

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Diploma

COMPUTER NETWORKS

3rd May 2001 - 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 are **indicative** of the weight given to each part of the question.*

1. a) Explain how the 'continuous RQ' protocol operates. Your answer should include a FULL description of the protocol using appropriate diagrams. **(20 marks)**
- b) Continuous RQ frames contain frame sequence numbers. How many bits are required to represent the frame sequence number? Explain your reasoning. **(5 marks)**
2. a) Explain the operating characteristics and cost differences between dial-up and private (leased) circuits. **(13 marks)**
- b) The Integrated Services Digital Network (ISDN) service most commonly supplied is described as 2B+D. Explain the difference between B and D channels. **(8 marks)**
- c) Describe FOUR of the advantages of ISDN over normal analogue dial-up telephone lines. **(4 marks)**
3. a) Communication protocols transfer information frames of varying sizes. For a given communication link there will be an 'optimum frame size'. Define, using an appropriate example, what is meant by the term 'optimum frame size'. **(10 marks)**
- b) Describe TWO techniques which are commonly used to help attain this frame size, explaining the 'costs' associated with each. **(10 marks)**
- c) What is the optimum frame size for Ethernet? Explain your answer. **(5 marks)**
4. a) Explain how Bit Synchronisation and Black Synchronisation are achieved in the CSMA/CD ('Ethernet') protocol. **(6 marks)**
- b) Describe the operation of the media access protocol known as CSMA/CD. Your description should include an explanation of the implications of the selection of a particular size of collision window and the action taken when a collision occurs. **(11 marks)**
- c) Show how the CSMA/CD protocol's performance (as measured by message delivery time) varies with increasing load. This protocol is often described as 'non-deterministic'. Explain what is meant by this. **(8 marks)**
5. a) Explain the definition of "Class A", "Class B" and "Class C" IP networks. **(6 marks)**
- b) Explain the action of the subnet mask, and with the aid of a diagram, show how it works. **(7 marks)**
- c) The default sub-net mask for the class of network you have is 255.255.0.0 but the network manager has decided the whole network will use the mask 255.255.255.128.
 - i) How many sub-networks can you have on your network? Explain how you obtained the answer.
 - ii) Again explaining how you obtain the answer, how many nodes can you have on each sub-net? **(12 marks)**

6. a) With reference to computer networks, describe the essential features and operating principles of the following:

- i) Router
- ii) Bridge
- iii) Adaptive routing algorithm
- iv) Circuit switching

(12 marks)

b) With the aid of schematic diagrams, explain the principle of operation of a single bit error correction facility with which you are familiar. **(6 marks)**

c) What is meant by the term 'burst errors'?

Describe the operation of a system which is able to correct burst errors.

Identify the limitations of the system with respect to the time interval over which the burst occurs and the time interval between successive bursts. **(7 marks)**