



GCE MARKING SCHEME

SUMMER 2016

**APPLIED ICT
1647/01**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE Applied ICT

SUMMER 2016 MARK SCHEME

AICT 7

eConnect

Networking Principles, Design and Management

1. (a) *Describe three advantages of using networked computers compared to stand alone computers.*

Advantages of using networked computers – Any **three** of: [3x1]

- Can share expensive hardware such as colour printers
- Easier to maintain as only install one copy of software on server or can manage network from console
- Easier to back up work on a central server / work is automatically (periodically) backed up
- All users can access/share same data such as databases
- All stations could have Internet access
- Can communicate using the network / set up company intranet
- Can monitor users on network
- Employees can be monitored (check what files have been accessed and when)

- (b) *Describe three disadvantages of installing and using networked computers compared to stand-alone computers.*

Disadvantages of installing and using networked computers – Any **three** of: [3x1]

- Disruption caused during installation of cables and equipment as opposed to stand-alone computers
- Cost of installation of cables and equipment (switches etc) as opposed to stand-alone computers
- Concerns over security - only as safe as the weakest point of entry as opposed to stand alone computers which are as secure as long as physical barriers like locking doors are in place
- If network is 'down' no one can work as opposed to stand-alone computers which are unlikely all to crash at same time
- Will require a network administrator/extra IT support as opposed to stand-alone computers which individuals can manage
- Virus spreading – a virus on one machine can spread on a network – the server should have sophisticated anti-virus software
- Under extreme load conditions the network response time can deteriorate

[Question total 6]

2. (a) *State two characteristics of a VLAN. – Any two of:*
- A Virtual Local Area Network (VLAN) offers higher performance for large Local Area Networks (LAN) (1)
because it limits broadcasts (1)
A VLAN does not require a physical local infrastructure (1)
- (b) *State two characteristics of a Virtual Private Network (VPN).*
A Virtual Private Network (VPN) can use a public network (1) to allow a remote computer to securely (1) communicate with a LAN. (2)
- (c) *Describe the processes used to keep communication secure on a Virtual Private Network (VPN). – Any two of* (2)
- Data is encrypted by sending computer (LAN) and decrypted by receiving LAN using same key
 - Data is sent via a virtual tunnel which is set up before communication begins and closed at end of communication
 - To access a VPN a user may require two factor authentication (or special frequently updated device) key in addition to username and password

[Question total 6]

3. *Name four communication protocols identifying a suitable use of each.*

One mark for protocol **and** suitable use (in some cases, could be an example)

HTTP (Hypertext Transfer Protocol)

Used when identifying, requesting and transferring multimedia Web pages over the Internet.

HTTPS (Secure Hypertext Transfer Protocol)

Used when identifying, requesting and **securely** transferring multimedia Web pages over the Internet.

Example - browsing/searching the web but with some encryption so could be used for on-line banking

FTP (File Transfer Protocol)

Used when copying a file from one location to another via the Internet.

Example – downloading a file from a server (on a network)

VoIP (Voice over Internet)

Used when routing voice conversations over the Internet or through any other IP-based network.

Simple Mail Transfer Protocol (SMTP) is a standard for electronic mail transmission across Internet Protocol (IP) networks

Example – **sending** emails over a network

Post Office Protocol (POP) is a standard used by local e-mail clients to retrieve e-mail from a remote server over a TCP/IP connection

Example – retrieve e-mail from a remote server

The Internet Message Access Protocol (IMAP) is a protocol that allows an e-mail client to access e-mail on a remote mail server.

