MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

TANZANIA INSTITUTE OF EDUCATION

ELECTRONICS AND COMMUNICATION ENGINEERING SYLLABUS FOR TECHNICAL SECONDARY SCHOOLS

FORM I - IV

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DECLARATION

The Electronics and Communication Engineering Syllabus is approved for use in Technical Secondary Schools in Tanzania.

Approved by ..... Dr. Lyabwene M. Mtatiabwa

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1.0 Introduction

This Electronics and Communication Engineering Syllabus is a revised version of 1993 syllabus for Form One to Form 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have been effected in the arrangement of topics and sub topics, addition of new topics and removal of irrelevant and outdated contents.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 observed a paradigm shift from content based to competence-based pedagogy to give room for the learners to build competencies in Electronics and Communication 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 Electronics and Communication 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 Electronics and Communication Engineering syllabus reflects the general objectives of secondary education in Tanzania, which are to:

a) consolidate, broaden and develop a deeper understanding of the ideas and concepts acquired at the primary level;

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

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

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

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

f) develop readiness to join the world of work.

4.0 General Competencies

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

a) exploring socio-economic factors as considerations in own subject, career and study choices;

b) using solid-state devices in the designing and operating electronic systems;

c) installing, maintaining, troubleshooting and repairing a variety of solid-state components and systems;

d) reading symbols of components used in electronics and communication systems;

e) checking faults of radio and television circuits using test instruments; and

f) servicing and repairing power supplies and other parts of a television receiver.

5.0 General Objectives

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

a) explore socio-economic factors as considerations in own subject, career and study choices;
b) use solid-state devices in the designing and operating electronic systems;
c) install, maintain, troubleshoot and repair a variety of solid-state devices and systems;
d) check faults of radio circuits using test instrument; and
e) service and repair television circuits including power supplies.

6.0 Structure and Organisation of the Syllabus

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

6.1 Class level competencies

Class level competencies are general competencies intended to be achieved within a 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.

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 of a portion of the content of the topic in question. The sub-topics have also been arranged to attain a logical order and facilitate learning process. The horizontal treatment of this syllabus is controlled by the sub-topics. This means that for every sub-topic, there are teaching and learning strategies; teaching and learning resources, assessment strategies and the estimated number of periods.

6.4 Specific objectives

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

6.5 Teaching and learning strategies

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

6.6 Teaching and learning resources

In the teaching and learning 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 developed within the course. Instruments of assessment should ensure that all the levels of cognitive, affective and psycho-motor domains are observed.

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 ability to:

a) investigate the diversity of jobs and make considerations in their own subject, career and study choices;
b) perform duties of Electronics and Communication Engineering in a society;
c) apply safety management rules and procedures related to Electronics and Communication Engineering laboratories/workshops;
d) identify tools, equipment and materials used in Electronics and Communication Engineering laboratory/workshop; and
e) use engineering drawing knowledge to draw electronic schematic diagrams.

CLASS LEVEL OBJECTIVES

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

a) investigate the diversity of jobs according to economic sectors, as well as work settings and forms of activities in Electronics and Communication Engineering;
b) explain the duties and importance of Electronics and Communication Engineering in a society;
c) identify engineering laboratories/workshops as related to other laboratories/workshops;
d) explain safety management, rules and procedures;
e) identify tools, equipment and materials used in Electronics and Communication Engineering laboratory/workshop; and
f) explain different types of measuring instruments and test equipment.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
1.0 ELECTRONICS ENGINEERING OCCUPATIONAL INFORMATION	1.1 Relationship between Science, Engineering and Technology	The student should be able to: a) Define science, engineering and technology. b) Identify application of science, engineering and technology in daily life. c) Differentiate between science, engineering and technology. d) Explain the application of science and technology in Electronics and Communication Engineering.	i) The teacher to use brainstorming questions to guide students to define the terms science, engineering and technology. ii) The teacher to use questioning strategies (why and how questions) to guide the students identify application of science, engineering and technology in daily life. iii) The teacher to organise group discussion for students to:	• Chalk/white board • Marker pens • Manila sheet • Multimedia projector • Poster of different scenarios of science, engineering and technology work in action • Reading texts	1. Is the student able to define science, engineering and technology? 2. Can the student identify application of science, engineering and technology in daily life? 3. Can the student differentiate science, engineering and technology? 4. Can the student explain the application of science and technology in Electronics and Communication Engineering?	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			- Differentiate between science, engineering and technology. - Explain the application of science and technology in Electronics and Communication Engineering. iv) Students to present their responses for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in perfoming the tasks given in part (i-iii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.2 Introduction to Electronics and Communication Engineering	The student should be able to: a) Explain in detail the meaning of Electronics and Communication Engineering. b) Differentiate Electronics and Communication Engineering from other fields of engineering. c) Identify opportunities obtained in the field of Electronics and Communication Engineering. d) Explain the essence of studying Electronics and Communication Engineering.	i) The teacher to use brainstorming questions to guide students to explain in detail the term Electronics and Communication Engineering. ii) The teacher to use questioning strategies (why and how questions) to guide students to: - Differentiate Electronics and Communication Engineering from other fields of engineering. - Identify opportunities obtained in the field of Electronics and Communication Engineering.	• Chalk/white board • Manila sheet • Marker pens • Multimedia projector • Poster of Electronics and Communication Engineering field	1. Is the student able to explain in detail the meaning of the term Electronics and Communication Engineering? 2. Can the student differentiate Electronics and Communication Engineering from other fields of engineering? 3. Can the student identify opportunities obtained in the field of Electronics and Communication Engineering? 4. Can the student explain the essence of studying Electronics and Communication Engineering?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			- Explain the essence of studying Electronic and Communication Engineering. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	1.3 Types of Electronics and Communication Engineering Occupations	The student should be able to: a) Identify Electronics and Communication Engineering occupations.	i) The teacher to use questions to guide students in pairs to identify Electronics and Communication Engineering occupations.	• Chalk/white board • Marker pens • Manila sheet • Flip chart • Multimedia projector • Poster of Electronics Engineering field • Reading texts	1. Can the student identify Electronics and Communication Engineering occupations?	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Explain different Electronics and Communication Engineering occupations and their qualifications. c) Classify different types of Electronics and Communication Engineering jobs in the economic sector. d) Investigate the diversity of Electronics and Communication Engineering jobs in the economic sector.	ii) The teacher to organise group discussion for students to: - Explain different Electronics and Communication Engineering occupations and their qualifications. - Classify different types of Electronics and Communication Engineering jobs in the economic sector. - Investigate the diversity of Electronics and Communication Engineering jobs in the economic sector.		2. Is the student able to define different Electronics and Communication Engineering occupations of artisan, crafts-person, technician, engineer and their qualifications? 3. Is the student able to classify different Electronics and Communication Engineering jobs in the economic sector? 4. Is the student able to investigate the diversity of Electronics and Communication Engineering jobs in the economic sector?	

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 feedback to support students in performing the tasks given in part (i) and (ii).			
	1.4 Duties and Responsibilities of Electronics Engineering personnel	The student should be able to: a) Explain duties and responsibilities of Electronics and Communication Engineering personnel.	i) The teacher to organise group discussion for students to: - Explain duties and responsibilities of Electronics and Communication Engineering personnel.	• Black/white board • Marker pens • Manila sheet • Flip chart • Multimedia projector • Posters • Reading texts	1. Is the student able to explain duties and responsibilities of Electronics and Communication Engineering personnel?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Identify needs of Electronics and Communication Engineering personnel in a society. c) Draw work structure of Electronics and Communication Engineering industry.	- Identify needs of Electronics and Communication Engineering personnel in a society. ii) The teacher to design activities for students to draw work structure of Electronics and Communication Engineering industry. 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 feedback to support students in performing the tasks given in part (i) and (ii).		2. Is the student able to identify needs of Electronics and Communication Engineering personnel in a society? 3. Is the student able to draw work structure of Electronics and Communication Engineering industry?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	1.5 The Importance of Electronics and Communication Engineering field in society	The student should be able to: a) Explain the importance of Electronics and Communication Engineering in the society. b) Identify Electronics and Communication Engineering roles to the society. c) Specify types of job activities carried out by personnel in the field of Electronics and Communication Engineering.	i) The teacher to guide group discussion for students to: - Explain the importance of Electronics and Communication Engineering field in the society. - Explain roles of Electronics and Communication Engineering in development of society. ii) Specify types of job activities carried out by personnel in the field of Electronics and Communication Engineering. iii) Students to present their responses for sharing and discussion.	• Chalk/white board • Marker pens • Manila sheet • Flip chart • Multimedia projector • Posters • Reading texts	1. Is the student able to explain the importance of Electronics and Communication Engineering in the society? 2. Can the student identify Electronics and Communication Engineering roles to the society? 3. Can the student specify types of job activities carried out by personnel in the field of Electronics and Communication Engineering?	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 feedback to support students in performing the tasks given in part (i).			
2.0 SAFETY MANAGEMENT AND RULES	2.1 Safety Rules Management	The student should be able to a) Explain the importance of safety management and rules in Electronics and Communication Engineering. b) Explain the importance of following procedures in Electronics and Communication Engineering work/practices.	i) The teacher to guide group discussion for students to: - Explain the importance of safety management and rules in Electronics and Communication Engineering. - Explain the importance of following procedures in Electronics and Communication Engineering.	• Manila sheet • Flip chart • Multimedia projector • Fire extinguisher • Posters • DVD/VCD • Computer • Poster/pictures with different safety symbols • First aid kit • Reading texts • Marker pens	1. Is the student able to explain the importance of safety management and rules in Electronics and Communication engineering? 2. Is the student able to explain the importance of following procedures in in Electronics and Communication Engineering work/ practices?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Enumerate safety rules and regulations in Electronics and Communication workshop/ laboratory. d) Explain safety precautions in Electronics and Communication workshop/ laboratory. e) Explain the effects of ignoring safety procedures in Electronics and Communication Engineering work/practices.	- Enumerate safety rules and regulations in Electronics and Communication workshop/ laboratory. iii) Students to present their responses for sharing and discussion. iii) The teacher to use questioning strategies (what, why and how questions) to guide students to: - Explain safety precautions in Electronics and Communication workshop/ laboratory.		3. Is the student able to enumerate safety rules and regulations in Electronics and Communication workshop/ laboratory? 4. Is the student able to explain safety precautions in Electronics and Communication workshop/ laboratory? 5. Is the student able to explain the effects of ignoring safety procedures in Electronics and Communication Engineering work/ practices?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			- Explain the effects of ignoring safety procedures in Electronics and Communication Engineering work/practices - The teacher should give feedback and use students' responses as feedback to support students in perfoming the tasks given in part (i-iii).			
	2.2 Personal Safety Rules and Management	The student should be able to a) Explain the rules and regulations of personal safety in Electronics and Communication Engineering laboratory/ workshop.	i) The teacher to guide group discussion for students to: - Explain the rules and regulations of personal safety in Electronics and Communication Engineering laboratory/ workshop.	• Manila sheet • Marker pens • Flip chart • Multimedia projector • Fire extinguisher • Posters	1. Is the student able to explain the rules and regulations of personal safety in Electronics and Communication Engineering laboratory/ workshop?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Explain the importance of safety rules management of Electronics and Communication Engineering personnel. c) Explain the main causes of accidents in Electronics and Communication Engineering laboratory/ workshop.	- Explain the importance of safety rules management of Electronics and Communication Engineering personnel. - Explain the main causes of accidents in Electronics and Communication Engineering laboratory/ workshop. ii) Students to present their responses for sharing and discussion. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).	• DVD/VCD • Computer • Poster/pictures with different safety symbols • First aid kit • Reading texts	2. Is the student able to explain the importance of safety rules management of Electronics and Communication Engineering personnel? 3. Is the student able to explain the main causes of accidents in Electronics and Communication Engineering laboratory/ workshop?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	2.3 Safety Rules and Management	The student should be able to a) Describe safety rules and management in Electronics and Communication Engineering laboratory/ workshop. b) Explain safety management rules of handling electronic tools and equipment. c) Explain importance of following safety rules in handling electronic tools and equipment.	i) The teacher to guide group discussion for students to: - Describe safety rules and management in Electronics and Communication Engineering laboratory/ workshop. - Explain safety management rules of handling electronic tools and equipment. - Explain importance of following safety rules in handling electronic tools and equipment. ii) Students to present their responses for sharing and discussion.	• Manila sheet • Flip chart • Multimedia projector • Fire extinguisher • Posters • DVD/VCD • Computer • Poster/pictures with different safety symbols • First aid kit • Reading texts • Marker pen	1. Is the student able to describe safety rules and management in Electronics and Communication Engineering laboratory/ workshop? 2. Is the student able to explain safety management rules of handling electronic tools and equipment? 3. Is the student able to explain importance of following safety rules in handling electronic tools and equipment?	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 feedback to support students in performing the tasks given in part (i).			
	2.4 Safety Rules and Regulations in Workshop Practices	The students should be able to: a) List workshop safety rules and regulations. b) List workshop hand tools and power tools. c) Differentiate between hand tools and power tools. d) Observe safety rules and regulations when using workshop tools and equipment.	i) The teacher to organise group discussion for students to: - List workshop safety rules and regulations. - List workshop hand tools and power tools. ii) The teacher to use questioning strategies (what, why and how questions) to guide students to differentiate between hand tools and power tools.	• Electronic workshop tool kit • Multimedia projector • TV set • Computer • CD/VCD / DVD • Electronic workshop equipment • Poster showing different electronic components/ devices, tools and equipment • Reading texts	1. Can the student list workshop safety rules and regulations? 2. Can the student list workshop hand tools and power tools? 3. Can the student differentiate between hand tools and power tools? 4. Is the student able to observe safety rules and regulations when using workshop tools and equipment?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		e) Apply safety procedures and regulations in workshops and laboratories. f) Use fire extinguisher and first aid kit.	iii) The teacher to use role play method to guide students to demonstrate on how to: - Apply tools, equipment, safety rules and regulations in workshops and laboratories. - Follow workshop/ laboratory safety procedures and regulations. - Apply safety procedures and regulations in workshops and laboratories. - Use fire extinguisher and first aid kit. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		5. Can the student apply safety procedures and regulations in workshops and laboratories? 6. Can the student use fire extinguisher and first aid kit?	

