INFORMATION TECHNOLOGY

SYLLABUS / LEARNING AND ASSESSMENT PROGRAMME

Contents

Introduction

The aim of this learning and assessment programme is to assist secondary schools to manage vocational programmes, specifically in the planning and implementation of the programme delivery.

This learning and assessment programme is structured into two parts, namely

Part A: General Policies

Part B: Unit Specifications

In Part A, the overall aim and objectives of the programme are explained. Important terms that will be used in the LAP (Learning and Assessment Programme) will be defined. Additionally, policies, guidelines and strategies related to assessment practices are documented in this section. Quality Assurance processes and procedures are also documented in Part A of this document.

In Part B, the detailed specification of the three units that are to be implemented are provided for each unit. The learning outcomes, together with a brief description of the unit are also stipulated. The assessment criteria for each unit, together with assessment methods that are to be applied, are presented in this part of the document.

In order to ensure effective implementation of the programme, important standards and quality assurance processes and procedures have to be adopted. Standard templates will be provided in a separate document and will be structured as presented in the table provided overleaf.

Reference	Template
A	Assignment Brief Front Sheet
A	Record of Internal Verification – Assignment Brief
A	Record of Internal Verification – Assessment Decision
A	Unit Tracking Sheet Template
QA	Internal Verification Report Templates
QA	External Verification Report Templates

Legend:

A: Assessment

QA: Quality Assurance

Part A: General Policies

A.1. Programme Aim and Objectives

The aim of the vocational programme in Information Technology is to provide learners with the underpinning knowledge related to Information Technology. By the end of the programme, candidates are expected to have gained sufficient skills and should be able to apply knowledge and skills.

Upon completing this programme, learners should be able to:

1. Choose modern computer systems and networks for specific needs.
2. Install and configure an operating system.
3. Identify threats and devise security solutions.
4. Create simple multimedia productions.
5. Develop static web pages.
6. Identify suitable components and justify a system installation/replacement/ upgrade.
7. Carry out, test and document a system installation/upgrade/replacement following good working practices.

A.2. Definitions/ Terminology

Term	Definition
Assessor	The person responsible to grade the candidates' work, issue a mark and determine the candidates' final grade.
Assessment (Continuous)	A number of tasks given to the candidate during the course; these could be an individual task or as group work.
Controlled Assessment	An assessment in the form, of an examination and conducted within a school environment. The minimum time for this assessment is 1 hour.
Learning Outcome	Learning Outcomes are statements, which describe what a qualification represents in terms of knowledge, skills and competences. The Malta Qualifications Framework (MQF) defines a learning outcome as what a learner understands and is capable of doing at the end of the learning process.
Knowledge	Knowledge refers to the understanding of basic, factual and theoretical information, which is traditionally associated with formal learning but can also be acquired from informal and non-formal learning.
Skills	Skills imply the application of acquired knowledge and understanding in different contexts. A skill may be the result of formal learning or of repetitive work in an informal setting.
Competences	Each competence is defined as a combination of knowledge and skills and is associated with the level of autonomy and responsibility that the person is expected to have at that level.
Unit Content	The unit content is the content required to be communicated and given to the candidate per learning outcome. Each learning outcome must have content related to it and this content must be delivered to give the candidates the tools to achieve that outcome.
Assessment Grading Criteria	A description of what a candidate is expected to do in order to demonstrate that a learning outcome has been achieved.
Sample of Work	A sample of work is a percentage of candidates' work gathered as a representative sample for the internal or external verifier.
Quality Assurance	To assure the standards and quality of the learning assessment programme.
Malta Qualification Framework	The Malta Qualifications Framework (MQF) provides an indication of the level of difficulty as a benchmark for a qualification, which needs to be assigned a level, and mapped to the framework. The MQF has level descriptors from Level 1 to 8. The level descriptors are useful for education and training providers as they describe the Knowledge, Skills and Competences and a set of Learning Outcomes, which indicate to the learner the end of a learning process.
Synoptic Assessment	A Synoptic Assessment can be defined as an assessment, which is designed to cover all the assessment grading criteria for a given unit.

A.3. Assessment

A.3.1. Scope

Assessment is an important element in any learning process. In order to ensure that assessment informs candidates and at the same time meets important conditions of reliability, validity and fairness, important rules and procedures must be adhered to. In particular, the assessment regulations and procedures that are explained in this section will ensure that assessments are:

➢ Of the required standard, quality and level
➢ Fair for all learners
➢ Valid and reliable

Each unit will be assessed by means of three assignments, one of which must be an assessment conducted within a controlled school environment. The assessment mode/type, criteria to be assessed and marks distribution are explained in Part B of the programme as part of the unit specifications.