Example – access an e-mail from a remote server

Accept MoIP (Mobile communications over Internet Protocol) allows mobile devices to communicate over the internet normally peer-to-peer using wifi without cost for the user

[Question total 4]

4. (a) *Name each transmission method described below:*
- (i) Duplex (1)
 - (ii) Half Duplex (1)
 - (iii) Simplex (1)
- (b) *Describe the difference between serial and parallel transmission, giving an example of where each transmission method might be used,* (4)

Serial transmission is where bits are transmitted one bit at a time (1) but parallel transmission bits are transmitted in groups (1) (usually 8 bits, 16 bits, 32 bits etc...) at a time

An example of where serial transmission might be used is connecting a device using a USB port to a computer (1)

An example of where parallel transmission might be used is connecting internal devices to the motherboard such as a hard disc drive or a monitor on a laptop (old printer connection) (1)

[Question total 7]

5. (a) *Describe the difference in processing capability between thin client workstations and standard workstations.* (2)

Thin client workstations have limited processing power (1) whereas standard (fat) client will have their own processor and run programs locally (1)

do not run programs (1) or store data/applications (1) whereas most fat client work stations will run programs and store data and/or applications locally.

- (b) *Explain why Green Rock should consider installing a thin client network. – Any three of:* (3)

Thin client workstations are cheaper and have lower running costs compared with standard workstations

They generate less heat and the environment will require less cooling which might be via air conditioning which is expensive to provide or may be required for a valid warranty

There is less hardware inside then they are less likely to fail and require less maintenance

They only require one copy of some software like virus checker for server required – and possibly some application software although user licences would still be required but at a discounted rate

Thin client workstations are physically smaller and save on desktop space

[Question total 7]

6. *Describe the main features of a peer-to-peer network and give one reason for installing a peer-to-peer network.* (4)

Main features of a peer-to-peer network.

- Computers can be connected via a simple hub (1)
- All stations can access each other's data (1)
- All stations can access each other's resources (1)

One reason for installing a peer-to-peer network is that they are fairly easy and inexpensive to set up which would suit a small organisation such as Green Rock (1)

[Question total 4]

7. *Explain how packet switching operates on the internet. Your answer should include reasons why packet switching is the preferred method of communication on wide area networks.* (8)

How packet switching operates:

- Data (content) split into packets before transmission
- Packets are sent in-order but arrive out of order and are re-assembled at destination
- Each packet can take a different route through network
- Each packet carries the source address
- Each packet carries the destination address
- Each packet carries the order number to re-assemble the packets
- Each packet carries data control signals and error control bits

Packet switching is the preferred method of communication on wide area networks because:

- Each packet can take a different route through network which therefore makes it more secure than circuit switching as it is difficult to intercept all the packets. With circuit switching all the data is on same route and could all be intercepted
- Each packet can take a different route through network which means more efficient use of data lines as no waiting during gaps in transmission whereas with circuit switching the line is in use throughout the whole of the communication and cannot be used for any other data.
- Each packet can take a different route through network which means more efficient use of data lines as packet can use least busy route.
- Packets are less likely to be affected by network failure because they can simply take an alternative route but with circuit switching if the circuit fails then another will have to set up

NOTE - The description of any of the points could be extended.

- 7 – 8 marks Candidates give a clear, coherent answer fully and accurately describing the main features of packet switching. They fully describe the contents of a packet and give detailed advantages of packet switching compared to circuit switching. They use appropriate terminology and accurate spelling, punctuation and grammar.
- 4 – 6 marks Candidates describe the main features of packet switching. They describe some of the contents of a packet and give at least one advantage of packet switching compared to circuit switching. There are few errors in spelling, punctuation and grammar.
- 1 – 3 marks Candidates describe some features of packet switching. They may describe some of the contents of a packet and possibly give advantages of packet switching compared to circuit switching. The response lacks clarity and there are significant errors in spelling, punctuation and grammar.
- 0 marks No appropriate response

[Question total 8]

Task 1

[8 Marks]

Screen shot clearly showing location of the following

Switch (accept router) in Office (1)

File server in Office (1)

Printer server in Office (1)

One new workstation (with NIC) in each activity reception and in the office (1)

Choice of each physical component should be justified – other suitable answers may be acceptable

Switch will be used because they have to connect the 3 computers, file server and print server to network (1)

File server because – any one of: (1)

- databases can be stored centrally and accessed from all stations
- only used by administrator to perform network tasks so more secure
- databases can easily be backed up from the file server

One printer server will manage printer in the office to print reports and invoices (1)

Three new workstations (will require a NIC) which will allow access to databases (network) from the sections (1)

Note – A good justification of inappropriate component in an unsuitable location can gain a mark for both the component and the justification.

