PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Midterm Examination: Semester 2 **Academic Year:** 2008-2009

Date: December 28, 2008 **Time:** 13:30 – 16:30

Subject Number: 240-362 **Room:** A200

Subject Title: Internet Engineering

Name: _____

Student Number: _____ Signature: _____

Exam Duration: 3 hours

This paper has 7 pages (including this page).

- Write the answers in the spaces provided in the examination paper.
- Clearly write your student number in the space provided at the top of each page. Write your name, and sign, in the spaces provided on this cover page.
- There are 60 marks total for this exam. This will contribute 20% of the course total.

Authorised Materials:

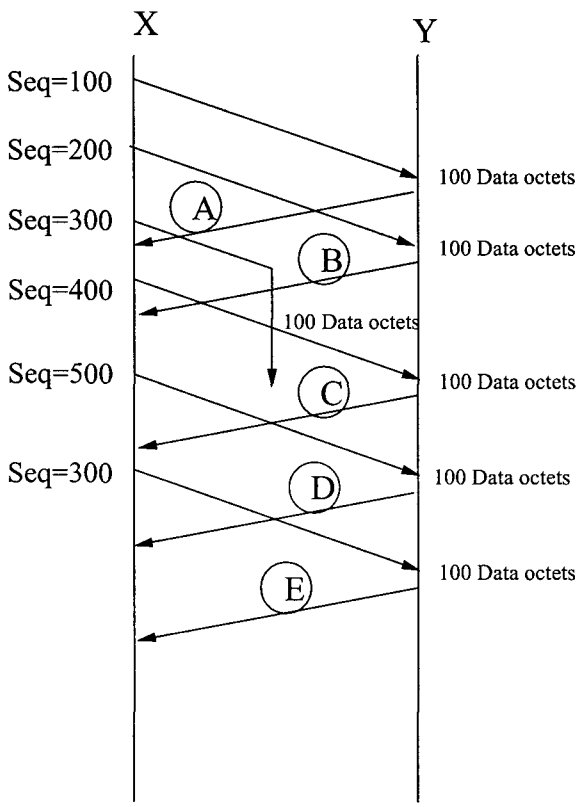
- Anything the student can carry (except communication devices.)

Instructions to Students:

- Attempt all 6 questions.
- Anything illegible is incorrect.
- Answer briefly where possible, essays are **not** required. There is no need to use all of the space provided for each answer!
- The marks allocated for each question are shown next to that question. There are 60 marks total for this examination.
- *Answer questions in English.* Good English is **not** required.

Question 1. *(10 marks)*

The diagram shows a timeline of part of the data transfer phase of a TCP connection (in ESTABLISHED state) between systems X (shown on the left) and Y (shown on the right).



Each packet from X to Y contains 100 octets (bytes) of data.

The value shown in the diagram, to the left of where each packet is transmitted, is in the Sequence Number field in the header of that packet.

One of the transmitted packets, as indicated, fails to reach Y.

The diagram also shows 5 packets from Y to X, each of which will acknowledge the data received.

In the diagram these are labelled **A, B, C, D** and **E**.

In the boxes below, write the value that will be in the Acknowledgement field of each of those packets: **A, B, C, D** and **E**.

A) ☐

B) ☐

C) ☐

D) ☐

E) ☐

Question 2. *(5 marks)*

Which claims about the Domain Name System (DNS) are true, and which are false?
(Write **T** *or* **F** *in each box provided)*

A) ☐

The DNS uses both UDP and TCP as its transport layer protocols.

B) ☐

The **Time To Live** in a DNS Resource Record is always ignored by DNS resolvers.

C) ☐

The answer section in the DNS reply message must have only one Resource Record.

D) ☐

It is possible for a DNS reply to indicate that no error occurred, and not provide the answer requested.

E) ☐

The two domain names, "sc.coe.psu.ac.th" and "SC.COE.psu.ac.th" can represent different nodes in DNS name tree.

Question 3. *(8 marks)*

Explain the purpose of the **port** numbers in the TCP and UDP headers.

Question 4. *(4 marks)*

A) An Internet Protocol (**IP**) Address contains a network number section, and a local part.

If two globally unique IP addresses have the same value in their network number sections, what can you conclude about the systems that have been assigned those addresses?

a) They were manufactured by the same manufacturer
b) They are owned by the same organisation
c) They are connected to the same link layer network
d) They were configured on the same day

B) Which of the following is not a valid IPv4 Internet Address?

a) 1.2.3.4
b) 101.101.101.101
c) 200.002.200.002
d) 111.222.123.321
e) 99.255.255.99

C) How many hosts is it possible to connect to an IPv4 network (link) that has a 26 bit subnet mask?

a) 26
b) 62
c) 6
d) 32
e) 64

D) Which of the following statements is true?

a) There is a well known address any host can use to talk to itself
b) There are four times as many IPv6 addresses as IPv4 addresses
c) All available IPv4 addresses have been assigned already
d) IPv6 is not used by any of the world's major networks

Question 5. *(18 marks)*

Use **time-line** diagrams to explain the passing of responsibility from a sending Mail Transfer Agent (MTA) to the receiving MTA when using the Simple Mail Transfer Protocol.

[10 marks]

Explain why the concept of **Responsible MTA** is important to the SMTP protocol. As part of this explanation, indicate what might occur if the concept did not exist.

[8 marks]

Question 6. *(15 marks)*

An Application implementing a transaction type of service decides that it should use UDP as its transport protocol.

Explain what the application will need to include in the data it sends if it needs the protocol to be reliable. That is, each transaction occurs at the receiver, exactly once, in the order they are submitted by the sender.

Explain why each data element you require is needed, and what might happen if that data was not present.