A.3.2. Programme Grade

A cumulative percentage mark, calculated on the basis of a sum total of all the 3 units, determines the final grade of candidates/ learners. Candidates/ Learners may qualify for Grades 1, 2, 3, 4, 5, 6 and 7. The results of candidates/learners who do not obtain at least a Grade 7 shall remain unclassified.

A.3.3. Important Conditions

Candidates must obtain a minimum of 50 marks in each unit in order to obtain a grade classification.

If a candidate obtains a minimum of 50 in two units, but fails to satisfy the examiner in the remaining unit, s/he may be eligible to obtain Grade 6 or Grade 7.

If a candidate obtains less than 120 marks, his grade will be Unclassified. The same applies if a candidate does not obtain at least 50 marks in two units by the end of the programme.

A.3.4. Re-Sits

If for a given unit, the total mark gained by a candidate is less than 50 marks, s/he will be eligible to re-sit. The re-sit assessment must consist of a synoptic assessment conducted within a school-controlled environment during the same academic year. The highest possible mark that may be obtained in this case is 60 marks.

Candidates who obtained an average of 50 marks or more on completion of the three tasks for a given unit will not be eligible for a re-sit to better their original mark.

Candidates who miss the controlled assessment for a justifiable reason will be eligible to sit for the synoptic assessment and may obtain full marks. The mark obtained in this assessment will replace the controlled assessment mark. The controlled assessment must not be more than 2 hours long.

A.4. Quality Assurance

An important aspect of this programme is the quality assurance process that must be conducted throughout the implementation of the programme. Three main processes are to be conducted as stipulated in the table below.

Internal Verification of Assessment Briefs	All assessment briefs are to be internally verified before being issued to the candidates. Within this process important checks relating to learning outcomes, criteria to be assessed, validated and reliability are to be performed.
Internal Verification of Assessment Decisions	Once learners complete their work and assessments have been corrected, a representative sample of learners' work is to be internally verified.
External Verification	The process of external verification will ensure that programme quality and standards criteria are met.

Part B: Unit Specifications

B.1. Introduction

This part of the programme guide provides detailed specification for each of the 3 units that are to be implemented for the successful completion of the programme. The curriculum design adopted for the development of the units of study is based on the learning outcomes approach. The latter can be defined as "written statements of what a learner should be able to do/know/apply by the end of the learning process."

The structure of the unit specifications is presented below:

Unit Title

Unit Description

Learning Outcomes

Unit Content

Assessment Criteria
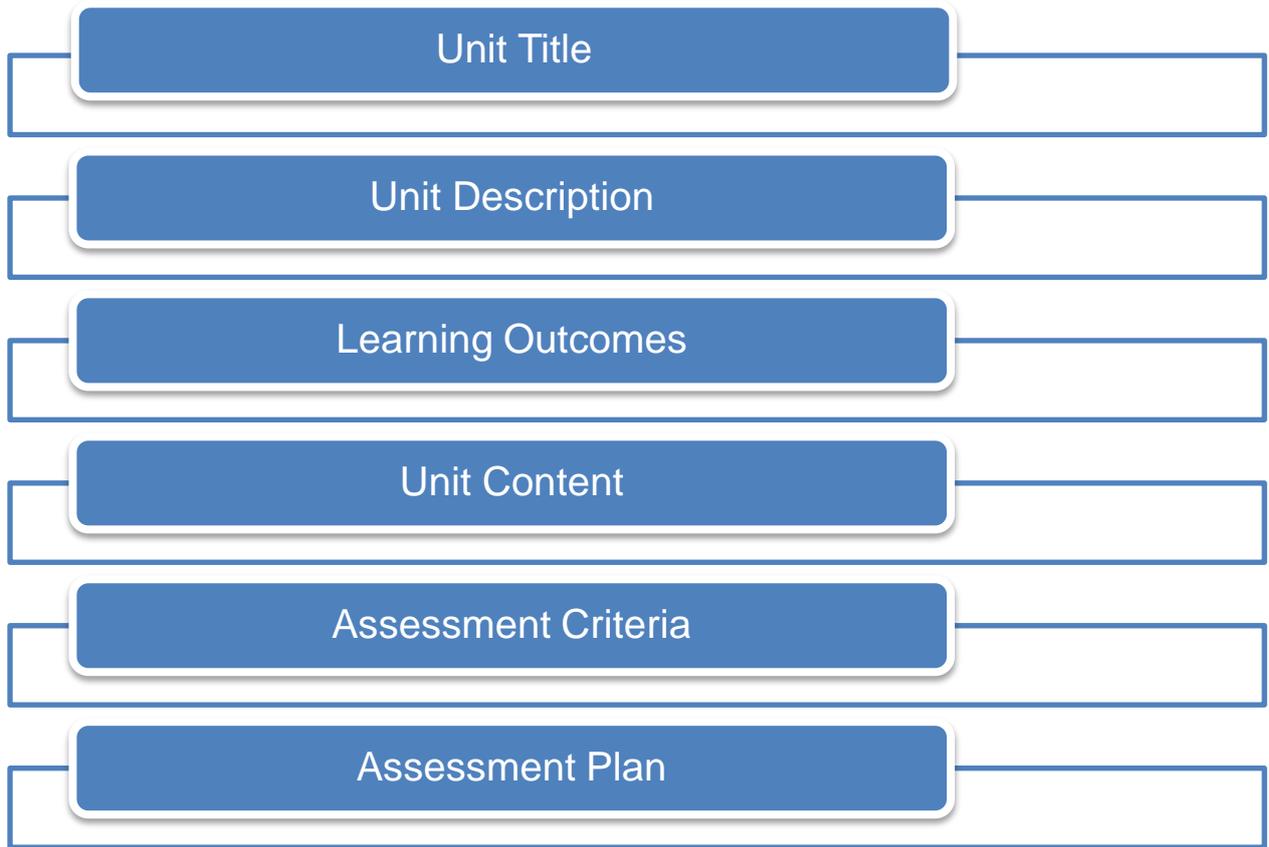
Assessment Plan

B.2. Interpreting the Unit Specifications.

Under each grading criterion all the content that has to be covered can be found. Examples (e.g.), semi-colons and commas are used in the Learning and Assessment Programme. When semi-colons are used the students should be assessed on all the content prescribed. However, when the list is headed with example (e.g.), all the content is to be covered but the students are expected to be assessed on more than 50% of the content prescribed for that grading criterion.

In each grading criterion there is a command verb which specifies the level of content expected by the student, such as list, identify, outline, describe, explain etc. These verbs are defined by MATSEC in the glossary of verbs available on their website. It is of vital importance that the command verbs specified in the grading criteria remain unchanged in the assignment brief.

B.2 Unit 1: Computer Systems and Networks

Unit 1	Computer Systems and Networks
Unit Description	In this unit, candidates will be given a general overview of different types of computer systems, commonly used in today's life, and their purpose. Candidates will learn the main terminology related to a personal computer system and how the different components of a computer system work together. Through the acquired knowledge, candidates will be able to identify appropriate peripheral devices and computer systems for the needs of various computer users. Moreover, they will be able to identify which computer components affect the system's performance. Candidates will also have the opportunity to practice the installation and configuration of an operating system. Furthermore, candidates will also be acquainted with the basic terminology related to computer networks, network size and the organisation of modern networks. The basic concepts of wired and wireless networks will be covered. In addition, candidates will also learn about the different user groups and the file and printer sharing permissions that can be assigned to each user. A hands-on-approach in which candidates are required to set sharing permissions will also be covered. Different network security threats and ways to protect the network system from such risks will also be tackled.

Learning Outcomes

Upon completion of this unit the learner will be able to:

LO 1. Describe the use of different types of computer systems.

LO 2. Perform basic installation and configuration of computer and operating systems.

LO 3. Understand the basic concepts of computer networking.

LO 4. Set up user-groups and sharing permissions.

LO 5. Set-up third-party security measures.

Unit Content

LO 1. Describe the use of different types of computer systems.

K-1: List in order the types of computer systems used today by their characteristics.
- Acknowledgment to Historical technology: mainframe; minicomputer.
- Types of computer systems used in today's life: supercomputer; cluster; desktop computer; laptop; tablet; e-book reader; gaming rig; smartphone; embedded device; wearables; systems for persons with special needs.
- Characteristics of computer systems: cost; speed; physical size; target use.

K-2: Describe the specific use for today's computer systems.
- Specific use: e.g. education, business and commerce, industry, communication, media production, entertainment, medical and scientific field, biometrics, travel.