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 feedback to support students in performing the tasks given in part (i-iii)			
	2.5 Accidents and Prevention in Electronic and Communication Engineering Workshop/ laboratory.	The student should be able to: a) Explain causes of accidents in Electronics and Communication Engineering laboratories/ workshops. b) Explain how to prevent accidents in Electronics and Communication Engineering laboratory/ workshop.	i) The teacher to use questioning strategies (what, how and why questions) to guide students to: - Explain causes of accidents in Electronics and Communication Engineering laboratories/ workshops. - Explain how to prevent accidents in Electronics and Communication Engineering laboratory/ workshop.	• Electronic workshop tool kit • Multimedia projector • TV set • Computer • CD/VCD / DVD • Electronic workshop equipment • Poster showing accidents, ways of prevention and treatment • Reading texts	1. Is the student able to explain causes of accidents in Electronics and Communication Engineering laboratories/ workshops? 2. Is the student able to explain how to prevent accidents in Electronics and Communication Engineering laboratory/ workshop?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) State the importance of first aid in Electronics and Communication Engineering laboratory/ workshop.	ii) State the importance of first aid in Electronics and Communication Engineering laboratory/workshop. ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).		3. Is the student able to state the importance of first aid in Electronics and Communication Engineering laboratory/ workshop?	
3.0 DRAWING TECHNIQUES	3.1 Drawing Office	Student should be able to: a) Explain the term drawing office. b) Identify tools and instruments used in drawing office. c) Explain the uses of each of the drawing office too and instruments.	i) The teacher to use brainstorming questions to guide students to explain the term drawing office. ii) The teacher to organise students in groups and guide them to:	• Drawing room • Drawing board • Manila sheet • Marker pens • Poster showing different types of drawing tools and instruments. • TV, VHS • CD/VCD/DVD	1. Is the student able to explain the term drawing office? 2. Is the student able to identify tools and instruments used in drawing office?	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		d) Explain the importance of care in handling a drawing office. e) Explain the importance of care in handling drawing office tools and instruments. f) Use office tools and instruments in drawing electronic objects.	- Identify tools and instruments used in drawing office. - Explain the uses of drawing office instruments. - Explain the importance of care in handling a drawing office. - Explain the importance of care in handling drawing office tools and instruments. iii) The teacher to create activities for students to use drawing office tools in drawing electronic objects. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).	• Computer • Reading texts	3. Is the student able to explain the use of each drawing office tool? 4. Is the student able to explain the importance of care in handling drawing office? 5. Is the student able to explain the importance of care in handling drawing office tools and instruments? 6. Is the student able to use drawing office tools and instruments in drawing electronic objects?	

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 feedback to support students in performing the tasks given in part (i-iii).			
	3.2 International Standards Organization (ISO) Sheet Layout and Sketching	Students should be able to: a) Define the term ISO. b) Differentiate types of drawing sheet sizes. c) Make layout of drawing sheet according to ISO specification. d) Produce a sketch according to ISO specification.	i) The teacher to use brainstorming questions to guide students to explain the meaning of ISO. ii) The teacher to use questions to guide students to identify different types of drawing sheet sizes. iii) The teacher to create activities for students to: - Make layout of drawing sheet according to ISO specification. - Produce a sketch according to ISO specification.	• Standard drawings • Drawing sheets • Drawing board • Drawing tools and instruments	1. Can the student define the term ISO? 2. Can the student differentiate types of drawing sheet sizes? 3. Can the student make layout of drawing sheet according to ISO specification? 4. Can the student produce a sketch according to ISO specification?	4

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 prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii)			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.3 Construction of Geometric Figures.	Students should be able to: a) Define the term geometric figures as applied to engineering drawing. b) Explain different geometric terms (i.e. plane figures, line, lettering and dimensioning) c) Identify types of angles. d) Draw different types of geometric figures in engineering. e) Construct different types of geometric plane figures (triangles quadrilaterals, polygons, circles and tangents).	i) The teacher to use questions to guide students to: - Define the term geometric figures as applied to engineering drawing. - Explain different geometric terms (i.e. plane figures, line, lettering and dimensioning). - Identify types of angles. ii) The teacher to create activities for students to: - Draw different types of geometric figures in engineering. - Construct perpendicular lines and divide a line into equal parts. - Construct and bisect different types of angles.	• Standard drawings • Drawing sheets • Drawing board • Drawing tools and instruments • Posters showing different types of lines, angles and plane figures	1. Is the student able to define the term geometric figures as applied to engineering drawing? 2. Can the student explain different geometric terms (i.e. plane figures, line, lettering and dimensioning)? 3. Can the student identify types of angles? 4. Can the student draw different types of geometric figures in engineering?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		f) Construct different types of geometric three-dimensional figures.	- Construct different types of plane figures. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii)		5. Can the student construct different types of geometric plane figures (quadrilaterals, polygons, circles and tangents)? 6. Can the student construct different types of geometric three dimensional figures?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	3.4 Similar Figures	Students should be able to: a) Explain the term similar figures. b) Explain the term enlargement and reduction of figures. c) Draw different types of similar figures. d) Construct different types of plane similar figures. e) Construct different types of three-dimensional similar figures.	i) The teacher to use brainstorming questions to guide students to: - Explain the term similar figures. - Explain the term enlargement and reduction of figures. ii) The teacher to create activities for students to: - Enlarge and reduce a given figure. - Draw different types of similar figures. - Construct a figure of equal area to a given one. - Do practice on constructing equal areas.	• Standard drawings • Standard drawing sheets • Drawing board • Drawing tools and instruments • Poster with different types of plane figures • Reading texts	1. Is the student able to explain the term similar figures? 2. Is the student able to explain the term enlargement and reduction of figures? 3. Can the student draw different types of similar figures? 4. Is the student able to construct different types of plane similar figures? 5. Can the student construct different types of three-dimensional similar figures?	10

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) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii)			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	4.6 Pictorial Drawing (Oblique and Isometric).	The student should be able to: a) Describe pictorial drawing. b) Describe oblique projection. c) Describe isometric projection. d) Construct oblique drawing using cavalier and cabinet methods. e) Construct isometric circles, cylinders, cones, pyramids and prisms.	i) The teacher to use questions to guide students to: - Describe pictorial drawing. - Describe oblique projection. - Describe isometric projection. ii) The teacher to create activities for students to: - Construct oblique drawing using cavalier and cabinet methods. - Construct isometric circles, cylinders, cones, pyramids and prisms.	• Standard drawings • Standard drawing sheets • Drawing board • Drawing tools and Instruments • Poster showing different isometric and pictorial drawings • Reading texts	1. Is the student able to describe pictorial drawing? 2. Is the student able to describe oblique projection? 3. Is the student able to describe isometric projection? 4. Can the student construct oblique drawing using cavalier and cabinet methods? 5. Can the student construct isometric circles, cylinders, cones, pyramids and prisms?	10

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) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
4.0 ELECTRONICS WORKSHOP/ LABORATORY PRACTICE I	4.1 Workshop/ Laboratory Practices	The student should be able to: a) Identify workshop/ laboratory tools and equipment for specific tasks. b) Observe safety of tools and equipment in conducting different tasks in the workshop/ laboratory. c) Use workshop/ laboratory tools and equipment to perform simple electronic engineering tasks.	i) The teacher to design activities for students to: - Identify workshop/ laboratory tools and equipment for specific tasks. - Observe safety of tools and equipment in conducting different tasks in the workshop/ laboratory. - Use workshop/ laboratory tools and equipment to perform simple electronic engineering tasks (bread boarding, soldering, de-soldering and measurement).	• Electronic workshop tool kit • Multimedia projector • TV set • Computer • CD/VCD / DVD • Electronic workshop equipment • Poster showing different electronic components/ devices, tools and equipment • Reading texts	1. Can the student identify workshop/ laboratory tools and equipment for specific tasks? 2. Can the student observe safety of tools and equipment in conducting different tasks in the workshop/ laboratory? 3. Can the student use workshop tools and equipment to perform simple electronic engineering tasks?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
5.0 ELECTRONICS DRAWING	5.1 Block and Basic Diagrams in Circuit Development	The Student should be able to: a) Explain the purposes of block and flow diagrams. b) Explain symbols used in preparation of block diagrams.	i) The teacher to organise group discussion for students to: - Explain the purposes of block and flow diagrams. - Explain symbols used in preparation of block diagrams.	• Chalk/white board • Marker pens • Drawing tools and instruments • Reading texts	1. Can the student explain the purposes of block and flow diagrams? 2. Can the student explain symbols used in preparation of block diagrams?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Specify different types of symbols used and their sequence when producing block and flow diagrams. d) Describe drafting procedure for preparation of clear block diagrams. e) Explain the elements of block diagrams. f) Explain how block, flow and basic diagrams can be used to describe transmission of information.	- Specify different types of symbols used and their sequence when producing block and flow diagrams. - Describe drafting procedure for preparation of clear block diagrams. - Explain the elements of block diagrams. ii) Students to present their responses for sharing and discussion. iii) The teacher to use questioning strategies (what, why and how questions) to guide students to:		4. Can the student specify different types of symbols used and their sequence when producing block and flow diagrams? 4. Can the student describe drafting procedure for preparation of clear block diagrams? 5. Can the student explain the elements of block diagrams? 6. Can the student explain how block, flow and basic diagrams are used to describe transmission of information?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		g) Explain how to plan an arrangement of block symbols to produce intelligible block and flow diagrams. h) Draw block diagrams for electronic systems.	- Explain how block, flow and basic diagrams are used to describe transmission of information. - Explain how to plan an arrangement of block symbols to produce intelligible block and flow diagrams. iv) The teacher to create activities for students to draw block diagrams for electronic systems (e.g. radio, television etc).		7. Can the student explain how to plan an arrangement of block symbols to produce intelligible block and flow diagrams? 8. Can the student draw block diagrams for electronic systems?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			
	5.2 Logic Diagrams	The Student should be able to: a) Explain the purposes of logic diagrams. b) Explain symbols used in preparation of logic diagrams.	i) The teacher to organise group discussion for students to: - Explain the purposes of logic diagrams. - Explain symbols used in preparation of logic diagrams.	• Chalk/white board board • Drawing tools and Instruments • Reading texts • Computer	1. Can the student explain the purposes of logic diagrams? 2. Can the student explain symbols used in preparation of logic diagrams?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		c) Specify different types of symbols used for producing block, flow and logic diagrams. d) Explain the elements of logic diagrams. e) Describe drafting procedure for preparation of clear logic diagrams. f) Explain the difference between flow diagrams and block diagrams and use examples to illustrate the difference.	- Specify different types of symbols used for producing block, flow and logic diagrams. - Explain the elements of logic diagrams. ii) Students to present their responses for sharing and discussion. iii) The teacher to use questioning strategies (what, why and how questions) to guide students to: - Describe drafting procedure for preparation of clear logic diagrams.		3. Can the student specify different types of symbols used for producing block, flow and logic diagrams? 4. Can the student explain the elements of logic diagrams? 5. Can the student describe drafting procedure for preparation of clear logic diagrams? 6. Can the student explain the difference between flow diagrams and block diagrams and use examples to illustrate the difference?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		g) Explain how to plan an arrangement of block symbols to produce intelligible logic diagrams. h) Draw logic symbols and their functions using truth tables. i) Draw various circuit symbols for electronic components/ devices.	- Explain the difference between flow diagrams and block diagrams and use examples to illustrate the difference. - Explain how to plan an arrangement of block symbols to produce intelligible logic diagrams. iv) The teacher to create activities for students to: - Draw logic symbols and their functions using truth tables.		7. Can the student explain how to plan an arrangement of block symbols to produce intelligible logic diagrams? 8. Can the student draw logic symbols and their functions using truth tables? 9. Can the student draw various circuit symbols for electronic components/ devices?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			- Draw various circuit symbols for electronic components/ devices v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			
	5.3 Electronic Component Schematic Symbols	The Student should be able to: a) Explain the use of standard symbols in electronic circuits.	i) The teacher to use questioning strategies (what, why and how questions) to guide students to: - Explain the use of standard symbols used in electronic circuits.	• Chalk/white board • Drawing Instruments • Electronics components	1. Can the student explain the use of standard symbols used in electronic circuits?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Explain the importance of electronic schematic symbols and diagrams. c) Explain the basic functions of commonly used electronic components. d) Relate component symbol shapes to component functions. e) Develop proficiency in drawing electronic symbols as per IEEE standard form.	- Explain the importance of electronic schematic symbols and diagrams. ii) The teacher to organise group discussion for students to: - Explain the basic functions of commonly used electronic components. - Relate component symbol shapes to component functions. iii) Students to present their responses for sharing and discussion.	• Reading texts • Marker pen	2. Can the student explain the importance of electronic schematic symbols and diagrams? 3. Can the student explain the basic functions of commonly used electronic components? 4. Can the student relate component symbol shapes to component functions? 5. Can the student develop proficiency in drawing electronic symbols as per IEEE standard form?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		f) Produce sketches of physical structures of common components. g) Draw standard electronic symbols	iv) The teacher to create practical activities and guide students to: - Produce sketches of physical structures of common components (e.g. resistors, capacitors, transformers, diodes, transistors, variable resistors, potentiometer, switches, batteries, microphone, recording pick-up - Develop proficiency in drawing electronic symbols in acceptable standard form.		6. Can the student produce sketches of physical structures of common components? 7. Can the student draw standard electronic symbols?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			lead aerial, play back pick-up lead). - Draw standard electronic symbols. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iv). vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
	5.4 Electronic Schematic Diagrams	The student should be able to: a) Identify electronic symbols used in circuit diagrams. b) Explain electronic symbols through circuit applications? c) Explain the purpose of schematic diagram. d) Identify the basic elements needed in all electronic circuits. e) Identify the basic circuits, which make up a complete electronic device. f) Explain the elements needed in most basic circuits.	i) The teacher to use questions to guide students to: - Identify electronic symbols used in circuit diagrams e.g. in simple amplifier. - Explain electronic symbols through circuit application e.g. in simple amplifier. - Explain how components are connected together to make a circuit using symbols. ii) The teacher to organise group discussion for students to: - Explain the purpose of schematic diagram.	• Chalk/white board • Drawing sheet • Schematic diagram. • Prepared drawings • Electronic system/device	1. Can the student identify electronic symbols used in circuit diagrams? 2. Can the student explain electronic symbols through circuit applications? 3. Can the student explain the purpose of schematic diagram? 4. Can the student identify the basic elements needed in all electronic circuits? 5. Can the student identify the basic circuits, which make up a complete electronic device?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
			- Identify the basic circuits, which make up a complete electronic device. - Explain the elements needed in most basic circuits. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).		6. Can the student explain the elements needed in most basic circuits?	
	5.5 Drawing Schematic Diagrams	The student should be able to: a) Identify stages needed in a typical electronic system when drawing schematic diagrams.	i) The teacher to organise group discussion for students to:	• Chalk/white board • Marker pens • Drawing tools and instruments • Drawing sheet • Computer	1. Can the student identify stages needed in a typical electronic system when drawing schematic diagrams?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		b) Explain the importance of symmetry and balance when drawing schematic diagrams. c) Explain how to draw diagrams of simple common electronic circuits. d) Draw schematic diagram in sequential manner and explain how signal flows through. e) Convert simple wiring diagrams to schematic diagrams and vice versa.	- Identify stages needed in a typical electronic system when drawing schematic diagrams. - Explain the importance of symmetry and balance when drawing schematic diagrams. - Explain how to draw diagrams of simple common electronic circuits e.g. single-stage common-emitter amplifier, cascaded common-emitter amplifier, power supply circuit, receiver circuit, etc.	• Multimedia projector	2. Can the student explain the importance of symmetry and balance when drawing schematic diagrams? 3. Can the student explain how to draw diagrams of simple common electronic circuits? 4. Can the student draw schematic diagram in sequential manner and explain how signal flows through? 5. Can the student convert simple wiring diagrams to schematic diagrams and vice versa?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO. OF PERIODS
		f) Draw a schematic diagram and explain how it functions.	ii) Students to present their responses for sharing and discussion. iii) The teacher to create activities for students to: - Draw schematic diagram in sequential manner and explain how signal flows through. - Convert simple wiring diagrams to schematic diagrams and vice versa. - Draw a schematic diagram and explain how it functions. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		6. Can the student draw a schematic diagram and explain how it functions?	