Task 2**[6 Marks]**

Green Rock Activity Centre has considered adopting a cable communication infrastructure with a mixture of fibre optic cables and twisted pair.

- (a) *Give three advantages of fibre optic compared with twisted pair.*

Advantages of using fibre optic cables compared with twisted pair:

Fibre optic does not suffer electro-magnetic interference but UTP cable may be subject to electro-magnetic interference

Fibre optic cable has no maximum length whereas twisted pair cable is limited to maximum length

Fibre optic cable would allow for faster rates for transmission of data - the maximum capacity of twisted pair cable is less

Fibre optic does not suffer corrosion whereas twisted pair cable may be subject to corrosion

Fibre optic is less susceptible to listening / hacking compared to twisted pair

- (b) *Give two disadvantages of installing fibre optic compared with twisted pair.*

Disadvantages of using fibre optic cables compared with twisted pair:

Expensive to install – cost of cable and connectors

Relatively difficult to install – expertise to install

- (c) *Name the device required to connect two dissimilar media types such as fibre optic and twisted pair.*

Media converter

Task 3**[6 Marks]**

Green Rock Activity Centre would prefer a wireless communication infrastructure.

- (a) *Describe the advantages of installing a wireless communication infrastructure compared with a cable communication infrastructure*

Advantages of installing a wireless communication infrastructure

- don't have to buy expensive cables
- less disruption and cost to business when installing as no need fit trunking etc...
- cables might be dangerous in an activity centre with visitors running around
- cables can be very difficult to repair or replace after installation
- can be difficult to add extra stations to a cable network
- will not require additional hardware such as sockets and cable to connect mobile devices such as tablet computers, notebooks, mobile phones, etc...

- (b) *Describe the role of a Wireless Access Point on a wireless network.*

Allows mobile devices to connect to a wireless network

(1)

Task 4

[4 Marks]

Describe two rules that you would recommend when naming objects to be used in the network.

For each of the two rules, give an example of a suitable name.

For each of the two rules, give an example of a name that would be disallowed.

One mark for **each** sensible rule

One mark for both acceptable and unacceptable names for the rule

Example of rules are:

1. There will be some disallowed characters so make sure that these are listed.

For example commonly disallowed characters are:

- backslash (\)
- slash mark (/)
- colon (:)
- asterisk (*)
- question mark (?)
- quotation mark (")
- less than sign (<)
- greater than sign (>)
- vertical bar (|)

Acceptable name MUST follow rule, for example TheOffice

Unacceptable name MUST break rule, for example The-Office

2. Use unique names as system will not allow duplicates
Acceptable name OfficeComputer and OfficeComputer
Acceptable names OfficeComputer1 and OfficeComputer2
3. Spaces might not be allowed
Acceptable name MUST follow rule – TheOffice
Unacceptable name MUST break rule – The Office

4. There will be reserved words that cannot be used.

For example common reserved words are:

- ANONYMOUS
- INTERNET
- NETWORK
- NETWORK SERVICE
- NT AUTHORITY
- NT DOMAIN
- NTLM AUTH
- NULL
- PROXY
- SELF
- SERVER
- SERVICE
- SYSTEM
- USERS

Acceptable name MUST follow rule – TheOffice

Unacceptable name MUST break rule – server

5. Names should have a minimum and maximum length, for example between one and fifteen characters

Acceptable name MUST follow rule – TheOffice

Unacceptable name MUST break rule – TheActivityCentreReception

Condone

Use all uppercase letters if justified about compatibility with very old systems as lowercase might be converted to uppercase

For example OffComp will be stored as OFFCOMP

Task 5**[2 Marks]**

Giving a reason, describe a suitable naming convention for the users of the network.

One mark for sensible naming convention related to user's actual name that DO NOT contradict any of the statements provided in Task 4 and will deal with duplicate names and will allow an increasing number of unique users to be created.

One mark for a convention and example that will have meaningful user names.

