

**MARK SCHEME for the May/June 2013 series**

**9713 APPLIED INFORMATION AND  
COMMUNICATION TECHNOLOGY**

**9713/12**

Paper 1 (Written A), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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**1 (a) Six from:**

*Discrete process control*

**Three** from:

Specific tasks are performed (by the robotic arm)

It is an on/off or stop/start process

Fitting the wheels on a car is an example/wheels are fitted by robots

Robots stop

Next car comes along and the process is repeated

*Continuous process control*

**Three** from:

Used in processes which appear to be unending

An example is the maintaining of temperature

Within a confined area

Keeping the temperature at a comfortable level for workers and robots

**[6]**

**(b) Six from:**

It's a proportional–integral–derivative algorithm

Used when preset value is a constant

PLC stores preset value of temperature

Temperature is input from sensors

A set of logic statements is used

PID causes the PLC to make proportional changes to the temperature ...

... by switching the compressor on for short periods of time

PLC/PID is used to compare temperature with a pre-set value

PID calculates difference between the input value and the preset value

If below, PLC switches heating element on/switches off compressor for a short time

If above, PLC switches heating element off/switches on compressor for a short time

PLC/PID checks the difference again

If still below, PLC switches heating element on for a short time

If still above, PLC switches off compressor for a short time

Until preset value is reached

**[6]**

**2 (a) Two from:**

Grippers

Vacuum/suction cups

**[2]**

**(b) Three from:**

Spray guns/sprayer to paint the car body

Polishers/finishers to produce a shiny finish (after painting)

Sanders to prepare body for painting

Cameras to inspect/check work

**[6]**

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(c) **Four** from:

(The programmer) controls the robot by physically guiding the arm through each step  
The programmer has sensors attached to his/her arm  
The sensors transmit data to the computer  
The computer stores the sequence of movements ...  
... as a program in its memory

[4]

(d) **Four** from:

Initial purchase of robots  
Initial cost of installation  
Initial redundancy payments  
Maintenance costs  
Initial cost of paying programmers  
Cost of re-training

[4]

(e) **Two** from:

It is a safer/less dangerous/less hazardous environment for humans  
The work areas are cleaner  
Jobs are less boring  
Don't have to lift heavy weights

[2]

3 (a) **Three** from:

Observation  
Benefit – enables the systems analyst to see the process as a whole  
Drawback – explanation of the 'Hawthorne effect'

Interviews  
Benefit – Interviewer can move away from their 'script' and ask a more in-depth question if a particular response is given/can interpret body language

Drawback – **One** from:  
Users have to be available at the time the systems analyst wants to interview them/may not have the time/can take a long time to interview all the users  
Interviewees might try and provide answers which they think the interviewer wants to hear

Questionnaires  
Benefit – **One** from:  
Answers tend to be, on the whole, more accurate  
Everyone can complete the questionnaire at the same time instead of one after the other (as with interviews)/can complete it at their leisure  
Drawback – it is very difficult to ask further questions based on the response to another question/ can be anonymous and so may not be taken seriously by user

Examining documents  
Benefit – helps to identify the inputs and outputs of the system/volume of data can be determined/processing can be deduced  
Drawback – can take a long time to collate documents

[9]

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**(b) Two** from:

Data flow diagrams  
Using (**two** from:) terminators, processes, flow arrows and stores  
Represents inputs, outputs and processing

**Two** from:

System flowcharts  
Using particular input, output, storage and processing symbols  
Represents inputs, outputs and processing  
(only if not used for DFDs)

[4]

**(c) One** factor for each item from:

*Specifying the required hardware*

The volume of data determines the choice of hardware  
The order that data will be output affects the choice of storage devices

*Designing data collection forms/screen layouts*

The user requirements influences the format  
The output required from system influences the design  
File structures affect the design

*Designing validation routines*

The form of input affects these  
The file structure affects these

*Designing the required file structure*

The data structures/programming depend on the types of processing  
The file structure depends on the input and output structures

[4]

**4 (a) Two** from:

A field which contains unique data/no value occurs more than once/is the primary key in one table/is the foreign key in the other table [1]

In this example the ISBN [1]

**(b) Three** from:

Relationships will be designed using the key field  
Between the two tables/separate tables  
The bookshop data table and the books data table  
Key field will be used as a foreign key in the linked table

[3]

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(c) **Three** from:

Data is not repeated  
 Less storage capacity needed  
 Easier to expand  
 Data only needs to be amended once  
 Easier to produce reports with cross-tabular data rather than separate files  
 Data integrity is maintained  
 (If data was duplicated) hackers would have easier access to data

[3]

5 (a) **Two** from:

Sort code  
 Account number  
 Date of birth  
 Examples of memorable data  
 Full name  
 Post code

[2]

(b) **Three** from:

Phone tapper/Hacker can only get hold of three characters in one go  
 Phone tapper/Hacker might need to know the whole password to get into account  
 Phone tapper/Hacker would need to intercept password several times to get into account  
 Will probably be different three characters asked for at next log in

[3]

(c) **Three** from:

It asks the caller to select from a menu  
 It asks the caller to enter information using a keypad  
 It asks the caller to enter information by answering yes/no/saying words  
 It translates key presses through the tones produced by the phone  
 It detects spoken words using speech recognition  
 Upon receiving data it gives the balance of the account  
 Call can be directed to an operator

[3]

(d) **Two** from:

Can take a long time to navigate through the menus/may be in a queue if you want to speak with an operator  
 The menus might provide too many/too few options  
 Too much information may be provided at the beginning of the call  
 Voice prompts might be hard to understand  
 IVR may not understand your accent/voice

[2]

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**6 (a) Three from:**

(Save costs as) don't have to rent so many high street premises  
 Employ fewer staff therefore less paid in staff wages  
 Save costs of printing/sending statements  
 Lower running costs, fewer branches so less electricity, heating and lighting  
 Less likelihood of the bank being robbed  
 Less money is spent on security staff [3]

**(b) Two from:**

High redundancy payments  
 Cost of buying equipment  
 Cost of installing system/paying systems analyst/programmers/web designers (to set up web site)  
 Some staff will need to retrain (which is costly) [2]

**(c) Four from**

There is no queuing in online banking  
 Can bank at any time of day or night  
 Can bank anywhere in the world providing you have Internet access  
 Can ask for a loan over the Internet without being embarrassed  
 Interest rates on savings accounts tend to be higher  
 Doesn't have to worry about whether the mail will get bill payments to companies on time  
 There is less likelihood of robbery/no likelihood of violence [4]

**7 (a) Three from:**

Insurance  
 Government  
 Tourism  
 Education  
 Social services [3]

**(b) Three from:**

Has range of multimedia - sound, video/animation, unlike posters/flyers  
 Other features e.g. slide transition effects, special text effects, image transition, unlike flyers/posters  
 Always on while mall is open/the user cannot switch it off – web site can be closed at any point/flyers can be thrown away  
 Flyers can target your audience better than slide show [3]