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

FORM II

CLASS LEVEL COMPETENCIES

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

a) describe the operating principles of circuit components;
b) demonstrate working knowledge on the working characteristics and applications of solid-state devices;
c) present information coherently using schematic drawings;
d) present electronic systems using schematic diagrams; and
e) service common household electronic systems.

CLASS LEVEL OBJECTIVES

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

a) identify components and express their values;
b) describe the characteristics of solid-state devices and methods of measuring them;
c) represent electronic systems with diagrams; and
d) assemble and test common household electronic systems.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
1.0 INTRODUCTION ON ELECTRICITY	1.1 Nature of Electricity	The students should be able to: a) State Ohm's law. b) Explain current, resistance and p.d. relationship. c) Explain the electron mobility and current flow d) Describe the structure of an atom. e) Explain the concept of electrons and current flow. f) Explain the concept of current and electron flow in conductors. g) Draw atomic structure and explain its composition.	i) The teacher to use questions to guide students to: - State Ohm's law. - Explain current, resistance and p.d. relationship. ii) The teacher to organise group discussion and guide students to: - Explain the electron mobility and current flow - Describe the structure of an atom. - Explain the concept of electrons and current flow. - Explain the concept of current and electron flow in conductors.	• Flip chart • Multimedia • Computer • Poster of atomic structure • Marker pens	1. Is the student able to state Ohm's law? 2. Is the student able to explain current, resistance and p.d. relationship? 3. Is the student able to explain the electron mobility and current flow? 4. Is the student able to describe the structure of an atom? 5. Is the student able to explain the concept of electrons and current flow?	3

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 to create activities for students to draw atomic structure and explain its composition. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).		6. Is the student able to explain the concept of current and electron flow in conductors? 7. Is the student able to draw atomic structure and explain its composition?	
	1.2 Electric Circuit	The students should be able to: a) Define the term electric circuit. b) Explain parts of an electric circuit. c) Draw electric circuit.	i) Students to brainstorm on the meaning of electric circuit. ii) The teacher to use questions to guide students to: - Describe parts of an electric circuit. - List electric circuit components.	• Black/white board • DC Power supply • Resistors • Wires • Capacitors • Inductors. • Reading texts • Marker pens	1. Is the student able to define an electric circuit? 2. Is the student able to explain parts of an electric circuit? 3. Can the student draw an electric circuit?	4

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.3 Series and Parallel Circuit Connection	The students should be able to: a) Draw series circuit. b) Draw parallel circuit. c) Calculate current, voltage and resistance in electric circuit.	i) The teacher to create activities for students on activities to: - Draw series circuit. - Draw parallel circuits. - Calculate current, voltage and resistance in electric circuit - Solve simple series and parallel circuits. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The students to present their work for sharing and discussion.	• Black/white board • Marker pens • Resistors • Matrix board • Calculator • Reading texts	1. Can the student draw series circuit? 2. Can the student draw parallel circuit? 3. Is the student able to find current, voltage and resistance in electric circuit?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
2.0 INTRODUCTION TO MEASUREMENTS AND INSTRUMENTATION	2.1 Ohmmeter, Voltmeter, Ammeter and Multimeter	The students should be able to: a) Define measurements and instrumentation. b) Explain Ohmmeter, Voltmeter, Ammeter and Multimeter.	i) The teacher to use brainstorming questions to guide students to: - Define measurements and instrumentation. - Explain Ohmmeter, Voltmeter, Ammeter and Multimeter.	• Chalk/ white board • Flip chart • Several types of resistors • Several types of inductors and capacitors • DC power supply • AC power supply • Reading texts	1. Is the student able to define measurements and instrumentation? 2. Is the student able to explain Ohmmeter, Voltmeter, Ammeter and Multimeter?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Explain principles of operation of Ohmmeter, Voltmeter, Ammeter and Multimeter. d) Use Ohmmeter, Voltmeter, Ammeter and Multimeter.	ii) The teacher to use questioning strategies to guide students to explain principles of operation of Ohmmeter, Voltmeter, Ammeter and Multimeter iii) The teacher to create activities for students to use Ohmmeter, Voltmeter, Ammeter and Multimeter in taking measurements. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) The students to present their work for sharing and discussion.	• Ohmmeter • Voltmeter • Ammeter • Multimeter • Marker pens	3. Can the student explain principles of operations of Ohmmeter, Voltmeter, Ammeter and Multimeter? 4. Can the student use Ohmmeter, Voltmeter, Ammeter and Multimeter in measurements?	

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 feedback to support students in performing the tasks given in part (i) - (iii).			
	2.2 Signal Generator	The students should be able to: a) Define the term signal generator. b) Explain principles of operations of signal generator. c) Use signal generator in electronic circuits to generate different waveforms.	i) The teacher to use questions to guide students to: - Define the term signal generator. - Explain principles of operation of signal generator. ii) The teacher to create activities for students to use signal generator in various electronic circuits such as amplifiers. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).	• Chalk/white board • Flip chart • Signal generator • Reading texts	1. Is the student able to define the term signal generator? 2. Can the student explain principles of operation of signal generator? 3. Can the student use signal generator in electronic circuits to generate different waveforms?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	2.3 Oscilloscope	The students should be able to: a) Define the term oscilloscope. b) Explain principles of operation of oscilloscope. c) Identify different types of oscilloscopes.	i) The teacher to use questions to guide students to: - Define the term oscilloscope. - Explain principles of operation of oscilloscope. - Identify different types of oscilloscopes.	• Chalk/white board • Flip Charts • Multimedia projector • Oscilloscope • Power supply • Connecting leads • Marker pens	1. Is the student able to explain an oscilloscope? 2. Can the student explain principles of operation of oscilloscope? 3. Can the student identify different types of oscilloscopes?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Use oscilloscope to display different signal waveforms. e) Calculate voltage and frequency of different waveforms displayed on oscilloscope.	ii) The teacher to create activities for students to: - Use oscilloscope to display different signal waveforms. - Calculate Voltage and frequency of different waveforms displayed on oscilloscope. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii).		4. Can the student use an oscilloscope to display different signal waveforms? 5. Can the student calculate voltage and frequency of different signal waveforms displayed on oscilloscope?	

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 feedback to support students in performing the tasks given in part (i) and (ii).			
3.0 ELECTRONIC COMPONENTS	3.1 Resistors and Colour Codes	The student should be able to: a) Identify types and sizes of resistors and their functions. b) Describe colour coding system of resistors. c) Calculate resistance using colour codes. d) Explain the practical application of various types of resistors.	i) The teacher to use questions to guide students to: - Identify types and sizes of resistors and their functions. - Name areas of applications of various types of resistors. - Describe the colour coding system of resistors. ii) Guide students in groups to identify the practical applications of various types of resistors.	• Chalk/white board • Flip chart • Several types of resistors • Multimeter • Magnifying glass • Marker pens • Posters • Multimedia equipment. • Reading texts	1. Is the student able to identify types and sizes of resistors and their functions? 2. Is the student able to describe the colour coding system of resistors? 3. Can the student calculate resistance using colour codes?	6

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 to create activities for students to: - Identify power ratings of resistors. - Calculate resistance using colour codes. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).		4. Can the student explain the practical applications of various types of resistors?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.2 Capacitors and Colour Codes	The student should be able to; a) Identify various types, sizes and functions of capacitors. b) Mention the colour codes of capacitors. c) Explain functions of capacitors. d) Identify the colour coding system of capacitors. e) Calculate capacitance by using colour codes. f) Explain the practical application of various types of capacitors.	i) The teacher to use questions to guide students to: - Describe capacitor and capacitance. - Mention the colour codes of capacitors and their meaning. - Identify types and sizes of capacitors. - Explain functions of capacitors. - Name areas of applications of various types of capacitors. - Identify voltage ratings of capacitors. ii) The teacher to design activities for students to: - Calculate capacitance by using colour codes.	• Flip chart • Several types of capacitors • Marker pens • Multimeter • Reading texts • Posters	1. Is the student able to identify various types, sizes and functions of capacitors? 2. Can the student mention the colour codes of capacitors? 3. Can the student explain the functions of capacitors? 4. Can the student identify the colour coding system of capacitors? 5. Can the student calculate capacitance by using colour codes?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Calculate capacitive reactance of a capacitor.	- Calculate capacitive reactance of a capacitor. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).		6. Can the student explain the practical application of various types of capacitors 7. Can the student calculate capacitive reactance of a capacitor?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.3 Inductors and Colour Codes	The student should be able to: a) Explain the terms inductor and inductance. b) Identify various types, sizes and functions of inductors. c) Mention colour codes of inductors. d) Identify areas of applications of various types of inductors. e) Determine the inductance of particular inductor. f) Calculate the inductive reactance of an inductor.	i) The teacher to use questions to guide students to: - Explain the terms inductor and inductance. - Identify various types and sizes of inductors. - Explain functions of inductors. - Mention the colour codes of inductors and their meaning. ii) The teacher to organise group discussions for students to: - Identify areas of applications of various types of inductors. - Determine the inductance of particular inductor	• Chalk/white board • Flip chart • Inductors • Multimeter • Marker pens • Posters • Reading texts	1. Is the student able to explain the terms inductor and inductance? 2. Is the student able to identify various types, sizes and function of inductors? 3. Can the student mention colour codes of inductors? 4. Is the student able to identify areas of applications of various types of inductors? 5. Can the student determine the inductance of particular inductor? 6. Can the student calculate the inductive reactance of an inductor?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Calculate inductance using colour codes. h) Point out areas of applications of inductors.	iii) The teacher to design activities for students to: - Calculate the inductance of an inductor by using colour codes. - Calculate the inductive reactance of an inductor. - Point out areas of applications of inductors. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii).		7. Can the student calculate inductance using colour codes? 8. Can the student point out areas of applications of inductors?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) The students to present their work for sharing and discussion. vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	3.4 Transformers	The student should be able to: a) Define transformers. b) Identify primary and secondary windings. c) Differentiate between step-up and step-down transformers. d) Explain applications of transformers.	i) The teacher to use questions to guide students to: - Define transformers. - Identify primary and secondary windings. ii) The teacher to use questioning strategies (what, how, and why questions) to guide students to: - Differentiate between step-up and step-down transformers. - List applications of transformers.	• Chalk/white board • Flip chart • Multimeter • Transformer • Posters • Reading texts • Marker pens	1. Can the student define transformers? 2. Can the student identify primary and secondary windings? 3. Can the student differentiate between step-up and step-down transformers? 4. Can the student explain applications of transformers?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Calculate the turns ratio of a transformer.	iii) The teacher to design activities for students to calculate the turns ratio of a transformer. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) - (iii).		5. Can the student calculate the turns ratio of a transformer?	
4.0 SEMI CONDUCTORS	4.1 Valence and Conduction Bands.	The student should be able to: a) Explain valence and conduction bands.	i) The teacher to guide students to brainstorm on valence and conduction bands.	• Flip chart • Marker pens • Posters • Multimedia equipment • Reading texts	1. Is the student able to explain valence and conduction bands?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Distinguish conductors, semiconductors, and insulators, using Fermi-energy level concept. c) Draw valence and conduction bands.	ii) The teacher to use questioning strategies to distinguish conductors, semiconductors, and insulators, using Fermi- energy level concept. iii) The teacher to design activities for students to draw valence and conduction bands. iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).		2. Can the student distinguish conductors, semi-conductors, and insulators using Fermi-energy level concept? 3. Can the student draw valence and conduction bands?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.2 Charge Carriers	The student should be able to: a) Explain the meaning of intrinsic and extrinsic semiconductors, diffusion, and drift in semiconductors. b) Identify majority and minority charge carriers in semi-conductors. c) Explain the effect of temperature in semi-conductors. d) Differentiate between acceptor and donor impurities.	i) The teacher to use questions to guide students to: - Explain the meaning of intrinsic and extrinsic semiconductors, diffusion and drift in semiconductors. - Explain the concept of doping in semi-conductors. - Identify majority and minority charge carriers in semi-conductors. ii) The teacher to organise group discussion for students to: - Explain the effect of temperature in semi-conductors. - Differentiate between acceptor and donor impurities.	• Flip chart • Marker pens • Posters • Multimedia equipment • Reading texts	1. Is the student able to explain the meaning of intrinsic and extrinsic semiconductors, diffusion, and drift in semiconductors? 2. Is the student able to identify majority and minority charge carriers in semi-conductors? 3. Is the student able to explain the effect of temperature in semi-conductors? 4. Can the student differentiate between acceptor and donor impurities?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Explain the effect of adding impurities (doping) to intrinsic semiconductor materials. f) Use diagrams to illustrate acceptor and donor atoms.	- Explain the effect of adding impurities (doping) to intrinsic semiconductor materials. iii) The students to present their work for sharing and discussion. iv) The teacher to design activities for students to use diagrams to illustrate acceptor and donor atoms. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) - (iii).		5. Can the student explain the effect of adding impurities (doping) to intrinsic semiconductor materials? 6. Can the student use diagrams to illustrate acceptor and donor atoms?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.3 P-N Junction	The student should be able to: a) Distinguish silicon from germanium semiconductors. b) Describe formation of P-N junction. c) Identify the terminals of a P-N junction. d) Explain forward and reverse bias characteristics of P-N junction. e) Draw forward and reverse characteristics of P-N junction. f) Identify the difference between silicon and germanium diodes.	i) The teacher to use questioning strategies to guide the students to distinguish between N-type and P-type semiconductor materials. ii) The teacher to organise group discussion for students to: - Differentiate between silicon and germanium semiconductor. - Identify terminals of P-N junctions. - Explain formation of N-type and P-type semiconductor materials. - Explain forward and reverse characteristics of P-N junction.	• Flip chart • Multimeter • Poster showing diode and transistor terminals • Reading texts	1. Can the student distinguish silicon from germanium semiconductors? 2. Can the student describe formation of a P-N junction? 3. Is the student able to identify the terminals of a P-N junction? 4. Can the student explain forward and reverse bias characteristics of P-N junction? 5. Can the student draw forward and reverse characteristics of P-N junction?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher to design activities for students to draw forward and reverse characteristics of P-N junction. iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).		6. Is the student able to identify the difference between silicon and germanium diodes?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
5.0 SEMI CONDUCTOR DEVICES	5.1 Diodes	The student should be able to: a) Define the term semiconductor diode. b) Explain voltage and current (V - I) characteristics of a P-N junction diode. c) Explain different types of semiconductor diodes and their applications.	i) The teacher to use questions to guide the students to: - Define the term semiconductor diode. - Explain voltage and current (V - I) characteristics of a P-N junction diode. ii) The teacher to organise students in groups and guide them to: - Explain different types of semiconductor diodes and their applications. - Explain the difference between ordinary P-N junction diode, rectifier diode, Zener diode, and varactor diode and their applications.	• Flip chart • Diodes • Multimeter • Matrix board • Marker pens • Connecting wires • Reading texts	1. Can the student define the term semiconductor diode? 2. Is the student able to explain voltage and current (V - I) characteristics of a P-N junction diode? 3. Can the student explain different types of semiconductor diodes and their applications? 4. Is the student able to explain the difference between ordinary P-N junction diode, rectifier diode, zener diode, varactor diode and their applications?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain the difference between ordinary P-N junction diode, rectifier diode, tunnel diode, zener diode, varactor diode and their applications. e) Determine the reverse and forward characteristics of a P-N junction diode f) Construct half-wave, full-wave and bridge rectifier circuits. g) Draw voltage and current (V - I) characteristics of a P - N junction diode.	iii) The teacher to design activities for students to: - Determine the reverse and forward characteristic of a P-N junction diode. - Construct half-wave, full-wave and bridge rectifier circuits and give their circuit applications. - Draw voltage and current (V - I) characteristics of a P - N junction diode. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii). v) Students to present their responses for sharing and discussion.		5. Can the student determine the reverse and forward characteristics of a P-N? 6. Can the student construct half-wave, full-wave and bridge rectifier circuits? 7. Can the student draw voltage and current (V - I) characteristics of a P - N junction diode?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	5.2 Bipolar Junction Transistors (BJTs)	The student should be able to: a) Describe the constructional structure of PNP and NPN transistors. b) Explain the biasing arrangement of NPN and PNP bipolar transistors.	i) The teacher to use questions to guide students to: - Explain the structure of bipolar junction transistor. - Describe biasing arrangements of NPN and PNP transistors.	• Flip chart • BJTs (NPN and PNP) • Marker pens • Posters • Multimedia equipment • Reading texts	1. Can the student describe the constructional structures of PNP and NPN transistors? 2. Is the student able to explain the biasing arrangements of PNP and NPN bipolar junction transistors?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Draw the BJT characteristic curves.	- Explain bipolar junction transistor (BJT) configurations/ connection modes. ii) The teacher to use questioning techniques to guide students to describe the theoretical structures of PNP and NPN transistors. iii) The teacher to create activities for students to draw corresponding characteristic curves and transistor configurations/ connection modes and explain them. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		3. Is the student able to draw the BJT characteristic curves?	

