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Monash University

Semester Two 2001

Faculty Of Information Technology

EXAM CODES: CSE 3020 /COT3020

TITLE OF PAPER: Network Technology

EXAM DURATION: 2 hours writing time

READING TIME: 10 minutes

THIS PAPER IS FOR STUDENTS STUDYING AT: CAULFIELD CAMPUS

Candidates are reminded that they should have no material on their desks unless its use has been specifically permitted by the following instructions.

AUTHORISED MATERIALS

CALCULATORS YES

OPEN BOOK YES

SPECIFICALLY PERMITTED ITEMS YES

If yes, items permitted are:

In addition to the above – any written materials

Candidates must complete this section if required to answer in this paper

STUDENT ID _____ DESK NUMBER _____

SURNAME _____

.....SIGNATURE.....

OTHER NAMES (in full) _____

Question 1		Question 2		Question 3		Question 4		Question 5		Question 6		TOTAL
A	B	A	B	A		B	A	B	A	B	A	

(For marking use only)

INSTRUCTIONS:

1. Use your **BEST** handwriting. Someone has to **READ** this stuff.
2. This is an **Open Book** exam, and **Calculators** are allowed.
3. Each question has an associated mark of 10 (each part is 5).
4. **Maximal total mark of this exam is 50.** To get the maximal total mark you have to attempt five questions. If you attempt six, then the best five will be considered for the total mark.
5. The final mark in **CSE3020** is the sum of: the total mark of this exam (of 50), the total mark of the problem sets (of 30), and the total mark of the presentations (of 20).

GOOD LUCK

Question 1 : Data Encoding

(10 marks)

- A. "Bandwidth is an expensive resource in networks, but the *Direct Sequence Spread Spectrum* encoding scheme increases the bandwidth of a signal". Starting from the definition of *Bandwidth*, explain why this statement is correct, and justify the usage of this high bandwidth technology for certain appropriate situations.
- B. A wireless channel of 48000 Hz is designed for transmission of digital information, using QPSK with filter parameter $r=0.5$. What is the expected transmission rate of the information in this channel? What could be the nature of this information?

Question 2: Data Link Protocols

(10 marks)

- A. Consider the HDLC protocol. In order to economize on the overhead of using this protocol it is suggested that the usage of the *Supervisory* frames should be abandoned. Describe scenarios in which doing this will cause problems.
- B. Frames of 4K bits are sent through a 0.5 Mbps full duplex channel established in a 400 km copper link. Acknowledgements are always piggybacked onto data frames. What is the maximum achievable channel utilization when a Sliding Window Flow control protocol is used? Assume that the window size is 2. By how much should we increase the window size so that the utilization will be maximal?

Question 3: Local Area Networks

(10 marks)

- A. Stallings claims, "The Priority scheme used in the Token Ring IEEE 802.5 will not work in FDDI". Describe briefly the scheme and justify his statement.
- A. Consider a heavily loaded 8-km long, 4 Mbps token ring LAN. 20 stations are uniformly spaced around the ring. Data frames are 32 Bytes, including a 4 Bytes trailer. Acknowledgements are sent by the normal mechanism of the Token Ring protocol. The token is 4 Byte. What is the effective rate of data sent by a station?

Question 4: ATM**(10 marks)**

- A. "Address Resolution". What is the procedure used, why do we need it, how is it done in a TCP/IP based Ethernet LAN and how is it done in an ATM Emulated LAN?
- B. An Announcement Server application running on a computer in a 6-computer LAN intends to send a one-packet announcement to the clients running on all of the other 5 computers on the Local Area Network. What is the minimal number of frames that will actually be transmitted by the computers, if the LAN is Ethernet, and how many if the LAN is emulated by ATM network that consists of a switch connecting the 6 computers? Justify these numbers.

Question 5: Wireless Networks (GSM)**(10 marks)**

- A. "The HLR/VLR database approach used in GSM limits the scalability of a GSM system". Describe briefly the HLR/VLR approach and discuss whether this assertion is true.
- B. In the GSM system: What is the raw data rate of a physical TDM channel? Is it compatible with the Nyquist bound? The actual transmission rates in the TCH channels are lower (what are they?). Explain why.

Question 6: Wireless Networks – Bluetooth**(10 marks)**

- A. Describe the Flow Control and Error control Protocols used in Bluetooth Baseband. Compare this briefly with the corresponding protocols in HDLC.
- B. Consider the FHS packet of Bluetooth. In which scenarios is it being used? How? What is, then, the required content of this packet?