US206

Answer Sheet for question 3(a) to be provided

Two Hours

UNIVERSITY OF MANCHESTER

INSTITUTE OF SCIENCE AND TECHNOLOGY

CT211 Networking and open systems

For candidates taking:

BSc IN COMPUTATION

SECOND YEAR SESSIONAL

BSc IN COMPUTING SCIENCE

SECOND YEAR SESSIONAL

BSc IN INFORMATION SYSTEMS ENGINEERING

SECOND YEAR SESSIONAL

BSc IN COMPUTING AND GEOGRAPHY

SECOND YEAR SESSIONAL

MEng, BEng IN SOFTWARE ENGINEERING

SECOND YEAR SESSIONAL

MEng, BEng IN ELECTRONIC AND MICROELECTRONIC SYSTEMS ENGINEERING

SECOND YEAR SESSIONAL

MEng, BEng IN COMPUTING AND COMMUNICATION SYSTEMS ENGINEERING

SECOND YEAR SESSIONAL

Wednesday 23 May 2001 2.00-4.00

Answer **three** questions – if you answer question 3 you must attach

the answer sheet to your examination script

The use of electronic calculators is NOT permitted

Note: Do not answer more than the required number of questions. Clearly cross out anything you do not wish to be marked.

PTO

1) Answer all parts

A large network is composed of a number of subnetworks into which individual computers are connected. These subnetworks can be composed of transmission cables, switches, routers, and nodes, or may be other basic network types, i.e. network of servers.

a) One view of the above network is a set of communications protocols organised in to layers or levels. The term "Network Architecture" is normally used to describe a layered network model.

You are a technical advisor to a group developing a layered network model for a new application. List the typical **layer design issues** which the group would have to consider when designing the model. Briefly comment on each **issue** in your list.

(6 marks)

(b) Describe a simple **3-Layer model** and clearly distinguish between the three layers.
Hint: a diagram may form part of your answer.

(4 marks)

c) Data is transmitted on a network using either 'circuit switching' or 'packet switching'.

Drawing on your knowledge of networked and open Systems, determine what is meant by the terms 'circuit switching' and 'packet switching'.

(5 marks)

d) Circuit switching and packet switching networks can be said to be connection-orientated and connectionless services, respectively.

Compare and contrast connection-orientated and connectionless services.
Hint: You will be marked on your evaluation of the two services and your ability to assess critically the two services.

(5 marks)

2) Answer all parts

A network consultancy company is given a brief to investigate the requirements of a network. The brief states that the communication channel '**minimum bandwidth**' should be selected to support a datarate of 5000bits/sec.

a) Comment on what is meant by '**minimum bandwidth**'.

(4 marks)

b) Calculate the '**minimum bandwidth**' for a 5000bits/sec signal transmitted over a communication channel. The minimum bandwidth should be calculated for the worst-case sequence 101010. State any assumptions you make when performing the calculation.

(6 marks)

c) Compare and contrast each of the following guided media communication technologies: twisted pair, coaxial cable, and fibre optic cable. State the most common applications for each of the guided media.

Hint: You will be marked on your critique of the three technologies.

(10 marks)

3) Answer all parts

Data is transmitted on a networked system from a source machine to a destination machine. The data is sent in two different formats and these two formats can be said to be the basic '**transmission modes**' of a networked computer at the physical layer.

a) The diagram below depicts one of the two 'transmission modes'. Label all five items and brief state what function each item performs.

(6 marks)

NOTE: Please label the diagram at the end of the exam book. If you answer this question you must tear off the back page of the exam and secure it in your exam answer book.

b) A networking company is developing two new physical layer protocols that use two different format '**transmission modes**'. One format transmits data byte by byte; the other transmits blocks of data.

Identify which of the two '**transmission modes**' you would use in each case and state why each was applicable for that application.

(7 marks)

c) Data transmitted on a channel connected to the physical layer of networked systems is normally digitally encoded.

Write an assessment of the advantages of a digital data transmission.
Hint: You will be marked on your critique of the advantages of a digital data transmission.

(7 marks)

4) Answer all parts

In a networked system the 7-layer ISO OSI Reference Model - Transport layer provides a virtual communications channel that provides an efficient, reliable and cost effective data transport between source and destination applications (programs). Another view is that it enhances the Quality of Service that the Network layer provides.

a) Drawing on your knowledge of the Transport layer draw up a critical appraisal of the **services** the OSI Transport layer provide.

(6 marks)

b) Name and briefly describe the main Quality of Service (QoS) parameters.

(8 marks)

c) The Transport layer is hierarchically above the network layer. One of the functions the Network layer provides is to find the most efficient and resilient path between source and destination. Routing algorithms carry out this task.

A networking company has employed you as a consultant network designer. They have asked you to give advice on typical routing algorithms.

Excise you knowledge of routing algorithms and contrast several typical routing algorithms.
Note: You answer may include a list of typical routing algorithms with a brief description of how each performs its task.

(6 marks)

PTO

5) Answer all parts

The goal of computer security is to guard against and eliminate potential threats. A secure system should maintain the integrity, availability and privacy of data held in the system.

A company has employed you as a computer security advisor to give a set of brief seminars to a group of company staff on **secure system**.

a) At the first seminar you brief the group on Accidental and Malicious data misuse/alteration.

Drawings on your knowledge of computer security discuss the difference between **Accidental** and **Malicious** data **misuse/alteration**.

(6 marks)

b) At the second seminar you explain the different break-in methods.

Explain in general terms some of the well-known break-in methods.

(8 marks)

c) In the third seminar you introduce the group to private key and a public key systems.

Compare and contrast private key and public key systems.
Hint: You will be marked on your critique of private key and a public key system.

(6 marks)

END OF PAPER

Answer Sheet for Question 3 part (a)

NOTE: Please label the diagram on this page if you answer Question 3 part (a). If you answer this question you must attach it to your exam answer book.

DO NOT label this diagram.

Copy of diagram on final page of Exam Book.