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 feedback to support students in performing the tasks given in part (i-iii).			
	5.3 Small Signal Transistor Amplifiers	The students should be able to: a) Determine the input and output resistances, current, voltage and power gains. b) Draw characteristic curves and explain them. c) Calculate dynamic resistance (rd).	i) The teacher to design activities for students to: - Derive the expressions for input and output resistances. - Determine the input and output resistances, current, voltage and power gains. - Draw characteristic curves of a transistor amplifier. - Calculate dynamic resistance (rd) or ac resistance.	• Flip chart • BJTs • Multimeter • Matrix board • Marker pens • Reading texts • Multimedia equipment	1. Can the student determine the input and output resistances, current, voltage and power gains? 2. Can the student draw characteristic curves and explain them? 3. Can the student calculate dynamic resistance (rd)?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i)			
	5.4 Field Effect Transistors (FETs)	The student should be able to: a) Identify the constructional features of FET.	i) The teacher to use questions to guide student to: - Identify the constructional features of FET.	• Flip chart • FET • Multimeter • Matrix board • Marker pens	1. Is the student able to identify the constructional features of FET?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Describe the principles of operation of FET. c) Differentiate unipolar and bipolar conduction as referred to FET and BJT respectively. d) Draw schematic symbol for FET. e) Draw characteristic curves of FET.	ii) Define the symbol for FET and name its terminals. iii) The teacher to use questioning strategies to guide students to: - Describe the principles of operation of FET. - Explain the application of FET. - Differentiate unipolar and bipolar conduction as referred to FET and BJT respectively iv) The teacher to create activities for students to: - Draw schematic symbol for FET and identify its terminals. - Draw characteristic curves of FET.	• Posters • Multimedia equipment • Reading texts	2. Can the student describe the principles of operation of FET? 3. Is the student able to differentiate between unipolar and bipolar conduction as referred to FET and BJT respectively? 4. Is the student able to draw schematic symbol for FET? 5. Can the student draw characteristic curves of FET?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
6.0 ELECTRONICS WORKSHOP PRACTICE II	6.1 Determining Resistor Values Using Colour Codes	The student should be able to: a) Differentiate colour codes of resistors. b) Obtain the values of resistors by reading colour codes. c) Use tolerance colour bands to obtain ranges of resistance. d) Use Ohmmeter to obtain the value of a resistor.	i) The teacher to use questioning strategies (what, why and how questions) to guide students to differentiate colour codes of resistors. ii) The teacher to create activities for students to: - Carry out demonstration on reading resistor colour codes. - Make calculations on the colours read from the resistors. - Obtain the values of resistors by reading colour codes and doing calculations. - Use tolerance colour bands to obtain ranges of resistances. - Measure resistance by using Ohmmeter.	• Resistors with colour codes • Multimeter (Ohmmeter) • Magnifying glass • Flip chart • Marker pens • Posters • Colour bands • Reading texts • Calculator	1. Is the student able to differentiate colour codes of resistors? 2. Is the student able to obtain values of resistors by reading colour codes? 3. Is the student able to apply tolerance colour bands to obtain ranges of resistances? 4. Is the student able to use Ohmmeter to obtain the values of resistor?	6

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 students to present their work for sharing and discussion. v) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	6.2 Determining Capacitor Values Using Colour Codes	The student should be able to: a) Read capacitor colour codes. b) Use capacitor colour codes to obtain the value of a capacitance. c) Use tolerance colours to obtain ranges of capacitances of capacitors.	i) The teacher to create activities for students to: - Read capacitor colour codes. - Use colour codes to obtain the capacitance values. - Use tolerance colour bands to obtain the ranges of capacitances. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The students to present their work for sharing and discussion.	• Capacitors with colour codes • Magnifying glass • Flip chart • Marker pens • Posters • Colour bands • Reading texts • Calculator	1. Can the student read the capacitor colour codes? 2. Can the student use capacitor colour codes to obtain value of a capacitance? 3. Can the student use tolerance colours to obtain ranges of capacitances of capacitors?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
	6.3 Determining Inductor Values	The student should be able to: a) Measure the inductance of an inductor. b) Determine the value of inductance using inductor colour codes.	i) The teacher to create activities for students to: - Use inductance-meter to measure the value of an inductor. - Obtain inductance value using colour codes.	• Different types of inductors • Flip chart • Posters • Inductance-meter • Reading texts • Calculator	1. Can the student measure the inductance of an inductor? 2. Can the student determine the value of inductance using inductor colour codes?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Compare measured and calculated values of inductance.	- Compare measured and calculated values of inductance. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The students to present their work for sharing and discussion. iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).		3. Can the student compare measured and calculated values of inductance?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	6.4 Diode Measurement	The student should be able to: a) Identify cathode terminal of a diode from its ring colour paint. b) Determine cathode and anode terminal using multimeter. c) Apply diode as a rectifier component. d) Display output waveform of the rectifier circuit on an oscilloscope. e) Build a simple power supply unit.	i) The teacher to create activities for students to: - Identify cathode terminal of a diode. - Identify cathode and anode terminals using multimeter. - Make a simple rectifier circuit. - Observe the rectified waveform on an oscilloscope. - Build the basic DC power supply. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The students to present their work for sharing and discussion.	• Diodes • Matrix board • Oscilloscope • Multimeter • Flip chart • Marker pens • Posters • Reading texts • Step-down transformers • AC mains	1. Is the student able to identify cathode terminal of diode from its ring colour paint? 2. Can the student determine cathode and anode terminals using multimeter? 3. Can the student use diode as a rectifier component? 4. Can the student display output waveform of the rectifier circuit on an oscilloscope?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).		5. Can the student build a simple power supply unit?	
	6.5 Transistor Measurements and Applications.	The student should be able to: a) Identify NPN and PNP transistors using a multimeter. b) Locate base, collector and emitter terminals of a transistor using a multimeter.	i) The teacher to create activities for students to: - Identify NPN and PNP transistors using a multimeter. - Identify transistor terminals (base, collector, emitter) using a multimeter.	• NPN Transistors • PNP Transistors • Oscilloscope • Signal generator • Matrix board • Soldering iron • Solder wire • Flip chart	1. Is the student able to identify NPN and PNP transistors using a multimeter? 2. Can the student locate base, collector and emitter terminals of a transistor using a multimeter?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Use a transistor as an amplifier. d) Operate a transistor as a switch. e) Use oscilloscope and signal generators to observe output waveforms of a transistor.	- Use a transistor as an amplifier. - Operate a transistor as a switch. - Use oscilloscope and signal generators to observe output waveforms of a transistor. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i). iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).	• Marker pens • Posters • Power supply • Reading texts	3. Can the student use a transistor as an amplifier? 4. Can the student operate a transistor as a switch? 5. Can the student use oscilloscope and signal generators to observe output waveforms of a transistor? 6. Can the student operate a transistor as a switch? 7. Can the student use oscilloscope and signal generators to observe output waveforms of a transistor?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	6.6 Field Effect Transistor Measurements and Applications	The student should be able to: a) Differentiate between N-type and P-type FET by using a multimeter. b) Identify transistor terminals (drain, source and gate) using special meter. c) Use FET as an amplifier. d) Use FET as a switch. e) Use oscilloscope and signal generator to display output waveforms of a FET.	i) The teacher to create activities for students to: - Differentiate between N-type and P-type FETs. - Use special meter to identify drain, source and gate terminals of FET. - Built a simple FET amplifier. - Built a simple switch circuit using FET. - Use oscilloscope and signal generator to display output waveforms of a FET. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i).	• N type FET • P type FET • Oscilloscope • Signal generator • Matrix board • Soldering gun • Solder wire • Flip chart • Marker pens • Posters • Power Supply • Reading texts	1. Can the student differentiate between N-type and P-type FET using a multimeter? 2. Can the student identify FET terminals (drain, source and gate) using a special meter? 3. Can the student use FET as an amplifier? 4. Can the student use FET as a switch? 5. Can the student use oscilloscope and signal generator to display output waveforms of a FET?	6

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

FORM III

CLASS LEVEL COMPETENCIES

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

a) classify transistor amplifiers and mention their characteristics;

b) perform addition and subtractions of binary numbers, convert decimal number to binary number and vice versa;

c) draw basic logic gates;

d) explain radio wave propagation;

e) identify types of radio transmitters;

f) identify types of radio receivers,

g) build electronic circuits such as amplifiers, oscillators and tuned circuits; and

h) test faults of radio circuits using measuring instruments and test equipment.

CLASS LEVEL OBJECTIVES

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

a) explain operation of amplifiers and draw circuit diagrams;

b) explain integrated circuits (ICs);

c) explain the conversion of decimal number to binary number and vice versa;

d) draw electronic logic circuit using NAND, AND, OR, NOR, NOT and Exclusive OR gates;

e) describe a radio, radio waves and ionosphere;

f) draw simple block diagrams of radio transmitters and explain their principles of operation;

g) define modulation and demodulation;

h) draw block diagrams of radio receivers and explain their operation principles; and

i) troubleshoot radio faults.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
1.0 TRANSISTORS	1.1 Transistor Amplifier	The student should be able to: a) Explain the term transistor bias. b) Draw transistor amplifier biasing circuits. c) Draw the loadline. d) Draw input and output signal waveforms. e) Determine amplifier bias conditions.	i) The teacher to use questions to guide the students to explain the term transistor bias. ii) The teacher to design activities for students to: - Draw biasing circuits of transistor amplifier. - Draw the loadline. - Draw input and output signal waveforms. - Determine amplifier bias conditions. iii) The teacher should monitor and facilitate students in performing the tasks given in part (i).	• Flip chart • Marker pens • Posters • Multimedia equipment • Electronic components (transistors, resistors and capacitors) • Reading texts	1. Is the student able to explain the term transistor bias? 2. Can the student draw transistor amplifier biasing circuits? 3. Can the student draw the loadline? 4. Can the student draw the input and output signal waveforms? 5. Can the student determine amplifier bias conditions?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The students to present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (ii).			
	1.2 Transistor as Switch	The students should be able to: a) Use transistor as a switch. b) Use data book to obtain transistor specifications.	i) The teacher to create activities for students to: - Identify bipolar junction transistors (NPN or PNP) and their terminals.	• Multi-meter • Variable regulated DC power supply • Reading texts • Data books	1. Can the student use transistor as a switch? 2. Can the student use data book to obtain transistor specifications?	2

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Connect transistor to operate as a switch.	- Use Data Book to get transistor specifications. - Connect bipolar junction transistor as a switch. ii) The teacher should monitor and facilitate students in performing the tasks given in part (i). iii) The students to present their work for sharing and discussion. iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i).	• Transistors • Resistors • Signal generator • CRO	3. Can the student connect the transistor to operate as a switch?	