C-1: Justify the appropriate computer system with the best price/performance ratio for a given situation.
- Compare computer systems by comparing their performance with the given price: processor type and speed; RAM; secondary storage; video adapters; cooling systems; power supply (PSU and/or battery).

LO 2. Perform basic installation and configuration of computer and operating systems.

K-3: Present the data flow diagram of a computer system.
- Data Flow Diagram: Input; process (ALU; CU;MU); output; secondary storage; basic I/O subsystem; flow of control.

K-4: Identify the minimum system requirements for a given operating system.
- Internal Components: RAM; CPU; hard disk type (Solid state; Mechanical) and capacity; graphics card.

K-5: Select the appropriate peripheral devices for a given scenario.
- Peripheral Devices:
  - Input devices: e.g. keyboard, optical character reader, 3D scanner;
  - Output devices: e.g. printer, monitor, plotter;
  - Secondary storage devices e.g. hard disk, optical disk drive, flash drive;
  - Accessibility Devices: e.g. braille keyboard, eye tracking system, puff-suck switch.

C-2: Discuss how different internal components of a computer can affect the system's performance.

A-1: Install an operating system according to user's needs.

- Types of software: system software; application software; utility software.
- Install an operating system according to user's needs:
  - Prepare: check operating system requirements; backup;
  - Install: setup boot up sequence; select type of installation; setting up partition; setting a restore point;
  - Customize: create a second account; setup an operating system accessibility option; personalise a desktop feature; add a secondary keyboard language.

LO 3. Understand the basic concepts of computer networking.

K-6: Outline the basic terms related to data communication and network technology.
- Basic data communication and network technology terminology:
  - Data services: client server model; peer-to peer;
  - Data transmission media e.g. telephone line, coaxial cable, Ethernet cable, optical cable, Bluetooth, satellite links, terrestrial microwaves;
  - Other terms: e.g. bandwidth, broadband, Network Interface Card (NIC), modem, router, switch, protocol.

C-3: Justify the best network set-up for a given scenario.
- Types of networks: LAN or WAN;
- Network set-up: wired or wirless; range; brandwidth speed; use of repeaters and/or access points; security.

LO 4. Set up user groups and sharing permissions.

K-7: Describe the common local user groups.
- Local user groups: administrator account; limited user account; guest account.

K-8: Present file and printer sharing procedures.
- File sharing procedure: e.g. share with, public;
- Printer sharing procedure.

C-4: Distinguish between standard user groups and different sharing permission types.
- Different standard user groups e.g. administrator account, limited user account, guest account.
- Different sharing permissions e.g. read, read/write, modify, full control.

A-2: Create local user account/s in conjunction with file and printer sharing.
- Create and test file and printer sharing permissions.

LO 5: Set-up third party security measures.

K-9: Outline the role of firewalls in safeguarding computer networks.
- Role of firewalls: e.g. alert and protect networks from unauthorised access, monitor incoming and outgoing data, allows the user to control which programs can or cannot access the local network and/or internet, provide information of target outgoing server, blacklisting, whitelisting.

K-10: Outline the malware protection plan.
- Malware protection plan e.g. firewall, anti-malware, restore point, security updates, disk freezing, sand boxing, backup, adware filtering.

C-5: Explain issues related to network security threats and protection.
- Network security threats: e.g. malware, botnet, hacking, Denial of Service attack, tunnelling;
- Network protection: e.g. firewall, anti-malware, restore point, security updates, disk freezing, sand boxing, backup, adware filtering.

A-3: Install a third-party internet security suite.
- Install third party internet security suite; modify firewall settings to include/exclude a website; run a quick system scan; remove/quarantine a threat from an external storage device; update security keys.

Assessment Criteria

Assessment criteria provide guidance on how the learners will be assessed in order to ensure that the learning outcome has been achieved. To achieve each outcome a learner must satisfy the following assessment criteria. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
LO 1	K-1: List in order the types of computer systems used today by their characteristics. K-2: Describe the specific use for today's computer systems.	C-1: Justify the appropriate computer system with the best price/performance ratio for a given situation.	
LO 2	K-3: Present the data flow diagram of a computer system. K-4: Identify the minimum system requirements for a given operating system. K-5: Select the appropriate peripheral devices for a given scenario.	C-2: Discuss how different internal components of a computer can affect the system's performance.	A-1: Install an operating system according to user's needs.
LO 3	K-6: Outline the basic terms related to data communication and network technology.	C-3: Justify the best network set-up for a given scenario.	
LO 4	K-7: Describe the common local user groups. K-8: Present file and printer sharing procedures.	C-4: Distinguish between standard user groups and different sharing permission types.	A-2: Create local user account/s in conjunction with file and printer sharing.
L05	K-9: Outline the role of firewalls in safeguarding computer networks. K-10: Outline the malware protection plan.	C-5: Explain issues related to network security threats and protection.	A-3: Install a third-party internet security suite.

