Paper Reference(s)

6959/01

Edexcel GCE

Applied Information and Communication Technology

Unit 9: Communications and Networks

5–23 May 2008

Assessment window 3 weeks

Time: 10 hours

Materials required for examination
Short treasury tag

Items included with question papers
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.
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. **(Total 10 marks)**.
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.

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Turn over

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Scenario

The Green Bay Building Company

The Green Bay Building Company was founded by David Green in 2003. David trained as an architect and has been designing houses since 1985. Over time David had become concerned about global warming and has introduced into his house designs aspects to minimise the carbon footprint of the occupiers. Unfortunately these modifications tend to make the houses more expensive to produce. The building firm that David worked for at the time did not like the modifications as it meant less profit. As a result David was instructed to remove them from his designs.

Unable to find a building company to take on his revolutionary designs, David decided the only way he was going to get his designs accepted was if he formed his own building company. Consequently the Green Bay Building Company was formed.

Since its inception the Green Bay Building Company has created many successful developments. David has found that some people will pay extra if they think the house is eco-friendly and would pay even more if they thought there would be a fuel saving.

David has also pioneered the idea of intelligent housing estates. In the past there have been 'intelligent buildings'; however David has taken this one step further and linked all the houses to a central computer. This allows the buildings to share facilities such as solar panels, wind turbines and other shared resources. At the same time, the central computer monitors various aspects of the fuel usage of each of the houses. This provides David's company with information upon which he can base the designs of future developments. It also provides the owners with details for their Home Information Pack should they wish to sell their property. David wants all the central computers of each development to be linked to the Head Office.

David's business has expanded at such a rate that the single floor, serviced offices can no longer hold his company. A move to new offices is to coincide with the recruitment of a number of personnel. The new offices will be in Oxford, not far from where David lives.

David's new offices will have two floors. On the top floor will be David's office, the offices of the company architects and the Finance Department. In addition there will be a statistician's office whose job it is to monitor and produce information from the remote housing estate computers.

The Finance Department will accommodate three accountants and their secretary. Each will have their own computer and they will share a printer. There will also be a fax machine and a photocopier. Both architects will have their own computer; they will each have their own printer but share a plotter for printing their plans. David has a laptop which he will connect to the network when in the offices.

The ground floor will be shared by the Administration and the IT Departments. The Administration Department will consist of 15 clerical workers who deal with planning applications and other administrative functions. Each administrator will require their own computer, and they will share three printers. There will also be a fax machine and a photocopier here. The IT Department consists of one IT technician who will have his own computer and printer. His office will be next to the server room which will contain all other equipment.

You have been employed as a network manager/designer by the Green Bay Building Company and you will share the office with the IT technician.

Note: All 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.

Minimum font size of ten should be used in all word processed documents, using a font type suitable for business purposes.

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

Activity 1 – Benefits of Networks (suggested time 1 hour)

Some of the accountants are concerned that their confidential data may be viewed by other personnel. They have asked for a peer-to-peer network in their department.

- Produce diagrams showing what both peer-to-peer and client-server architecture might logically look like

- Explain the advantages and disadvantages of independent peer-to-peer networks, rather than connecting the Finance Department to the central network.

Evidence to be submitted

No more than **two** A4 pages of computer output:

- ❑ Diagrams illustrating what both peer-to-peer and client-server architecture might logically look like

- ❑ Document explaining the advantages and disadvantages of setting up several independent peer-to-peer networks rather than connecting to a central network.

(Total 8 marks)

Activity 2 – Components of a Network (suggested time 2 hours)

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

David Green has asked you to design an appropriate network solution for the Green Bay Building Company's network.

In order to help David understand why you will be recommending particular components he has asked you to provide information about possible components of the network.

Investigate these network components.

- Bridge
- Gateway
- Hub
- Repeater
- Router
- Server
- Switch

- Produce a document explaining the functions of all the components listed

- For each of the components listed explain why it would or would not be needed in your network design.

Evidence to be submitted

No more than **three** word processed A4 pages:

- Notes explaining the function of each component.

- Your recommendation as to which components will be required for your network together with reasons why others would not be of any use.

(Total 17 marks)

Activity 3 – Network Design (suggested time 4 hours)

Having investigated the various components, you now need to design an appropriate network solution for the Green Bay Building Company's network.

- Use network design software to produce the logical network design for the complete project
- Explain and justify any decisions that you have made regarding the selection and positioning of network devices and equipment
- Draw up a scheme for implementing IP addresses to be used within the network; give an indication of the actual IP addresses to be used.

The intelligent housing estates need to be able to send data to the Head Office. Owing to the distance between the developments and the Head Office it is not possible to link the computers in each development to the central computer using any form of cable.

- Advise on **two** methods of connecting the sites together
- Recommend the most suitable method of connection.

Evidence to be submitted

No more than **three** A4 pages of computer output:

- ❑ A **one** page design for the total network
- ❑ Notes justifying each major decision made with regard to the network design
- ❑ A scheme for IP addresses with some indication of the actual IP addresses to be used
- ❑ Notes describing two different methods of connecting the developments to the Head Office
- ❑ Your recommendation as to which method of connection is most suitable

(Total 36 marks)

Activity 4 – Protocols (suggested time 1 hour)

The Green Bay Building Company wants to organise educational visits for local schools and colleges. The visits will include talks on environmental issues and on the way the company works.

You have been asked to create a slide show presentation explaining the TCP/IP model. The presentation should include slides on:

- The purpose of each of the four layers of the TCP/IP model
- The functions of each layer of the TCP/IP model, the protocols and their roles
- A comparison of the OSI model and the TCP/IP model.

Evidence to be submitted

- ❑ The **six** slide presentation, with speaker's notes, printed out with **one** slide per A4 page.

(Total 11 marks)

Activity 5 – Network Management (suggested time 2 hours)

David is worried that, as the site is liable to flooding, equipment and data may be lost. The success of the company depends on data records spanning several years being kept and not lost due to hardware failure caused by natural disasters such as flooding and lightning strikes.

- Draw up a contingency plan covering the internal network, all of its components and any data stored on it. The plan should include strategies to prevent network problems occurring and disaster recovery.

Evidence to be submitted

No more than **two** word processed A4 pages:

❑ A contingency plan for the network to include:

- Prevention of network problems occurring as a result of natural disasters
- Disaster recovery.

(Total 16 marks)

(Standard ways of working: 2 marks)
TOTAL FOR PAPER: 90 MARKS

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