

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Advanced Subsidiary Level and GCE Advanced Level**

**MARK SCHEME for the May/June 2012 question paper**  
**for the guidance of teachers**

**9713 APPLIED ICT**

**9713/31**

Paper 3 (Written B), 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.

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1 (a) Any **four** devices identified and **one** purpose for each given from, e.g.:

Network Interface Card/NIC

- for a system to communicate with network
- interface between network cable and computer
- prepare and send network traffic to/from computer

Hubs

- receives and/or sends packets to all devices connected to it

Switches

- direct flow of data packets to specific/individual devices connected to it
- stores details of MAC address of connected device(s) in order to direct packets

Cabling/wireless link

- carry data

Bridge

- to link sectors of network
- to convert protocols of one network to those of another

Router

- to send data to other networks/between LAN and WAN
- forwards a data packet to its destination

Proxy server

- act as intermediary between client devices and servers
- to cache frequent requests for data/web pages to speed up access for client device

Firewall (hardware) to control data traffic

- to analyse traffic
- to allow or deny access by network traffic

Servers

- File servers to store user data
- Application servers to distribute software to client devices

[8]

(b) Any **four** from:

Examines IP address in packet and uses look up table of allowed IP address/forbidden addresses

Checks allowed domain names in allowed/forbidden table

Filters on keywords/code sequences in data packets

Blocks/allows ports for data transmission

Can be set to stealth mode so that packets are not bounced back

Can monitor traffic flow

Can act as a proxy server to control access

Can act as authenticator for remote access e.g. manages passwords

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- (c) Any **four** points from:
- Source port/IP address which is the port of sending device
  - Destination port/IP address to know where the data is to be forwarded
  - Number in the sequence of packets
  - ACK number (if set)
  - Data offset value – showing where the header ends and data begins
  - Checksum for error detection
  - Options flag to permit further information
  - Padding to fill in header before data
  - Total length of packet
  - Time to live

[4]

**2 (a) Any 3 described plus a benefit point from:-**

twisted pair

Electrical cable with at least two central wire conductors surrounded by layers of insulation

- Carries data at high speed
- Higher bandwidth than WiFi
- Reduction in data loss due to lower susceptibility to electrical/magnetic interference
- Lower susceptibility to interception
- Fairly cheap to run a link

Fibre optic

Made of high quality glass using light as carrier of data

- Higher speed data transfer than copper or WiFi
- Bandwidth is greater than copper or WiFi
- Longer lengths possible c.f. copper cable
- Can be used for external links between buildings
- More secure as data cannot be read while in transit/glass has to be broken to be tapped into

WiFi

Communication is by radio waves

- No need for wires hence less costs installing
- Easy to just fit an access point than wire up a switch
- Most laptops have WiFi and can quickly be given access rights
- Enables mobile connections

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- 3 (a) Any **four** devices described and **one** purpose identified or example given from:
- Joystick/flight yoke for use by hand linked to potentiometer to record movement by pilot/manoeuvre aircraft
  - Pedals for use by feet linked to sensor to record movement by pilot
  - Switches to control inputs to system e.g. lower under-carriage
  - Microphone to communicate with instructor
  - Loudspeakers/headset/headphones to output sound to provide feedback to pilot
  - Throttle levers linked to sensor/potentiometers for input of engine control
  - Instruments/dials/display showing current conditions of plane
  - Navigation display to show direction/location
  - Large display/screen to project image for pilot to interpret

[8]

- (b) 6 points from:-

*Advantages:*

- There may be no aircraft available to permit training
- Passengers would not be happy if a trainee was undertaking tasks
- Extremely unusual events can be programmed into the simulator
- Events can be repeated as often as required
- The operator can adapt the program to suit trainee's performance
- Training can be recorded for future use/automatic assessment
- Weather conditions can be created at will
- Cheaper than using real aircraft/flights
- Safer than using real aircraft

*Disadvantages:*

- Pilots may not consider the simulator as real
- Simulators are very expensive to buy and run
- Not all events/parameters/conditions can be simulated

Max 5 marks if all advantages or disadvantages

[6]

- 4 (a) Any **four** points from:
- Shows clearly the stages/tasks in a big project/project milestones
  - Can be used as a communication device between team members
  - Can be used to motivate teams by showing progress
  - Allows tasks to be better co-ordinated
  - Problems can be resolved by seeing the effect of moving resources
  - Permits time management of project/shows end time of project
  - Allows flexibility in project management
  - Permits more efficient management of tasks/show timings of each task/deadlines
  - Parallel and sequential tasks with appropriate examples can be represented
  - Progress of each task with appropriate example can be shown

