Edexcel GCE

Applied Information and Communication Technology

Unit 9: Communications and Networks

12–30 January 2009

Assessment window 3 weeks

Time: 10 hours

Materials required for examination	**Items included with question papers**
Short treasury tag	Cover sheet

Instructions to Candidates

Complete your candidate details on the cover sheet provided.
At the end of each session you should hand your materials in to your teacher.
All tasks must contain your name, candidate number, centre number and activity number.
At the end of the examination use a treasury tag to attach your printouts to Page 2 of the cover sheet in the correct order as shown.

Information for Candidates

There are **five** activities in this examination totalling **88** marks. **2** further marks are allocated to Standard Ways of Working giving a paper total of **90** marks.
The marks for each of the activities are shown in round brackets: e.g. **(2)**.
There are suggested timings against each activity: e.g. **(15 minutes)**.

Advice to Candidates

Read the Scenario carefully.
Work through the activities in order.
Attempt **ALL** activities.
Label your printouts clearly as instructed.
Printing must be undertaken within the examination period.

Turn over

edexcel
advancing learning, changing lives

Scenario

LAURA ELLE Range of Perfumes

Laura Lewis and Steven Gee met whilst employed by a clinical research organisation in Bracknell. The basis for their business partnership happened largely by accident. Steven was working on the development of a new allergy tablet. He was carrying out an experiment when Laura, from marketing walked past and complimented him on his aftershave. Steven was quite surprised by this as he did not use aftershave and so he called her back. After a while they realised that the aroma was coming from a test tube containing a mixture of chemicals.

Laura was quick to see the possibilities of marketing the mixture as a perfume. She persuaded Steven that this was a good idea and asked him to conduct further experiments. Steven created a laboratory in his garage and the pair bought the chemicals between them. Over the next few weeks Steven experimented with the chemicals in the original mix and in the end he came up with some recipes for perfumes.

Laura then approached a large department store chain which agreed to stock the Laura Elle range of perfumes. Encouraged by this, Laura and Steven are now preparing for larger scale production. Steven's garage is too small for that level of production, so they have rented a building in the newly opened Bracknell Science Park and started trading as Laura Elle.

The building is 15 metres wide and 30 metres long and is divided into three equal sized areas by partitions across its width. Despatch is at the front of the building, warehousing in the middle, and production at the rear. The despatch area is only half the height of the building and has a staircase leading up to a balcony and three rooms. These will be used as a reception room and offices for Laura and Steven. The other areas occupy the full height of the building.

The building is well serviced with telephone points, power sockets, and cable ducts, but there are no data cables or data points. A fibre optic Internet connection is included in the rent. This terminates at a sealed box near the foot of the staircase. The box has a single RJ45 socket. The Science Park management have given Steven a leaflet explaining how his Internet connection works.

The leaflet says that he:
- has been allocated a public Class C address of 164.58.28.250
- may use any private Class C address on his own network

Laura and Steven will be employing warehouse, despatch, and office staff once they move into the building.

Laura and Steven are competent computer users but their network experience is limited.
For example, they are able to plug a network cable in or connect to a WiFi system with a laptop.

Your project

You have been asked to advise Laura and Steven about networks and to design a suitable system for Laura Elle.

In discussions with Laura and Steven you find out their immediate requirements are a:
- networked PC and printer in each of the three upstairs rooms
- networked PC and printer in the despatch area
- networked PC and printer in the warehouse area
- facility to connect visitors' laptops to the system while they are in the building
- facility for Steven to use the Laura Elle network through a Virtual Network from his home PC
- facility for Laura to use the Laura Elle network through a Virtual Network from her laptop both at home and during sales trips.

You are also told that their main concerns are cost, security, and reliability.
You have visited the building with Laura and Steven and are familiar with its layout. You may assume that the power system is adequate and that there are sufficient cable ducts, power points, spaces for data points, and mounting points for installing equipment.

All word processed documents must have a header and a footer. The header must contain the activity number. The footer must contain your name, candidate number, and centre number.

A minimum font size of 10 should be used in all word processed documents, using a font suitable for business purposes.

Diagrams should be large enough for the detail to be read.

Activity 1 – Network Topologies – (suggested time 1 hour 30 minutes)

You have been asked to advise Laura and Steven on how to lay out the network inside the building. Steven has collected a lot of technical information about network topologies. These include:
- bus
- star
- tree
- ring
- mesh.

Steven is now completely confused by the technical jargon and wants you to explain things to him in simple terms.

Explain to Steven the different network topologies.
Identify and compare the **two** network topologies you think are most suitable.

Evidence to be submitted

❑ A document for Steven which describes the characteristics of the different network topologies. The document should be in non-technical language and include a diagram of each topology.

(5)

❑ A one page document for Steven and Laura which identifies the **two** best options for their situation and compares them in terms of:
- cost
- security
- reliability
- other relevant factors.

(8)

(Total 13 marks)

Activity 2 – Components of a network – (suggested time 1 hour 50 minutes)

Computer networks are made up of hardware devices, software, and cabling.

