concept of electromagnetic induction.</p> <p>b) Identify the magnetic effect of electric current.</p> <p>c) Describe the pattern of magnetic flux around a conductor when carrying current.</p> <p>d) State the laws governing electromagnetic induction (Faraday's and Lenz's Laws).</p>	<p>i) The teacher to use questioning strategies (what, why and how questions) to guide the students to:</p> <p>– Explain the concept of electromagnetic induction.</p> <p>– Identify the magnetic effect of electric current.</p> <p>– Describe the pattern of magnetic flux around a conductor when carrying current.</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Text books</li> <li>• Coil of the conductor</li> <li>• Magnetic material</li> <li>• Permanent magnets</li> <li>• Straight conductors</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain the concept of electro-magnetic induction.</p> <p>2. Can the student identify the magnetic effect of electric current?</p> <p>3. Can the student describe the pattern of magnetic flux around a conductor when carrying current?</p>	5

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Draw the pattern of magnetic fields around straight conductors carrying current. f) Calculate the force on a current carrying conductor in a magnetic field. g) Apply the expression of the magnitude of the force on current carrying conductor $F=BIL$ . h) Apply the expression for the magnitude of e.m.f induced in a conductor or a coil. i) Solve problems related to e.m.f?	– State the laws governing electromagnetic induction (Faraday’s and Lenz’s Laws). ii) The teacher to create activities for students to; – Draw the pattern of magnetic fields around straight conductors carrying current. – Calculate the force on a current carrying conductor in a magnetic field.		4. Can the student state the laws governing electro-magnetic induction (Faraday’s and Lenz’s Laws)? 5. Can the student draw the pattern of magnetic fields around straight conductors carrying current? 6. Can the student calculate the force on a current carrying conductor in a magnetic field?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>– Apply the expression of the magnitude of the force on current carrying conductor <math>F=BIL</math>.</li> <li>– Apply the expression for the magnitude of e.m.f induced in a conductor or a coil.</li> <li>– Solve problems related to e.m.f.</li> </ul> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>		<p>7. Can the student apply the expression of the magnitude of the force on current carrying conductor <math>F=BIL</math>?</p> <p>8. Can the student apply the expression for the magnitude of e.m.f induced in a conductor or a coil?</p> <p>9. Can the student solve problems related to e.m.f?</p>	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>3.0 GENERATION OF AC VOLTAGE</b>	3.1 Fundamentals of AC Theory	<p>The student should be able to:</p> <p>a) Define the terms r.m.s value, instantaneous value, peak value, average values, period and frequency of a sinusoidal wave.</p> <p>b) Describe the production of alternating emf by rotating a coil in a magnetic field.</p> <p>c) Calculate r.m.s value, instantaneous value, peak value, average values, period and frequency of a sinusoidal wave.</p>	<p>i) The teacher to use brainstorming questions to guide students to define the terms r.m.s value, instantaneous value, peak value, average values, period and frequency of a sinusoidal wave.</p> <p>ii) The teacher to organise group discussion and guide students to describe the production of alternating emf by rotating a coil in a magnetic field.</p> <p>iii) The teacher to create activities for students to:</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Model of a generator</li> <li>• TV, Multimedia, Computer</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<p>1. Can the student define the terms r.m.s value, peak value, average values, period and frequency of a sinusoidal wave?</p> <p>2. Can the student describe the production of alternating emf by rotating a coil in a magnetic field?</p>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>d) Calculate instantaneous value, period, root mean square value, peak value, average value and frequency.</p> <p>e) Solve instantaneous value, period, root mean square value, peak value, average value and frequency.</p>	<p>– Calculate r.m.s value, instantaneous value, peak value, average values, period and frequency of a sinusoidal wave.</p> <p>– Calculate instantaneous value, period, root mean square value, peak value, average value and frequency.</p> <p>– Solve instantaneous value, period, root mean square value, peak value, average value and frequency.</p>		<p>3. Can the student calculate r.m.s value, peak value, average values, period and frequency of a sinusoidal wave?</p> <p>4. Can the student calculate instantaneous value, period, root mean square value, peak value, average value and frequency</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</li> <li>v) With the help of assessment guideline, the teacher should guide student to use the guideline to assess the activities performed on part (iii).</li> <li>vi) Students to present their works for sharing and discussion.</li> <li>vii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).</li> </ul>		<p>5. Can the student solve instantaneous value, period, root mean square value, peak value, average value and frequency?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.2 Single Phase AC Circuits	<p>The student should be able to:</p> <p>a) Explain the concept of single phase AC circuits.</p> <p>b) Identify series circuit consisting of resistance, capacitance and inductance.</p> <p>c) Explain the concept of power factor correction.</p> <p>d) Calculate voltage and current in a series AC circuit.</p> <p>e) Calculate power in single phase AC circuit.</p> <p>f) Calculate voltage and current in parallel AC circuit.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Explain the concept of single phase AC circuits.</li> <li>– Identify series circuits consisting of resistance, capacitance and inductance.</li> <li>– Explain the concept of power factor correction.</li> </ul> <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Calculate voltage and current in a series AC circuit.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Circuit components</li> <li>• TV, Multimedia, Computer</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student explain the concept of single phase AC circuits?</li> <li>2. Can the student identify series circuit consisting of resistance, capacitance and inductance?</li> <li>3. Can the student explain the concept of power factor correction?</li> </ol>	20

