Qualification: 5220-30-030/530 Level 3 Advanced Technical Certificate in Digital Technologies – Theory Exam

Exam date: May 2018

1a	State **two** indicators of progress used in project management.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** indicator stated, maximum of 2 marks. • Technologies eg GANTT charts (1) • Critical task lists (1) • Milestones (1) • Stage sign-offs (1)	Accept the following or any other reasonable answer	2
1b	For **each** of the **two** indicators stated in Question 1a), explain how they are used as indicators of progress.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** explanation, maximum of 4 marks. • The Gantt chart is used to show tasks on a timeline (1) and the dependencies of tasks on each other (1). • The Critical task list is used to define tasks that exist on the critical path (1) and cannot be delayed without delaying the whole project (1).	Accept the following or any other reasonable answer	4
2a	State **two** access control methods.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** method stated, maximum of 2 marks. • Mandatory Access Control (MAC) (1) • Discretionary Access Control (DAC) (1) • Role-Based Access Control (RBAC) (1) • Attribute-Based Access Control (ABAC) (1)	Accept the following or any other reasonable answer	2

2b	For **each** of the **two** access control methods stated in Question 2a), explain how they are used to control system access.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** explanation, maximum of 4 marks. • Mandatory Access Control (MAC) is defined only by the systems administrator (1) who defines rights to objects that cannot be changed by the user (1). • Discretionary Access Control (DAC) defines rights based on the identity of the user (1) and the groups they belong to (1).	Accept the following or any other reasonable answer	4
3	Explain how a system can be protected against **each** of the following types of malicious code. • Viruses. • Logic Bombs. • Worms.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** correct explanation, maximum of 6 marks. • A system can be protected against Viruses by the installation of anti-virus software (1) and keeping its definitions database/dictionary up to date (1). • Some system protection against Logic Bombs can be achieved by account control (1) making sure that past employees can no longer access the system when they have left the organisation (1). • A system can be protected against Worms by logging in as a user type other than administrator (1) so that software cannot automatically be installed without direct authorisation (1).	Accept the following or any other reasonable answer	6
4a	State **two** types of storage media that can be used in a computer system.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** storage type stated, maximum of 2 marks. • Removable media (1) • External/remote storage eg cloud (1) • Data server (1) • Local media eg hard disk (1)	Accept the following or any other reasonable answer	2
4b	For **each** of the **two** types of storage stated in Question 4a), explain one of its security vulnerabilities.		
	Acceptable answer(s)	**Guidance**	**Max mks**

	2 marks for **each** correct explanation, maximum of 4 marks. • Removable media may be lost (1) and if data is unencrypted it is easily accessed by the finder (1). • External Storage, eg cloud storage may offer a poorly designed interface (API) (1) and this can fail to restrict the access to data to that intended (1) for use by the users of the API.	Accept the following or any other reasonable answer	4
5a	State **two** types of physical network topologies.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** topology type stated, maximum of 2 marks. • Point to point (1) • Ring (1) • Bus (1) • Star (1) • Mesh (full/partial) (1) • Cellular (1) • LAN (1) • WAN (1)	Accept the following or any other reasonable answer	2
5b	For **each** of the **two** topologies stated in Question 5a), explain how data is transmitted.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** explanation, maximum of 4 marks. • In a Point to Point topology data is transmitted using a direct connection between nodes (1) without any network device between them (1). • In a Ring topology nodes are connected using a single cable in a ring structure (1) and data is transmitted through the nodes until the destination is • reached (1).	Accept the following or any other reasonable answer	4
6	Explain the use of **each** of the following network software. • Proxy server. • Web server. • Voice Over Internet Protocol (VOIP).		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** explanation, maximum of 6 marks. • A Proxy Server acts as an intermediary (1) between an end point device and the client requesting the server (1).	Accept the following or any other reasonable answer	6

	• A Web Server uses the client/server model and Hypertext Transfer Protocol (HTTP) (1) to serve data that is used to form web pages (1). • Voice Over Internet Protocol (VOIP) is used to transmit voice and multimedia (1) over Internet Protocol (IP) networks (1) by using a CODEC to encapsulate the data into packets and re-converting them on receipt.		
7a	State **two** layers of the TCP/IP model.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** layer stated, maximum of 2 marks. • Application (1) • Transport (1) • Network/Internet (1) • Network Interface (1)	Accept the following or any other reasonable answer	2
7b	Explain the network function for **each** of the layers stated in Question 7a).		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** explanation, maximum of 4 marks. • The Application Layer controls the communication and interface methods (1) used in process to process communications (1). • The Transport Layer provides logical communication between application processes (1) running on different hosts (1) enabling them to send and receive data packets.	Accept the following or any other reasonable answer	4
8a	State **two** programming language techniques.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** technique stated, maximum of 2 marks. • Sequential / top down Programming (1) • Structured Programming / Procedural Programming (1) • Object Oriented Programming (1) • Event Driven Programming (1)	Accept the following or any other reasonable answer	2
8b	For **each** of the techniques stated in Question 8a), explain how programmes are constructed.		
	Acceptable answer(s)	**Guidance**	**Max mks**

