

**Qualification: 5220-32-035/535 Level 3 Advanced Technical Extended Diploma
in Digital Technologies (Application Development) – Theory
Exam**

Exam date: June 2018

1a	State two analytical tools used to understand feasibility of a proposed application.		
	Acceptable answer(s)	Guidance	Max mks
	1 mark for each tool stated, maximum of 2 marks. <ul style="list-style-type: none"> • interview (1) • survey (1) • direct questioning (1) • market research (1) • availability of products (1) 	Any of the following or any other reasonable answer	2
1b	Describe how each of the tools stated in Question 1a) is used.		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for each description, maximum of 4 marks. <ul style="list-style-type: none"> • <u>Interviews</u> can be used to discuss requirements directly (1) with the range of end users who will use the planned application (1). • <u>Surveys</u> can be used to gather information on a range of defined topics (1) to gather information about the proposed application and analyse it (1). • <u>Market research</u> can be used to establish the extent of the competitor applications (1) so that the viability of the proposed application is established (1). 	Any of the following or any other reasonable answer	4
2	Describe the following system constraints in relation to a feasibility study. <ul style="list-style-type: none"> • Hardware • Software • Web/cloud based. 		
	Acceptable answer(s)	Guidance	Max mks

	<p>2 marks for each description, maximum of 6 marks.</p> <ul style="list-style-type: none"> • <u>Hardware</u> available to the potential end users must be considered (1) as there can be minimum hardware specifications for the proposed application such as processor speed and/or RAM available (1). • <u>Other software</u> may be required to run the proposed application (1) and the feasibility study must establish whether it is available to all end users or arrange for its availability (1). • <u>Web/cloud based</u> applications require a reliable and consistently available Internet connection (1) and the developers must plan for management of the connection being lost (1). 	Any of the following or any other reasonable answer	6
3	<p>Describe the use of the following life cycle models in Software development.</p> <ul style="list-style-type: none"> • Waterfall • Rapid Application Development (RAD) • Agile. 		
	Acceptable answer(s)	Guidance	Max mks
	<p>2 marks for each description, maximum of 6 marks.</p> <ul style="list-style-type: none"> • <u>Waterfall</u> models are used where it is possible to clearly define the stages of the project in advance (1) and when implemented, the stages are completed in one direction only (1). • <u>RAD</u> models are used to develop different parts of the application at the same time (1) which are assembled and tested as an integrated application (1). • <u>Agile</u> models split the development into separate parts for delivery (1) and where each part/version is planned on completion of the previous one (1). 	Any of the following or any other reasonable answer	6
4a	State two types of variable scope.		
	Acceptable answer(s)	Guidance	Max mks
	<p>1 mark for each type stated, maximum of 2 marks.</p> <ul style="list-style-type: none"> • Local (1) • Global (1) • Static (1) 	Any of the following or any other reasonable answer	2
4b	For each of the scope types given in Question 4a), explain their availability for recall, assignment or amendment in a computer program.		
	Acceptable answer(s)	Guidance	Max mks
	<p>2 marks for each explanation, maximum of 4 marks.</p> <ul style="list-style-type: none"> • <u>Local</u> - available to the current code structure (1) in scope at runtime (1). 	Any of the following or any other reasonable answer	4

	<ul style="list-style-type: none"> • <u>Global</u> - available to all code structures in the application (1) for sharing and re-use (1). • <u>Static</u> – maintains return value (1) for sharing between functions (1). 		
5	Explain one reason for using compiler directives in a computer program.		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for a correct explanation, maximum of 2 marks. <ul style="list-style-type: none"> • Improvement of code structure (1) through use of modules(1) • Modules have been pre-tested (1) and have known reliability (1) • More re-use of code is possible (1) saving money and time (1) • Many are pre-written as part of the development tool or language (1) and are available for use throughout (1) • Improvement of code maintenance (1) through the use of modules (1) • Easier extension of code (1) to include new features or facilities (1) • Easier debug and error finding (1) as the code is in smaller units (1) • Faster (1) compilation of executable (1) • Smaller (1) executable file size (1) 	Any of the following or any other reasonable answer	2
6a	State three types of data structures used in programs.		
	Acceptable answer(s)	Guidance	Max mks
	1 mark for each type stated, maximum of 2 marks. <ul style="list-style-type: none"> • array (1) • stack (1) • queue (1) 	Any of the following or any other reasonable answer	3
6b	Describe how each of the structures stated in Question 6a) is used with program data.		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for each description, maximum of 6 marks. <ul style="list-style-type: none"> • an <u>array</u> is used to hold multiple data items of a similar type (1) and each data element is referenced by its assigned index (1). • a <u>stack</u> is a data structure to which items are added and removed at one end of the structure by 'PUSH' and 'POP' operations (1). Data is managed on a 'Last In First Out (LIFO)' basis. 	Any of the following or any other reasonable answer	6