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Calculate reactance, impedances and current in series RL, RC and RLC circuits. h) Calculate circuit current and impedance. i) Perform practical on voltage and current measurements. j) Draw power triangle and discuss its importance. k) Solve problems on power and power factor correction.	<ul style="list-style-type: none"> <li>– Calculate power in single phase AC circuits.</li> <li>– Calculate voltage and current in parallel AC Circuit</li> <li>– Calculate reactance, impedances and current in series RL, RC and RLC circuits.</li> <li>– Calculate circuit current and impedance.</li> <li>– Perform practical on voltage and current measurements.</li> </ul>		4. Can the student calculate voltage and current in a series AC circuit? 5. Can the student calculate power in single AC circuits? 6. Can the student calculate voltage and current in parallel AC Circuit?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>– Draw power triangle and discuss its importance.</li> <li>– Solve problems on power and power factor correction.</li> <li>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</li> </ul>		<ul style="list-style-type: none"> <li>7. Can the student calculate reactance, impedances and current in series RL, RC and RLC circuits?</li> <li>8. Can the student calculate circuit current and impedance?</li> <li>9. Can the student perform practical on voltage and current measurements?</li> <li>10. Can the student draw power triangle and discuss its importance?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>iv) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on calculating reactances, impedances and current in series RL, RC, RLC, power and power factor.</p> <p>v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i), (ii) and (iv).</p>		11. Can the student solve problems on power and power factor correction?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
4.0 TRANSFORMER	4.1 Transformer	<p>The student should be able to:</p> <p>a) Define the term transformer.</p> <p>b) Identify types of transformers.</p> <p>c) Explain the construction of a transformer.</p> <p>d) Explain the operation of a transformer.</p> <p>e) Explain principles of operating transformer.</p> <p>f) Calculate turns ratio, voltage and current ratio of a transformer.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Define the term transformer.</li> <li>– Identify types of transformer.</li> </ul> <p>ii) The teacher to use questioning strategies (what, why and how questions) to guide students to:</p> <ul style="list-style-type: none"> <li>– Explain construction and operation of transformers.</li> <li>– Explain principles of operating transformers.</li> </ul>	<ul style="list-style-type: none"> <li>• Transformer models</li> <li>• Inductors</li> <li>• Laminated core</li> <li>• Steel sheet</li> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• TV, Computer</li> <li>• VHS/CD/ VCD/ DVD</li> <li>• Text book</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term transformer?</li> <li>2. Can the student identify types of transformer?</li> <li>3. Can the student explain construction of transformer?</li> <li>4. Can the student explain the operation of a transformer?</li> <li>5. Can the student explain principles of operating transformers?</li> </ol>	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>iii) The teacher to create activities for students to calculate turns ratio, voltage and current ratio of a transformer.</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, guide students to assess activities conducted on power, current and voltages calculations.</p>		<p>6. Can the student calculate turns ratio, voltage and current ratio of a transformer?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).			
	4.2 Types of Transformers	<p>The student should be able to:</p> <p>a) Identify different types of transformers basing on the way windings are wound in the ferromagnetic core.</p> <p>b) Describe different types of transformers basing on applications.</p>	<p>i) The teacher to use questioning strategies to guide students to:</p> <ul style="list-style-type: none"> <li>– Identify different types of transformer s basing on core types.</li> <li>– Describe the types of transformers basing on applications (step-up and step-down).</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• Transformer model</li> <li>• TV, Computer</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student identify different types of transformers basing on the way windings are wound in the ferromagnetic core.</li> <li>2. Can the student describe types of transformers basing on applications?</li> </ol>	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Draw core and shell type transformers. d) Draw windings of step-up and step-down transformers.	ii) The teacher to design activities for students to: – Draw core and shell type transformers. – Draw windings of step-up and step-down transformers. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the use of assessment guideline, students to assess activities conducted on power, current and voltages calculations.		3. Can the students draw core and shell type transformers? 4. Can the students draw windings of step-up and step-down transformers?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			
	4.3 Transformer Rating and Application	The students should be able to: a) Define the term transformer rating. b) Explain the applications of different types of transformers.	i) The teacher to use questions to guide students to: – Define the term transformer rating. – Explain the applications of different types of transformers (step-up and step-down).	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia projector</li> <li>• TV, Computer</li> <li>• VHS/CD/ VCD/ DVD</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student define the term transformer rating?</li> <li>2. Can the student explain applications of different types of transformers?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			ii) The teacher to arrange a visit to nearby substation for students to observe the applications of transformers and guide them to identify different types of transformers and their applications.  iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher should give feedback and use students' responses as guide to support students in identifying different types of transformers and their applications.			
<b>5.0 CURRENT ELECTRICITY</b>	5.1 Resistors in Series	The student should be able to: a) Draw resistor in series. b) Calculate the total resistance connected in series. c) Connect the resistors in series	i) The teacher to create activities for students to: – Draw resistor in series. – Calculate the total resistance in series. – Connect resistors in series. ii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).	<ul style="list-style-type: none"> <li>• Resistors</li> <li>• Wires</li> <li>• Bulb</li> <li>• Reading texts</li> <li>• Circuit board</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student draw resistor in series?</li> <li>2. Can the student calculate the total resistance in a series?</li> <li>3. Can the student connect resistors in series?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>iii) Students to present their work for sharing and discussion.</li> <li>iv) With the help of assessment guideline, the teacher should guide student to assess the activities performed on part (i).</li> <li>v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).</li> </ul>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	5.2 Resistors in Parallel	<p>Students should be able to:</p> <p>a) Draw resistors in parallel.</p> <p>b) Calculate the total resistance connected in parallel circuit.</p> <p>c) Connect the resistors in parallel.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Draw a resistor in parallel.</li> <li>– Calculate the total resistance connected in parallel.</li> <li>– Connect the resistors when connected in parallel.</li> </ul> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p> <p>iii) Students to present their work for sharing and discussion.</p>	<ul style="list-style-type: none"> <li>• Resistor</li> <li>• Wires</li> <li>• Bulb</li> <li>• Reading texts</li> <li>• Circuit board</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student draw resistors in parallel?</li> <li>2. Can the student calculate the total resistance connected in parallel?</li> <li>3. Can the student connect resistors in parallel?</li> </ol>	4

