



BCS Level 3 IT Solutions Technician Digital IT Apprenticeship End-point Assessment Knowledge Unit

Hardware Syllabus

**Version 1.1
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BCS Level 3 IT Solutions Technician Digital IT Apprenticeship End-point Assessment Knowledge Unit - Hardware

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Change History

Any changes made to the syllabus shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and changes made. The purpose is to identify quickly what changes have been made.

Version Number	Changes Made
V1.0 February 2020	Document created.
V1.1 May 2020	Removal of "Training Criteria" and "Classroom size" sections as not applicable.

Introduction

This is the third unit of the four knowledge units required for the Level 3 IT Solutions Technician Apprenticeship Hardware route and forms part of the end-point assessment. It covers the range of concepts, approaches and techniques that are applicable to hardware, for which apprentices are required to demonstrate their knowledge and understanding.

Objectives

Apprentices should be able to demonstrate knowledge and understanding of hardware principles and techniques. Key areas are:

1. Understands the principles of Solution Architecture as applied to hardware.
2. Understands the advantages and disadvantages of different types of hardware configurations.
3. Understands a range of cabling and connectivity.
4. Understands the concepts of standard builds.
5. Understands the concepts of mobile data, Bluetooth, 3G, 4G and Wi-Fi and the security implications of such solutions.
6. Understands different types of storage including locally attached, SAN (storage area network) and networked, and the concepts of RAID (Redundant Array of Independent Discs) and knowledge of RAID levels.
7. Understands requirements when working with electrostatic sensitive equipment (including personal grounding devices) and when working in a server room and/or data centre and/or handling equipment.
8. Understands how to install, configure and test hardware components, networks and devices – including servers, end-user computers and mobile devices.

Evidence of lessons learnt in these key areas should be collected and reflected upon when the apprentice is compiling the portfolio as the apprentice could identify how the task might be done better / differently with knowledge subsequently gained.

Target Audience

The syllabus is relevant to anyone enrolled on the Level 3 IT Solutions Technician Hardware route apprenticeship programme.

Eligibility for the Examination

Apprentices must be enrolled on the level 3 IT Solutions Technician Digital IT apprenticeship and have entered end-point assessment gateway. Level 2 English and Maths will need to be achieved, if not already, prior to taking the end-point assessment.

Format and Duration of the Examination

The format for the examination is a 1-hour multiple-choice examination consisting of 40 questions. The examination is closed book (no materials can be taken into the examination room). The pass mark is 26/40 (65%).

Additional Time for Apprentices Requiring Reasonable Adjustments Due to a Disability

Apprentices may request additional time if they require reasonable adjustments. Please refer to the [reasonable adjustments policy](#) for detailed information on how and when to apply.

Additional Time for Apprentices Whose Language is Not the Language of the Examination

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to 25% extra time.

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to use their own **paper** language dictionary (whose purpose is translation between the examination language and another national language) during the examination. Electronic versions of dictionaries will **not** be allowed into the examination room.

Syllabus

For each top-level area of the syllabus a percentage and K level is identified. The percentage is the exam coverage of that area, and the K level identifies the maximum level of knowledge that may be examined for that area.

1 Principles of Solution Architecture (7.5%, K2)

In this topic, the apprentice will gain an understanding in the principles of solution architecture as applied to hardware. The successful apprentice should be able to:

- 1.1 Explain what a solution is and describe the main principles of solution architecture.
 - establish a clear definition the business problem to be solved by the hardware;
 - design the structure, characteristics and behaviour of the solution to solve the business problem;
 - identify the constraints of the given solution;
 - implement the agreed solution;
 - maintain communication with stakeholders during the project.

2 Hardware Configurations (5%, K2)

In this topic area, the apprentice will understand the advantages and disadvantages of different types of hardware configurations. The successful apprentice should be able to:

- 2.1 Describe the key features as well as the advantages and disadvantages of hardware configurations.
 - laptop;
 - tablet;
 - desktop;
 - server;
 - Next Unit of Computing (NUC);
 - PC stick;
 - system on a chip.

3 Cabling and Connectivity (17.5%, K2)

In this topic area, the apprentice will understand a range of cabling and connectivity. The successful apprentice should be able to:

3.1 Explain the key differences between cables and connector types.

- network copper;
 - co-axial;
 - unshielded twisted pair (UTP)
 - shielded twisted pair (STP)
- network fibre – glass / plastic;
 - multi-mode;
 - single mode;
- USB;
- serial;
- connectors;
 - RJ45;
 - RJ11
 - USB;
 - BNC;
 - straight tip (ST);
 - subscriber connector (SC);
 - local connector (LC);
- cable wiring configurations;
 - straight through;
 - crossover;
 - rollover.

3.2 Identify network applications of Cat1-6 cables.

- Cat1-4 cable obsolete;
- Cat5, 5e, 6, 6A;
 - capacity;
 - maximum distance;
- network applications;
 - 10BaseT;
 - 100Base-TX;
 - 1000Base-T;
 - 10GBase-T.

3.3 Identify network applications of fibre cables.

- multi-mode, single mode;
 - capacity;
 - maximum distance;
- network applications;
 - 10BaseFL;
 - 100BaseFX;
 - 1000BaseLX;
 - 1000BaseSX.

4 Standard Builds (5%, K2)

In this topic area, the apprentice will understand the concepts of standard builds. The successful apprentice should be able to:

4.1 Explain the advantages of using standard builds.

- compatibility;
- fault finding;
- maintenance;
- security;
- economies.

