

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS BCS Level 5 Diploma in IT

COMPUTER NETWORKS

28th April 2008, 2.30 p.m.-4.30 p.m.

Answer FOUR questions out of SIX. All questions carry equal marks

Time: TWO hours

*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.

1.

- a) Produce a sketch of the ISO Reference Model with each of the seven layers clearly labelled. Clearly show which layers are mainly associated with the operation of the network infrastructure and which are mainly associated with the application.

(9 marks)

- b) Within the context of the protocol layer model, what is meant by the term '*peer to peer protocol*'?

(6 marks)

- c) A computer is connected to an Ethernet LAN. Assuming that it is running a web browser to access the Internet using the TCP/IP protocol, produce a protocol layer diagram to represent this communication. Clearly show how the protocols being used map onto the ISO Reference Model.

(10 marks)

2.

- a) What are the basic principles of operation of a Frame Relay network?

(10 marks)

- b) When a Frame Relay virtual circuit connection is established between two end-stations, a number of traffic characteristics, such as the *committed burst size*, are specified within the Call SETUP message. Why are parameters of this type important to allow a Frame Relay network to provide dynamic bandwidth allocation?

(10 marks)

- c) What is the function provided by the Data Link Connection Identifier (DLCI)?

(5 marks)

Turn over]

3.

a) What is the difference in the quality of service offered to applications by the TCP and UDP protocols?

(8 marks)

b) What are TCP and UDP port numbers used for?

(5 marks)

c) Explain the basic principles of how TCP is able to overcome transmission errors and ensure a reliable end to end data transfer.

(12 marks)

4.

a) In the context of IPv4, explain the differences between Class A, Class B and Class C addresses.

(6 marks)

b) Explain what is meant by a *netmask*. A network manager is instructed by his supervisor to install four small IP networks, each with 32 computers attached, connected by a router. The manager is only allocated one Class C network. How can the network manager make use of netmasks when configuring this network? Identify one possible suitable value that could be chosen for the netmask.

(10 marks)

c) Routing within small networks that use IPv4 is often handled using distance vector protocols. Explain the general behaviour of distance vector protocols. Your answer should draw attention to problems which can occur within such networks.

(9 marks)

5.

a) In a traditional Ethernet, built using co-axial cable, there are rigid requirements that govern the maximum size of the network. Produce a description, accompanied by a sketch diagram, to illustrate a maximally sized network and the components involved.

(10 marks)

b) Describe the general behaviour of the CSMA/CD algorithm used to control media access within an Ethernet. Your answer should also cover the behaviour of the *truncated binary exponential backoff* algorithm used when collisions occur.

(15 marks)

6.

- a) Simple serial communication systems often use a method known as parity checking as a means of error control. Explain what is meant by a parity bit and how it is calculated.

(5 marks)

- b) Assume a small block of eight, 8-bit characters are to be transmitted. Describe how a combination of both transverse and longitudinal parity can be used to locate any single bit error that might occur within the block of characters.

(10 marks)

- c) It is becoming increasingly important that we can exchange information in a secure manner.

- i) Explain the main problem that affects the use of symmetric key cryptography systems.

- ii) How does a public key cryptography system overcome the problem you have identified in 6c(i)?

(10 marks)