THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

3rd May 2007, 10.00 a.m.-12.00 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)* Briefly explain the operation of the Address Resolution Protocol (ARP). **(10 marks)**

b) Two LANs, L1 and L2 are interconnected by a Router. A computer, C1, located on LAN L1 wishes to communicate with a server, S2, located on LAN L2. C1 knows the IP address of S2. Determine the MAC addresses that would be used in the LAN frames that carry the IP datagram from C1 to S2. **(6 marks)**

c) Referring again to the network described in part *b)*, if the server is able to support more than one TCP connection with C1, explain how TCP port numbers can be used to differentiate between these two connections. **(9 marks)**

2. *a)* Explain the operation of the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Local Area Network access protocol. **(10 marks)**

b) Show by means of a diagram the frame format used within the IEEE 802.3 CSMA/CD LAN. **(9 marks)**

c) Why does the CSMA/CD LAN impose both a minimum and a maximum size frame limit? **(6 marks)**

3. *a)* Show by means of a diagram, the cell format used within the ATM network. **(5 marks)**

b) What is the difference between a Virtual Path and a Virtual Channel? **(6 marks)**

c) Explain the purpose and function of the ATM Adaptation Layer (AAL) protocol. **(9 marks)**

d) What is meant by the Available Bit Rate (ABR) service? **(5 marks)**

4. *a)* The Data Encryption Standard (DES) is an example of a block cipher.

Taking DES as an example, explain:
i) what is a block cipher?
ii) What are the limitations to a block cipher?
iii) What are the advantages of chaining? **(9 marks)**

b) Explain the difference between public key and private key encryption. **(8 marks)**

c) What are the advantages and disadvantages of the use of a public key in encryption? **(8 marks)**

5. *a)* Explain, in general terms, how the link state approach to routing differs from the distance vector approach. **(10 marks)**

b) In the context of TCP/IP give one example of a protocol that embodies the distance-vector approach, and one that embodies the link state approach. **(2 marks)**

c) Explain why the link state approach to routing scales better than the distance vector approach. **(13 marks)**

6. *a)* Briefly explain the overall approach to security embodied in using firewalls. **(8 marks)**

b) Why must all firewalls on the same system be configured the same way? **(5 marks)**

c) Explain the idea behind packet filtering and give two examples of criteria that might be chosen as the basis of filtering datagrams. **(6 marks)**

d) To use a packet filter effectively, a firewall grants access rather than restricting access. Explain why that approach is more effective. **(6 marks)**