Laura and Steven have purchased five second-hand PCs and a server. The machines have operating systems installed but all other software has been removed. The PCs, server, and Laura's laptop have 802.11g WiFi and Gigabit Ethernet cards fitted. The server is fully configured.

Laura and Steven have asked you to design a network which meets all of their immediate requirements as given in the scenario. They are concerned about
- cost
- security
- and reliability.

They have agreed a payment for the labour costs and now have a maximum of £1000 for setting up the network in the building.

As a first step in your design you must prepare a budget.

Produce documents explaining the:
- quantity, function, and cost of all hardware devices to be used in your design
- quantity and cost of any cables and infrastructure components to be used in your design
- cost and function of each item of software required.

Explain how your choices meet Laura and Steven's concerns.

Laura wishes to be able to use the Laura Elle network via a Virtual Network. She can connect through their home broadband, but Laura also needs to be able to connect during sales trips.

Describe to Laura **two** options available for doing this.

Recommend a suitable method for her. Justify your recommendation in terms of cost, security, and reliability.

Evidence to be submitted

On no more than **one** A4 page, tables showing:

❑ the quantity, cost, and function of all hardware devices to be used in your design.

(4)

❑ the quantity and cost of any cables or network infrastructure components to be used in your design.

(2)

❑ the function and cost of any software required. Include the **total** cost of your design.

(4)

On no more than **one** A4 page:

❑ Notes describing **two** ways of connecting Laura's laptop to a Virtual Network while she is on sales trips

(2)

❑ Your recommendation, with reasons, as to which is most suitable.

(4)

(Total 16 marks)

Activity 3 – Network Design – (suggested time 2 hour 20 minutes)

Having talked to Laura and Steven about their requirements and having investigated the possible options, you now need to design an appropriate network solution.

Use network design software to produce a network design for the complete project, the building and the remote connections.

Explain and justify any decisions that you have made regarding the positioning of network devices and equipment.

Evidence to be submitted

On no more than **one** A4 page each:

❑ A design for the complete project which meets all of the requirements

(12)

❑ Word processed notes explaining and justifying each major decision made about the positioning of network devices and equipment

(4)

❑ A diagram explaining the route data will take between Laura's laptop and the network in the building, while she is away on a sales trip.

(5)

(Total 21 marks)

Activity 4 – Network Addressing – (suggested time 2 hour 20 minutes)

The Science Park management have given Steven a leaflet explaining how his Internet connection works.

It says that he:
* has been allocated a public Class C address of 164.58.28.250
* may use any private Class C address on his own network.

Steven does not understand what is meant by public and private addresses, or what Classes are. He is concerned that he will have to make changes to his home PC or Laura's laptop.

Write a document which explains what the leaflet means by:
* has been allocated a public Class C address of 164.58.28.250
* may use any private Class C address on his own network.

Write a document which answers Steven's concerns about changes to his home PC or Laura's laptop.

Draw up a scheme for implementing IP addresses across the private network. Explain and justify your decisions.

Laura has been looking at the documentation that comes with the Virtual Network software. She is happy with the installation instructions but has had trouble with the technical information about how to set up the connection.

Laura e-mails you with some questions.
* which IP address she should put into the Set Up screen?
* why does it want a Port Number, what is a Port Number, and what should she enter?
* there is something about enabling Network Address Translation on the router; what does that mean and does she need it?

Write a response to Laura's e-mail.

Evidence to be submitted

On no more than **one** A4 page each:

❑   A document to Steven which explains, using examples, what the leaflet means by:
* has been allocated a public Class C address of 164.58.28.250
* may use any private Class C address on his own network.

(4)

❑   A document which answers Steven's concerns about changes to his home PC or Laura's laptop.

(2)

❑   A scheme for implementing IP addresses across the private network, with notes justifying each major decision

(6)

❑   A draft response to Laura's e-mail.

(8)

(Total 20 marks)

Activity 5 – Network Management – (suggested time 2 hours)

Once the network is installed and running, it has to be managed. Laura and Steven cannot afford to employ a network manager or any other IT staff. Steven has therefore decided to do the job himself.

Steven is a competent computer user but has never been involved with network management.

Write some guidance notes on the key tasks which Steven will need to carry out when managing the network.

Evidence to be submitted

On no more than **one** A4 page, a set of word processed notes which:

❑   State the key tasks which Steven will need to carry out when managing the network

(6)

❑   Explain why each task is necessary for the Laura Elle network and/or company

(6)

❑   Describe an easy way for Steven to carry out each task. The descriptions should outline a method that could be used for each task. Step by step instructions for Steven are not required.

(6)

(Total 18 marks)

Standard ways of working.

All printouts must contain the activity number, your name, candidate number, and centre number.
Pages must be securely fastened to the cover sheet and in the correct order.
A minimum font size of 10 should be used for all word processed documents.

(Total 2 marks)

TOTAL FOR PAPER: 90 MARKS

END