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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.
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


(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
(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

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
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

(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

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

(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

© University of Cambridge International Examinations 2012
(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

(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

© University of Cambridge International Examinations 2012
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

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

[6]
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 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]
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.