



*Rewarding Learning*

**ADVANCED  
General Certificate of Education  
January 2014**

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## **Information and Communication Technology**

**Assessment Unit A2 1**

*assessing*

**Module 3: Information Systems**

**[AP211]**

**MONDAY 20 JANUARY, 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 the 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 the 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)** Software can be shared  
 Hardware can be shared  
 Communication between users is possible  
 Users are not restricted to a specific computer  
 Security can be controlled centrally  
 [1] for each of three points [3]
- (b)** There is a central/controlling node/a hub  
 A client is a 'dumb' terminal  
 The clients make requests for resources  
 Example of resource: data/HW/SW/web connection  
 (When a request is made,) then the server meets the requests/provides  
 or allocates the resource  
 [1] for each of four points [4]
- (c)** Devices do not have to be physically connected together  
 . . . so devices can connect to the network anywhere there is a signal  
 [1] for each of two points
- Additional devices can be connected to the network  
 . . . using a wireless card/portable devices such as notebooks can be added  
 [1] for each of two points
- [2] for each of two benefits [4]
- (d)** Security can be a risk  
 . . . unless access to the network is password protected  
 [1] for each of two points [2]
- (e)** 10101011  
 This number of 1s is odd/the parity is odd  
 . . . so one bit has flipped/an odd number of bits has flipped/changed
- 10101010  
 The number of 1s is even  
 . . . so two bits have flipped/an even number of bits has flipped/changed  
 [1] for each of four points [4]
- (f)** Check sums [1]  
 Before a block of data bytes is transmitted, the binary values of the data  
 bytes are added together.  
 This check sum is placed in a byte and sent along with the data.  
 When the data arrives at the destination, the checksum is recalculated  
 If the check sums do not match, the data will be re-transmitted.  
 [1] for each of three points
- Echo checking [1]  
 The receiving device sends the data back to the transmitting device  
 The transmitting device compares this data with the original data  
 The transmitting device retransmits the data if there was an error  
 [1] for each of three points
- [4] for one method [4]

- 2 (a)** It is an iterative development process (continuous/cyclical)  
 Users and developers take part in regular workshops/focus groups  
 A preliminary data model/prototype is developed along with a user interface  
 This helps verify the requirements/refine the data model/implement the required processing  
 There are strict deadlines set for each refinement/end times are set  
 Requirements/functionality are prioritised/categorised  
 . . . as essential/non essential
- [1] for each of five points [5]
- (b)** The waterfall model [1]  
 Consists of a number of distinct stages  
 Example – Analysis  
 Each stage has a deliverables e.g. requirements specification  
 Each stage may be repeated  
 [1] for each of four points
- Prototyping [1]  
 A first-cut model is developed  
 . . . and evaluated by the users  
 . . . who provide feedback to the developer  
 There are two types – evolutionary and throwaway  
 [1] for each of four points
- [5] for one method [5]
- (c)** Alpha testing  
 Performed by the developer  
 . . . using test/simulated data  
 Module/integrated/system testing is involved  
 White box/black box testing may be used  
 [1] for each of two points
- Beta testing  
 Performed by representative end users  
 . . . using real data and real volumes of data  
 This is pre-release testing  
 [1] for each of two points [4]
- (d)** System specification  
 Function/module specifications  
 Code listings  
 HW & SW specifications  
 Data dictionaries  
 Data models, e.g ERDs  
 Test schedule/data  
 [1] for each of four points [4]
- (e)** Is in overall charge of the project  
 Plans/allocates budget/schedule/resources  
 Monitors project progress  
 Identifies/responds to risk  
 [1] for each of four points [4]

- 3 (a)** To accept input from the user  
To provide output for the user  
[1] for each of two points [2]
- (b)** Allows user to interact using written or spoken 'human' language  
Verbs or phrases are used  
... to instigate functionality  
Example: creating, selecting, modifying data  
The user's commands are compared  
... with a database of sounds  
... using speech recognition software  
[1] for each of four points [4]
- (c)** Perception [1]  
Past experiences or intuition  
... can influence how users perceive objects  
Example – the use of colours to strengthen or weaken information such as  
'green for go'  
This can influence the use of metaphors/icons  
[1] for each of three points
- Memory [1]  
How humans retain and recall information  
... including long-term/short-term memory  
The memory load on the user should be kept to a minimum/cognitive  
overload should be avoided  
Examples: the use of short menus/use of standard interface  
[1] for each of three points [8]
- (d)** A touch screen is an input and output device  
Menu options/help is displayed on the screen  
A stylus may be provided  
The screen may be covered by a membrane  
... which is sensitive to pressure  
Or there may be a line of infrared/light/lasers/sensors  
... at the corners/sides of the screen  
The pressure of the user's finger is detected/the finger cuts the beams  
The position of the location is calculated  
[1] for each of four features [4]
- (e)** The course is delivered over the Internet/an intranet  
Each participant logs on at time convenient to them and sets their own  
pace and can repeat/review previous sections/jump ahead  
The course content is presented using multimedia/video/audio/graphics  
Participants may communicate with the instructor via email/forum/user  
groups  
Information may be disseminated to participants via bulletin boards  
Different navigation paths may be provided for different categories of users  
The progress of the trainees can be monitored electronically  
Performance feedback can be provided  
[1] for each of four points [4]