	<ul style="list-style-type: none"> a <u>queue</u> is a data structure in which data is added and removed at both ends of the structure using 'PUSH' and 'POP' operations (1). Data is managed in a 'First In First Out (FIFO)' basis (1). 		
7a	State two numeric data types used to define items in a program.		
	Acceptable answer(s)	Guidance	Max mks
	1 mark for each type stated, maximum of 2 marks. <ul style="list-style-type: none"> Integer (1) Float (1) Decimal (1) Real (1) Double (1) 	Any of the following or any other reasonable answer	2
7b	Describe the main features of the numeric data used in each of the types named in Question 7a).		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for each description, maximum of 4 marks. <ul style="list-style-type: none"> <u>Integer</u> data types hold whole numbers with no fractional component (1) and their definition must specify the upper limit of the value to be held (1) (eg SMALLINT, LONG INTEGER). <u>Float</u> data types allow the storage of numbers which can specify whole number values and their fractional components (1) and their definition must specify the precision of the fraction (1) allowed by the bits of storage defined for the type. <u>Decimal</u> data types allow the storage of whole numbers and their fractional component (1) where the fractional component is restricted to two decimal places (1). 	Any of the following or any other reasonable answer	4
8	Describe the purpose of the following 'decision' types. <ul style="list-style-type: none"> Conditional check Conditional statement Switch/Select Case. 		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for each description, maximum of 6 marks. <ul style="list-style-type: none"> <u>Conditional checks</u> are used to compare items (1) and will return a Boolean result based on comparisons such as equality/greater than/less than/logic (1). 	Any of the following or any other reasonable answer	6

	<ul style="list-style-type: none"> • <u>Conditional statements</u> control the flow of execution of a program (1) based on the outcome of a conditional check (1). • <u>Switch/Select Case</u> statements control the flow of execution of a program (1) based on a conditional check against multiple defined values (multiway branch) (1) and a default pathway. 		
9a	State three types of testing methodologies.		
	Acceptable answer(s)	Guidance	Max mks
	1 mark for each type stated, maximum of 3 marks. <ul style="list-style-type: none"> • Phased (1) • Black box (1) • White box (1) • Stress (1) • Functionality (1) • Boundary (1) 	Any of the following or any other reasonable answer	3
9b	Describe how each of the methodologies stated in Question 9a) is used in software development.		
	Acceptable answer(s)	Guidance	Max mks
	2 marks for each description, maximum of 6 marks. <ul style="list-style-type: none"> • <u>Phased</u> testing is used to test software during different parts of the development life cycle (1) and can contain test phases such as Alpha, Beta, Final Master and User acceptance (1). • <u>Black box</u> testing is used to test the outputs of a program based on the inputs supplied (1) and does not examine the code used to produce the outputs (1). • <u>White box</u> testing is used to test the outputs of a program based on the inputs supplied (1) and examines the code used to produce the outputs (1). 	Any of the following or any other reasonable answer	6
10	State two types of functionality testing.		
	Acceptable answer(s)	Guidance	Max mks
	1 mark for each type stated, maximum of 2 marks. <ul style="list-style-type: none"> • usage (1) • target environment (1) 	Any of the following or any other reasonable answer	2
11	Describe one benefit and one limitation of using an array structure in a program.		

	Acceptable answer(s)	Guidance	Max mks
	<p>2 marks for each description, maximum of 4 marks.</p> <p><u>Benefits:</u></p> <ul style="list-style-type: none"> • Data is defined in size in advance (1) and this helps resource consideration (1) • Data can be accessed (1) through the use of indexes (1) • The element indexes can be used for navigation processes (1) through the data elements (1) • Elements of data can be amended or deleted (1) without affecting the original structure (1) • Multi-dimension data structures can be created (1) for storage of complex data (1). <p><u>Limitations:</u></p> <p>Array can only hold data of a single type</p> <ul style="list-style-type: none"> • Pre-definition of the size of the array can introduce complexity (1) of code if it must be altered (1) • Search routines (1) may be inefficient in large arrays (1) • Coding for handling multi-dimensional arrays (1) may be complex to write (1) 	Any of the following or any other reasonable answer	4
12a	<p>Figure 1 shows the pseudocode for an algorithm carried out on an array of numbers called myArray. However some of the lines of code are in the wrong order.</p> <pre> 1 IF myArray[i] > myValue THEN 2 PRINT myValue 3 SET myValue to myArray[0] 4 ENDFOR 5 SET myValue to myArray[i] 6 ENDIF 7 FOR i = 1 to myArray length - 1 </pre> <p>Figure 1</p> <p>What is the intended purpose of the algorithm in Figure 1?</p>		
	Acceptable answer(s)	Guidance	Max mks
	<p>2 marks for a correct explanation, maximum of 2 marks.</p> <ul style="list-style-type: none"> • To return the maximum number/value in the array named myArray (1) using the value held in the variable myValue (1). 	Any of the following or any other reasonable answer	2
12b	Using the numbers 1 – 7 in Figure 1 , arrange the lines of code into the correct order for the algorithm to operate correctly.		

