Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Digital Technology

Assessment Unit AS 1

assessing

Approaches to System Development

[SDT11]

FRIDAY 26 MAY, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

AVAILABLE MARKS

1 (a) **Indicative content**

Waterfall model
This consists of a sequence of discrete stages
A stage must be complete before the next one starts
Deliverables are produced at the end of each stage
An earlier stage may be revisited if an error is found during a later stage

Agile
The project is split into a number of small independent modules
Each module is developed by a separate team. The teams work concurrently
A project leader coordinates the teams

Points of comparison
The waterfall method is suitable for larger scale projects with long delivery times whereas the agile approach is suitable for smaller scale projects which are required relatively quickly
The stages in the waterfall model are completed linearly (with possible iteration) while, the agile approach is a combination of the iterative and incremental models - different modules of the project are completed separately and concurrently

Level of response	Marking criteria	Marks
Band 2 **Excellent**	The candidate • Describes the waterfall model and agile approaches accurately and concisely • Clearly articulates a comparison between the two approaches • Uses appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	**[4] or [5]**
Band 1 **Good**	The candidate • Describes some of the key features of the waterfall model and agile approaches • Makes a comparison between the two approaches • Uses some relevant Digital Technology terminology Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	**[2] or [3]**
Band 0 **Basic**	The candidate • Makes a distinction between the waterfall model and agile approaches • Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	**[1]**

[5]

AVAILABLE MARKS

(b) Constraint
A restriction/limit on the project
Example: the available budget/the required development time/the need to integrate with other IT systems/the software development expertise available
(2 × [1]) [2]

Risk
A factor which could have a detrimental effect on the success of the project/cause the system to fail to meet its objectives
Example: problems with scheduling/ problems meeting the budget/personnel or productivity issues/incomplete or incorrect specification/requirements inflation
(2 × [1]) [2]

(c) Personnel/analysts/programmers
Hardware
Software
Budget
(3 × [1]) [3]

(d) Schedule/monitor/oversee the project
Allocate/manage/control the budget
Identify risk/respond to risks or bottlenecks
Report back to the client/management
(2 × [1]) [2]

(e) System specification/module specifications/user requirements
Design components – DFDs, ERDs, storyboards, flowcharts, pseudocode/data dictionaries/IO formats/menu structures
Database structures/tables/queries/reports
Program documentation/purpose/listings/code/restrictions
Test plans/test schedule/test data/test results/test schedule
Hardware and software configuration/specification/requirements
(4 × [1]) [4]

(f) The development team must all be working from the same version of the software/documentation
All changes must be recorded
There must be a method of tracking changes
... and reversing changes
All documents/code modules should have version numbers
Old versions of documents/code should be archived
(4 × [1]) [4] 22

2 (a) To design the user interface

Prototyping
An initial non-functioning model
... of the user interface is created
This has no database access/it might use dummy data
Additional interaction is added
... from feedback from the user
(3 × [1]) [3]

AVAILABLE MARKS

Storyboarding
Diagrams are used
... to show the content of screens
... to show the sequence of screens
... including different navigation paths/branches
(3 × [1]) [3]

(b) The item/element/component being tested
Example: module/IO screen/variable/input box/validation rule
How the test will be carried out/test procedures to be used
The test data/test cases to be used
The expected outcomes/expected results
(4 × [1]) [4]

(c) **(i)** If a natural disaster/flood etc occurs
... a business must be able to operate as normally as possible/in emergency mode
... until the emergency/disaster is over
Critical or key data/processes/personnel identified/risks will be identified
The backup and recovery method will be described
An alternative location will be identified from which they can operate
(4 × [1]) [4]

(ii) **Differential backup**
Backs up data/files which have changed since the last full backup

Incremental backup
Backs up data/files which have changed since the last backup, whether full backup or incremental backup
(2 × [1]) [2] 16

3 **(a)** **GIVEN** **Over budget**

Systems were not being delivered on time/late
Developments in software were not keeping pace with developments in hardware/formal methods were not being used
Software systems were becoming more complex
Systems did not meet the user requirements/system specification
The user interface did not match the users' IT skills
Systems were difficult/expensive to maintain
(3 × [1]) [3]

(b) **Indicative content**

Document sampling
The aim is to identify the data the organisation needs, how this data flows throughout the organisation, and the volume of data
Existing documents such as data collection forms, invoices, orders, receipts, reports are sampled to discover how data is input, collated, processed and output

Observation
The analyst selects a representative sample of end users and shadows them as they perform their everyday tasks.
The purpose is to identify the processes they carry out and the data they use or generate as they perform them, the competences required and the time taken

AVAILABLE MARKS

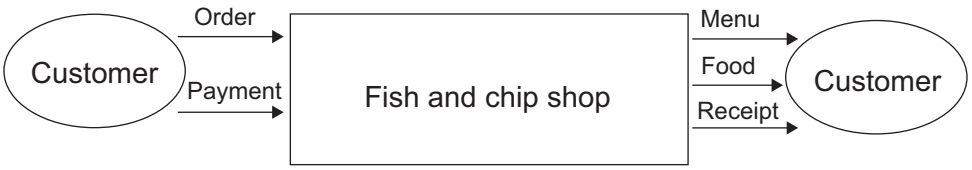
Points of comparison
The warehouse is large, busy with heavy equipment. Observation could expose the observer to physical danger. Document sampling would be safer. It might be difficult to identify data and data flows simply from observing physical activities in the warehouse whereas suitable documents (invoices etc.) will already exist.