	2 marks for **each** explanation, maximum of 4 marks. • In Sequential Programming the program always executes the same instruction (1) and always produces the same results (1). • In Structured/Procedural Programming the execution is based on the concept of calls (1) in which statements are structured into Procedures (1) (also known as subroutines, functions or methods).	Accept the following or any other reasonable answer	4
9a	State **two** types of testing techniques.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** type stated, maximum of 2 marks. • Black Box (1) • White Box (1) • Volume (1) • Functionality (1) • Boundary (1)	Accept the following or any other reasonable answer	2
9b	Explain a principle for **each** of the testing techniques stated in Question 9a).		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for **each** correct explanation, maximum 4 marks. • Black Box technique tests only the outputs of a process, given a known input (1). It does not test the code in the algorithm (1). • White Box technique tests the inputs and outputs (1) and also tests the algorithms used in the code (1).	Accept the following or any other reasonable answer	4
10a	State **two** data structures used in programming.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	1 mark for **each** structure stated, maximum of 2 marks. • Array (1) • Stack (1) • Queue (1)	Accept the following or any other reasonable answer	2
10b	Explain how **each** of the data structures stated in Question 10a) is used in programming.		
	Acceptable answer(s)	**Guidance**	**Max mks**

	2 marks for **each** explanation, maximum of 4 marks. • An Array is a logical data structure in memory used to hold several data items of a similar type (1). Data in the array is referenced for storage and retrieval using an index value (1). • A Stack is a logical structure in memory holding elements added by 'pushing' and retrieved by 'popping' (1). The data is managed on a Last In First Out (LIFO) basis (1).	Accept the following or any other reasonable answer	4
11	Explain the difference between State and Stateless in website programming.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	2 marks for an explanation, maximum of 2 marks. An object or service that manages State generally has a known request type and can retain information between calls (1). Stateless objects and services simply perform the service as long as the request is authenticated (1).	Accept the following or any other reasonable answer	2
12	You have been asked to give a presentation to your company's directors about a proposed software development where an application will be used to gather and share personal information. Discuss what you would include in the presentation.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Band 1: **1-3 marks** Consideration of software project planning is basic. Software development processes are discussed but detail is limited. Basic consideration is given to the security of personal information. **Band 2:** **4-6 marks** Consideration of software project planning is adequate and discusses roles within projects. Software development processes are discussed adequately. Adequate consideration is given to the security of personal information. **Band 3:** **7-9 marks** The consideration of software project planning is well-developed. Software development processes are discussed and evaluated comprehensively. There is comprehensive discussion about systems of information security and the responsibilities of organisations recording and sharing information.	**Indicative content** • Software project planning • Software development processes • Information security ***For no awardable content, award 0 marks.***	9
13	A school trust runs a Primary School, High School and a Sixth Form in **three** different locations. IT wants to provide a 'kiosk' where students in all their schools can log onto a PC and leave their opinions about their student experience.		

	Discuss the steps the school can take to complete the development process.		
	Acceptable answer(s)	**Guidance**	**Max mks**
	Band 1: **1-3 marks** Proposals for data collection are basic. Consideration of the project plan to establish the network is limited. The consideration of system security is brief. **Band 2:** **4-6 marks** The range of proposals for data collection and sharing software is adequate. The consideration of life-cycle development methods and project management is adequate and reflects the needs of the school to some degree. Adequate consideration is given to the security of the system and the student information and some consideration is given to legislation associated with data collection and sharing. **Band 3:** **7-9 marks** Comprehensive project proposals are made for the system to be deployed for collection and sharing of data and these accurately reflect the needs of the client. There are clear suggestions for the development and deployment of the system in the schools. The proposed life cycles are entirely appropriate and well considered. The proposals for management of information security are well developed, logical and there is comprehensive consideration given to legal and ethical requirements for the gathering and storing of data.	**Indicative content** • Project planning and development life cycles • Network and software development • Security requirements for data systems ***For no awardable content, award 0 marks.***	9