For example HaroldPalmer01 and NOT user1, user2 etc....

The administrator should be able to identify users in future OR help users remember their login names.

AND

One mark for a convention and example that will cope with identical names.

For example DavidJones01 is acceptable but DavidJones is not login names must be unique and some people will have similar or identical names so will need to uniquely identify these users.

Task 6**[1 Mark]**

One mark for 11 suitable user names including a generic auditor login

Example login names are:

Description	Login Name
Harold Palmer, centre manager	HaroldPalmer01
Ms Henrietta Small, assistant centre manager	HenriettaSmall01
Auditor who will be a different person every visit	TheAuditor
Mrs Helen Smythe, outdoor activity manager	HelenSmythe01
Mr Henry Smythe, indoor activity manager	HenrySmythe01
Miss Suzanne Smith, indoor activity supervisor	SuzanneSmith01
Miss Coleen Keegan, outdoor activity supervisor	ColeenKeegan01
Mr David Jones, outdoor activity staff	DavidJones01
Miss Shirley Smith, outdoor activity staff	ShirleySmith01
Miss Deirdre Jones, indoor activity staff	DeirdreJones02
Mr David Jones, indoor activity staff	DavidJones02

Task 7**[2 Marks]**

One mark for at least **three** groups that attempt to allow objectives to be satisfied
Two marks for all groups - notes that a sensible solution with a different number of groups might exist

No descriptions but sensible meaningful group names then apply criteria above
No descriptions and meaningless names then no marks

Example group description and sensible meaningful names are:

Group Description	Group Name
The activity managers and supervisors in the outdoor activity receptions	OutdoorManagers
The activity managers and supervisors in the indoor activity receptions	IndoorManagers
Outdoor staff	OutdoorStaff
Indoor staff	IndoorStaff
The manager and his assistant	CentreManagers
The auditor	TheAuditor

Task 8

[6 Marks]

One mark for each group's permission correctly described **and** the objective(s) achieved for: the shared folder that contains the **Outdoor Activity Booking** Database.

The group that contains the **activity managers and supervisors in the outdoor activity receptions** will need **Full** Permissions to satisfy the objective:

2. *the supervisors and activity managers in the outdoor activity reception to view and make outdoor activity bookings*

The group that contains the **activity managers and supervisors in the indoor activity receptions** will need **Read** Permissions to satisfy objective:

3. *the supervisors and activity managers in the outdoor activity reception to only view indoor activity bookings*

The group that contains the **outdoor staff** will need **Read** Permissions to satisfy the objective:

6. *the staff in the outdoor activity reception to view bookings for outdoor activities*

The indoor staff group that contains the **indoor staff** will not require any Permissions.

The group that contains the **manager and his assistant** will need Full Permissions to satisfy objective:

8. *the centre manager and his assistant should be able to view and amend all activity bookings*

The group that contains the **auditor** will need Read Permissions to satisfy objective.

9. *the auditor should be able to view all activity bookings*

Task 9

[6 Marks]

One mark for each group's permission correctly described **and** the objective(s) achieved for: the shared folder that contains the **Indoor Activity Booking** Database.

The group that contains **the activity managers and supervisors in the outdoor activity receptions** will need **Read** Permissions to satisfy the objective:

3. *the supervisors and activity managers in the outdoor activity reception to only view indoor activity bookings*

The group that contains the **activity managers and supervisors in the indoor activity receptions** will need Full Permissions to satisfy objective:

2. *the supervisors and activity managers in the outdoor activity reception to view and make outdoor activity bookings*

The outdoor staff group that contains the **outdoor staff** will not require any Permissions.

The indoor staff group that contains the **indoor staff** will need Read Permissions to satisfy the objective:

7. *the staff in the indoor activity reception to view bookings for indoor activities*

The Centre Managers group that contains **the manager and his assistant** will need Full Permissions to satisfy objective:

8. *the centre manager and his assistant should be able to view and amend all activity bookings*

The group that contains the **auditor** will need Read Permissions to satisfy objective.

9. *the auditor should be able to view all activity bookings*

Task 10**[1 Mark]**

One mark for the evidence requested of **11** users created correctly **suitable** login names.