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	5.3 Power wasted in a Resistor	<p>Students should be able to:</p> <p>a) Calculate power in a resistor.</p> <p>b) Calculate power loss in a resistor.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Calculate power in a resistor.</li> <li>– Find the power loss in a resistor</li> </ul> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p> <p>iii) Students to present their work for sharing and discussion.</p> <p>iv) With the help of assessment guideline, the teacher should guide student to assess the activities performed on part (i)</p>	<ul style="list-style-type: none"> <li>• Wires</li> <li>• Bulb</li> <li>• Screw driver</li> <li>• Reading texts</li> <li>• Circuit board</li> </ul>	<p>1. Can the student calculate power in a resistor?</p> <p>2. Can the student calculate power loss in a resistor?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).			
	5.4 Electric Quantities in DC Circuit Using Kirchhoff's Law	Students should be able to: a) State Kirchhoff's law b) Formulate voltage and current equation using Kirchhoff's Law c) Calculate electric quantities in DC circuit	i) The teacher should use brainstorming questions to guide students to state Kirchhoff's law ii) The teacher to create activities for students to: – Formulate voltage and current equation using Kirchhoff's Law. – Calculate electric quantities in DC circuit.	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Multimedia</li> <li>• Chalk/ whiteboard</li> <li>• Marker pen</li> <li>• Calculator</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student State Kirchhoff's law?</li> <li>2. Can the student formulate voltage and current equation using Kirchhoff's Law?</li> <li>3. Can the student calculate electric quantities in DC circuit?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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) Students to present their work for sharing and discussion. v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>6.0 CAPACITORS AND CAPACITANCES</b>	6.1 Capacitors in series	Students should be able to: a) Connect the capacitors in series. b) Calculate the total capacitance connected in series circuit.	i) The teacher to design activities and guide students in groups to: – Connect the capacitors in series. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) With the help of assessment guideline, the teacher should guide student to assess the activities performed on part (i). iv) Students to present their work for sharing and discussion.	<ul style="list-style-type: none"> <li>• Capacitors</li> <li>• Wire</li> <li>• Cell</li> <li>• Battery</li> <li>• Reading texts</li> <li>• Circuit board</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student able to connect the capacitors in series?</li> <li>2. Can the student calculate the total capacitance connected in series?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).			
	6.2 Capacitors in parallel	Students should be able to: a) Draw the capacitors in parallel. b) Calculate the total capacitance connected in parallel circuit.	i) The teacher to arrange students in groups and guide them to explain how to connect capacitors in parallel. ii) The teacher to design activities for students to: – Draw the capacitors in parallel. – Calculate the total capacitance connected in parallel circuit.	<ul style="list-style-type: none"> <li>• Capacitors</li> <li>• Wire</li> <li>• Cell</li> <li>• Battery</li> <li>• Circuit board</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student draw the capacitors in parallel?</li> <li>2. Can the student calculate the total capacitance connected in parallel?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>iii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</li> <li>iv) With the help of assessment guideline, the teacher should guide student to assess the activities performed on part (i).</li> <li>v) Students to present their work for sharing and discussion.</li> <li>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).</li> </ul>			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	6.3 Energy Stored in Capacitor	<p>The student should be able to:</p> <p>a) Explain how energy is stored in a capacitor.</p> <p>b) Calculate energy stored in a capacitor.</p>	<p>i) The teacher to organise students in groups and guide them to explain how energy is stored in a capacitor.</p> <p>ii) The teacher to design activities for students to find energy stored in a capacitor.</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"> <li>• Capacitor</li> <li>• Wire</li> <li>• Cell</li> <li>• Battery</li> <li>• Circuit board</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain how to find energy stored in a capacitor?</p> <p>2. Can the student calculate energy stored in a capacitor?</p>	4

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

## FORM IV

### CLASS LEVEL COMPETENCIES

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

- a) perform domestic electrical installation;
- b) install DC motors and generators;
- c) install AC motors and generators; and
- d) install transformers.