Assessment criteria – Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.
6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.
10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

Ass. No.	Assessment Mode	Percentage distribution
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

B.3 Unit 2: Multimedia Systems and Basic Website Design

Unit 2	Multimedia Systems and Basic Website Design
Unit Description	This unit presents a general introduction to digital multimedia systems. It enables candidates to explore techniques associated with the development of an interactive multimedia product. The learners will learn about multimedia system components, their roles, features and characteristics. Learners will be familiar with the basic types and characteristics of text, images, audios, animations and computer video formats. In order to be able to apply the knowledge obtained, learners will learn how to use multimedia hardware components and multimedia application software for media processing. Learners will learn how to use software applications for editing audio files. They will be able to select and use video software tools and techniques to edit video sequences. This will allow learners to use experimental and creative approaches while acquiring production skills. By combining text, images, animations, audios and videos, and applying filters and effects, the learners will be able to develop a multimedia project using video editing software. Learners will also be able to design and create static web pages and simple websites. This unit will enable learners to achieve basic understanding of the principles of professional web design and development. Learners will also learn about web design standards and why they are important.

Learning Outcomes

Upon completing the unit, learners should be able to:

LO1. Describe different multimedia systems and list their attributes.

LO2. Modify and create digital images and animation.

LO3. Use video editing software to develop a multimedia project.

LO 4. Plan and design a website according to specific requirements.

Unit Content

LO1. Describe different multimedia systems and list their attributes.

K-1: Describe different multimedia systems.
- Different multimedia systems: e.g. websites, gaming, social media, CAD, CBT, virtual reality, holograms, information kiosks, simulations.

K-2: List the format of different multimedia components.
- Multimedia components and format:
    o Text: e.g. doc, docx, txt, text, rtf, asc, sub;
    o Images: e.g jpeg, png, tiff, bmp, pdf, jfif, rif;
    o Audio: e.g. mp3, wav, flac, aiff, vob, aac, ogg;
    o Video: e.g. avi, wmv, mp4, mkv, h.264, mpeg, mov;
    o Animation: e.g. gif, fla, swf, flv, flc, swi, fli.

C-1: Justify the most appropriate multimedia project for a given scenario.
- Justifications based on: e.g. Audience, costs, I/O devices, software resources, time-limitation.

LO2. Modify and create digital images and animation.

K-3: Relate between different image file types with their qualities.
- Image file types: e.g: jpeg, png, tiff, bmp, pdf, jfif, rif;
- Image Quality: e.g. lossy, lossless, uncompressed, raster, vector, resolution, colour depth.

K-4: Identify different image effects.
- Image effects: e.g. brightness, contrast, gamma, hue, saturation, colour balance, sketch.

C-2 Describe the different layers involved in creating a composite image.
Different layers:
- blending options:e.g. hard light, overlay, multiply, vivid, soflight;
- layer effects: e.g. drop shadow, inner shadow, inner glow, outer glow, bevel/emboss.

A-1 Create a simple animation.
- Simple basic animation: Minimum of 20 frames.

LO3. Use video editing software to develop a multimedia project.

K-5: Relate between different types of audio files and their characteristics.
- Audio files and their characteristics:
    o Audio file types: e.g. mp3, wav, flac, aiff, vob, aac, ogg;
    o Audio characteristics: compression, quality, lossy, lossless.

K-6 Relate between different types of video files and their characteristics.
- Video files and their characteristics:
    o Video file types: e.g. avi, wmv, mp4, mkv, h.264, mpeg, mov;
    o Video characteristics: compression, quality, lossy, lossless.

K-7 Define audio related terminology.
- Terminology: e.g. Amplification, threshold, pitch, reverb, echo, tempo, noise removal, cross fade, equalization, delay, inversion, loop, multichannel, bass, treble, compression, mixing, splitting, clipping.

