



**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2018**

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# **Digital Technology**

**Assessment Unit AS 1**

*assessing*

**Approaches to System Development**

**[SDT11]**

**MONDAY 4 JUNE, MORNING**

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**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.

**1 (a) Systems analyst**

Carries out a feasibility study  
 Liaises with the client/the users  
 Identifies the user requirements/the (data) processing requirements  
 Undertakes fact finding/interviews/observation/questionnaires  
 /documentation sampling  
 Defines the system specification  
 (3 × [1])

**Programmer**

Writes/produces the code  
 ... from the module specifications/algorithms/flowcharts  
 Tests the code/performs application testing/alpha testing  
 ... using the test schedule/test plan/test data  
 Debugs/corrects the code  
 Documents code  
 (3 × [1])

[6]

**(b) Non-functional requirement**

Specifies an additional condition the system must meet/a condition not specific to the particular application/a condition not specific to the hotel reservation system

Example: R113  
 (2 × [1])

**Functional requirement**

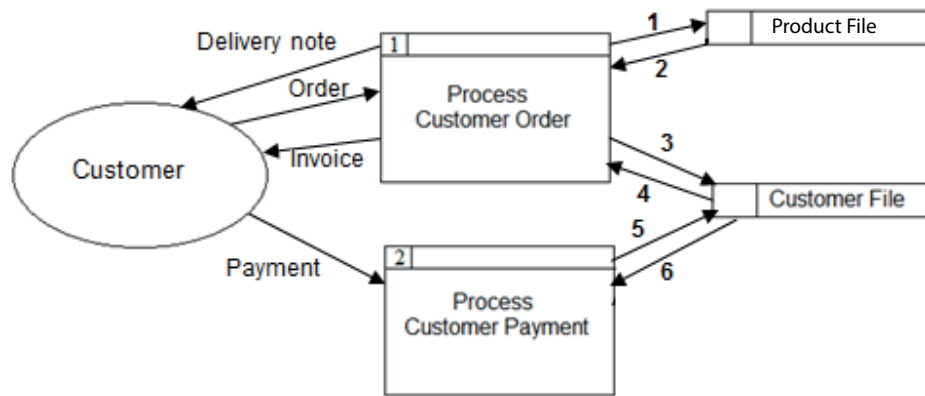
Specifies what the system must do for the specific application/a function or process which is part of the hotel reservation system/the activities that a system must perform for users

Example: R101 or R106  
 (2 × [1])

[4]

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(c) Correct symbols must be used



**Dataflow labels**

- 1 Order details, productID, quantity
- 2 Stock details, productID, quantityInStock
- 3 Order details, orderTotalCost
- 4 Customer details, customerID
- 5 Payment details, amountPaid
- 6 Customer details, totalPayment

- [1] for **customer order** process using correct notation
- [1] for two way data flows from process to **Product** data store
- [1] for two way data flows from process to **Customer** data store
- [1] for **customer payment** process using correct notation
- [1] for two way data flows from process to **Customer** data store

[5]

AVAILABLE  
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**(d) What is it observation?**

The systems analyst selects a sample of users/employees and shadows them as they carry out their everyday tasks

**Purpose?**

To identify the processes involved, the data needed to perform each process, the data generated by each process

**Suitability**

There is a single warehouse which will make it straightforward to identify suitable users and carry out observation

**Unsuitability**

The company sells throughout the world so the volume of transactions will be high making it difficult to identify the separate processes/data involved

Level of response	Marking criteria	Marks
<b>Band 2</b>  <b>Excellent</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate description of the observation method and its purpose</li> <li>Describes an advantage <b>and</b> a disadvantage of the method <b>in this case</b></li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> <p>Presentation, spelling, punctuation and grammar are of a high standard.</p>	<b>[4]–[5]</b>
<b>Band 1</b>  <b>Good</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate description of the observation method</li> <li>Provides an accurate description of the purpose of the observation method</li> <li>Uses some relevant Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.</p>	<b>[2]–[3]</b>
<b>Band 0</b>  <b>Basic</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides a description of the observation method which is correct but which lacks detail</li> <li>Makes limited use of Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.</p>	<b>[1]</b>

[5]