### CLASS LEVEL OBJECTIVES

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

- a) design installation power layout for various purposes;
- b) explain the construction mechanism of DC motors and generators;
- c) explain the construction of single and three phase AC motors;
- d) describe the construction mechanism of AC generators;
- e) explain the principle of operation of AC generators; and
- f) explain causes of power losses in transformers.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>1.0 ILLUMINATION</b>	1.1 Illumination	<p>The student should be able to:</p> <p>a) Explain the terms cosine law, brightness glare and photometry.</p> <p>b) Explain the concept of illumination, luminous intensity and luminous flux.</p> <p>c) Explain the concept of coefficient of utilization and maintenance factor.</p> <p>d) State the law of illumination.</p>	<p>i) The teacher to use brainstorming questions to guide students to:</p> <p>– Explain the terms cosine law, brightness glare and photometry.</p> <p>– Explain the concept of illumination, luminous intensity and Luminous flux.</p> <p>– Explain the concept of coefficient of utilization and maintenance factor.</p> <p>– State the law of illumination.</p>	<ul style="list-style-type: none"> <li>• Lux meter</li> <li>• Lamps</li> <li>• Flip chart</li> <li>• Marker pen</li> <li>• Manila sheet</li> <li>• TV, VHS/ VCD/CD/ DVD</li> <li>• Poster showing different types of lamps</li> <li>• Computer</li> <li>• Text book</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain the terms cosine law, brightness glare and photometry?</p> <p>2. Can the student explain the concept of illumination, luminous intensity and luminous flux?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>e) Calculate illumination intensity and illumination flux.</p> <p>f) Calculate the number of lights required in a room based on the type and size of room.</p>	<p>ii) The teacher to design activities for students to:</p> <ul style="list-style-type: none"> <li>– Calculate illumination intensity and illumination flux.</li> <li>– Calculate the number of lights required in a room based on the type and size of room</li> </ul> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>		<p>3. Can the student explain the concept of coefficient of utilization and maintenance factor?</p> <p>4. Can the student state the law of illumination?</p> <p>5. Can the student calculate illumination intensity and illumination flux?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (ii) v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).		6. Can the student calculate the number of lights required in a room based on the type and size of room?	
	1.2 Lighting Scheme	The student should be able to: a) Explain spacing/height ratio. b) Identify different types of lamps.	i) The teacher to organise students in groups and guide them to: – Explain spacing/ height ratio. – Identify different types of lamps.	<ul style="list-style-type: none"> <li>• Lux meter</li> <li>• Lamps</li> <li>• Flip chart</li> <li>• Manila sheet</li> <li>• TV, VHS/ VCD/CD/ DVD</li> </ul>	1. Can the student explain spacing/ height ratio?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Select proper lighting scheme. c) Design lighting scheme by lumen method. d) Design lighting scheme by point to point method. f) Calculate correctly illumination on open space (point-to-point and cosine law).	ii) Students to present their responses for sharing and discussion. iii) The teacher to design activities for students to: – Select proper lighting scheme. – Design lighting scheme by lumen method. – Design lighting scheme by point to point method. – Calculate correctly illumination on open space (point-to-point and cosine law).	<ul style="list-style-type: none"> <li>• Poster showing different types of lamps</li> <li>• Computer</li> <li>• Text book</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	2. Can the student identify types of lamps? 3. Can the student select proper lighting scheme? 4. Can the student design lighting scheme by lumen method? 5. Can the student design lighting scheme by point to point method?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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 help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (iii).  vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (iii).		6. Can the student calculate correctly illumination on open space?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.3 Domestic Wiring Systems	<p>The students should be able to:</p> <p>a) Explain types of wiring systems, conduits, duct and trunking.</p> <p>b) Inspect and test continuity of wiring systems.</p> <p>c) Draw different types of wiring systems.</p>	<p>i) The teacher to use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Identify the types of wiring systems, conduits, duct and trunking.</li> <li>– Explain how to inspect and test continuity of wiring systems.</li> </ul> <p>ii) The teacher to design activities for students to:</p> <ul style="list-style-type: none"> <li>– Inspect and test continuity of wiring systems</li> <li>– Draw different types of wiring systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• TV, VHS/ VCD/CD/ DVD</li> <li>• Poster showing different types of domestic wiring systems</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student explain the types of wiring systems, conduits, duct and trunking?</li> <li>2. Can the student inspect and test continuity of wiring systems?</li> <li>3. Can the student draw different types of wiring systems?</li> </ol>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			
	1.4 Electrical Diagrams	The students should be able to: a) Differentiate circuit from wiring diagrams.	i) The teacher to use questioning strategies to guide students differentiate circuit from wiring diagrams.	<ul style="list-style-type: none"> <li>• Manila sheet</li> <li>• TV, VHS/ VCD/CD/ DVD</li> <li>• Poster showing different circuit and wiring diagrams</li> </ul>	1. Can the student differentiate circuit from wiring diagrams?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Draw plan layout of wiring diagrams. c) Draw schematic diagrams of electric circuit. d) Draw block diagrams of electric circuit and wiring system.	ii) The teacher to create activities for students to: – Draw plan layout of wiring diagrams. – Draw schematic diagrams of electric circuit. – Draw block diagrams of electric circuit and wiring system.  iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	2. Can the student draw plan layout of wiring diagrams?  3. Can the student draw schematic diagrams of electric circuit?  4. Can the student draw block diagrams of electric circuit and wiring system?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.5 Simple Domestic Electrical Installation	<p>The students should be able to:</p> <p>a) Describe the requirements for domestic electrical wiring.</p> <p>b) Build simple domestic electrical wiring installation.</p> <p>c) Inspect and test simple domestic electrical wiring installation.</p>	<p>i) The teacher to use questioning strategies (what, why and how questions) to guide the students to describe the requirements for domestic electrical wiring.</p> <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Build simple domestic electrical wiring installation.</li> <li>– Inspect and test simple domestic electrical wiring installation.</li> </ul> <p>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</p>	<ul style="list-style-type: none"> <li>• Workbench</li> <li>• Electrical materials (conductors, cables and insulation tapes)</li> <li>• Continuity testers</li> <li>• Accessories (electrical switches, switch sockets, lamps)</li> <li>• Power supply</li> <li>• Tool box</li> <li>• White board</li> <li>• Marker pens</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student describe the requirements for domestic electrical wiring?</li> <li>2. Can the student build simple domestic electrical wiring installation?</li> <li>3. Can the student inspect and test simple domestic electrical wiring installation?</li> </ol>	48

