BCS The Chartered Institute for IT

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Thursday 22nd April 2010 - Afternoon
Answer **any** FOUR questions out of SIX. All questions carry equal marks
Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Only **non-programmable** calculators are allowed in this examination.

Section A

Answer Section A questions in Answer Book A

A1.

a. What is the difference between a *connection orientated* and *connectionless* communications protocol?

(4 marks)

b. Explain what Quality of Service (QoS) is offered by:

i. IP

(1 mark)

ii. UDP

(3 marks)

iii. TCP

(4 marks)

c. What function do TCP and UDP port numbers provide and what is meant by a *well known* port?

(5 marks)

d. Briefly explain how TCP achieves reliable data transfer over a network even if errors occur during the transmission.

(8 marks)

A2.

a. A telephone line is designed to provide a channel bandwidth of approximately 3kHz for the transmission of voice. Explain the basic principles of a modem (modulator/demodulator) which allows for computer data to be transmitted over a telephone voice channel.

(6 marks)

b. Explain how asynchronous digital subscriber line (ADSL) technology is able to deliver very high bandwidths for downloading data from the world-wide-web over voice grade telephone lines.

(8 marks)

c. A user is in their home and accessing the Internet from a laptop computer connected via a wireless LAN (WiFi) to an ADSL broadband router which in turn

is connected to their telephone line. The user also has a conventional (analogue) telephone.

i. Why is it necessary to use a micro-filter in this network?

(2 marks)

ii. How is the user's data separated from their telephone calls within the local exchange?

(3 marks)

d. Although ADSL is advertised to provide data rates of up to 8MBps download, give three reasons why a user may actually experience a data rate much lower than this.

(6 marks)

A3.

a. Produce a sketch of the ISO Reference Model in which you clearly label each layer with its name.

(7 marks)

b. Explain what is meant by the term *peer to peer protocol*.

(2 marks)

c. MAC and IP addresses belong to different layers within the ISO Reference Model. Which layer do they belong to and what function do they perform?

(6 marks)

d. If you know an IP address of a computer that is within the same sub-network as you, explain how the Address Resolution Protocol (ARP) is able to obtain that computer's MAC address.

(8 marks)

e. If you were trying to connect to a computer that is on a different sub-network to your own, what MAC address would you need to use?

(2 marks)

Section B

Answer Section B questions in Answer Book B

B4.

The work conducted by routers used within TCP/IP inter-networks can be broken into two separate tasks that could be named as ***packet forwarding*** and ***routing table determination.***

a)

i) Describe the actions involved in the task known as ***packet forwarding***. Include within your answer a discussion of the frequency that packet forwarding occurs and an important objective to be met by the packet forwarding task.

(9 marks)

ii) Discuss the extent to which the ***packet forwarding*** task is an activity within a single router or conducted as an activity involving multiple routers.

(3 marks)

b)

i) Describe the actions involved in the task known as ***routing table determination***. Include within your answer a discussion of the frequency that route table determination occurs and two important objectives to be met by the route table determination subtask.

(9 marks)

ii) Discuss the extent to which the ***routing table determination*** task is an activity within a single router or conducted as an activity involving multiple routers.

(4 marks)

B5

Many wire based local area networks comply with the twisted pair Ethernet (IEEE802.3) standards normally known as 10base-T or 100base-T.

a) Describe the main differences between the two types of device known as hubs (sometimes called repeating hubs) and switches (sometimes called switching hubs). Include in your answer a discussion of the devices' handling of unicast Ethernet frames and broadcast Ethernet frames. Also discuss the extent to which hubs and switches be compared to the devices known as repeaters and bridges on co-axial cable Ethernets?

(10 marks)

b) Describe the frame format used by the Ethernet. Include in your answer a discussion of at least five of the seven fields that make up an Ethernet frame.

(15 marks)

B6

Error detection and correction is an important issue when we are moving information across network links.

a) Briefly describe the technique known as single bit parity checking. Include is your answer an explanation of what is meant by even parity and odd parity.

(6 marks)

b) Describe what is meant by longitudinal parity and transverse parity and how both can be used together as an error correction technique under some circumstances.

(6 marks)

c) In many circumstances, parity checking is inadequate and other techniques have to be used. Produce an outline of the technique known as Frame Check Sequence (FCS) or Cyclic Redundancy Check (CRC).

(10 marks)

d) Identify the circumstances when the use of Frame Check Sequence (FCS) would be more suitable than parity checking.

(3 marks)