EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE 2002/03 & 2002/03 (A)

SECOND SEMESTER (April/May, 2004)

CS 302 – Computer Networks

Answer All Questions **Time allowed: Two hours**

Q1

(a) State clearly the reasons for using layered protocols. {20}

(b) Explain how a packet originating from the presentation layer of the sending host travels through the layers to the receiving host's presentation layer. {25}

(c) Describe the principal difference between connectionless communication and connection-oriented communication. {15}

(d) Describe each of the following switching techniques: {40}

a. Circuit switching

b. Packet switching

Q2

(a) Describe:

(i) Character oriented transmission with character stuffing. {15}

(ii) Bit oriented transmission with bit stuffing. {15}

(b) Describe the parity bit error detection method for blocks of characters. {15}
Illustrate your answer for the following block {15}

B_6	B_5	B_4	B_3	B_2	B_1	B_0
0	1	0	1	0	0	0
1	0	0	0	1	1	0
0	1	0	0	0	0	0
0	1	0	1	1	0	1
1	0	0	0	0	0	0
1	1	0	0	0	1	1

(c) Describe the principle of operation of a CRC error detection method. By means of an example, show how: {40}

(i) the error detection bits are generated

(ii) the received frame is checked for transmission error
use the generator polynomial $x^4 + x^3 + 1$

Q3

(a) Consider a simple protocol for transferring files over a link. After an initial negotiation, **A** sends data packets of size 1 KB to **B**; **B** then replies with an acknowledgement. A always waits for each ACK before sending the next data packet; this is known as ***stop-and-wait.*** Packets that are overdue are presumed lost and are retransmitted.

(i). In the absence of any packet loses or duplication, explain why it is not necessary to include any ***sequence number*** data in the packet headers. {15}

(ii). Suppose that the link can lose occasional packets, but that packets that do arrive always arrive in the order sent. Is a 2-bit sequence number enough for **A** and **B** to detect and resend any lost packets? Is a 1-bit sequence number enough? {10}

(iii). Now suppose that the link can deliver out of order, and that sometimes a packet can be delivered as much as 1 minute after subsequent packets. How does this change the sequence number requirements? {15}

(b) Two neighbouring nodes (**A** and **B**) use a sliding-window protocol with a 3-bit sequence number. As the ARQ mechanism, Go-back-N is used with a window size of 4. Assuming **A** is transmitting and **B** is receiving, show the window positions for the following succession of events:

(i). Before **A** sends any frames. {20}

(ii). After **A** sends frames 0, 1, 2 and **B** acknowledges 0, 1 and the ACKs are received by **A**. {20}

(iii). After **A** sends frames 3, 4 and 5 and **B** acknowledges 4 and the ACK is received by **A**. {20}

Q4

(a) List the four main types of network topology currently in widespread use for LAN's and, with the aid of sketches, explain their operation. {40}

(b) Describe the principle of operation of the following LAN methods: {40}
- (i) CSMA/CD
- (ii) Token ring

(c) Briefly describe the Eastern University Campus Wide Area Network setup. {20}