THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS
Diploma

COMPUTER NETWORKS

19th October 2005, 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.*

1. *a)* Show, by means of a diagram, the frame format used within the IEEE 802.3 CSMA/CD LAN. **(6 marks)**

b) Why must the data field size always be equal to, or greater than, 46 octets? **(6 marks)**

c) What is meant by a *real-time system* and what quality of service do real-time systems demand from a network? **(5 marks)**

d) By considering the performance of an IEEE 802.3 LAN explain why this technology is not well suited to supporting real time services. (**8 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 in allowing a Frame Relay network to provide dynamic bandwidth allocation? **(10 marks)**

c) If a Frame Relay packet passes through an area of congestion within the network, explain how the receiving end-station would learn that congestion exists within the network. **(5 marks)**

3. *a)* What are the advantages and disadvantages of using ATM networks? **(6 marks)**

b) Explain with the help of a diagram, how ATM cells are routed through a network. Explain why the cells invariably take a fixed route. **(12 marks)**

c) Explain why quality of service (QOS) is an important issue for ATM networks. **(7 marks)**

4. *a)* Outline the basic operation of the *Open Shortest Path (OSPF)* routing protocol. **(12 marks)**

b) Why is it important for routers to know about all of the possible routes through a network topology? **(5 marks)**

c) Show, by means of a diagram, how a subnet mask can be used to extract the network identification and host identification from an IP address. **(8 marks)**

5. *a)* Explain with the help of appropriate diagrams, the following terms:
i) amplitude modulation
ii) frequency modulation
iii) phase modulation **(6 marks)**

b) Discuss the sources of noise in data communication sytems. Why it is important to consider the effect of noise on data communication systems? **(8 marks)**

c) Show with the help of appropriate diagrams how the bit patterns 100001011111 can be encoded using:
i) Manchester encoding
ii) Differential Manchester encoding.

What is the advanatage of using Differential Manchester encoding? **(11 marks)**

6. *a)* What is a wireless LAN? What are the advantages and disadvantages of using wireless LANs? **(6 marks)**

b) What transmission techniques are used in these LANs? **(9 marks)**

c) With the help of a diagram explain the IEEE 802.11 wireless LAN standard protocol stack. **(10 marks)**