[4]

- (b) Any **four** points from:

- An item would be ordered to be delivered at a specified time
- Just in time to be fitted to the simulator
- Order triggered automatically by stock control system when stocks are at re-order level

[4]

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(c) any **five** points from

CAD

Computer Aided Design is used by engineers to design accurate drawings of a component

Component/prototype can be tested before it is produced

Can modify designs as result of testing under variety of conditions

3D views can be created from 2D drawings

Can zoom/view from different angles

Total cost of a product can be calculated using a database of parts held by program

CAM

Computer Aided Manufacture linked to computer system

CAD generates a list of instructions for the Computer Numerically Controlled lathe/similar appropriate device

To cut product to designed dimensions

Using LOGO type commands

And monitoring the dimensions of the prototype

[5]

5 (a) Any **four** points from:

Facts base

Holds the data collected from experts

Rules base

Holds the rules as a series of IF...THEN...

Tests the input data

Backward/forward chaining

(b) **One** item identified and **one** description from:

Explanation system

providing a trace of the reasoning that produced a decision

User interface

using a display

to allow user to input data/request

Inference engine

which reasons by chaining

used in conjunction with rules base to reason through a problem

to provide a solution

Knowledge base editor

used to edit data

input/update facts

[3]

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**6 Three services plus one example from:**

Education and learning opportunities  
such as places in senior schools/universities

Motoring  
such as driving licence/car tax

Home  
such as regulations for building/selling

Community  
such as local councillors/crime rates/contacts

Employment  
such as local government vacancies

Financial matters  
such as rates, tax benefits, pensions

Health information  
such as local doctors, hospitals, safe practices

Travel and transport  
such as bus times/company details, passports

Environment  
such as recycling centres, progress towards targets

Crime  
such as location of police stations, crime figures for state, location of courts

Legal rights  
such as DPA, consumer rights, citizenship issues

Electoral issues  
such as registration of voters/electoral timetables/online voting

[6]

**7 Three descriptions of reports e.g.:**

Average time of call by operator  
Used to rank operators  
Identify weaker operators for training/sacking  
Comparison with previous sessions

Statistics on number of calls made  
Proportion of calls rejected  
Totals calls by operator  
Identification of best operator for prize

Costs associated with survey  
Operators' total time  
Call costs  
Computer time costs

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**8 Six from:**

Video conference

- Greater perception of personal safety than flying abroad
- Can use an encrypted link so information is secure
- Participants can see body language/facial expressions
- Can be called at short notice
- Costs of travel reduced
- Costs of venue reduced

- Requires special conferencing software with CODEC/compression
- Requires specialist hardware e.g. video camera/microphone
- Equipment costs are higher than telephone conference
- Delays in video/audio signals can be problematic
- Time has to be agreed with participants

Phone conferencing

- Participants just log in with touch keys
- Cheaper running costs than other conferencing

- Time has to be agreed with participants
- Call has to be set up with server
- Cannot see other participants
- Never sure whose turn it is to speak

Instant messaging

- Easier to use than e.g. video-conferencing
- Need to log in
- Cheaper provided there is internet access

- Not really suitable for large groups of users
- Some companies block use
- Can be insecure for e.g. transferring confidential documents

**[6]**

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- 9 Any **six** points with disadvantage(s) from e.g.:  
Limited access to:

Education services

limiting school education/university entrance  
no access to research facilities

Health services

e.g. lack of access to doctor or dentist services lowering life expectancy  
no access to online services e.g. NHS Direct

Employment opportunities

not knowing if there are vacancies in big cities/going to big city and being turned away  
no applications for jobs

Smaller market for local products

no online sales for e.g. craft ware  
no online advertising

Local government community services

house stock availability  
planning applications

Local government news service

updates not easily accessed  
policies not easily accessed

Communications limited due to lack of infrastructure

Reduced speed of communication

Web services such as e-commerce, email, information searching

Limited ICT skills:

Lack of computer skills e.g. not skilled in application use e.g. word-processing

Unable to apply or jobs online

Lack of skills in e.g. searching for information

Reduced access to information

Reduced ability to evaluate information/news

Reduction in ability to communicate information.

[6]