LEVEL 3

UNIT 1: Fundamentals of IT

M/507/4999

Guided learning hours: 90

Essential resources required for this unit: none

This unit is externally assessed by an OCR set and marked examination.

UNIT AIM

A sound understanding of IT technologies and practices is essential for IT professionals. Information learnt in this unit will provide a solid foundation in the fundamentals of hardware, networks, software, the ethical use of computers and how business uses IT.

After completing this unit, the knowledge, skills and understanding you have developed will underpin your study for the additional units.

Knowledge gained in the study of this unit will also help prepare you for relevant industry qualifications such as CompTIA A+, CompTIA Mobility+ and Cisco IT Essentials.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades.
Anything which follows an i.e. details what must be taught as part of that area of content. Anything which follows an e.g. is illustrative.

For externally assessed units, where the content contains i.e. and e.g. under specific areas of content, the following rules will be adhered to when we set questions for an exam:

- a direct question may be asked about unit content which follows an i.e.
- where unit content is shown as an e.g. a direct question will not be asked about that example.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
1. Understand computer hardware	1.1 Computer hardware, i.e.: • input devices • output devices • communications devices • benefits (e.g. integrated devices make portable devices simpler to use) • limitations (e.g. voice recognition performs poorly in noisy environments) • uses (e.g. membrane keyboard could be used in harsh physical environments) 1.2 Computer components, i.e.: • processors • motherboards • storage (hard drive, solid state, flash, internal, removable, SAS, SCSI, portable, Cloud) • ports (USB, Firewire, SATA, Network, Fibre Channel) • memory (RAM, ROM, cache)	Learners should know about the different types of computer hardware required for a variety of computer systems. This should lead into learners developing their understanding of their benefits, limitations and uses. Learners should know about the component parts of a computer system and their characteristics. This should lead into learners developing their understanding of the purpose of each component.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	• expansion cards (sound, network, graphics, storage controller, fibre channel) • power supplies • characteristics • purpose 1.3 Types of computer system, i.e.: • desktop/server • tablet/hybrid • smartphone • embedded system/Internet of Things (e.g. cars, home appliances, etc.) • mainframe • quantum • uses (e.g. tablet device can be used when travelling due to physical properties) • benefits (e.g. desktop computer can have a large screen which can improve productivity) • limitations (e.g. mainframes can be expensive to purchase and maintain) 1.4 Connectivity methods, i.e.: • copper • fibre • wireless technologies (Bluetooth, WiFi, microwave, infrared, laser, Satellite, GSM, 3G/4G and future technologies) • characteristics • purpose	Learners should know about the different types of computer systems. This should lead to an understanding of where and how they are used, benefits and limitations of each type of computer system and a justification of a suitable system in a given context. Learners should be aware that some devices feature embedded systems, such as modern cars, washing machines and other home appliances. Learners should know about different connectivity methods and their characteristics. This should lead to an understanding of their purpose and justification of different methods within a given context.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	1.5 Communications hardware, i.e.: • hub • switch • router • modem • wireless access point • combined/hybrid devices • characteristics • purpose and use 1.6 Hardware troubleshooting, i.e.: • identifying hardware faults • troubleshooting tools • documentation/fault management 1.7 Units of measurement, i.e.: • bit, nibble, byte • metric (kilo, mega, giga, tera, peta) • binary (kibi, mebi, gibi, tebi, pebi) • comparison in sizes between metric and binary measurements. e.g. 1 kilobyte = 1000 bytes vs 1024 bytes 1.8 Number systems, i.e.: • binary • decimal • hexadecimal 1.9 Number conversion, i.e.: • converting between binary, decimal and hexadecimal	Learners should know about different communications hardware and their characteristics. This should lead to an understanding of their purpose and use. Learners should be aware of the difference between a combined or hybrid device, which often provides the functionality of a modem, router, switch and wireless access point in one device, and the individual devices. Learners should know about the process needed to troubleshoot common hardware problems as well as the documentation involved. Learners should know about the units of measurement used in IT. This should lead to an understanding of how to convert between the different number systems.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
2. Understand computer software	2.1 Types of software, i.e.: • open source • closed source • off the shelf • bespoke • shareware • freeware • embedded • characteristics • use	Learners should know about different types of software and their characteristics. This should lead to an understanding of the use and justification of different types of software within a given context.
	2.2 Applications software, i.e.: • productivity software (e.g. word processor, spreadsheet, database, email, etc.) • development tools (e.g. compiler, debugger, translator, integrated design environment, etc.) • business software (e.g. MIS, multimedia, collaboration, project management, manufacturing, CAD/CAM, publishing, expert systems, healthcare, etc.)	Learners should know about the different applications software available. This should lead to an understanding of the purpose and advantages and disadvantages of each application.
	2.3 Utility software (e.g. backup, anti-virus, compression, etc.) • purpose • advantages and disadvantages	
	2.4 Operating systems, i.e.: • single user/multiuser • single processor/multiprocessor • off the shelf/open source/bespoke	Learners should know about different forms of operating systems and their key functions. This should lead to an understanding of the benefits and limitations of operating system types.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification

	2.5 Functions
	
	2.6 Benefits and limitations
	
	2.7 Communication methods, i.e.:
	• SMS
	• email
	• messaging software
	• social networking
	• VoIP
	• personal assistants (e.g. Siri, Cortana)
	• teleconference
	• video conference
	• cellular/satellite
	• instant messaging
	• characteristics
	• purpose
	• advantages and disadvantages
	
	2.8 Software troubleshooting, i.e.:
	• common faults (e.g. unexpected software behaviour, software freeze, unexpected rebooting)
	• troubleshooting tools to investigate a problem (e.g. logs, installable tools, baselines)
	• documentation (e.g. types of documentation)
	
	2.9 Protocols, i.e.:
	• popular protocols
	  ○ IP
	  ○ TCP
	  ○ UDP
		Learners should know about different types of communication methods used within a business context and their characteristics.
		