K-8 Define video related terminology.
- Terminology: e.g. PAL/NTSC, 4K, sequence, fade in/fade out, transitions, wipe, aspect ratio, keyframe.

C-3 Justify the most appropriate audio and video files for a given scenario.
- Justifications based on: quality; size; compatibility; time-limitation (upload/download); costs; aspect ratio.

A-2: Produce an audio/visual production for a given scenario.
- Planning: storyboard; sequence; background music; effects; narration; filters; angle; text;
- Production: different videos; transitions; images/photos; sound; audio effects; video effects;
- Output: type of format; aspect ratio; codec; PAL and NTSC; frame rate, publishing medium.

LO 4. Plan and design a website according to specific requirements

K-9: Identify the basic features of a website.
- Basic Features: static or dynamic; drop down menu; search box; font size; colour scheme; metadata; hyperlinks; tags.

K-10: List the advantages of using CSS with HTML.
- Advantages: interactivity; design and templates; separation of presentation from content; internal and external CSS.

C-4: Explain the features of a website for a specific scenario.
- Features:
  - Use: Commercial or educational or state services or entertainment or learning management system (LMS) or content management system (CMS);
  - Static or dynamic;
  - Interactive: e.g. feedback form, contact form, hyperlink/hypermedia.

C-5: Explain different HTML tags and their respective attributes in a given code snippet.
- HTML tags: e.g. <html>,<head>, <h1>,<body>, <p>, <table>, <tr>,<td>,<hr>, <ol>, <ul>,<li>, <img>,<a>, <div>, <span>;
- Attributes e.g. alternative text, language, id, class, source.

A-3: Create a website using HTML and CSS.
- Planning: wireframe layout for a 3-page static website; navigational structure; theme; image placeholder; text placeholder; video placeholder;
- Development: internal and external CSS; design;
- Testing and Maintenance;
- Online publishing.

Assessment Criteria

Assessment criteria provide guidance on how the learners will be assessed in order to ensure that the learning outcome has been achieved. To achieve each outcome a learner must satisfy the following assessment criteria. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
LO1	K-1: Describe different multimedia systems. K-2: List the format of different multimedia components.	C-1: Justify the most appropriate multimedia project for a given scenario.	
LO2	K-3: Relate between different image file types with their qualities. K-4: Identify different image effects.	C-2 Describe the different layers involved in creating a composite image.	A-1 Create a simple animation.
LO3	K-5: Relate between different types of audio files and their characteristics. K-6 Relate between different types of video files and their characteristics. K-7 Define audio related terminology. K-8 Define video related terminology.	C-3 Justify the most appropriate audio and video files for a given scenario.	A-2: Produce an audio/visual production for a given scenario.
LO4	K-9: Identify the basic features of a website. K-10: List the advantages of using CSS with HTML.	C-4: Explain the features of a website for a specific scenario. C-5: Explain different HTML tags and their respective attributes in a given code snippet.	A-3: Create a website using HTML and CSS.

Assessment criteria – Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.

6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.

10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

Ass. No.	Assessment Mode	Percentage distribution
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

B.4 Unit 3: Computer Hardware Installation

Unit 3	Computer Hardware Installation
Unit Description	In this unit, learners will recognise when computer systems need to be upgraded or need hardware components. They will learn about risks to the human beings and electronic components when installing/ upgrading/replacing internal hardware and take the necessary precautions. Learners will also be able to identify the source of the hardware problem and be able to perform the necessary maintenance in order to solve the problem. In this process, they will acquire the necessary skills to be able to perform an internal hardware component installation, replacement or upgrade while at the same time be able to install and configure the necessary software. Learners will also learn about the importance of documenting the installation/replacement/upgrade process, registering components and testing the computer system to ensure that it works and therefore, verify that the installation/upgrade/replacement is successfully carried out.

Learning Outcomes

Upon completion of this unit, the learner will be able to:

LO 1. Identify the reasons which require a hardware/software installation/ upgrade/ replacement.

LO 2. Identify the risks involved when performing an installation/upgrade/replacement and take the necessary precautions to avoid such risks on both human and electronic component terms.

LO 3. Install/Upgrade/Replace internal hardware components and configure the necessary software.

LO 4. Document an installation/upgrade/replacement and identify the importance of registering products.

Unit Content

LO 1. Identify the reasons which require a hardware/software installation/ upgrade/ replacement.

K-1: State reasons which require a computer upgrade.
- Reasons for upgrade: e.g. user requirements, compatibility, increase storage capacity, increase processing speed, increase hardware reliability, software requirements.