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.6 Load Calculation	<p>The students should be able to:</p> <p>a) Calculate the total load for the installation.</p> <p>b) Select cable size.</p>	<p>i) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Calculate total load for electrical installation.</li> <li>– Select cable size.</li> </ul> <p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p> <p>iii) With the help of assessment guideline, the teacher should guide student to assess the activities performed on part (i).</p>	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Cables</li> <li>• Reading texts</li> </ul>	<p>1. Can the student calculate total load for electrical installations?</p> <p>2. Can the student select cable size?</p>	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).			
	1.7 Protection Devices and Wiring Standards	The students should be able to: a) Inspect the distribution boards b) Use IEE regulations in conducting wiring. c) Apply circuit breakers and fuses. d) Apply wiring standards.	i) The teacher to design activities for students to: – Inspect the distribution boards – Use IEE regulations in conducting wiring. – Apply circuit breakers and fuses. – Apply wiring standards.	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Reading texts</li> <li>• Distribution board</li> <li>• IEE regulations</li> <li>• Circuit breaker</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student inspect the distribution boards?</li> <li>2. Can the student use IEE regulations in conducting wiring?</li> <li>3. Can the student apply circuit breakers and fuses?</li> </ol>	16

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).</p> <p>iii) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (i).</p> <p>iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).</p>		4. Can the student apply wiring standards?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.8 Earthing	<p>The student should be able to:</p> <p>a) Define the term earthing.</p> <p>b) Describe earthing methods.</p> <p>c) Differentiate Miniature Circuit Breaker (MCB) and Earth Leakage Circuit Breaker (ELCB)</p>	<p>i) The teacher to use brainstorming questions to guide students to define the term earthing.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <ul style="list-style-type: none"> <li>– Describe earthing methods.</li> <li>– Differentiate MCB and ELCB.</li> </ul> <p>iii) Students to present their responses for sharing and discussion.</p> <p>iv) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).</p>	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Electrodes</li> <li>• MCB</li> <li>• ELCB</li> <li>• Reading texts</li> </ul>	<p>1. Can the student define the term earthing?</p> <p>2. Can the student describe earthing methods?</p> <p>3. Can the student differentiate MCB and ELCB?</p>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.9 Tariffs	<p>The students should be able to:</p> <p>a) Explain the meaning of tariffs.</p> <p>b) Identify types of tariffs.</p> <p>c) Explain uses of tariffs.</p> <p>d) Classify TANESCO tariffs.</p> <p>e) Prepare electric tariffs for consumers.</p> <p>f) Read energy meters.</p>	<p>i) The teacher use questions to guide students to:</p> <ul style="list-style-type: none"> <li>– Explain the meaning of tariffs.</li> <li>– Identify types of tariffs.</li> <li>– Explain uses of tariffs.</li> </ul> <p>ii) The teacher to create activities for students to:</p> <ul style="list-style-type: none"> <li>– Classify TANESCO tariffs.</li> <li>– Prepare electric tariffs for consumers.</li> <li>– Read energy meters.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Electricity bills</li> <li>• Energy meter</li> <li>• Energy models</li> <li>• Reading texts</li> </ul>	<p>1. Can the student explain the meaning of tariffs?</p> <p>2. Can the student identify types of tariffs?</p> <p>3. Can the student explain uses of tariffs?</p> <p>4. Can the student classify TANESCO tariffs?</p> <p>5. Can the student prepare electric tariffs for consumers?</p>	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>vi) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</li> <li>iv) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (ii).</li> <li>v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).</li> </ul>		6. Can the student read energy meters?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
2.0 TRANSFORMER	2.1 Power in Transformer	<p>The student should be able to:</p> <p>a) Define the terms active power and apparent power.</p> <p>b) Explain the possible interpretation of active and apparent power.</p> <p>c) Describe the expressions for the magnitude of active power and apparent power.</p>	<p>i) The teacher to use brainstorming questions to guide students to define the terms active power and apparent power.</p> <p>ii) The teacher to organise students in groups and guide them to:</p> <p>– Explain the possible interpretation of active and apparent power.</p> <p>– Describe the expressions for the magnitude of active power and apparent power.</p> <p>iii) Students to present their responses for sharing and discussion.</p>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• TV, Computer</li> <li>• Multimedia projector</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<p>1. Can the student define the terms active power and apparent power?