

PRINCE OF SONGKLA UNIVERSITY  
FACULTY OF ENGINEERING

**Final Examination:** Semester 1

**Academic Year:** 2006-2007

**Date:** October 6, 2006

**Time:** 09:00 – 12:00

**Subject Number:** 240-643

**Room:** A203

**Subject Title:** The Internet and its Protocols

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**Exam Duration:** 3 hours

**This paper has 3 pages** (including this page).

**Authorised Materials:**

- Anything the student can carry, except for mobile phones.

**Instructions to Students:**

- *Answer questions in English.* Good English is **not** required.
- 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.
- The marks allocated for each question are shown next to that question. There are 75 marks total for this examination. This will contribute 75% of the course total. Questions assigned higher numbers of marks expect a more detailed and thorough answer than questions allocated less marks.
- Attempt all 5 questions.
- Anything illegible is incorrect.
- Answer briefly where possible, essays are **not** required.

**Question 1.***(10 marks)*

With the change from IPv4 to IPv6, many uses of IPv4 header options have been replaced by IPv6 extension headers.

Explain why this change was made.

Are there any disadvantages to the use of extension headers? If so, give examples showing the disadvantages.

**Question 2.***(20 marks)*

Explain the tradeoffs and design decisions that led to the IP fragmentation requirement, for both IPv4 and IPv6, that the size of all fragments except the last fragment of a packet must be a multiple of 8 octets.

Why was 8 (eight) chosen?

What other values might have been reasonable, and what would the advantages and disadvantages of those values have been?

Would there have been any reason to consider changing this requirement when IPv6 fragmentation was being designed? If so, what reason? If not, why not?

**Question 3.***(10 marks)*

Explain the use of Object Identifiers (OIDs) in the Simple Network Management Protocol (SNMP) and its management database, the Management Information Base (MIB).

Give an example of how an OID might be manipulated in an SNMP exchange.

**Question 4.**

*(25 marks)*

Which do you believe is more important when designing a protocol, efficiency, or extensibility?

Why?

Give reasons for your opinion, including examples from protocols that support your argument (which can be cases where a positive result was achieved from following the advice you would give, or cases where a poor result was achieved after adopting the other approach).

**Question 5.**

*(10 marks)*

Finite State Machines (FSM) and Grammars are both tools useful to a protocol designer.

Suggest common protocol design scenarios where each of those might be a suitable tool to use, and give examples. That is, what kind of protocol design is likely to benefit from the use of each of these tools.