20

- 2 (a) A storyboard is used in the design of the user interface  
 It uses diagrams  
 ... to show the screens/pages  
 It identifies navigation paths/branches  
 It identifies any input and output  
 (3 × [1]) [3]
- (b) A prototype is a 'first cut' model  
 The prototype will focus on processes/functions  
 ... and the IO required  
 ... so that data structures/tables and relationships can be identified  
 (4 × [1]) [4]
- (c) A set of data to test a particular function/feature/scenario [1]  
 ... and the expected outcome [First point required] [1] [2]
- (d)
- | Test data  | Type of test data   | Purpose of test data   |
|------------|---------------------|--|
| <b>-50</b> | Invalid/exceptional | To check that a reorder quantity outside the range is rejected   |
| <b>'X'</b> | Invalid/exceptional | To check that an incorrect data type/<br>incorrect format<br>/data which is not an integer is rejected |
| <b>100</b> | Boundary/extreme    | To check that a reorder quantity at the upper limit is processed correctly                             |
- (6 × [1]) [6]

AVAILABLE  
MARKS

**(e) System testing**

Performed in house by the development team using the test plan/schedule  
 Comprises system testing, module or unit testing, integration testing  
 White box/black box testing may be used

**Purpose**

Tests that the system meets the system specification  
 Tests that each individual function or module meets its specification  
 Tests the interaction/integration between modules

**Acceptance testing**

Performed by the user using real volumes of data

**Purpose**

Tests that the system meets the user requirements so that the system can be handed over/signed off

Level of response	Marking criteria	Marks
<b>Band 2</b>  <b>Excellent</b>	The candidate <ul style="list-style-type: none"> <li>Provides an accurate description of <b>both</b> methods of testing</li> <li>Distinguishes clearly between the purpose of each method of testing</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> Presentation, spelling, punctuation and grammar are of a high standard.	<b>[4]–[5]</b>
<b>Band 1</b>  <b>Good</b>	The candidate <ul style="list-style-type: none"> <li>Provides an accurate description of <b>both</b> methods of testing</li> <li>Uses some relevant Digital Technology terminology</li> </ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	<b>[2]–[3]</b>
<b>Band 0</b>  <b>Basic</b>	The candidate <ul style="list-style-type: none"> <li>Provides a description of <b>both</b> methods of testing which are correct but which lack detail</li> <li>Makes limited use of Digital technology terminology</li> </ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	<b>[1]</b>

[5]

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**3 (a) Technical documentation**

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/IO formats  
 Test plans/test schedule/test data/test results/test schedule  
 Hardware and software configuration/specification/requirements  
 (3 × [1])

**User documentation**

User guide/operating instructions  
 Installation guide  
 The HW/SW required  
 Help/troubleshooting/FAQ support  
 Training materials/tutorials  
 (3 × [1])

[6]

**(b) General points**

The new system is implemented in one section/department or part of the organisation's data will be processed by the new system  
 The existing system is still used elsewhere or all the data continues to be processed by the existing system  
 When proven, the new system will then be implemented across the organisation or the new system will then process all the data

**MAX [2]** for features of pilot changeover method

**Advantages**

It the new system fails only one section/department will be affected  
 Results between the two systems can be compared  
 Users of the pilot can be used to train other users

**Disadvantages**

There is duplication of resources/effort  
 It can be difficult to identify an appropriate section/department/partition of data for the pilot  
 The ability of the system to process all the data is not tested by the pilot  
 (6 × [1])

[6]

- (c)** The way in which existing data is structured/stored does not match the way in which it will be stored in the new system  
 Example: different data structures/different file formats/different tables/  
 different attributes/existing paper-based records  
 (2 × [1])

[2]

AVAILABLE MARKS



**(d) Corrective maintenance**

Removes errors discovered when the system is in use

**Adaptive maintenance**

Adds new functionality to the system required by changes in the user requirements, internal and external

**Why might corrective maintenance decrease?**

The longer the system is used, more and more errors will already have been found and fewer errors will remain

**Why might adaptive maintenance increase?**

The longer the system is used, the more likely it is that the needs of the user will change due to changing business demands or external factors such as new legislation

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Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate description of <b>both</b> methods</li> <li>Explains clearly why the amount of corrective maintenance will decrease and why the amount of adaptive maintenance will increase</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> <p>Presentation, spelling, punctuation and grammar are of a high standard.</p>	<b>[5]–[6]</b>
<b>Band 1</b> <b>Good</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate description of <b>both</b> methods</li> <li>Explains why corrective maintenance reduces <b>or</b> adaptive maintenance increases</li> <li>Uses some relevant Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.</p>	<b>[3]–[4]</b>
<b>Band 0</b> <b>Basic</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides descriptions of <b>both</b> methods which are correct but which lack detail <b>or</b> refers to corrective maintenance reducing or adaptive maintenance increasing</li> <li>Makes limited use of Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.</p>	<b>[1]–[2]</b>