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 feedback to support students in performing the tasks given in part (i).			
	1.3 Single Stage Amplifier	The student should be able to: a) Define the term single-stage amplifier. b) Describe the operation of single-stage amplifier. c) Describe types/ classes of single-stage transistor amplifiers. d) Explain operation principles of single-stage transistor amplifier.	i) The teacher to use brainstorming questions to guide students to define the term single-stage amplifier. ii) The teacher should organise group discussion for students to describe the operation of single-stage amplifier. iii) The teacher to use questioning strategies (what, how, and why questions) to guide students to:	• Flip chart • Marker pens • Posters • Multimedia equipment • Reading texts	1. Is the student able to define the term single-stage amplifier? 2. Can the student describe the operation of single-stage amplifier? 3. Is the student able to describe types/ classes of single-stage transistor amplifiers?	3

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Draw labelled circuit diagram of single-stage amplifier. f) Draw labelled input and output waveforms of single-stage amplifier.	- Describe types/ classes of single-stage transistor amplifiers. - Explain operation principles of single-stage amplifier. iv) The teacher to create activities for students to: - Draw a labelled circuit diagram of a single-stage amplifier. - Draw labelled input and output waveforms of single-stage amplifier. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv).		4. Is the student able to explain operation principles of single-stage transistor amplifier? 5. Can the student draw labelled circuit diagram of single stage amplifier? 6. Can the student draw labelled input and output waveforms of single-stage amplifier?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	1.4 Multi-Stage Amplifiers	The student should be able to: a) Differentiate between single-stage and multi-stage amplifiers. b) Describe multi-stage amplifier. c) Describe operation principles of multi-stage amplifier. d) State advantages of multi-stage amplifiers. e) Identify types of multi-stage amplifiers. f) Draw multi-stage amplifier circuits.	i) The teacher to use questioning strategies to guide students to: - Differentiate between single-stage and multi-stage amplifiers. - Describe multi-stage amplifier. - Explain operation principles of simple multi-stage amplifiers. ii) The teacher should organise group discussion for students to: - State advantages of multi-stage amplifiers. - Identify types of multi-stage amplifiers.	• Electronic components • Flip chart • Marker pens • Posters • Multimedia equipment • Reading texts	1. Is the student able to differentiate between single-stage and multi-stage amplifiers? 2. Is the student able to describe multi-stage amplifiers? 3. Is the student able to describe the operation principles of multi-stage amplifier? 4. Is the student able to state advantages of multi-stage amplifiers? 5. Is the students able to identify types of multi-stage amplifiers?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher to create activities for students to draw multi-stage amplifier circuits. iv) The students to present their work for sharing and discussion. v) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i) - (iii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i)-(iii).		6. Can the student draw multi-stage amplifier circuits?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
2.0 ELECTRONICS AMPLIFIERS	2.1 Classes of Amplifiers and their Operations	Students should be able to: a) Describe the operation of various classes of amplifiers. b) Explain the meaning of frequency response of an amplifier. c) Distinguish between power and voltage amplifiers. d) Distinguish between linear and non-linear amplifiers. e) Describe the operation of AF amplifiers.	i) The teacher to use questions to guide students to: - Describe the operation of various classes of amplifiers (i.e., class A, class B, class AB, class C and class D) - Explain the meaning of frequency response of an amplifier. ii) The teacher should organise group discussion for students to: - Distinguish between power and voltage amplifier. - Distinguish between linear and non-linear amplifiers.	• Oscilloscope • Signal generator • Solder wire • Soldering iron • Reading texts • Matrix/vero boards • Bread boards • Multimeter	1. Can the student describe the operation of various classes of amplifiers? 2. Is the student able to explain the meaning of frequency response of an amplifier? 3. Can the student distinguish between power and voltage amplifiers? 4. Is the student able to distinguish between linear and non-linear amplifiers? 5. Can the student describe the operation of AF amplifiers?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		f) Describe the operation of tuned amplifier. g) Describe the operation of single-stage amplifier, push pull amplifier and cascaded amplifiers. h) Carry out experiments to determine the frequency responses of various types of amplifiers listed above.	- Describe the operation of tuned amplifier. - Describe the operation of single-stage amplifier, push-pull amplifier and cascaded amplifiers. iii) The teacher to organise practical activities for students to construct and test the frequency responses of various types of amplifiers. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		6. Can the student describe the operation principles of tuned amplifier? 7. Can the student describe the operation principles of single-stage amplifier, push pull amplifier and cascaded amplifiers? 8. Can the student carry out experiments to determine the frequency responses of various types of amplifiers listed above?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			v) The students to present their work for sharing and discussion. vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	2.2 Feedback in Amplifier and Oscillator Circuits	Students should be able to: a) Explain the meaning of the term feedback in electronic circuits. b) Explain the concept of oscillation and positive feedback. c) Describe types of feedback in electronic circuits.	i) The teacher to use brainstoming questions to guide students to: - Explain the meaning of the term feedback in electronic circuits.	• Electronics trainer kits • Discrete components • Signal generator	1. Can the student explain the meaning of the term feedback in electronic circuits? 2. Can the student explain the concept of oscillation and positive feedback?	6

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain the difference between positive and negative feedback. e) Derive the expression for the loop gain. f) Derive the overall voltage gain of a feedback amplifier. g) Describe the characteristics of feedback amplifier. h) Explain effects of positive and negative feedback in amplifier circuits	- Explain the concept of oscillation using stone in water medium, using fork, string and wired instrument ix) The teacher to use questioning strategies to guide students to: - Explain the difference between positive and negative feedback - Describe types of feedback in electronic circuits i.e. negative and positive feedback. - Derive the expression for the loop gain. - Derive the overall voltage gain of a feedback amplifier.		3. Can the student describe types of feedback in electronic circuits? 4. Can the student explain the difference between positive and negative feedback? 5. Can the student derive the expression for the loop gain? 6. Can the student derive the overall voltage gain of a feedback amplifier? 7. Can the student describe the characteristics of a feedback amplifier?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The teacher should organise group discussion for students to: - Explain effects of positive and negative feedback in amplifier circuits - Describe the characteristics of feedback amplifier. iv) The students to present their work for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).		8. Can the student explain effects of positive and negative feedback in amplifier circuits?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	2.3 Laboratory Work on Amplifiers and Oscillators	The students should be able to: a) Construct different amplifier and oscillator circuits. b) Test the constructed amplifier and oscillator circuits. c) Determine the frequency responses of amplifiers and oscillators. d) Demonstrate the operation of a stable multi-vibrator using switches and LEDs.	i) The teacher to create practical activities and guide students in groups to: - Construct oscillators. (i.e., L.C. oscillator, Harley oscillator, Colpitt's oscillator, R.C. oscillator, multi-vibrator and timers) - Test the constructed oscillator circuits. - Construct and test the frequency responses of the following types of amplifiers: - Illustrate the circuit diagrams of various multi-vibrators and explain why they are so called.	• Electronic components • Electronic tool kit • Multimeter • Oscilloscope • Signal generator	1. Can the student construct amplifier and oscillator circuits? 2. Is the student able to test the constructed amplifier and oscillator circuits? 3. Is the student able to determine the frequency responses of amplifiers and oscillators?	8

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	2.4 Principles of Operational Amplifier (OP.AMP)	Students should be able to: a) Describe operational amplifiers and their characteristics. b) Describe types and applications of operational amplifiers. c) Construct operational amplifier circuits. d) Test the constructed OP.AMP circuits.	i) The teacher to use questions to guide students to: - Describe operational amplifiers and their characteristics. - Describe types and applications of operational amplifiers. ii) The teacher to design activities for students to: - Construct various types of circuits using operational amplifiers. - Test the constructed OP.AMP circuits. iii) The teacher should monitor and facilitate students in performing the tasks given in part (i) and (ii).	• A chart • Oscilloscope • Signal Generator • Lead sucker • Multimeter • Reading texts • OP.AMPs • IC sockets • Bread boards • Matrix /vero boards • Soldering iron • Solder wire	1. Can the student describe operational amplifiers and their characteristics? 2. Can the student describe types and applications of operational amplifiers? 3. Can the student construct various types of operational amplifier circuits? 4. Can the student test the constructed OP.AMP circuits?	10

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
3.0 COMMUNICATION SYSTEMS	3.1 Types of Communication	The student should be able to: a) Define the term communication. b) Identify types of communication systems. c) Explain applications of different types of communication systems. d) Identify needs for communication systems.	i) The teacher to use questions to guide students to: - Define the term communication. - List types of communication systems. ii) The teacher to use questioning strategies (why and how questions) to guide students to: - Explain applications of different types of communication systems. - Identify needs for communication systems. iii) The teacher should give feedback and use students' responses as feedback to support students in perfoming the tasks given in part (i) and (ii).	• Chalk/white board • Marker pens • Flip chart • Multimedia projector • DVD/VCD • Reading texts	1. Can the student define communication? 2. Is the student able to mention types of communication systems? 3. Can the student explain applications of different types of communication systems? 4. Is the student able to identify the needs for communication systems?	1

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.2 Tuned Circuits	The student should be able to: a) Describe tuned circuit, resonant frequency and selectivity. b) Explain how desired signal is selected. c) Explain the uses of tuned circuits in radio receivers. d) Draw R L C tuned circuits. e) Calculate resonant frequency.	i) The teacher to use brainstorming questions to guide students to: - Define the term tuned circuit, resonant frequency and selectivity. - Explain how desired signal is selected. ii) The teacher to use questions to guide students to explain the use of tuned circuits in radio receivers. iii) The teacher to create activities for students to: - Draw R L C tuned circuits. - Calculate resonant frequency.	• Chalk/white board • Marker pens • Flip chart • Circuit components i.e. transistors, resistors, capacitors, inductors etc • Reading texts	1. Is the student able to define tuned circuit, resonant frequency and selectivity? 2. Can the student explain how desired signal is selected? 3. Is the student able to explain the use of tuned circuits in radio receivers? 4. Can the student draw R L C tuned circuits? 5. Can the student calculate resonant frequency?	6

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) The students to present their work for sharing and discussion. vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.3 Oscillators	The student should be able to: a) Describe the operation of basic L-C oscillators. b) Identify oscillator circuits used in radio receivers. c) Analyse types of oscillators.	i) The teacher to use questions to guide students to: - Explain basic L-C oscillators. - Name types of oscillators. - Identify oscillator circuits used in radio receivers. - Analyse types of oscillators. ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).	• Chalk/white board • Flip chart • Transistors • Inductors • Capacitors • Resistors • Reading texts	1. Is the student able to describe the operation of basic L-C oscillators? 2. Is the student able to identify oscillator circuits used in radio receivers? 3. Is the student able to analyse types of oscillators?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.4 Oscillators and their Operations	Students should be able to: a) Identify the frequency of an oscillator as the channel frequency of a TV or Radio station. b) Describe operation principles of different oscillators. c) Provide examples of Radio and TV tuners. d) Analyse the applications of multi-vibrators.	i) The teacher should organise group discussion and guide students to: - Identify the frequency of an oscillator as the channel frequency of a TV or Radio station. - Describe operation principles of different oscillators. (i.e.L.C. Oscillator, Harley oscillator. Colpitts oscillator, Tuned-base, Tuned anode, R.C. oscillator, Multi vibrators and timers). - Provide examples of Radio and TV tuners. - Analyse the applications of multi-vibrators.	• Oscilloscope • Black/white board • Marker pens • Flip chart • Multimedia projector • Reading texts • Frequency meter	1. Can the student identify the frequency of an oscillator as the channel frequency of a TV or Radio? 2. Is the student able to describe operation principles of different oscillators? 3. Is the student able to provide examples of radio and TV tuners? 4. Is the student able to analyse the applications of multi-vibrators?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			ii) The students to present their work for sharing and discussion. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).			
	3.5 Transducers	The student should be able to: a) Define the term transducer. b) Identify types of transducers. c) Describe the application of transducers.	i) The teacher to use questions to guide students to: - Define the term transducer. - Identify types of transducers. ii) The teacher to use questioning strategies to guide students to describe the application of transducers.	• Chalk/white board • Flip chart • Marker pens • Transducers	1. Is the student able to define the term transducer? 2. Is the student able to identify types of transducers? 3. Is the student able to describe the application of transducers?	2

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 feedback to support students in performing the tasks given in part (i) and (ii).			
	3.6 Antennae	The student should be able to: a) Define the term antenna. b) Mention types of antennae. c) Explain the uses of antennae in communication. d) Describe dipole, ferrite rod and T antennae.	i) The teacher to use questions to guide students to: - Define the term antenna. - Mention types of antennae. ii) The teacher should organise group discussion and guide students to: - Explain the uses of antennae in communication	• Chalk/white board • Flip chart • Antennae • User manual • Other reading texts	1. Can the student define the term antenna? 2. Can the student mention types of antennae? 3. Is the student able to explain the uses of antennae in communication? 4. Is the student able to describe dipole, ferrite rod, and T antennae?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Describe parabolic and Yagi-Uda antennae. f) Mention apllications of parabolic and Yagi-Uda antennae. g) Differentiate between parabolic and Yagi-Uda antennae. h) Distinguish between directional and ommi-directional antennae	- Describe dipole, ferrite rod and T antennae. - Describe parabolic and Yagi -Uda antenna. - Distinguish between directional and omni-directional antennae. iii) The students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).		5. Is the student able to describe parabolic and Yagi -Uda antennae? 6. Can the student mention applications of parabolic and Yagi-Uda antennae? 7. Can the student differentiate between parabolic and Yagi-Uda antennae? 8. Is the student able to differentiate between directional and omni-directional antennae?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.7 Modulation	The student should be able to: a) Define the term modulation, amplitude modulation (AM) and frequency modulation (FM). b) Differentiate between amplitude modulation (AM) and frequency modulation (FM). c) Describe AM and FM waves. d) Draw A.M and F.M waveforms.	i) The teacher to use questions to guide student to define the term modulation, amplitude modulation (AM) and frequency modulation.(FM) ii) The teacher should organise group discussion and guide students to: - Differentiate between amplitude modulation (AM) and frequency modulation (FM). - Describe AM and FM waves. - Draw A.M and F.M waveforms. iii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).	• Flip chart • Radio receiver • Marker pens • Reading texts	1. Can the student define the terms modulation, amplitude modulation (AM) and frequency modulation (FM)? 2. Can the student differentiate between amplitude-modulation (AM) and frequency-modulation (FM) waves? 3. Is the student able to describe AM and FM waves? 4. Can the student draw A.M and F.M waveforms?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
4.0 RADIO COMMUNICATION	4.1 Basic Principles of Radio Transmission	Student should be able to: a) Explain the aim of radio transmission, electro-magnetic wave, and radio wave. b) Explain the function and operation of a radio transmitter (AM and FM). c) Explain the principles of AM & FM modulation in radio transmission. d) Explain the principles of transmitting and receiving antennae.	i) The teacher should organise group discussion and guide students to: - Explain the aim of radio transmission, electro-magnetic wave and radio wave. - Explain the function and operation of a radio transmitter (AM and FM). - Explain the principles of AM & FM modulation in radio transmission. - Explain the principles of transmitting and receiving antennae. ii) The students to present their responses for sharing and discussion.	• AM/FM Modules • Soldering iron • Strip board • Solder wire • AM/FM radio receiver • Oscilloscope • Microphone • Signal generator • Reading texts	1. Can the student explain the aim of radio transmission, electro-magnetic wave, and radio wave? 2. Can the student explain the function and operation of a radio transmitter (AM and FM)? 3. Can the student explain the principles of AM & FM modulation in radio transmission? 4. Can the student explain the principles of transmitting and receiving antennae?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) State importance of modulation in radio transmission. f) Construct simple radio transmitter. g) Construct a transmitting antenna.	iii) The teacher to use questioning strategies to guide students to: - State importance of modulation in radio transmission. - Explain the function and operation of a radio transmitter (AM and FM). iv) The teacher to create activities for students to: - Construct and test a simple AM and FM transmitter. - Construct a simple transmitting antenna. - Calculate frequency and wavelength of radio signal.		5. Can the student state importance of modulation in radio transmission? 6. Can the student construct simple radio transmitter? 7. Is the students able to construct a transmitting antenna?	10

