Rewarding Learning

ADVANCED
General Certificate of Education
January 2014

Applied Information and Communication Technology

Assessment Unit A2 13

assessing

Unit 13: Networking and Communications

[A6J71]

TUESDAY 28 JANUARY, MORNING

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.

		AVAILABLE MARKS

1   Home network advantages

- allows a number of family members to connect to the Internet (with the help of a router) at the same time
- allows connection to Internet with smart phones and tablets
- no need for cabling
- speed of installation
- simplicity of installation
- flexibility of location
- can share peripherals if, say, a printer is also wireless

Any **two** advantages with brief description = 2 × [2]   [4]   4

2   Network card

It allows data to be passed from node to node.	TRUE
It works as a router.	FALSE
It needs to be inserted directly onto the computer's motherboard.	FALSE
It holds an address called the Media Access Control Address (MAC).	TRUE
It creates an internet user's IP address.	FALSE
It is needed when setting up a peer to peer network.	FALSE

Suitable TRUE/FALSE answers = 6 × [1]   [6]   6

3   (a) Asynchronous

- At irregularly timed intervals
- Usually a byte at a time
- Independent clocks

(b) Handshaking

- Process of ensuring sender and receiver are alerted to the data transfer process and are both ready to send and receive
- Can be full duplex, half duplex or simplex (plus brief descriptions)

(c) Parity checking

- Checking that data sent from the sender has been properly transferred
- Can be either odd or even parity (+ brief description)

Any **two** explanations for each term = 3 × [2]   [6]   6

4   CLIENT SERVER ADVANTAGES vs DISADVANTAGES

CLIENT – SERVER	Advantage	Disadvantage
Centralised bandwidth	•	
Server provides data and information for each client	•	
Central file server can be used for processing and data backup	•	
Server allocates resources and storage space	•	
Server allocates Login names and passwords	•	
S/W and data held on a file server	•	
Control and security easier to maintain	•	
Software updates are easier	•	
Initial costs of HW and SW		•
Fault may disrupt all clients		•
Network manager required		•
Maintenance may be an issue		•
Backup strategy of files required		•
Needs AUP		•
Upgrades may disrupt users		•
Virus can affect whole network		•

Any **two** advantages with brief description = 2 × [2]
Plus any **two** disadvantages with brief description = 2 × [2]   [8]   8

5   AUP

A statement about restrictions on how to use the Internet for personal purposes	✓
A request that unsuitable material should not be accessed	✓
Obligations of users regarding the Computer Misuse Act	✓
A statement about the monitoring of staff Internet usage	✓
A reminder that all material accessed on the Internet is available for employees to download	
A statement that the normal rules of copyright do not apply to Internet usage in the company	
A statement telling users the company's procedure for passwords	✓
A statement of the legal implications of improper Internet use	✓
A statement of Internet policy that an employee must accept before being allowed to use the Internet	✓
The roles of the senior managers in the organisation with regard to employees' work hours and duties	

Each correct tick = 7 × [1]   [7]   7
(Minus [1] for each extra tick; [0] if all ticked)

6   Network security

The main points of discussion should include:

- **Misuse of the computer system**
  - ○ Most of computer misuse is committed by employees of the organisation. Examples include creating (and paying) bogus employees, creating dummy purchase orders and paying invoices etc.
    - ➢ Policies need to be in place to ensure these events can't happen
  - ○ Employees need to be educated not to share their IDs and passwords
    - ➢ Training issues
  - ○ Employees may attempt to enter restricted areas on the system
    - ➢ Consequences explained

- **Attacks on the network**
  - ○ These can be identified by:
    - • Unstructured threats – inexperienced individuals download software from the Internet and 'try something!'
      - ➢ Training and explanation of consequences
    - • Structured threats – usually by experienced hackers or war driving
      - ➢ Firewalls installed
    - • Internal threats – someone authorises the use of the network for non work related tasks
      - ➢ Training and policies in place

- **Physical threats**
  - ○ Attempts to damage the server
    - ➢ Countered by physically locking the server away (or removing keyboard and/or screen)
  - ○ Attempts to enter prohibited areas
    - ➢ Use of physical security devices, e.g. fobs, swipe cards, key in codes
  - ○ Attempts to use resources without authority, e.g. printers
    - ➢ Allocation of rights and permissions
  - ○ Depending on topology (e.g. star) risk to network if hub (or switch) is damaged
    - ➢ Have appropriate backup strategy in place
  - ○ Power surge (or outage)
    - ➢ Backup strategy in place
- **Other threats**
  - ○ Fraud
  - ○ Misuse to include gambling, you tube, surfing, chat rooms, misuse of e-mail, phishing, spam