Level of response	Marking criteria	Marks
Band 2 **Excellent**	The candidate • Describes the document sampling and observation methods accurately and concisely • Clearly articulates an advantage or disadvantage of each method referring directly to the warehouse • Uses appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	**[6]–[8]**
Band 1 **Good**	The candidate • Describes some of the key features of the document sampling and observation methods • Identifies an advantage or disadvantage of each method referring directly to the warehouse as described in the question • Uses some relevant Digital Technology terminology Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	**[3]–[5]**
Band 0 **Basic**	The candidate • Refers to the document sampling and observation methods • Identifies an advantage or disadvantage of one of the methods but does not refer to the warehouse • Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	**[1] or [2]**

[8]

AVAILABLE MARKS

(c) (i) [0] for any response which does not use the correct symbols



[1] for the process name – 'Fish and chip shop' or equivalent
[1] for Customer as data source } These may be combined
[1] for Customer as data destination } using one entity symbol
[3] for all five data flows – [2] if one missing [1] if two missing
(6 × [1]) [6]

(ii) 'produced from a context level DFD'

The main process will be expanded on/refined/broken down
... into the main sub processes
Data stores will be identified
Data flows will be identified
(4 × [1]) [4]

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AVAILABLE MARKS

4 (a) (i) **Explanation**
The old system is stopped/discarded
The new system immediately replaces it
(2 × [1]) [2]

Advantage
No duplication of resources [1]

Disadvantage
High risk if new system fails/there is no backup system [1]

(ii) **Indicative content**

Definition of a pilot
The new system is implemented in one section/office
It is tested and evaluated thoroughly
When proven, it is implemented in the other sections/offices

Suitability
The structure of the organisation is suitable – it has a number of similar offices
There is minimum risk from the system failing as only one office will be affected
Expertise gained in implementing the pilot can be applied to the implementation in the other offices

Level of response	Marking criteria	Marks
Band 2 **Excellent**	The candidate • Describes the pilot implementation method accurately and concisely • Clearly articulates the suitability of this method referring directly to the organisation • Uses appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	**[5] or [6]**
Band 1 **Good**	The candidate • Describes some of the key features of the pilot implementation method • Identifies an advantage of this method referring directly to the organisation as described Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	**[3] or [4]**
Band 0 **Basic**	The candidate • Identifies a feature of the pilot implementation method • Identifies an advantage or disadvantage of this method • Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	**[1] or [2]**

[6]

AVAILABLE MARKS

(b) Data is taken from existing documents
... such as forms/reports/invoices/orders
The data may need reorganising for new database structure, e.g. tables created/modified
The database structure is created on the system
Data is keyed in/transcribed
... and verified/validated
The database tables are populated with data
(4 × [1]) [4]

(c) **(i)** Perfective
Corrective
(2 × [1]) [2]

(ii) Additional/new functions must be added
The environment within which the system is used has changed/ the user's requirements have changed
... for internal reasons/new business requirements
... for external reasons/ changes in legislation
(3 × [1]) [3] 19

5 **(a)** **'Translation' given, so 'compiler' excluded**

Project file management support/directory trees
Design tools/GUI builder
A code editor/text editor
Smart editor/syntax checker/syntax suggestions/automatic tabs/automatic comments/automatic white space/automatic line numbering
Code linking/execution
Debugging tools/breakpoints/variable inspection
(4 × [1]) [4]

(b) Computers operate in binary/machine code
Programming languages are designed to be understood by humans/to enable humans to focus on problem solving/algorithms
These include high level languages
... and assembly languages
A program must be converted to binary before the computer can execute it
(4 × [1]) [4]

(c) **'Explain what is meant by ...' Example of a loop not accepted**

A sequence of instructions/the body of the loop is executed/repeated
... while a condition is true
... in which case the condition is tested at the start of the loop
... or until a condition becomes true
... in which case the condition is tested at the end of the loop
(4 × [1]) [4]

(d) Indicative content

AVAILABLE MARKS

The algorithm
The algorithm is incorrect
It outputs the sum of the first 5 odd numbers (25), not the first 10 (100)

Cause of error
The variable count is being used in two conflicting ways
... as a loop counter (which should take the values 1 to 10)
... as the odd number (which should take the values 1, 3, 5 etc)

Possible corrections
Use two separate variables eg count and number
Use a for loop (from 1 to 10) and the variable number
Use a for loop from 1 to 10 and use the value of twice the loop counter minus 1 for the odd numbers

Level of response	Marking criteria	Marks
Band 2 **Excellent**	The candidate • Clearly identifies the error in the algorithm and accurately describes the cause of this error • Clearly describes a suitable correction • Uses appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	**[5] or [6]**
Band 1 **Good**	The candidate • Identifies the error in the algorithm's output • Suggests a suitable correction • Uses some relevant Digital Technology terminology Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	**[3] or [4]**
Band 0 **Basic**	The candidate • States (or traces) the incorrect output from the algorithm Or • Produces a corrected algorithm • Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	**[1] or [2]**

[6]

(e) A class can inherit the properties/attributes and methods/behaviours of an existing class
The existing class is known as the base/parent/super class
The new class is known as a derived class/child/sub class
Inherited properties/attributes and methods/behaviours can be defined for the derived class
Inherited methods/behaviours can be re-defined or overwritten
(4 × [1]) [4]

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Total **100**