</p> <p>2. Can the student explain the possible interpretation of active and apparent power?</p> <p>3. Can the student describe the expressions for the magnitude of active power and apparent power?</p>	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Use the expressions for the magnitude of active power and apparent power. e) Solve simple problems on active and apparent power. a) Calculate power in single-phase transformer circuits.	iv) The teacher to create activities for students to: <ul style="list-style-type: none"> <li>– Use the expressions for the magnitude of active power and apparent power.</li> <li>– Solve simple problems on active and apparent power.</li> <li>– Calculate power in single-phase transformer circuits.</li> </ul> v) The teacher should monitor and facilitate students in performing the tasks given in part (iv).		4. Can the student use the expressions for the magnitude of active power and apparent power? 5. Can the student solve simple problems on active and apparent power? 6. Can the student calculate power in single-phase transformer circuits?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iv).			
	2.2 Transformer Losses and Efficiency	The student should be able to: a) Identify different types of transformer losses. b) Explain causes of losses in transformer. c) Describe the effects of losses to output power of transformer.	i) The teacher to use questioning strategies (what, why and how questions) to guide the students to: – Identify different types of transformer losses (copper and iron losses). – Explain causes of losses in transformers.	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• TV, Computer</li> <li>• Multimedia projector</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student identify different types of transformer losses?</li> <li>2. Can the student explain causes of losses in transformers?</li> </ol>	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain the concept of efficiency in transformer. e) Classify transformer losses. f) Calculate efficiency of a transformer.	ii) The teacher to organise students in groups and guide them to: – Describe the effects of losses to output power. – Explain the concept of efficiency in transformer. – Classify transformer losses. iii) Students to present their responses for sharing and discussion iv) The teacher to design activities for students to calculate the efficiency of transformers.		3. Can the student describe the effects of losses to output power? 4. Can the student explain the concept of efficiency in transformer? 5. Can the student classify transformer losses? 6. Can the student calculate efficiency of a transformer?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	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 (iv).</p> <p>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iv).</p>			
	2.3 Voltage Regulation	<p>The student should be able to:</p> <p>a) Explain the concept of on load and no-load condition in transformer.</p>	<p>i) The teacher to use questions to guide students to</p> <p>– Explain the concept of voltage regulation in transformer.</p>	<ul style="list-style-type: none"> <li>• Flip charts</li> <li>• TV</li> <li>• Computer</li> <li>• Multimedia projector</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Text book</li> <li>• Reading texts</li> <li>• Marker pens</li> </ul>	<p>1. Can the student explain the concept of on load and no-load condition in transformer?</p>	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Explain the concept of voltage regulation. c) Differentiate the concepts of no load and load condition in transformers. d) Perform calculation about voltage regulation.	– Explain the concept of voltage regulation. ii) The teacher to use questioning strategies (what, why and how questions) to guide the students to differentiate the concepts of no load and load condition in transformers. iii) The teacher to design activities for students to calculate voltage regulation. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		2. Can the student explain the concept of voltage regulation? 3. Can the student able to differentiate the concepts of no load and load condition in transformers? 4. Can the student perform calculation about voltage regulation?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).			
<b>3.0 DC MACHINES</b>	3.1 DC Motors	The student should be able to: a) Describe the construction mechanism of DC motors. b) Explain principle operation of a DC motor. c) Identify types/ classes of DC motors.	i) The teacher to organise group discussion for students to: – Describe the construction mechanism of DC Motors. – Explain principle of operation of a DC motor. – Identify types/ classes of DC motors.	<ul style="list-style-type: none"> <li>• Sample DC motors</li> <li>• Models of motors</li> <li>• Flip chart</li> <li>• TV</li> <li>• Computer</li> <li>• Multimedia projector</li> <li>• Marker pens</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student describe the construction mechanism of DC motors?</li> <li>2. Can the student explain principle of operation of a DC motor?</li> </ol>	20