C-1: Describe the implications induced by hardware/software installation/ upgrade/ replacement.
- Implications: user training/re-training; hardware compatibility; software compatibility; decommissioning of hardware; service level agreements on new systems; migration of data.

LO 2. Identify the risks involved when performing an installation/ upgrade/ replacement and take the necessary precautions to avoid such risks on both human and electronic component terms.

K-2: Identify good health and safety practices on the work place.
- Good health and safety practices: no food/drink/smoking near workplace; clear fire exists; fire fighting equipment at hand; no trailing cables; enough space; good ventialtion; adequate clothing; organised equipment.

K-3: Describe the risks involved when replacing/installing/upgrading hardware components.
- Risks:
  - Electrostatic discharge;
  - Physical damage to equipment;
  - Negative impact on data (data loss and data corruption);
  - Human injury (cuts, bruises, harm to the eye).

C-2: Discuss precautions which must be taken to avoid risks when installing/ upgrading/ replacing hardware components.
- Precautions: e.g. use of anti-static equipment, use of appropriate tools, watch out for excessive force, take data backups, use data recovery tools, wear appropriate clothing.

LO 3. Install/Upgrade/Replace internal hardware components and configure the necessary software.

K-4 Identify compatible components for a given motherboard.

Components: RAM; CPU; heat sink; hard disk; graphics card; sound card; network card; power supply unit.

K-5: Outline the correct working procedures which must be followed during a replacement/ installation/ upgrade keeping in mind health and safety procedures.

Working procedures:
- identify the problem and think of a possible solution;
- check for compatibility;
- take data backups;
- prepare the necessary equipment and clean up the computer system;
- install components in the correct order;
- test the computer system;
- restore data and install the necessary software;
- set a system restore point.

K-6: Describe ways which can be used to test an installation/upgrade/replacement.

- Ways: BIOS; operating system file manager; device manager; third-party diagnostic tools.

K-7: Identify hardware problems from the BIOS.

- Beep codes identifying hardware problems: e.g. system board error, video adapter error, keyboard adapter error, power supply error, processor error, memory test failure;
- Post-test read-outs identifying hardware problems: amount of memory; identify drives; date-time setting; processor test.

K-8: Identify issues which can cause an installation/ upgrade/replacement to be unsuccessful.

- Issues: Loose or wrongly inserted connections; internally broken cables; dead-on-arrival (DOA) components; installing components in the wrong slot.

C-3. Explain a plan to pinpoint a system fault.

- System fault: e.g. computer not starting or boot up disk not found or computer continuously restarting or no audio output or no video output or network connection.

C-4: Justify which hardware components and their specifications need to be installed/upgraded/ replaced for a given scenario.

Hardware components: e.g. RAM, hard disk, graphics card, sound card, optical drives, PSU, cooling system, battery, external storage, motherboard.

A-1: Carry out the necessary preparations required to perform a hardware replacement/installation/ upgrade.

Preparation:

- Obtain and check resources (tools, anti-static equipment, cleaning tools, hardware components, software, access rights);
- Develop a test plan;
- Record hardware components serial numbers;
- Open up computer case following Health and Safety procedures;
- Read the necessary hardware installation guides.

A-2: Install/upgrade/ replace hardware components and configure the necessary software.

Install/upgrade/replace:

- Remove hardware components which are to be replaced;
- Install new hardware components: e.g. RAM, hard disk, graphics card, sound card, optical drives.
- Reassemble computer;
- Install and configure any necessary software;
- Confirm that the installed hardware is functioning.

LO 4. Document an installation/upgrade/replacement and identify the importance of registering products.

K-9: Describe the importance of documenting an installation/upgrade/replacement.
- Importance of documentation: record keeping of work done; warranties of any components; completed test plan; reference point for trouble shooting.

K-10: List the advantages of registering products.
- Advantages: e.g. Hardware updates, software updates, technical assistance, proof of purchase, service level agreement, promotional offers.

C-5: Explain the different types of computer maintenance required in a particular scenario.
- Sorts of maintenance:
  - Preventative: e.g. ensure that air vents are free from dust, take regular backups, cleaning the system;
  - Corrective: e.g. replace parts when they malfunction, re-attach cables which have come loose, re-install software which has become corrupt;
  - Perfective :e.g. increase memory, increase screen size, upgrade to a more powerful software application;
  - Adaptive: e.g. use adaptors to connect older hardware to new systems or vice-versa, install drivers to accommodate new peripherals, convert old files to work with new version of application.