[6]

20

- 4 (a)** Consists of a number of stages  
 The stages are completed in sequence/one after the other  
 Example: Analysis/Design/Implementation/Testing/Installation/Maintenance  
 Each stage must be completed before the next stage commences  
 Each stage produces a deliverable  
 Example: systems specification at end of the analysis stage  
 If an error is discovered in one stage, the stage may have to be restarted  
 ... or a previous stage may have to be revisited  
 (6 × [1]) [6]
- (b)** The name/reference number of the stage  
 The finish date of each stage/the duration of each stage  
 The predecessor of each stage  
 The successor of each stage  
 The current status of the project  
 Dependencies between stages  
 The resources required for each stage  
 (3 × [1]) [3]
- (c)** The chain/sequence of activities which must be followed  
 ... to ensure the project is completed in the minimum time/is not delayed  
 (2 × [1]) [2]

AVAILABLE MARKS

**(d) Critical path analysis**

A method or software tool which enables the project manager to plan the project's schedule, monitor the project's progress and amend the scheduled if required.

**More control**

The project manager can construct a graphical model of the project and identify the resources required, dependencies between stages, and stages which can be completed in parallel, critical activities and float times and calculate the minimum time needed for project completion.

Once the project commences, the project manager can monitor the project's progress, resolve conflicts/bottlenecks, and respond to delays by reallocating resources so that project completion time is a minimum.

The critical path can be calculated and updated automatically.

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate and detailed description of critical path analysis</li> <li>Explains clearly why the use of critical path analysis gives the project manager more control of a project</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> <p>Presentation, spelling, punctuation and grammar are of a high standard.</p>	<b>[4]–[5]</b>
<b>Band 1</b> <b>Good</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate and detailed description of critical path analysis</li> <li>Uses some relevant Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.</p>	<b>[2]–[3]</b>
<b>Band 0</b> <b>Basic</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides a description of critical path analysis which is correct but which lacks detail</li> <li>Makes limited use of Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.</p>	<b>[1]</b>

[5]

**(e) The organisation may be at risk from natural/man-made disasters**

The organisation must be able to continue to function

... in an emergency capacity while the risk is active

... and to function normally as soon as possible after the risk has been eliminated

The organisation needs to identify the risks/key personnel/key data/key functions

The organisation needs an alternative location to switch over to

(4 × [1])

[4]

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**5 (a) Syntax**

The set of rules

... defining the format/structure of each type of program statement/command/instruction

(2 × [1])

**Data type**

A description of the kind of data

... which is stored or manipulated in a variable/program/field/attribute

(2 × [1])

**Variable**

The name/identifier of a memory location

... which holds data during program execution.

(2 × [1])

[6]

**(b) A sequence**

A series/number of instructions is executed

... in the order in which they are listed/one after the other

(2 × [1])

**Scenario** The three steps in the algorithm will be executed one after the other [1]

**Selection**

An action will be executed ... only if a condition is true [2]

**Scenario** The basic pay will be increased if the employee has worked for more than 35 hours [1]

**A count controlled loop**

A variable governs the number of times the loop is executed

... for which start/end/increment values are specified

(2 × [1])

**Scenario** The three steps algorithm will be repeated 100 times [1]

[9]

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**(c) Inheritance**

A new class can inherit the properties (attributes) and methods (behaviours) of an existing class and have additional properties and methods

The existing class is the base/parent/super class

The new class is the derived/child/sub class

**Improved productivity**

A new class does not have to be developed from scratch. The code of an existing class can be reused. New code is required only for the additional properties and the additional/overwritten methods. This reduces development time.

The super class will have been already tested. Testing is required only for the additional properties and the additional/overwritten methods of the derived class. This reduces the time required to perform testing.

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate and detailed description of inheritance</li> <li>Explains clearly one reason why the use of inheritance should result in improved productivity</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> <p>Presentation, spelling, punctuation and grammar are of a high standard.</p>	<b>[4]–[5]</b>
<b>Band 1</b> <b>Good</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides an accurate and detailed description of inheritance</li> <li>Uses some relevant Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.</p>	<b>[2]–[3]</b>
<b>Band 0</b> <b>Basic</b>	<p>The candidate</p> <ul style="list-style-type: none"> <li>Provides a description of inheritance which is correct but which lacks detail</li> <li>Makes limited use of Digital Technology terminology</li> </ul> <p>Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.</p>	<b>[1]</b>

[5]

**Total****AVAILABLE MARKS**

20

**100**