		This should lead to an understanding of the purpose, advantages and disadvantages of each method.
		
		Learners should know about common software faults, the tools used to investigate them and the documentation involved.
		
		This should lead to an understanding of why different trouble shooting tools are used in different contexts and a justification for their use.
		
		Learners should know about protocols and their features.
		
		This should lead to an understanding of the purpose of protocols and their common usage in given contexts.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	○ SMTP ○ FTP ○ HTTP ○ SNMP ○ ICMP ○ POP • features • purpose • common usage scenarios	Learners should be aware of the TCP/IP protocol stack including common functions in each layer.
3. Understand business IT systems	3.1 Types of servers, i.e.: • file/print • application • database • web • mail • hypervisor 3.2 Virtualisation, i.e.: • server • client • storage • cloud • hybrid • benefits and limitations 3.3 Networking characteristics, i.e.: • peer to peer • client server • bus/star/ring/mesh	Learners should know about different types of server. Learners should know about different forms of virtualisation. This should lead to an understanding of the benefits and limitations to a business of using virtualisation technology. Learners should know about different networking topologies and their characteristics. This should lead to an understanding of the use and

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	• addressing • diagrammatical representation • linking to given context 3.4 Connectivity methods, i.e.: • LAN (Ethernet, Token Ring) • WAN (ADSL, leased line, ISDN) • MAN • voice (PSTN, cellular) • satellite (voice, data) • characteristics • purpose 3.5 Business systems, i.e.: • MIS • CRM • SOP • helpdesk • purpose • benefits and limitations	justification of a particular topology in a given context. Learners should know about different connectivity methods and their characteristics. This should lead to an understanding of the purpose of the different methods and how these would be used in a given context. Learners should know about different business systems. This should lead to an understanding of the purpose, and of the benefits and limitations of these systems in a given context.
4. Understand employability and communication skills used in an IT environment	4.1 Communication skills, i.e.: • interpersonal skills (e.g. eye contact, body language) • questioning techniques • verbal (e.g. meetings, telephone, group discussions) • written (e.g. reports, letters, emails, social networking)	Learners should know about the different communication skills used in the IT environment and the potential barriers involved. This should lead to an understanding of the different skills used for different audiences and situations.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	• non-verbal (e.g. body language) • barriers (e.g. language, distraction, noise, lack of concentration) • appropriate use of language (e.g. formal, informal, technical, non-technical)	
	4.2 Communication technology, i.e.: • presentation software • word processing • email • web • blogs/vlogs • instant messaging • use	Learners should know about different communication technologies available. This should lead to an understanding of the use and justification of different communication technologies in a given context.
	4.3 Personal attributes (e.g. self-motivation, leadership, respect, dependability, punctuality, problem solving, determination, independence, time management, team working, written numerical and verbal skills, planning and organisation skills)	Learners should know about different personal attributes. This should lead to an understanding of why these attributes are important for certain job roles and valued by an employer.
	4.4 Ready for work, i.e.: • dress (e.g. appropriate clothing depending on situation) • presentation (e.g. personal grooming, appearance etc.) • attitude (e.g. can do attitude, responsive)	Learners should know about being ready for work. This should lead to an understanding of why this is important for themselves as well as the organisation.
	4.5 Job roles, i.e.: • Network manager • IT technician	Learners should know about different job roles in the IT industry. This should lead to an understanding of the skills

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	• Programmer • Web designer • Animator • Key skills required for each (e.g. technical and non-technical) 4.6 Professional bodies (e.g. BCS) • purpose • benefits and limitations 4.7 Industry certification • benefits to individual and employer • current vendors (e.g. CompTia ®, Cisco ®)	required. Learners should know about different professional bodies and industry certification. This should lead to an understanding of the purpose of professional bodies, and the benefits and limitations of membership to themselves and an employer. This should also lead to an understanding of why it is useful to gain industry certification and the benefits to themselves and an employer.
5. Understand ethical and operational issues and threats to computer systems	5.1 Ethical issues, i.e.: • whistle blowing • disability/gender/sexuality discrimination • use of information • codes of practice • staying safe online • bias 5.2 Operational issues, i.e.: • security of information • health and safety • disaster planning and recovery • organisational policies (acceptable use policy, code of conduct, etc.) • change management • scale of change:	Learners should know about different ethical and operational issues. This should lead to an understanding of how these issues can be addressed.

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	○ drivers (change in business practice, legislation, competition) ○ needs (e.g. improved networking, remote access for employees, etc.) 5.3 Threats, i.e.: • phishing • hacking • virus • Trojan • interception • eavesdropping • data theft • social engineering 5.4 Physical security, i.e.: • locks • biometrics • RFID • tokens • privacy screens • shredding • characteristics 5.5 Digital security, i.e.: • anti-virus • firewalls • anti-spyware • username/passwords • permissions • encryption	Learners should know about different threats to computer systems. Learners should know about physical and digital security methods and their characteristics. This should lead to an understanding of why different security methods are used in different contexts and a justification for their use

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	• characteristics 5.6 Safe disposal of data and computer equipment, i.e.: • legislation • overwrite data • electromagnetic wipe • physical destruction	

LEARNING OUTCOME (LO) WEIGHTINGS

Each learning outcome in this unit has been given a percentage weighting. This reflects the size and demand of the content you need to cover and its contribution to the overall understanding of this unit. See table below:

LO1	10-20%
LO2	10-20%
LO3	25-35%
LO4	5-15%
LO5	10-20%