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>d) Describe applications of DC motor.</p> <p>e) Explain Fleming's right and left hand rules for determining the direction of force, field and current in a machine.</p> <p>f) Explain the concepts of back e.m.f. in DC Motors.</p> <p>g) Derive the expression for the magnitude of the back e.m.f. and the speed of a motor.</p>	<p>– Describe applications of DC motor.</p> <p>ii) The teacher to use questioning strategies (what, why and how questions) to guide students to:</p> <p>– Explain Fleming's right and left hand rules for determining the direction of force, field and current in a machine.</p> <p>– Explain the concepts of back e.m.f. in DC Motors.</p>	<ul style="list-style-type: none"> <li>• VHS/CD/ VCD/DVD</li> <li>• Permanent magnets</li> <li>• Electro magnetic/ solenoid</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<p>3. Can the student identify types/classes of DC motors?</p> <p>4. Can the student describe applications of DC motor?</p> <p>5. Can the student explain Fleming's right and left hand rules for determining the direction of force, field and current in a machine?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>h) Calculate back e.m.f. and speed of motors.</p> <p>i) Calculate torque and efficiency of a DC motor.</p> <p>j) Conduct experiment on DC motors.</p>	<p>iii) The teacher to design activities and require students to:</p> <ul style="list-style-type: none"> <li>– Derive the expression for the magnitude of the back e.m.f. and the speed of a motor.</li> <li>– Calculate back e.m.f. and speed of motors.</li> <li>– Calculate torque and efficiency of a DC motor.</li> <li>– Conduct on experiment on DC motors</li> </ul> <p>iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).</p>		<p>6. Can the student explain the concepts of back e.m.f. in DC Motors?</p> <p>7. Can the student derive the expression for the magnitude of the back e.m.f. and the speed of a motor?</p> <p>8. Can the student calculate back e.m.f. and speed of motors?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>v) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (iii).</p> <p>vi) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).</p>		<p>9. Can the student calculate torque and efficiency of a DC motor?</p> <p>10. Can the student conduct experiment on DC motors?</p>	
	3.2 DC Generator	<p>The student should be able to:</p> <p>a) Identify types of DC generator.</p>	<p>i) The teacher to organise students in groups and guide them to:</p> <p>– Identify types of DC generator.</p>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Small DC generators</li> <li>• Models of DC generators</li> <li>• Chalk/white board</li> </ul>	<p>1. Can the student identify types of DC generator?</p>	22

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Explain the applications of DC generator. c) Describe the generation of e.m.f. d) Describe construction mechanism of a DC generator. e) Describe e.m.f. generation. f) Solve problems related to generated e.m.f.	– Explain the applications of DC generator. – Describe the generation of e.m.f. – Describe construction of a DC generator. – Describe e.m.f. generation. ii) Students should present their responses for sharing and discussion.	<ul style="list-style-type: none"> <li>• Chalk/white</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	2. Can the student explain the applications of DC generator? 3. Can the student describe the generation of e.m.f? 4. Can the student describe construction of a DC generator? 5. Can the student describe e.m.f. generation?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Derive the expression for the magnitude of generated e.m.f. h) Perform experiment on DC generator. i) Recognize the effects of armature reaction and commutation in generators.	iii) The teacher to design activities and require students to: <ul style="list-style-type: none"> <li>– Solve problems related to generated e.m.f.</li> <li>– Derive the expression for the magnitude of generated e.m.f.</li> <li>– Recognize the effects of armature reaction and commutation in generators.</li> <li>– Perform experiment on DC generator.</li> </ul>		6. Can the student solve problems related to generated e.m.f? 7. Can the student derive the expression for the magnitude of generated e.m.f? 8. Can the student recognize the effects of armature reaction and commutation in generators? 9. Can the student perform experiment on DC generator?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
4.0 AC MACHINES	4.1 AC Generators	<p>The student should be able to:</p> <p>a) Describe the construction and principles of operation of AC generators.</p> <p>b) Describe the generation of e.m.f in AC generators.</p> <p>c) Perform experiment on generation of e.m.f. in AC generator.</p> <p>d) Derive the expression for the magnitude of the generated e.m.f.</p> <p>e) Calculate e.m.f. generated.</p>	<p>i) The teacher to use questioning strategies (what, why and how questions) to guide the students to:</p> <ul style="list-style-type: none"> <li>– Describe the construction and principles of operation of AC generators.</li> <li>– Describe the generation of e.m.f in AC generators.</li> </ul> <p>ii) The teacher to design activities and require students to:</p> <ul style="list-style-type: none"> <li>– Perform experiment on generation of e.m.f. in AC generator.</li> </ul>	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Model of generator</li> <li>• TV, Computer</li> <li>• Multimedia projector</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Poster showing dismantled AC generator</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Marker pens</li> <li>• Text book</li> <li>• Reading texts</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student explain the construction and principles of operation of AC generators?</li> <li>2. Can the student describe the generation of e.m.f. in AC generator?</li> <li>3. Can the student perform experiment on generation of e.m.f. in AC generator?</li> </ol>	22