Level of response	Marking Criteria	Mark band
Excellent	The candidate describes correctly, and in detail, many of the issues surrounding network security and how the network manager counteracts these threats. Their use of spelling, punctuation and grammar is excellent and clearly legible. Their discussion shows a very wide knowledge of the security issues. Their discussion of the need for security uses an excellent form and style. Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.	[7]–[10]
Good	The candidate describes correctly some of the issues surrounding network security and how the network manager counteracts these threats. Their use of spelling, punctuation and grammar is satisfactory and legible. Their discussion shows a satisfactory knowledge of the security issues. Their discussion of network security uses a satisfactory form and style. Their discussion is coherent and organised and they use a range of specialist terms.	[4]–[6]
Poor	The candidate describes few of the issues surrounding network security. Their use of spelling, punctuation and grammar is poor and their work is not that legible. Their discussion shows a weak knowledge of the security issues. Their discussion of network security is not organised and uses a poor form and style. Their discussion is not organised and they use a few (if any) correct specialist terms.	[1]–[3]

AVAILABLE MARKS

10

7 **(a)** User name
- Needed to log onto the e-mail system
- user@email.com
    - i username would have been chosen by the user (if available) or chosen from a preferred list supplied by the ISP
    - ii @email.com identifies the name of the e-mail provider (in this case email.com)
    - iii Unique ID used to log on to the system

   Any **two** correct statements = 2 × [1]   [2]

(b) Password
- Needed to secure the e-mail account
- Protects other users from accessing the user's e-mail messages
- Strong passwords are recommended
    - i mixture of upper and lower case, numbers and symbols, e.g. P@s$w0Rd
    - ii not to use familiar names of friends, pets, etc.

   Any **two** correct statements = 2 × [1]   [2]

(c) POP3 server (Post Office Protocol)
- This is the server protocol that retrieves e-mails from a remote server
- It listens for incoming mail on port 110
- It has a list of all users' accounts
- When a message is composed and sent from the e-mail client, a connection is made to the e-mail server and this server passes details of the sender and proposed recipient together with the message (it may also include such details as time and date plus a subject line)
- It will erase messages from the inbox when requested

   Any **two** correct statements = 2 × [2]   [4]

(d) SMTP server (Simple Mail Transfer Protocol)
- This is the server protocol that sends e-mails from one server to another
- When the send e-mail button is pressed
    - i The e-mail client (in this case called e-mail) will communicate with the SMTP server
    - ii It will inform the SMTP server of the sender's address and the address of the receiver together with the message
    - iii A DNS server will be used to find the IP address of the domain name part of the receiver's e-mail address
    - iv Communication takes place via port 25
    - v If there is a problem, the message joins a queue, and the SMTP server will attempt to resend. After numerous attempts (over some days) it will give up and return the message with an error report

   Any **two** correct statements = 2 × [2]   [4]

(e) Security type (SSL and TLS)
- The Secure Sockets Layer (SSL) is a protocol for managing the security of a message transmission on the Internet. (SSL has recently been succeeded by TLS.)
- SSL was developed by Netscape and is used by Microsoft and other Internet client/server developers.
- It was the standard until Transport Layer Security.
- The "sockets" part of the term refers to the method of passing data between a client and a server program in a network or between program layers in the same computer.
- SSL uses the public-and-private key encryption system and includes the use of a digital certificate.
- TLS uses handshaking to agree a port between sender and receiver.
- Communication uses encryption.

Any **two** correct statements = 2 × [2]   [4]

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8 The main points of discussion should include detail on:

- LAN topologies
    - Star
    - Bus
    - Ring
    - (Possibly) Hybrid and mesh

- LAN Client Hardware requirements
    - network cards (NIC)
    - cabling (coaxial, twisted pair, fibre optic)
    - file servers

- Cabling describing coaxial, twisted pair and fibre optic and when each is used

- Hubs and switches

Level of response	Marking Criteria	Mark band
Excellent	The candidate describes correctly, and in detail, the issues surrounding network implementation together with appropriate advice. Their use of spelling, punctuation and grammar is excellent and clearly legible. Their discussion shows a very wide knowledge of the issues. Their discussion of the issues uses an excellent form and style. Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.	[7]–[10]
Good	The candidate describes correctly the issues surrounding network implementation together with advice. Their use of spelling, punctuation and grammar is satisfactory and legible. Their discussion shows a satisfactory knowledge of the issues. Their discussion of the issues uses a satisfactory form and style. Their discussion is coherent and organised and they use a range of specialist terms.	[4]–[6]
Poor	The candidate describes few of the issues surrounding network implementation. Their use of spelling, punctuation and grammar is poor and their work is not that legible. Their discussion shows a weak knowledge of the issues. Their discussion of the issues uses a poor form and style. Their discussion is not organised and they use few correct specialist terms.	[1]–[3]