A-3: Document the installation/upgrade/replacement.
- Documentation stating:
  - Reason/s for upgrade/installation/replacement due to a fault or user requirement;
  - Suggested installation/upgrades/replacements;
  - Implemented changes;
  - Log of serial numbers;
  - 2 tests for each component installed/upgraded/replaced and their respective results.

Assessment Criteria

Assessment criteria provide guidance on how the learners will be assessed in order to ensure that the learning outcome has been achieved. To achieve each outcome a learner must satisfy the following assessment criteria. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
LO 1	K-1: State reasons which require a computer upgrade.	C-1: Describe the implications induced by hardware/software installation/ upgrade/ replacement.	
LO 2	K-2: Identify good health and safety practices on the work place. K-3: Describe the risks involved when replacing/installing/upgrading hardware components.	C-2: Discuss precautions which must be taken to avoid risks when installing/ upgrading/ replacing hardware components.	
LO 3	K-4 Identify compatible components for a given motherboard. K-5: Outline the correct working procedures which must be followed during a replacement/ installation/ upgrade keeping in mind health and safety procedures. K-6: Describe ways which can be used to test an installation/ upgrade/ replacement. K-7: Identify hardware problems from the BIOS. K-8: Identify issues which can cause an installation/ upgrade/replacement to be unsuccessful.	C-3. Explain a plan to pinpoint a system fault. C-4: Justify which hardware components and their specifications need to be installed/upgraded/ replaced for a given scenario.	A-1: Carry out the necessary preparations required to perform a hardware replacement/ installation/ upgrade. A-2: Install/upgrade/ replace hardware components and configure the necessary software.
LO 4	K-9: Describe the importance of documenting an installation/ upgrade/ replacement. K-10: List the advantages of registering products.	C-5: Explain the different types of computer maintenance required in a particular scenario.	A-3: Document the installation/ upgrade/ replacement.

Assessment criteria – Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.

6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.

10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

Ass. No.	Assessment Mode	Percentage distribution
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

Appendix 1 – Suggested Resources

This list is not intended to be exhaustive but should be taken as a guide.

Common

Access to a School Computer Laboratory with internet access, Projector and sound system

Two Lockable Storage Cabinets for tools and consumables.

Separate Storage room with shelving and cabinets for Lab computers and spare parts

1 x 4GB USB per student

4 x Printer / Scanner / Photocopier (3 in 1) - (USB recommended) per lab

1 x External Storage Hard disk

Ilearn Cloud Storage

Additional Equipment related to Health and Safety e.g. First Aid Box, Fire extinguisher

Form 3

Hardware

Air-conditioned Computer Workshop area with Class-work tables

Work-station tables

20 computers including DVD-writer and monitors,

Electrical Power outlets,

Extra network jacks,

Elevated storage shelves for Routers and Switches,

Network cables.

2 x Internet Wireless Router

2 x Internet Network Switches – 24 port

Software

A recent Operating System – e.g. Windows 7 / 8 or 8.1/10 plus Key for Installation

Internet Security Suite e.g. Comodo

Form 4

Hardware

Air-conditioned Computer Lab,

4 x Digital Video Camera complete with Tripod

Suggested Software

Image editing software e.g. GIMP, pixlr

Sound editing software e.g. Audacity, WavePad Sound Editor

Video editing software e.g. Shotcut, Lightworks

Website editing software e.g. BlueGriffon, OpenElement.

Form 5

Hardware

Air-conditioned Computer Workshop area with Class-work tables,

Work-station tables, 20 computers including DVD-writer and monitors,

Electrical Power outlets,

Extra network jacks,

Elevated storage shelves for Routers and Switches,

Network cables,

20 x functional old computers (Dual Core and above) with mice, keyboard and monitors.

16 x Computer repair Tool-kits (one per student)

16 x Electrostatic bench mats (one per student)

16 x Electrostatic wrist bands and earthing leads (one per student)

1 x Mini compressor

1 x UPS

Hardware components which are to be used during the installation/ upgrade/ replacement

RAM

Hard disks

Graphics cards

Sound cards

Optical disks

<u>Software</u>

A recent Operating System e,g, Windows 7 / 8 or 8.1/10 plus Key for Installation in case it is necessary during the installation of a hard disk drive

Diagnostic software tool e.g. CPU-Z, Speccy.