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.2 Radio receiver	The student should be able to: a) Explain the principle of AM and FM signal reception. b) Identify function of a radio receiver. c) Describe the operation of radio receiver. d) Explain the operation of Local Oscillator and IF stages. e) Describe different parts making up a radio receiver. f) Describe radio receiver modes	i) The teacher should organise group discussion and guide students to: - Explain the principle of AM and FM signal reception. - Explain function of radio receiver. - Describe the operation of radio receiver. - Explain the operation of Local Oscillator and IF stages. - Describe different parts making up a radio receiver. - Describe radio receiver modes ii) Students in groups to discuss the operation of radio receiver.	• Flip chart • Marker pens • Posters • Radio receiver • Reading texts	1. Is the student able to explain the principle of AM and FM signal reception? 2. Is the student able to identify function of a radio receiver? 3. Is the student able to describe the operation of radio receiver? 4. Can the student explain the operation of Local Oscillator and IF stages? 5. Is the student able to describe different parts making up a radio receiver? 6. Is the student able to describe radio receiver modes?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Explain the operation of detector stage and A.G.C. in radio receiver. h) State the full meanings of A.F.C. and A.G.C. and their importance in radio receivers.	iii) The teacher to use questioning strategies (what, how and why questions) to guide students to: - Explain the operation of detector stage and A.G.C. in radio receiver. - State the full meanings of A.F.C. and A.G.C. and their importance in radio receivers. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (iii).		7. Is the student able to explain the operation of detector stage and A.G.C. in radio receiver? 8. Is the student able to state the full meanings of A.F.C. and A.G.C. and their importance in radio receivers?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.3 Radio Tuned Circuits	The student should be able to: a) Identify a typical tuned circuit in a radio set. b) Explain resonance and how to achieve it with LC circuits. c) Explain the application of tuned circuits in radio communication. d) Explain the operation of RF and mixer stages.	i) The teacher to use questioning strategies to guide students to: - Identify a typical tuned circuit in a radio set. - Explain resonance and how to achieve it with LC circuits. - Explain the application of tuned circuits in radio communication. - Explain the operation of RF and mixer stages. ii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).	• Flip chart • Marker pens • Posters • Radio circuits • Reading texts	1. Is the student able to identify a typical tuned circuit in a radio set? 2. Is the student able to explain resonance and how to achieve it with LC circuits? 3. Is the student able to explain the application of tuned circuits in radio communication? 4. Is the student able to explain the operation of RF and mixer stages?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.4 Drawing Radio Receiver Block and Circuit Diagrams	The student should be able to: a) Draw AM and FM demodulator circuits. b) Draw block diagrams of a tuned radio frequency (TRF) or straight receiver and super- heterodyne receiver. c) Draw the schematic diagram and describe the operation of - Local Oscillator - IF (IF filter).	i) The teacher should organise practical activities for students to: - Draw AM and FM demodulator circuits. - Draw block diagrams of a tuned radio frequency (TRF) or straight receiver and super- heterodyne receiver and explain them. - Draw the schematic diagram and describe the operation of Local Oscillator and IF (IF filter). - Tune radio receiver for broadcast reception.	• Flip chart • Marker pens • Posters • Radio receiver • Reading texts	1. Can the student draw AM and FM demodulator circuits? 2. Can the student draw block diagrams of a TRF receiver and super-heterodyne receiver? 3. Can the student draw the schematic diagram and describe the operation of Local Oscillator and IF (IF filter)?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Draw the schematic diagram and explain the operation of: RF stage (aerial input circuits) and mixer (acceptor and rejector circuits). e) Tune radio receiver for broadcast reception.	- Draw the schematic diagram and explain the operation of: RF stage (aerial input circuits) and mixer (acceptor and rejector circuits). ii) The teacher should monitor and facilitate students in perfoming the tasks given in part (i). iii) The students to present their responses for sharing and discussion. iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (i).		4. Can the student draw the schematic diagram and explain the operation of: RF stage (aerial input circuits) and mixer (acceptor and rejector circuits)? 5. Can the student tune radio receiver for broadcast reception?	

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 feedback to support students in performing the tasks given in part (i).			
	4.5 Troubleshoot and Repair of Radio Sets	Student should be able to: a) Explain the concept and phenomenon of AM and FM. b) Explain the differences between AM and FM detector circuits. c) Distinguish between an AM and FM receiver. d) Explain the method of fault-finding in AM and FM receiver circuits.	i) The teacher to use questioning strategies to guide students to: - Explain the concept and phenomenon of AM and FM. - Explain the differences between AM and FM detector circuits. - Distinguish between an AM and FM receiver. ii) The teacher should organise group discussion and guide students to:	• Block diagram of TRF and super heterodyne radio receivers • Chalk/white board • Demonstration receiver on FM and AM • Domestic AM/FM radio receiver • Communication receiver • Safety gear	1. Can the student explain the concept and phenomenon of AM and FM? 2. Can the student explain the differences between AM and FM detector circuits? 3. Can the student distinguish between an AM and FM receiver?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Identify the radio fault-finding equipment. f) Interpret radio set schematic diagram. g) Use the radio fault-finding equipment. h) Use limiter circuit in FM. i) Explain the essence of observing safety during troubleshooting.	- Explain the method of fault-finding in AM and FM receiver circuits. - Interpret radio set schematic diagram. - Identify the radio fault-finding equipment. iii) The students to present their responses for sharing and discussion. iv) The teacher to create activities in the Electronics and Communication workshop/laboratory for students to: - Use fault-finding equipment. - Use limiter circuit in FM signal reception.	• Service manuals of radio receivers • Data Books • Tool kit • Signal tracer • Signal generator • IF sweep generator, • Meters • Loop antenna, • Frequency counter • Non-magnetic screwdriver • Reading texts • Oscilloscope	4. Can the student explain the method of fault-finding in AM and FM receiver circuit? 5. Can the student identify the radio fault-finding equipment? 6. Can the student interpret radio set schematic diagram? 7. Can the student use the fault-finding equipment? 8. Can the student use limiter circuit in FM? 9. Can the student explain the essence of observing safety during troubleshooting?	

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	4.6 Fault Tracing in Radio Receivers	Student should be able to: a) Describe the fault-finding techniques in radio servicing. b) Identify fault symptoms of a radio receiver and their causes. c) Diagnose fault in a radio receiver using fault-finding techniques. d) Align a radio receiver as specified by the manufacturer. e) Repair radio receivers f) Observe safety precautions while servicing a radio receiver	i) The teacher to use questions to guide students to: - Describe the fault-finding techniques in radio servicing. - List fault-finding steps. - Identify fault symptoms of a radio receiver and their causes. ii) The teacher to create practical activities for students to: - Perform cold (visual) and hot (thermal) checks on a defective radio receiver. - Trace faults.in a radio receiver using fault-finding techniques.	• Domestic AM/FM radio receiver • Communication receiver • Safety gear • Service manuals of radio receivers • Multimeter • Signal generator • Oscilloscope • Data Books • Tool kit • Reading texts	1. Can the student describe the fault-finding techniques in radio servicing? 2. Is the student identify fault symptoms of a radio receiver and their causes? 3. Can the student diagnose faults in a radio receiver using fault-finding techniques? 4. Is the student able to align a radio receiver as specified by the manufacturer? 5. Can the student repair radio receivers?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			- Demonstrate alignment of IF and RF stages using the necessary equipment and tools for FM and AM radio receivers. - Repair radio receiver according to service manual. - Diagnose faults in a radio receiver using fault-finding techniques. - Observe safety precautions while servicing a radio receiver. iii) The students to present their responses for sharing and discussion.		6. Can the student observe safety precautions while servicing a radio receiver?	

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) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). vi) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
5.0 CONSUMER ELECTRONIC PRODUCT TESTING AND FAULT-FINDING	5.1 Testing Electronic Equipment	The student should be able to: a) Explain the possible causes of faults in electronic components/ equipment and how to locate the faults. b) Test various points of electronic equipment. c) Trace faults at different points of electronic equipment.	i) The teacher to guide students to brainstorm on different types of testing. ii) The teacher to use questions to guide students to: - Explain the possible causes of faults in electronic components/ equipment and how to locate the faults. - Explain how to test different types of electronic components and equipment. iii) The teacher to create practical activities for students to: - Test various points of electronic equipment.	• Flip chart • Electronic components/ equipment • Soldering iron • Solder wire • Signal generator • Oscilloscope • Multimeter • Marker pens • Reading texts	1. Can the student explain the possible causes of faults in electronic components/ equipment and how to locate the faults? 2. Can the student test various points on electronic components/ equipment? 3. Can the student trace faults at different points of electronic equipment?	15

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			- Trace faults at different points of electronic equipment. iv) The students to present their responses for sharing and discussion. v) The teacher should monitor and facilitate students in perfoming the tasks given in part (iii). vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iii). vii) The students to present their responses for sharing and discussion.			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			viii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).			
	5.2 Instrumentation	The student should be able to: a) Identify different types of electronic measuring instruments and test equipment. b) Adjust instruments before measuring electronic equipment. c) Select ranges of measurements. d) Use measuring instruments in troubleshooting electronic equipment.	i) The teacher to use questions to guide students to identify various types of electronic measuring instruments and test equipment. ii) The teacher to create activities for students to: - Adjust instruments before measuring electronic equipment. - Select ranges of measurements.	• Electronic equipment • Electronic circuits • Multi-meter • Signal generator • Oscilloscope • Frequency meter • Reading texts	1. Can the student identify different electronic measuring instruments and test equipment? 2. Can the student adjust instruments before measuring electronic equipment? 3. Can the student select ranges of measurements? 4. Can the student use measuring instruments in troubleshooting electronic equipment?	16

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Troubleshoot faults in electronic equipment. f) Locate fault points.	- Use measuring instruments in troubleshooting electronic equipment. - Troubleshoot faults in electronic equipment. - Locate fault points iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The students to present their responses for sharing and discussion		5. Can the student troubleshoot faults in electronic equipment? 6. Can the student locate fault points?	

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 feedback to support students in performing the tasks given in part (i) and (ii).			
6.0 DIGITAL ELECTRONICS	6.1 Binary Number Systems	The student should be able to: a) Explain the importance of number systems in digital applications. b) Convert decimal number to binary, octal, hexadecimal and vice versa. c) Perform simple addition, multiplication and division calculations using binary numbers.	i) The teacher to use questions to guide students to explain the essence of number systems in digital operations. ii) The teacher to create activities for students to: - Convert decimal number to binary, octal, hexadecimal numbers and vice versa.	• Flip chart • Marker pens • Posters • Reading texts	1. Can the student explain the importance of number systems in digital applications? 2. Can the student convert decimal to binary, octal, hexadecimal and vice versa?	13

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Simplify logic expressions using Boolean algebra.	- Perform simple addition, multiplication and division calculations using binary numbers. - Simplify logic expressions using Boolean algebra. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The students to present their responses for sharing and discussion.		3. Can the student perform simple addition, multiplication and division calculations using binary numbers? 4. Can the student simplify logic expressions using Boolean algebra?	

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 feedback to support students in performing the tasks given in part (i) and (ii).			
	6.2 Logic Gates	The student should be able to: a) Define basic logic gates. b) Identify the truth table for each gate. c) Explain the truth table for each gate. d) Explain how OR is converted to NOR and X- OR. e) Explain how AND is converted to NAND.	i) The teacher to use brainstorming questions to guide students to define basic logic gates (i.e., AND, OR, NOT and X-OR). ii) The teacher to create activities for students to: - Draw basic logic gate symbols. - Explain the truth table for each gate. - Explain how OR is converted to NOR and X-OR.	• Flip chart • Marker pens • Posters • Reading texts	1. Is the student able to define basic logic gates? 2. Can the student identify the truth table for each gate? 3. Can the student explain the truth table for each gate? 4. Can the student show how OR is converted to NOR and X-OR?	13

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		f) Perform conversion of OR and AND to NOR, X-OR and NAND. g) Apply principle of DUALITY. h) Draw simple logic circuits.	- Show how AND is converted to NAND. - Perform conversion of OR and AND to NOR, X-OR and NAND. - Apply principle of DUALITY - Draw simple logic circuits (combinational and sequential) using logic gates. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii).		5. Can the student convert AND to NAND gate? 6. Can the student perform conversion of OR and AND to NOR, X-OR and NAND? 7. Can the student apply principle of DUALITY? 8. Is the student able to draw simple logic circuits?	

