

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester 1

Academic Year: 2003-2004

Date: July 28, 2003

Time: 09:00 - 12:00

Subject Number: 240-574

Room: A200

Subject Title: Special Topics Information Network Engineering I
(Internet and its Protocols)

Exam Duration: 3 hours

This paper has 3 pages (including this page).

Authorised Materials:

- Anything the student can carry.

Instructions to Students:

- *Answer questions in English.* Good English is **not** required.
- Attempt all questions
- Write answers in an answer book
- Start the answer to each question on a new page.
- **Clearly Number** the answers. It is **not** required that questions be answered in order.
- Anything illegible is incorrect.
- Answer briefly where possible, essays are not required.
- The marks allocated for each question are shown next to that question. There are 40 marks total for this examination, which will contribute 20% of the course total.

Question 1.

(3 marks)

How can the use of a Finite State Machine aid the definition of a protocol?

Question 2.

(4 marks)

UDP packets carry a checksum that protects the UDP header, UDP payload (user data) and parts of the IP header. Use of the checksum is optional, when the packet is carried over IPv4. When the checksum is not present the checksum field has all bits set to zero.

However, when using IPv6, the checksum is mandatory, and may not be omitted (a zero value is an error).

Explain why that change was made.

Question 3.

(6 marks)

What factors would lead an application to prefer to use UDP or TCP as its transport protocol?

Which application types are likely to prefer one or the other?

When might TCP for Transactions (T/TCP) be a better choice?

Question 4.

(6 marks)

The TCP protocol has a **window size** that limits the amount of outstanding (unacknowledged) data transmitted from sender to receiver. The size of the header field used restricts the maximum size of the window.

Explain the problems this limit can cause, and how TCP was modified to overcome those problems.

Explain the issues that needed to be taken into account when designing the extension mechanism.

Question 5.

(5 marks)

The IPv6 packet format is different in many ways from IPv4.

List 5 of the differences, and explain why each change was made.

Question 6.

(6 marks)

Explain the role of the sequence number in the TCP 3-way handshake, used to initialise a new instantiation (instance) of a connection.

Why is the 3-way handshake required?

Question 7.

(3 marks)

Explain the purpose of ICMP (or ICMPv6) **error** packets, and the circumstances in which one should be sent, and when one should not.

Question 8.

(7 marks)

IPv6 has Duplicate Address Detection (DAD) as a standard feature, whereas IPv4 does not. Why?

Is it possible to implement DAD for IPv4? If possible, how might that be done?

What issues would need to be overcome (if any)?