- 4 (a)** Unauthorised access to computer material  
 Unauthorised access with intent to commit or facilitate commission of further offences  
 Unauthorised modification of computer material
- [1] for each of two points [2]
- (b)** Data Protection Act [1]
- The Act applies to any computerised or manual records containing personal information about people  
 Organisations using personal data must register that they use personal information  
 . . . and comply with enforceable rules for handling personal information  
 [1] for each of two points
- Copyright, Designs and Patents Act [1]
- Applies the concept of intellectual property/ownership to software  
 A licence is required for copyrighted software  
 It is illegal to copy unlicensed software  
 It is illegal to distribute unlicensed software  
 [1] for each of two points
- The Health and Safety at Work Act [1]
- Defines legal standards for computer equipment  
 . . . and identifies the steps employers must take to minimise risks  
 The Act places most responsibilities firmly with the employer  
 The employee may receive damages for injuries  
 . . . if the employer could have foreseen the risk and ignored it  
 [1] for each of two points
- [3] for each of two laws [6]
- (c)** A rationale for the policy  
 The employer's rights/the employee's responsibilities regarding the use of ICT  
 Security procedures such as secure logging on and off  
 Prohibited actions which will compromise data security, e.g. the use of storage devices not checked for viruses  
 Management and employees responsibilities relating to legislation  
 The disciplinary process/appeals process  
 . . . and the penalties for non-compliance  
 [1] for each of four points [4]
- (d)** They will be members of the professional body for IT professionals  
 It has over 65,000 members in more than 100 countries  
 They will be able to enroll for accredited IT qualifications/courses  
 They will be able to join one of 40 specialist groups  
 . . . and keep abreast of current developments in numerous areas of IT  
 The BCS fosters links and resource sharing between industry, academics and business  
 . . . and establishes good working practices, codes of conduct/standards/ influences legislation  
 The BCS supports employers to help them adopt best practice  
 [1] for each of four points [4]

- 5 (a) Some (non-key) attributes will be stored more than once/data duplication  
Example: customer names  
This can lead to increased storage requirements  
. . . and to data inconsistency  
. . . where an attribute may have more than one value  
Example: there may be two versions of a customer's address  
[1] for each of four points [4]

(b) 1NF

- \* LoanID Customer ID CName Address LoanDate TotalCost
- \* LOAN-PLANT-1  
LoanID Plant ID PName Quantity

2NF

- LOAN-1*  
*LoanID CustomerID CName Address LoanDate TotalCost*
- \* LOAN-PLANT-2  
LoanID Plant ID Quantity
- \* PLANT  
PlantID PName

3NF

- \* LOAN-2  
LoanID CustomerID LoanDate TotalCost
- LOAN-PLANT-2*  
*LoanIDPlantID Quantity*
- PLANT*  
*PlantID PName*
- \* CUSTOMER  
CustomerID CName Address

[1] for each of six starred entities

[6]

**Alternative solution**

AVAILABLE  
MARKS

**1NF**

\* LOAN-PLANT-1  
LoanID Plant ID Quantity CustomerID CName Address LoanDate TotalCost

\* PLANT  
PlantID PName

**2NF**

\* LOAN-1  
LoanID CustomerID CName Address LoanDate TotalCost

\* LOAN-PLANT-2  
LoanID PlantID Quantity

*PLANT*  
*PlantID PName*

**3NF**

\* LOAN-2  
LoanID CustomerID LoanDate TotalCost

*LOAN-PLANT-2*  
*LoanIDPlantID Quantity*

*PLANT*  
*PlantID PName*

\* CUSTOMER  
CustomerID CName Address

[1] for each of six starred entities

[6]



(c) The responsibilities of the DBA include:

- Installing and upgrading the DBMS software
  - Monitoring the performance of the database
  - Making optimum use of storage
  - Establishing backup and recovery duties
  - Setting access rights
  - Managing the database users and security measures
  - Working with the database developers
- [1] for each of four points

[4]

(d) End users will be able to run queries  
 End users will be able to produce reports  
 End users will be able to run macros  
 [1] for each of two points

[2]

(e) Reservations must be processed immediately  
 . . . so that the plants involved are identified as booked  
 . . . so that nobody else can book the same plants  
 . . . and only plants that are available can be booked  
 [1] for each of four points

[4]

(f) The garden centre staff will be questioned  
 . . . by the expert system's designer  
 They will contribute to the knowledge base  
 They will explain how they identify plants, the different features of plants they use and their knowledge of plant genealogy  
 . . . including any intuition/'rules of thumb'  
 [1] for each of four points

[4]

24

**6** How the MIS is used to optimise stock levels

This is known as 'just in time' (JIT) delivery of stock  
 The MIS will take raw/transaction data from a number of internal/external sources and provide up-to-date reports on stock levels/deliveries  
 It will use data from automated stock control/sales processing systems  
 Bar codes used at POS/warehouse for automatic stock level updating  
 Automatic reordering of stock when levels fall below set minimum levels  
 Electronic reordering of stock directly with suppliers  
 Too much stock wastes storage space and is expensive while too little stock risks stock shortages  
 [1] for each of four 'substantive' points with appropriate use of ICT

The risks in optimising stock levels

Deliveries/stock levels are so fine-tuned that any disruption to the ordering/delivery process can lead to immediate shortages  
 Stock with very short shelf lives (e.g. fresh food) is particularly vulnerable to disruption  
 Internal disruptions such as a power failure at supermarket/suppliers will prevent stock being updated/reordered  
 External disruptions such as a minor disruption to transport network from the weather may lead to immediate shortages as delivery lorries may be stranded  
 [1] for each of four 'substantive' points

[0],[1] or [2] for structure

[10]

10

QWC

5

**Total**

**120**

AVAILABLE  
MARKS

## Quality of Written Communication (QWC) in GCE Mark Schemes

The assessment of quality of written communication.

Marks are to be allocated to QWC in accordance with the following criteria.

<b>Performance Level</b>	<b>Criteria</b>	<b>Marks</b>
Threshold	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	0, 1
Intermediate	Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	2, 3
High	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy; deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	4, 5