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 feedback to support students in performing the tasks given in part (i) and (ii).			
	6.3 Integrated Circuits (ICs)	The student should be able to: a) Describe the formation of types of integrated circuits (ICs). b) Identify types of ICs. c) Differentiate between linear and digital ICs. d) Explain the operation of IC. e) Identify applications of ICs.	i) The teacher to use questions to guide students to; - Describe the formation of types of integrated circuits. - Identify types of ICs ii) The teacher to organise group discussion for students to: - Differentiate between linear and digital ICs. - Explain the operation of ICs.	• Flip chart • Marker pens • ICs • Data Books • Other reading texts	1. Is the student able to describe the formation of types of integrated circuits? 2. Is the student able to identify types of ICs? 3. Is the student able to differentiate between linear and digital ICs? 4. Is the student able to explain the operation of ICs?	13

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		f) Identify types of ICs and their connection pins using data books.	- Identify applications of ICs - Identify types of ICs and their connection pins using data books. iii) The teacher to create activities for students to: - Locate IC connection pins - Use Data Book to identify IC connection pins. iv) The teacher should monitor and facilitate students in performing the tasks given in part (iii).		5. Is the student able to identify applications of ICs? 6. Can the student identify types of ICs and their connection pins using data books?	

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

FORM IV

CLASS LEVEL COMPETENCIES

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

a) use basic principles of TV signal transmission and reception;
b) apply operation principles of TV camera;
c) draw a block diagram of a monochrome and colour television (colour camera encoding and decoding);
d) determine the colours of television (visible light spectrum and colour mixing);
e) apply multimedia skills;
f) repair video tapes/DVD, VCD, TV camera, recorders and TV receivers; and
g) repair mobile phones.

CLASS LEVEL OBJECTIVES

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

a) draw TV block diagrams, explain the principles of operation of picture tube (Television) and camera tube;
b) describe video tape recorders and allocate common faults;
c) maintain power supplies and TV receiver circuits;
d) maintain video recorders; and
e) identify common faults in electronic communication systems.

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
1.0 TELEVISION RECEIVER	1.1 Television (TV)	The student should be able to: a) Describe television. b) Explain colour TV transmission systems. c) Differentiate TV from radio. d) Describe modern TV systems. e) Identify tuner stage of a TV set. f) Explain key terms used in TV technology.	i) The teacher to use questions to guide students to: - Describe television. - Explain colour TV transmission systems ii) The teacher to organise group discussion for students to: - Differentiate TV from radio. - Explain colour TV transmission systems. - Describe modern TV systems. - Identify tuner stage of a TV set. - Explain key terms used in TV technology.	• Flip chart • TV receiver set • TV camera • Marker pens • Chalk/white board • Sound detector • Signal generator • Oscilloscope multi-meter • Tool kit • Reading texts • Chart showing TV block diagram	1. Is the student able to describe television? 2. Is the student able to explain colour TV transmission systems? 3. Is the student able to differentiate TV from radio? 4. Is the student able to describe modern TV systems? 5. Is the student able to identify tuner stage of a TV set?	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 feedback to support students in performing the tasks given in part (i) and (ii).		6. Is the student able to explain key terms used in TV technology?	
	1.2 TV Parts and Diagrams	The student should be able to: a) Identify different stages of TV set. b) Draw a block diagram of monochrome receiver. c) Draw block diagram of sound detection stage in TV.	i) The teacher to use questions to guide students to identify different stages of TV set. ii) The teacher to create activities for students to: - Draw a block diagram of monochrome receiver.	• Flip chart • TV receiver set • TV camera • Marker pens • Chalk/white board • Sound detector • Signal generator • Oscilloscope multi-meter • Tool kit • Reading texts	1. Can the student identify different stages of TV set? 2. Can the student draw a block diagram of monochrome receiver? 3. Can the student draw block diagram of sound detection stage in TV?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Draw different stages of chrominance signal. e) Draw block diagram of sound and video detection stage in TV. f) Draw synchronization separator stage. g) Draw block diagram of a colour TV receiver and explain its operation. h) Trace circuit diagram of TV receiver.	- Draw block diagram of sound detection stage in TV. - Draw different stages of chrominance signal - Draw block diagram of sound and video detection stage in TV. - Trace circuit diagram of TV receiver. - Draw synchronization separator stage. - Draw block diagram of a colour TV receiver and explain its operation. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii).		4. Can the student draw different stages of chrominance signal? 5. Can the student draw block diagram of sound and video detection stage in TV? 6. Can the student trace circuit diagram of TV receiver? 7. Can the student draw synchronization separator stage? 8. Can the student draw block diagram of a colour TV receiver and explain its operation?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i).and (ii).			
	1.3 TV Operations.	The student should be able to: a) Explain the principles of colour mixing. b) Identify transducers used in TV system.	i) The teacher to use questions to guide students to: - Explain the principles of colour mixing. - Identify transducers used in TV system.	• Flip chart • TV receiver set • TV camera • Marker pens • Chart showing block diagrams • Chalk/white board • Sound detector • Signal generator • Oscilloscope • Multimeter	1. Is the student able to explain the principles of colour mixing? 2. Is the student able to identify transducers used in TV system?	4

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Explain the principles of operation of camera tubes (photoconductive and photoemission modes). d) Explain principles of operation of a monochrome picture tube. e) Describe stages of monochrome TV receiver. f) Identify TV transmission channels. g) Describe primary, secondary and complementary colours. h) Describe colour TV, camera tube and picture tube.	ii) The teacher to organise group discussion for students to: - Explain the principles of operation of camera tubes (photoconductive and photoemission modes). - Explain principles of operation of monochrome picture tube. - Describe stages of monochrome TV receiver. - Identify TV transmission channels	• Tool kit • Reading texts	3. Is the student able to explain the principles of operation of camera tubes (photoconductive and photoemission modes)? 4. Is the student able to explain principles of operation of monochrome picture tube? 5. Is the student able to describe stages of monochrome TV receiver? 6. Is the student able to identify TV transmission channels?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		i) Explain negative and positive modulation. j) Explain vestigial transmission of LED – LCD TV, Plasma TV, and Cable TV. k) Explain how television detection takes place. l) Identify TV transmission channels.	iii) The teacher should use questioning strategies (what, why and how questions) to guide students to: - Describe colour TV, camera tube and picture tube. - Explain negative and positive modulation. - Explain vestigial transmission of LED – LCD TV, Plasma TV, and Cable TV. - Explain how television detection takes place. - Identify TV transmission channels. iv) Students should present their responses for sharing and discussion.		7. Is the student able to describe primary, secondary and complementary colours? 8. Is the student able to describe colour TV, camera tube and picture tube? 9. Is the student able to explain negative and positive modulation? 10. Is the student able to explain vestigial transmission of LED – LCD TV, Plasma TV, and Cable TV?	

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 feedback to support students in performing the tasks given in part (i)- (iii).		11. Is the student able to explain how television detection takes place? 12. Is the student able to identify TV transmission channels?	
	1.4 TV Receiver	The student should be able to: a) Identify TV receiver stages. b) Describe stages of monochrome TV receiver. c) Identify TV receiver stages i.e. RF unit, sound unit, synchronization/ deflection unit, video processing unit and explain their functions.	i) The teacher should use questions to guide students to: - Identify TV receiver stages. - Describe stages of monochrome TV receiver. - Identify TV receiver stages i.e. RF unit, sound unit, synchronization/ deflection unit, video processing unit and explain their functions.	• Flip chart • TV receiver set • TV camera • Marker pens • Chart showing TV receiver block diagrams • Chalk/ white board • Sound detector • Signal generator • Oscilloscope multimeter • Tool kit • Reading texts	1. Is the student able to identify TV receiver stages? 2. Is the student able to describe stages of monochrome TV receiver? 3. Is the student able to identify TV receiver stages i.e. RF unit, sound unit, synchronization/ deflection unit, video processing unit and explain their functions?	8

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain how synchronization of pulse separator takes place. e) Explain how sound in TV receiver is detected. f) Describe primary, secondary and complementary colours. g) Differentiate luminance and chrominance and define other terms used in colour TV receivers. h) Draw block diagram of a TV receiver and explain its operation. i) Read circuit diagram of a TV receiver.	ii) The teacher should use questioning strategies (what, why and how questions) to guide students to: - Explain how synchronization of pulse separator takes place. - Explain how sound in TV receiver is detected. iii) The teacher to organise group discussion for students to: - Describe primary, secondary and complementary colours. - Differentiate luminance and chrominance and define other terms used in colour TV receivers.		4. Is the student able to explain how synchronization of pulse separator takes place? 5. Is the student able to explain how sound in TV receiver is detected? 6. Is the student able to describe primary, secondary and complementary colours? 7. Is the student able to differentiate luminance and chrominance and define other terms used in colour TV receivers?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		j) Draw block diagram of stages of chrominance signal. k) Draw a block diagram of TV set and explain its operation. l) Read circuit diagram of a TV receiver.	iv) The teacher to create activities for students to: - Draw block diagram of a TV receiver and explain its operation? - Read circuit diagram of a TV receiver. - Draw block diagram of stages of chrominance signal. - Draw a block diagram of TV set and explain its operation. - Read circuit diagram of a TV receiver. v) The teacher should monitor and facilitate students in perfoming the tasks given in part (iv).		8. Is the student able to draw block diagram of a TV receiver and explain its operation? 9. Is the student able to read circuit diagram of a TV receiver? 10. Is the student able to draw block diagram of stages of chrominance signal? 11. Is the student able to draw a block diagram of TV set and explain its operation? 12. Is the student able to read circuit diagram of a TV receiver?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (iv). vii) The teacher should give feedback and use students' responses as feedback to support students in perfoming the tasks given in part (i-iv).			
	1.5 TV Power Supplies	The student should be able to: a) Define the term TV power systems. b) Identify TV Power stages. c) Identify the distribution of power to different TV parts.	i) The teacher to guide students to brainstorm about TV power systems. ii) The teacher to use questions to guide students to: - Categorize power levels (extra high tension, middle and low).	• Marker pens • Flip chart • TV set • Soldering iron • Solder wire • Tool kit • Safety gear • Multimeter • Reading texts	1. Is the student able to define the term TV power systems? 2. Is the student able to identify TV power stages? 3. Is the student able to identify the distribution of power to different TV parts?	15

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Explain how to take precaution of the high tension (HT) stage. e) Explain the use of Fly-back transformer (FBT). f) Explain the purpose of degaussing in TV receiver.	- Explain need of power in TV stages. - Identify the distribution of power to different TV parts. iii) The teacher to organise group discussion for students to: - Explain how to take precaution of the high tension (HT) stage. - Explain the use of Fly-back transformer (FBT). - Explain the purpose of degaussing in TV receiver. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iii).		4. Can the student explain the importance of taking precaution of the high tension (HT) stage? 5. Can the student describe the use of fly-back transformer (FBT)? 6. Can the student explain the purpose of degaussing in TV receiver?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
2.0 REPAIR AND MAINTENANCE OF TV RECEIVER SET	2.1 Diagnose and Clear Faults in a TV Set	The student should be able to: a) Identify fault symptoms in each stage of a TV receiver. b) Enumerate the common faults in TV receivers. c) Select instruments and equipment for fault diagnosis/ troubleshooting. d) Troubleshoot defective TV set. e) Carry out maintenance of a detective TV set. f) Test a TV set after maintenance.	i) The teacher to create practical activities for students to: - Identify fault symptoms in each stage of a TV receiver. - Enumerate the common faults in TV receivers - Select instruments and equipment for fault diagnosis/ troubleshooting. - Troubleshoot defective TV set. - Carry out maintenance of a detective TV set - Test a TV set after maintenance	• Flip chart • Soldering iron • Soldering wire • Electronic components • TV set (defective) • Tool kit • Safety gear • Reading texts • Oscilloscope • Signal generator • Multimeter • Marker pens	1. Is the student able to identify fault symptoms in each stage of a TV receiver? 2. Is the student able to enumerate the common faults in TV receivers? 3. Is the student able to select instruments and equipment for fault diagnosis/ troubleshooting? 4. Is the student able to troubleshoot defective TV set? 5. Is the student able to carry out maintenance of a detective TV set? 6. Is the student able to test a TV set after maintenance?	18

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

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	2.2 Repair Faulty Cathode-Ray Tube (CRT) TV Set	The student should be able to: a) Explain procedural steps of clearing faults. b) Identify the faulty symptoms in each stage of a TV receiver. c) Follow the repair procedure. d) Localize faulty area of a TV set. e) Isolate the faulty area. f) Clear/rectify the fault. g) Replace faulty component with proper value and rating component without damaging adjacent parts. h) Test the repaired TV set.	i) The teacher to use questioning strategies to guide students to explain procedural steps of clearing fault. ii) The teacher to create activities for students to: - Identify faulty area. - Localize faulty area of a TV set. - Clear identified fault. - Repair B&W and color television set. - Perform TV adjustment and settings. - Carry out basic earthing test and volt-ampere test. - Test the repaired TV set.	• CRT Television of different makes with User Manuals • Digital Multi-meter • Digital IC tester with manual/ Batch • Trainer Kit • CRO • Tool Kit • SMD Soldering Tools • Lamp load • Power Supply • Reading texts	1. Is the student able to explain procedural steps of clearing fault? 2. Is the student able to identify the fault symptoms in each stage of a TV receiver? 3. Can the student follow the repair procedure? 4. Can the student localize faulty area of a TV set? 5. Can the student isolate the faulty area? 6. Can the student clear/rectify the fault? 7. Can the student test the repaired TV set?	20

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		i) Carry out adjustment of TV set.	- Replace faulty component with proper value and rating component without damaging adjacent parts. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (ii).		8. Can the student replace faulty component with proper value and rating component without damaging adjacent parts? 9. Is the student able to carry out adjustment of TV set?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	2.3 Repair faulty Flat Panel Display (FPD) TV Set	The student should be able to: a) Explain basic fundamentals of repairing faults in LCD/ LED television set. b) Identify the reason for fault on the LED/ LCD TV set and fix it. c) Identify the fault symptoms on each stage of a TV receiver. d) Perform procedural repair on the defective FPD TV set. e) Use service manual to clear faults. f) Rectify fault in Flat Panel Display (FPD) TV set.	i) The teacher to organise group discussion and guide students to: - Explain basic fundamentals of repairing faulty LCD/ LED television set. - Identify the reason for fault on the LED/ LCD TV set and fix it. ii) The teacher to create activities for students to: - Inspect all electrical and electronic parts of the unit. - Repair a faulty FPD television. - Carry out cold and hot checks before dismantling the unit. - Clear the fault using service manual.	• Flat Panel Television sets of different makes with User Manuals • Tool kit • Oscilloscope • Signal generator • Safety gear • Multimeter • Digital Multi-meter • Digital IC tester with manual/ Batch	1. Is the student able to explain basic fundamental of repairing faulty LCD/ LED television set? 2. Is the student able to identify the reason for fault on the LED/ LCD TV set and fix it? 3. Is the student able to identify the fault symptoms of each stage of a TV receiver? 4. Is the student able to perform procedural repair on the defective FPD TV set? 5. Is the student able to use service manual to clear faults?	18