[10]

10

9

STATIC ADDRESSING	
allocates a permanent IP address which allows a device connection to the Internet.	TRUE
of devices ensures safety from attack from outside an organisation.	FALSE
DYNAMIC ADDRESSING	
is allocated on demand.	TRUE
can be used with NAT to ensure that devices can only be seen within an organisation.	TRUE

Each correct answer = 4 × [1]   [4]   4

10 Bluetooth vs infrared technologies

BLUETOOTH	INFRARED
Wireless, inexpensive and automatic	Low cost
Used by mobile phones, computers, PDA	Used by mobile phones, computers, PDA
Easily interconnected	Can't be seen
Uses short range wireless to connect	Interference is uncommon
All computer devices can be coordinated	'Line of sight' technology
Makes its own connections (without wires) – no action needed on the part of the user – forms a PAN	Two devices must be lined up
Short range (10 m) low power radio frequency standard	Light waves with low frequency
Uses very weak signalling (1mW)	Secure
Can connect many devices simultaneously	Always 'one-to-one'

Level of response	Marking Criteria	Mark band	AVAILABLE MARKS
Excellent	The candidate describes correctly, and in detail, the characteristics of Bluetooth and provides some information on infrared technologies. Their use of spelling, punctuation and grammar is excellent and clearly legible. Their discussion shows a very wide knowledge of both transmission media. Their discussion of the issues uses an excellent form and style. Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.	[7]–[10]	
Good	The candidate describes correctly the characteristics of one of the technologies. Their use of spelling, punctuation and grammar is satisfactory and legible. Their discussion shows a satisfactory knowledge of both transmission media. Their discussion of the issues uses a satisfactory form and style. Their discussion is coherent and organised and they use a range of specialist terms.	[4]–[6]	
Poor	The candidate describes few of the characteristics of one of the technologies. Their use of spelling, punctuation and grammar is poor and their work is not that legible. Their discussion shows a weak knowledge of the transmission media. Their discussion of the issues uses poor form and style. Their discussion is not organised and they use few correct specialist terms.	[1]–[3]	10

[10]

11 The user's **browser** requests the web page address (URL). The request is passed to the **DNS server** which will **locate** the IP address using Address Resolution Protocol (ARP). The IP address is sent back to the user's browser. The user's browser requests the web page at this IP address. The **requested** page is returned to the browser. The user **views** the webpage.

Each correct missing word = 5 × [1]   [5]   5

12 Face-to-face versus video conferencing

Level of response	Marking Criteria	Mark band
Excellent	The candidate describes correctly, and in detail, the advantages and disadvantages of face-to-face and videoconferencing. Their use of spelling, punctuation and grammar is excellent and clearly legible. Their discussion shows a very wide knowledge of both. Their discussion of the issues uses an excellent form and style. Their discussion is highly coherent and is very well organised and they use a wide range of advantages and disadvantages.	[7]–[10]
Good	The candidate describes correctly the advantages and disadvantages of face-to-face and videoconferencing. Their use of spelling, punctuation and grammar is satisfactory and legible. Their discussion shows a satisfactory knowledge of both transmission media. Their discussion of the issues uses a satisfactory form and style. Their discussion is coherent and organised and they use a range of advantages and disadvantages.	[4]–[6]
Poor	The candidate describes few of the advantages and disadvantages of face-to-face and videoconferencing. Their use of spelling, punctuation and grammar is poor and their work is not that legible. Their discussion shows a weak knowledge of the transmission media. Their discussion of the issues uses a poor form and style. Their discussion is not organised and they use few advantages and disadvantages.	[1]–[3]

[10]   10

13 VPN

- VPN means that some part of the company's network uses the Internet
- VPN uses client authentication
- Data sent across the Internet is encrypted
- The offices merge into one network
- Encrypted IP traffic can travel securely over the public TCP/IP network
- The company could dedicate server A to handle traffic
- Security is guaranteed by tunnelling

Any **two** explanations = 2 × [2]   [4]   4

                                                          Total   **100**