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<ul style="list-style-type: none"> <li>– Derive the expression for the magnitude of the generated e.m.f.</li> <li>– Calculate e.m.f. generated.</li> <li>iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).</li> <li>iv) With the aid of assessment the teacher should guide students to use the checklist to assess the experiment done on generation of e.m.f. in AC generator.</li> </ul>		<ul style="list-style-type: none"> <li>4. Can the student derive the expression for the magnitude of the generated e.m.f.?</li> <li>5. Can the student calculate e.m.f. generated?</li> </ul>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i) and (ii).			
	4.2 AC Motors	The student should be able to: a) Identify types of AC motors. b) Describe basic parts of an AC motor. c) Describe the construction of single phase motors and three phase induction motors.	i) The teacher to use questions to guide students to: – Identify types of AC motors. – Describe basic parts of an AC motor. ii) The teacher to use questioning strategies (what, why and how questions) to guide the students to:	<ul style="list-style-type: none"> <li>• Flip chart</li> <li>• Models of AC motors</li> <li>• TV</li> <li>• Computer</li> <li>• Multimedia projector</li> <li>• VHS/CD/ VCD/DVD</li> <li>• Text book</li> <li>• Marker pens</li> <li>• Chalk/white board</li> <li>• Chalk</li> <li>• Induction motor</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student identify different types of AC motors?</li> <li>2. Can the student describe basic parts of an AC motor?</li> </ol>	38

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		<p>d) Describe the construction of three phase synchronous motors.</p> <p>e) Outline the principles of operation of AC motors.</p> <p>f) Carry out rewinding of induction motor.</p> <p>g) Design and build three and single phase starter motors.</p> <p>h) Sketch the construction of an AC motor.</p>	<p>– Describe the construction of single phase motors and three phase induction motors.</p> <p>– Describe the construction of three phase synchronous motors.</p> <p>– Outline the principles of operation of AC motors.</p>	<ul style="list-style-type: none"> <li>• Tools for rewinding of induction motor.</li> <li>• Reading texts</li> </ul>	<p>3. Can the student describe the construction of single phase motors and three phase induction motors?</p> <p>4. Can the student describe the construction of three phase synchronous motors?</p> <p>5. Can the student outline the principles of operation of AC motors.?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		i) Design, draw and install three and single phase starter motor. j) Design starter motor circuit. k) Install wiring circuit of DOL starter motors.	iii) The teacher to create activities and require students to: <ul style="list-style-type: none"> <li>– Carry out rewinding of induction motor.</li> <li>– Sketch the construction of an AC motor.</li> <li>– Design, draw and install three and single phase starter motor.</li> <li>– Design starter motor circuit.</li> <li>– Install wiring circuit of DOL starter motors.</li> </ul> iv) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		6. Can the student carry out rewinding of induction motor? 7. Can the student design and build three and single phase starter motors? 8. Can the student sketch the construction of an AC motor? 9. Can the student design, draw and install three and single phase starter motor?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			<p>v) With the help of assessment checklist, the teacher should guide student to use the checklist to assess the activities performed on part (iii)</p> <p>vi) Students should present their responses for sharing and discussion.</p> <p>vii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i-iii).</p>		<p>10. Can the teacher design starter motor circuit?</p> <p>11. Can the teacher install wiring circuit of DOL starter motors.?</p>	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
<b>5.0 STUDY TOUR</b>	5.1 Study Tour to Power Utility Company	<p>The student should be able to:</p> <p>a) Relate the theory and the actual activities performed by the utility company.</p> <p>b) Produce report on actual activities performed by utility of the company.</p>	<p>i) The teacher to arrange a visit to a power utility company and guide students to:</p> <ul style="list-style-type: none"> <li>– Observe activities performed by the utility company.</li> <li>– Produce report on actual activities performed by utility the company.</li> </ul> <p>ii) Students to present their reports for sharing and discussion.</p>	<ul style="list-style-type: none"> <li>• Transport</li> <li>• Fund for study tour cost</li> </ul>	<ol style="list-style-type: none"> <li>1. Can the student relate the theory and the actual activities performed by the utility company?</li> <li>2. Can the student produce report on actual activities performed by utility of the company?</li> </ol>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).			
	5.2 Study Tour to Processing Industry	<p>The student should be able to:</p> <p>a) Relate the theory and activities performed by the processing industry.</p> <p>b) Produce report on application of electric machines on activities performed by the processing industry.</p>	<p>i) The teacher to arrange a visit a processing industry and guide students to:</p> <ul style="list-style-type: none"> <li>– Observe activities performed by the processing industry.</li> <li>– Produce reports on activities performed by the processing industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Transport</li> <li>• Fund for study tour cost</li> </ul>	<p>1. Can the student relate the theory and activities of a processing industry?</p>	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			ii) Students to present their reports for sharing and discussion.  iii) The teacher should give feedback and use students' responses as guide to support students in performing the tasks given in part (i).		2. Can the student produce report on application of electric machines on activities performed by the processing industry?	