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		g) Replace faulty component with proper value and rating component without damaging adjacent part. h) Test repaired TV set after re-assembling.	- Reassemble the Television set and test its functioning. - Operate measuring tools and equipment used to repair FPD TV set. iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). vi) With the help of prepared assessment guideline, the teacher should guide students to use the guideline to assess activities performed in part (ii). v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).	• Trainer Kit • CRO • Soldering Tool Kit • SMD Soldering Tools • Power Supply • Magnifying Glass • PPE like antistatic wrist band and mat etc • Magnetic Screw Driver Set • Drilling Machine • Pliers • Digital IC data book • Various Model Circuit Diagram • Technicians tool kit • Infra-Red remote control tester • Reading texts	6. Can the student repair faulty Flat Panel Display (FPD) TV set? 7. Can the student replace faulty component with proper value and rating component without damaging adjacent parts? 8. Can the student test repaired TV set after re-assembling?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
3.0 CONSUMER ELECTRONICS	3.1 Audio Systems	The student should be able to: a) Explain the principles of AM and FM radio receiver, wide band receiver, receiver characteristics and alignment. b) Explain principles of recording and replay of audio CD/VCD/DVD/ Blu-Ray disc. c) Describe Audio compression and its use, MP3/MP4 player, different audio/Video file formats and their differences.	i) The teacher to use questioning strategies (why and how questions) to guide students to: - Explain the principles of AM and FM radio receiver, VCD, DVD and CD players. - Explain principles of recording and replay of audio CD/VCD/DVD/ Blu-Ray disc. ii) The teacher to organise group discussion and guide students to describe audio compression and its use, MP3/ MP4 player, different audio/Video file formats and their differences.	• Marker pens • Flip chart • Electronic components • VTR • Multimeter • AM/FM radio receiver • VCD, DVD and CD players • Tool kit • Safety gear • CRO • DMM • Reading texts	1. Can the student explain the principles of AM and FM radio receiver, VCD, DVD and CD players? 2. Can the student explain principles of recording and replay of audio CD/VCD/DVD/ Blu-Ray disc? 3. Can the student describe audio compression and its use, MP3/MP4 player, different audio/Video file formats and their differences?	12

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iii) The students to present their responses for sharing and discussion. iv) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	3.2 Fault Diagnosis to Audio, Video and Data (Multimedia) Equipment including CD, VCD, DVD players and other multimedia.	The student should be able to: a) Explain the importance of service and maintenance of electronic equipment. b) Explain servicing and maintenance procedures.	i) The teacher to organise group discussion and guide students to: - Explain the importance of service and maintenance of electronic equipment. - Explain servicing and maintenance procedures.	• Marker pens • Flip chart • Electronic components • Soldering iron • Solder wire • VTR • Multimeter • Reading texts • VCD, DVD, CD players	1. Is the student able to explain the importance of service and maintenance of electronic equipment? 2. Is the student able to explain servicing and maintenance procedures?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		c) Repair all electronics and mechanical faults related to video, audio, data and CD equipment.	ii) The teacher to guide students to do activities on repair of all electronics and mechanical faults related to video, audio, data and CD equipment, Video recording, and other multimedia iii) The teacher should monitor and facilitate students in performing the tasks given in part (ii). iv) The students to present their responses for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).		3. Is the student able to repair all electronics and mechanical faults related to video, audio, data and CD equipment?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	3.3 Video Systems	The student should be able to: a) Explain the meaning of video tape recorder, VCD player and DVD/BD player. b) Explain the purpose of changing over from analog to digital TV and its timeline. c) Explain Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH. d) Explain construction and working principles of LCD, plasma, LED TV and flat panel displays.	i) The teacher to use questions to guide students to explain the meaning of video tape recorder, VCD player and DVD/BD player. ii) The teacher to organise group discussion and guide students to: - Explain the purpose of changing over from analog to digital TV and its timeline. - Explain Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH. - Explain the purpose of changing over from analog to digital TV and its timeline.	• Black/white board • Marker pens • Flip chart • Soldering iron • Solder wire • VTR • Multimeter • TV sets • VCD, DVD/BD players • Tool kit • Safety gear • Reading texts	1. Is the student able to explain the meaning of video tape recorder, VCD player and DVD/BD player? 2. Is the student able to explain the purpose of changing over from analog to digital TV and its timeline? 3. Is the student able to explain Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH? 4. Is the student able to explain construction and working principles of LCD, plasma, LED TV and flat panel displays?	5

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Explain the applications of TV, CCTV and CATV. f) Draw block diagrams of digital LCD and plasma TV. Video monitors-CRT and LCD/LED. g) Draw block diagrams of VCD player and DVD/ BD player.	iii) The teacher to use questioning strategies (why and how questions) to guide students to: - Explain construction and working principles of LCD, plasma, LED TV and flat panel displays. - Explain Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH. - Explain the applications of TV: CCTV and CATV. - Explain construction and working principles of LCD, plasma, LED TV and flat panel displays.		5. Is the student able to explain the applications of TV, CCTV and CATV? 6. Is the student able to draw block diagrams of digital LCD and plasma TV, video monitors-CRT and LCD/ LED? 7. Is the student able to draw block diagrams of VCD player and DVD/ BD player?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher to create activities for students to: - Draw block diagrams of digital LCD and plasma TV. Video monitors- CRT and LCD/LED. - Draw block diagrams of VCD player and DVD/ BD player. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) The students to present their responses for sharing and discussion. vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
4.0 CABLE TELEVISION	4.1 Principles of Operation of TV Cable	The student should be able to: a) Explain the general principles of television signal distribution through coaxial cables. b) Explain television signal distribution through wireless transmitter (Multiple Channel, Multiple Distribution System (MMDS). c) Explain types of receiving antennae and their components; Yagi, concave antenna and MMDS LND.	i) The teacher to organise group discussion for students to: - Explain the general principles of television signal distribution through coaxial cables. - Explain television signal distribution through wireless transmitter (Multiple Channel, Multiple Distribution System (MMDS). - Explain types of receiving antennae and their components; Yagi, concave antenna and MMDS LND.	• Chalk/white board • Video cassette recorder • Mini TV signal Sender Television • Coaxial cable • TV connectors • Tool kit • Safety gear • Antennae • Marker pens	1. Can the student explain the general principles of television signal distribution through coaxial cables? 2. Can the student explain television signal distribution through wireless transmitter (Multiple Channel, Multiple Distribution System (MMDS)? 3. Can the student explain types of receiving antennae and their components; Yagi, Concave antenna and MMDS LND?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		d) Carry out a two point distribution from one signal source NCR to two television sets. e) Explain with the aid of diagram MMDS transmission and reception. f) Demonstrate using wireless TV Sender, signal distribution from a source to multiple points. g) Explain with the aid of diagrams the various antenna designs.	ii) The teacher to create activities for students to: - Carry out a two point distribution from one signal source NCR to two television sets. - Explain with the aid of diagram MMDS transmission and reception. - Demonstrate using wireless TV Sender, signal distribution from a source to multiple points. - Explain with the aid of diagrams the various antenna designs.		4. Can the student carry out a two point distribution from one signal source NCR to two television sets? 5. Can the student explain with the aid of diagram MMDS transmission and reception.? 6. Can the student demonstrate using wireless TV Sender, signal distribution from a source to multiple points? 7. Can the student explain with the aid of diagrams the various antenna designs?	

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 students to present their responses for sharing and discussion. v) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i) and (ii).			
	4.2 Installation of Camera and Closed Circuit TV (CCTV)	Student should be able to: a) Explain the basic principles of Television Surveillance for security.	i) The teacher to organise group discussion for students to: - Explain using diagrams remote sensing of TV signal and transmission through cable and wireless to monitors.	• Chalk/white board • Television Receivers • Mini CCD Monitor • Camera • Diagram of a black & white TV receiver (PAL)	1. Can the student explain the basic principles of Television Surveillance for security?	10

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		b) Explain the relative difference between CCTV monitor, TV receiver, CCTV camera, video camera, and door store TV. c) Explain the principle of magnetic door latching and practical installation of a complete system. d) Explain the basic principles of Television Surveillance for security. e) Explain the working principles and installation techniques of security panel incorporating door phone TV, and door latching system.	- Explain the principle of magnetic door latching and practical installation of a complete system. - Explain the basic principle of Television Surveillance for security. ii) Students should present their responses for sharing and discussion. iii) The teacher to use questioning strategies (why and how questions) to guide students to: - Explain the relative difference between CCTV monitor, TV, receiver, CCTV camera, video camera, and door store TV.	• Tool kit • Safety gear • Black and white television receiver, VCR or transmitter signals from a TV station • Reading texts	2. Can the student explain the relative difference between CCTV monitor, TV receiver, CCTV camera, video camera, and door store TV? 3. Can the student explain the principle of magnetic door latching and practical installation of a complete system? 4. Can the student explain the basic principles of Television Surveillance for security?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Install security panel.	- Explain the working principles and installation techniques of security panel incorporating door phone TV, and door latching system. iv) The teacher to create activities for students to install security panel. v) The teacher should monitor and facilitate students in performing the tasks given in part (iv). vi) The students to present their responses for sharing and discussion. vii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-iv).		5. Can the student explain the operation principles and installation of security panel incorporating door phone TV, and door latching system? 6. Can the students install security panels?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
5.0 CELL PHONE REPAIRS AND SERVICE	5.1 Basic Principles of Mobile Communication System	The student should be able to: a) Explain the principles of operation of mobile communication system. b) Explain the principles of operation of different sections of mobile communication system. c) Explain types of mobile communication systems. d) Use block diagram to describe the functions of the various sections of mobile communication system.	i) The teacher to organise group discussion for students to: - Explain the principles of operation of mobile communication system. - Explain the principles of operation of different sections of mobile communication system (i.e.phones, mobile Station, base station, mobile and switch sections. - Explain types of mobile communication systems (i.e, GSM, cellular, and radio communication).	• A chart • Block and schematic diagrams • Mobile phones • Manuals • Vehicle and funds to carry out visits • Reading texts	1. Can the student explain the principles of operation of mobile communication system? 2. Can the student explain the principles of operation of different sections of mobile communication system? 3. Can the student explain types of mobile communication systems? 4. Can the student use block diagram to describe the functions of the various sections of mobile communication systems?	20

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Use schematic and block diagrams to describe the operation of mobile phone f) Identify different software codes g) Draw the pictorial presentation of mobile phone.	ii) The students to present their responses for sharing and discussion. iii) The teacher to guide the students to use schematic block diagram to: - Describe the functions of the various sections of mobile communication system. - Describe the functions of the various sections of mobile communication system. - Describe the operation of mobile phones. - Identify different software codes.		5. Can the student describe using schematic and block diagrams the operation of the mobile phone? 6. Can the student identify different software codes? 7. Can the student draw the pictorial presentation of the mobile phone?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			iv) The teacher to use questions to guide students to identify components of Multimedia Interface (i.e., camera, blue-tooth and infrared). v) The teacher to create activities for students to draw pictorial presentation of mobile phones. vi) The teacher should monitor and facilitate students in performing the tasks given in part (v). vii)The students to present their responses for sharing and discussion. viii) The teacher should give feedback and use students' responses as feedback to support students in performing the tasks given in part (i-v).			

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
	5.2 Components of GSM System and their Functions.	The student should be able to: a) Describe software and hardware components of GSM phones. b) Explain the functions of essential parts of mobile phones. c) List some essential websites of service providers and mobile phones manufacturers.	i) The teacher to organise group discussion and guide students to: - Describe GSM system, hardware and software of GSM phones. - Identify the sections of mobile phone. - Explain the functions of essential parts of mobile phones, (i.e., CPU, SIM card, keyboard, battery, power supply unit, ear-piece, memory etc.). ii) The teacher to use questions to guide students to list some essential websites of service providers and mobile phone manufacturers	• GSM manuals • Various mobile phones • Multimeter • Soldering Iron • Solder sucker • Accessories • Manuals • Cleaning aids • Software • Toolkit	1. Can the student describe software and hardware components of GSM phones? 2. Can the student explain the functions of essential parts of mobile phones? 3. Can the student list some essential websites of service providers and mobile phone manufacturers?	

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 feedback to support students in performing the tasks given in part (i).			
	5.3 Repairs of GSM Phones	The student should be able to: a) Observe safety precautions when carrying out repairs on GSM phones. b) Use cleaning aids on mobile phones. c) Use software codes for fault-finding and repair of mobile phones. d) Demonstrate fault-finding and repairs of CPU, ROM & RAM of mobile phones.	i) The teacher to guide students to observe safety precautions when carrying out repairs on GSM phones. ii) The teacher to organise group discussion for students to: - Explain use of cleaning aids on mobile phones. - Explain how to use software codes for fault-finding and repair of mobile phone	• GSM manuals • Various mobile phones. • Multimeter • Soldering Iron • Solder sucker • Accessories • Manuals • Cleaning aids • Software • Toolkit • Safety gear • Reading texts	1. Can the student observe safety precautions when carrying out repairs on GSM phones? 2. Can the student use cleaning aids on mobile phones? 3. Can the student demonstrate the use of software codes for fault-finding and repair of a mobile phone?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
		e) Follow fault-finding and repair procedures of power supply and charging system of a mobile phone. f) Demonstrate fault-finding and repair of RF sections of mobile phones. g) Demonstrate the fault-finding and repair of multimedia interface.	- Describe the procedure of fault-finding and repairs of CPU, ROM & RAM of mobile phones. - Describe the procedures for fault-finding and repair of power supply and charging system of a mobile phone iii) The teacher to create activities for students to: - Conduct repairs of mobile phones. - Carry out fault-finding and repairs of CPU, ROM & RAM of mobile phone.		4. Can the student demonstrate fault-finding and repairs of CPU, ROM & RAM of mobile phones? 5. Can the student demonstrate fault-finding and repair of power supply and charging system of a mobile phone? 6. Can the student demonstrate fault-finding and repair of RF sections of mobile phones? 7. Can the student perform fault-finding and repair of multimedia interface?	

TOPIC	SUB-TOPICS	SPECIFIC OBJECTIVES	TEACHING/ LEARNING STRATEGIES	TEACHING/ LEARNING RESOURCES	ASSESSMENT	NO OF PERIODS
			- Carry out fault-finding and repair of power supply and charging system of a mobile phones. - Perform fault-finding and repair of RF sections of mobile phones. - Use of software device in fault-finding and repairs of mobile phones. - Perform fault-finding and repair of multimedia interface; e.g. camera, blue tooth, infrared, radio etc.			

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 feedback to support students in performing the tasks given in part (i) and (ii).			