	<pre> 1 IF myArray[i] > myValue THEN 2 PRINT myValue 3 SET myValue to myArray[0] 4 ENDFOR 5 SET myValue to myArray[i] 6 ENDIF 7 FOR i = 1 to myArray length - 1 </pre> <p>Figure 2</p>							
	<table border="1"> <thead> <tr> <th>Acceptable answer(s)</th><th>Guidance</th><th>Max mks</th></tr> </thead> <tbody> <tr> <td> <p>1 mark for each code line in the correct sequence, maximum of 7 marks.</p> <p>Line 3 (1) Line 7 (1) Line 1 (1) Line 5 (1) Line 6 (1) Line 4 (1) Line 2 (1)</p> <pre> SET myValue to myArray[0] FOR i = 1 to myArray length - 1 IF myArray[i] > myValue THEN SET myValue to myArray[i] ENDIF ENDFOR PRINT myValue </pre> </td><td> <p>Any of the following or any other reasonable answer</p> </td><td> <p>7</p> </td></tr> </tbody> </table>	Acceptable answer(s)	Guidance	Max mks	<p>1 mark for each code line in the correct sequence, maximum of 7 marks.</p> <p>Line 3 (1) Line 7 (1) Line 1 (1) Line 5 (1) Line 6 (1) Line 4 (1) Line 2 (1)</p> <pre> SET myValue to myArray[0] FOR i = 1 to myArray length - 1 IF myArray[i] > myValue THEN SET myValue to myArray[i] ENDIF ENDFOR PRINT myValue </pre>	<p>Any of the following or any other reasonable answer</p>	<p>7</p>	
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13	<p>A company wants to develop an application that calculates Value Added Tax (VAT) charges. The application will be sold to business users.</p> <p>Discuss the steps that should be carried out to complete the development processes.</p> <table border="1"> <thead> <tr> <th>Acceptable answer(s)</th><th>Guidance</th><th>Max mks</th></tr> </thead> <tbody> <tr> <td> <p>Band 1: 1-3 marks The response demonstrates a limited understanding of the processes and technologies involved and is mostly a statement of facts, which are not developed. The approach to the task is inconsistent. Statements may be occasionally incorrect and the use of precise technical language is sparse.</p> <p>Band 2: 4-6 marks The candidate has produced a discussion that expands on the factual knowledge but lacks detail in some areas. They show an adequate understanding of the processes and technologies</p> </td><td> <p>Indicative content</p> <ul style="list-style-type: none"> • Specification of the application • Implementation and testing • Support documentation <p>For no awardable content, award 0 marks.</p> </td><td> <p>9</p> </td></tr> </tbody> </table>	Acceptable answer(s)	Guidance	Max mks	<p>Band 1: 1-3 marks The response demonstrates a limited understanding of the processes and technologies involved and is mostly a statement of facts, which are not developed. The approach to the task is inconsistent. Statements may be occasionally incorrect and the use of precise technical language is sparse.</p> <p>Band 2: 4-6 marks The candidate has produced a discussion that expands on the factual knowledge but lacks detail in some areas. They show an adequate understanding of the processes and technologies</p>	<p>Indicative content</p> <ul style="list-style-type: none"> • Specification of the application • Implementation and testing • Support documentation <p>For no awardable content, award 0 marks.</p>	<p>9</p>	
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	<p>involved including some reasons for their selection. They have provided some valid reasons for their choices. The response is structured and presented in a logical order.</p> <p>Band 3: 7-9 marks</p> <p>The candidate has produced a thorough discussion in a logical and professional manner. They show a thorough understanding of the processes and technologies involved and have covered these in the correct logical order, including reasons behind the processes and technologies, the factors that need to be considered and the impact these factors may have on the implementation. They have clearly understood how all of the processes and technologies link to one another in terms of order and importance. They have provided valid reasons for their choices. The response is clear, coherent and all information has been presented in a logical order.</p>		
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