5 Mobile Technology Concepts (17.5%, K2)

In this topic area, the apprentice will understand the concepts of mobile data, Bluetooth, 3G, 4G and Wi-Fi and the security implications of such solutions. The successful apprentice should be able to:

5.1 Describe operating principles of mobile connection technologies.

- Bluetooth;
- 802.11 (WiFi);
- 3G;
- 4G;
- near-field communication (NFC).

5.2 Describe security threats to wireless communications, Bluetooth and 3G / 4G.

- wireless communications;
 - evil twins;
 - rogue access points;
 - man-in-the-middle;
- Bluetooth;
 - Bluejacking;
 - Bluesnarfing;
 - Bluebugging;
- 3G / 4G;
 - malware;
 - eavesdropping / interception;
 - APN flooding.

5.3 Describe how using encryption technologies can securely transport data across mobile or wireless networks.

- HTTPS;
 - certificates;
- VPN technologies;
 - PPTP;
 - IPsec;
 - L2TP/IPsec;
 - IKEv2;
 - OpenVPN.
- wireless encryption;
 - WEP;
 - WPA;
 - WPA2.

6 Storage (10%, K2)

In this topic area, the apprentice will understand different types of storage including locally attached, SAN and networked, and the concepts of RAID and knowledge of RAID levels. The successful apprentice should be able to:

6.1 Describe the key features of:

- locally attached storage (direct-attached storage);
- storage area network (SAN);
- network attached storage (NAS).

6.2 Describe the purpose of redundant array of Independent discs (RAID) and identify the main characteristics of RAID configurations.

- RAID0;
- RAID1;
- RAID5;
- RAID6;
- RAID10.

7 Safety (10%, K2)

In this topic area, the apprentice will understand requirements when working with electrostatic sensitive equipment (including personal grounding devices) and when working in a server room and / or data centre and / or handling equipment. The successful apprentice should be able to:

7.1 Explain health and safety requirements when working in an IT environment.

- manual lifting;
- confined spaces;
- lone working;
- fire safety;
- PPE;
- electrical safety;
- display systems equipment (DSE).

7.2 Explain how static electricity is harmful to computer equipment and what steps can be taken to mitigate the risk.

- electrostatic wrist bands;
- electrostatic discharge stations;
- electrostatic mats.

8 Installing and Configuring (27.5%, K2)

In this topic area, the apprentice will understand how to install, configure and test hardware components, networks and devices – including servers, end-user computers and mobile devices. The successful apprentice should be able to:

8.1 Identify and explain the use of installation, configuration and testing tools and equipment used with wired and wireless networks.

- speed testers;
- port analysers;
- wired;
 - multimeter;
 - multi-function cable testers;
 - tone generator and probe;
 - loopback plug;
 - punch-down tool;
 - crimping tool;
- wireless;
 - wireless locator / WiFi analyser;
 - wireless heat maps;
- network;
 - route utility;
 - netstat;
 - nslookup;
 - ping;
 - ipconfig / ifconfig;
 - tracert / traceroute;
 - protocol analysers.

8.2 Describe typical initial configuration requirements of a server or end user computer (physical or virtual).

- administrative access;
- naming conventions;
- networking;
- domain access;
- OS / firmware updates;
- remote access;
- security.

8.3 Describe in-built testing / configuration tools.

- vendor hardware utilities;
 - basic input / output system (BIOS);
 - uninterruptible power supply (UPS);
 - redundant array of independent discs (RAID);
 - network interface card (NIC).

- 8.4 Explain methods of component stress testing.
- storage;
 - memory;
 - CPU;
 - cooling systems.
- 8.5 Explain configuration functions, including security provided by mobile device management (MDM) software.
- system / software updates;
 - common suite of applications;
 - data encryption;
 - remote wipe;
 - phone tracking;
 - security policy enforcement.
- 8.6 Explain configuration methods for remote access.
- VPN;
 - remote desktop;
 - cloud services.

Levels of Knowledge / SFIA Levels

This syllabus will provide apprentices with the levels of difficulty / knowledge skill highlighted within the following table, enabling them to develop the skills to operate at the levels of responsibility indicated. The levels of knowledge and SFIA levels are explained on the website www.bcs.org/levels. The levels of knowledge above will enable apprentices to develop the following levels of skill to be able to operate at the following levels of responsibility (as defined within the SFIA framework) within their workplace:

Level	Levels of Knowledge	Levels of Skill and Responsibility (SFIA)
K7		Set strategy, inspire and mobilise
K6	Evaluate	Initiate and influence
K5	Synthesise	Ensure and advise
K4	Analyse	Enable
K3	Apply	Apply
K2	Understand	Assist
K1	Remember	Follow

Question Weighting

Syllabus Area	Target Number of Questions
1. Principles of Solution Architecture	3
2. Hardware Configurations	2
3. Cabling and Connectivity	7
4. Standard Builds	2
5. Mobile Technology Concepts	7
6. Storage	4
7. Safety	4
8. Installing and Configuring	11
Total	40 Questions

Format of Examination

Type	40 Question Multiple Choice.
Duration	1 Hour. An additional 25% will be allowed for apprentices sitting the examination in a language that is not their native / mother tongue.
Pre-requisites	Training from a BCS accredited training provider is strongly recommended but is not a pre-requisite.
Supervised	Yes.
Open Book	No.
Pass Mark	26/40 (65%).
Calculators	Calculators cannot be used during this examination.
Delivery	Online.