Screen Shot 10a - Example screen shot showing user created, password set and must change at next logon:

Screen Shot 10b - Example screen shot showing **11** user created:

Task 11**[1 Mark]**

One mark for evidence of all groups created correctly with **suitable** names.

Screen Shot 11 - Example screen shot showing groups created:

Task 12**[6 Marks]**

One mark up to a maximum of **six** for evidence of **all** users correctly added to **each** group.

NOTE – A good reason for adding a user to a group other than the most obvious or most sensible could gain a mark for reason and a mark for adding user to the group.

Screen Shot 12 - Example screen shot showing the activity managers and supervisors in the outdoor activity receptions added to a group

Screen Shot 12 - Example screen shot showing the activity managers and supervisors in the indoor activity receptions added to a group

Screen Shot 12 - Example screen shot showing the Outdoor staff added to a group

Screen Shot 12 - Example screen shot showing the Indoor staff added to a group

Screen Shot 12 - Example screen shot showing the manager and his assistant added to a group

Screen Shot 12 - Example screen shot showing the auditor added to a group

Task 13

[7 Marks]

One mark for evidence of a shared folder for the outdoor activities data base correctly created

NOTE – Evidence for creating a shared folder could be given in Task 13 or Task 14

One mark for evidence of a shared folder for the outdoor activity database correctly created

One mark for evidence of correctly adding **each** group and setting correct share permissions as stated in Task 8.

The group that contains the **activity managers and supervisors in the outdoor activity receptions** will need **Full** Permissions

The group that contains the **activity managers and supervisors in the indoor activity receptions** will need **Read** Permissions

The group that contains the **outdoor staff** will need **Read** Permissions

The group that contains the **manager and his assistant** will need **Full** Permissions

NOTE - The following groups will have the same Permissions for both folders so only award marks once in either Task 13 or Task 14

The group that contains the **auditor** will need Read Permissions

The group that contains the **indoor staff** will not require any Permissions – if any set the deduct one mark

NOTE - The 'Everyone' group should be deleted but condone if not.

Screen Shot 13 - Example screen shot showing the **activity managers and supervisors in the outdoor activity receptions** with **Full** Permissions

Screen Shot 13 - Example screen shot showing the **activity managers and supervisors in the indoor activity receptions** with **Read** Permissions

Screen Shot 13 - Example screen shot showing the **outdoor staff** with **Read** Permissions

Screen Shot 13 - Example screen shot showing the group that contains the **manager and his assistant** with **Full** Permissions

Screen Shot 13 - Example screen shot showing the **auditor** with Read Permissions

Task 14

[4 Marks]

NOTE – Evidence for creating a shared folder could be given in Task 13 or Task 14

One mark for evidence of a shared folder for the outdoor activity database correctly created

One mark for evidence of correctly adding **each** group and setting correct share permissions as stated in Task 9.

The group that contains the **activity managers and supervisors in the outdoor activity receptions** will need **Read** Permissions

The group that contains the **activity managers and supervisors in the indoor activity receptions** will need **Full** Permissions

The group that contains the **indoor staff** will need **Read** Permissions

NOTE - The following groups will have the same Permissions for both folders so only award marks once in either Task 13 or Task 14

The group that contains the **manager and his assistant** will need **Full** Permissions

The group that contains the **auditor** will need Read Permissions

The group that contains the **outdoor staff** will not require any Permissions – if any set then deduct one mark

NOTE - The 'Everyone' group should be deleted but condone if not.

Screen Shot 14 - Example screen shot showing the **activity managers and supervisors in the outdoor activity receptions** with **Read** Permissions

Screen Shot 14 - Example screen shot showing the **activity managers and supervisors in the indoor activity receptions** with **Full** Permissions

Screen Shot 14 - Example screen shot showing the **indoor staff** with **Read** Permissions

Screen Shot 14 - Example screen shot showing the group that contains the **manager and his assistant** with **Full** Permissions

Screen Shot 14 - Example screen shot showing the **auditor** with Read Permissions