**Institutionen för Data-
och Systemvetenskap**

STOCKHOLMS
UNIVERSITET

KUNGLIGA
TEKNISKA
HÖGSKOLAN

The following documents are allowed during the exam:

1. Documents in Compendium 1, printed on coloured paper.

2. Documents in Compendium 2, printed on coloured paper.

3. Documents in Compendium 3, printed on coloured paper.

4. Ordinary language dictionaries between English and Swedish.

Note 1: Compendium 4, 5 and 6 are not allowed during the exam.

Note 2: Some students may have the compendiums from the previous time this course was given. Some of these compendiums have yellow paper only on the front page of the allowed documents, and there was a separate document Appendix A: ASN.1 syntax (basic items) which is allowed during the exam.

Note 3: Compendium 4 was wrongly printed on yellow paper in August 1998, but is not allowed during the exam.

Note 4: A few copies of these compendiums (part 1-3) will be available for loan during the exam for students who have not bought the compediums.

Important warning

It is not acceptable to answer an exam question by just a verbatim quote from the allowed documents above. You must show that you understand the question and your answer by using your own words.

Questions during the exam

Jacob Palme will come to the exam rooms around 14-15 hours on the day of the exam, to answer any questions on interpreting the exam questions.

Notification of result by e-mail

Print your e-mail address on the front cover page of the exam, so that I can notify you by e-mail if you did not pass the exam. Print legibly!

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No.	Question in English	Question in Swedish	Max points
1	Om man vill skicka data från en dator till en annan, finns det ett behov att markera slutet på ett delfält. Hur kan man, exempelvis, inkludera teckent ".” i en sträng, om ".” används för att markera strängens slut. Diskutera olika lösningar på detta problem i protokoll baserade på ABNF, ASN.1 och XML, och för- och nackdelarna med de olika metoderna.	If you want to send data from one computer to another, there is a need to mark the end of one data item. How can you, for example, include the ".” character in a string, if ".” is used to mark the end of the string. Discuss different methods to handle this problem in protocols based on ABNF, ASN.1 and XML, and their pros and cons.	6
	1) Put a length counter in front of the data. The data can then contain anything. Main method in BER. Also used to some extent in HTTP (2). 2) Split the data into chunks, with a length counter in front of each chunk. Again, anything can be included, but the sender need not even know all the data before starting to send it. Also used in BER and in e-mail "chunking” method (1). 3) Forbid certain characters in the data (1). If they occur anyway, encode them in some special way. The three most common such special ways are: a) Double all occurences of the forbidden character. Example: Encode "His name is "John" today” as "His name is ""John"" today" (0.5). b) Put a special quoting charater in front of forbidden characters. Example: "John F. Nilsson” as "John\ F\.\ Nilsson”. Used in e-mail (0.5). c) Encode using the hexadecimal or decimal value of the character. Example: "Göran Åberg” as "Gäran Åran” or G%f5ran %c5”. Used in HTML and many other standards (0.5). An extreme variant of this is BASE64, where *all* characters are encoded. d) Encode using a "name” of the character. Example: "Göran Åberg” as "Göran Åberg”. (0.5) e) Let a line break indicate the end of a string, but allow line breaks in the string if they are succeded by linear white space (e-mail headers). (0.5) Some of these methods have special problems if the character which needs to be encoded or the encoded variant is at the end of the string to be transmitted.		

No.	Question in English	Question in Swedish	Max points
2	Man vill sända en persons namn, uppdelat på separata delfält för efternamn, förnamn, initialer och generationsmarkering (exempel "Jr"). Visa hur detta specificeras både i ASN.1 och XML/DTD. Visa också ett exempel på hur namnet "John F. Kennedy Jr" sänds, och jämför hur många bytes som behöver sändas med ASN.1/BER och med XML-kodningen.	You want to send a person's name, separated into subfields for Surname, Given name, Middle Initial and Generation qualifier (like "Jr"). Show how this is specified using both ASN.1 and XML/DTD. Also show an example of how the name "John F. Kennedy Jr" is sent, and compare how many bytes are sent using the ASN.1/BER and the XML encoding.	6

ASN.1:

```
Name ::= SEQUENCE {
        Surname [0] VisibleString OPTIONAL,
        Givenname [1] VisibleString OPTIONAL,
        Initials [2] VisibleString OPTIONAL,
        Generation [3] VisibleString OPTIONAL }
```

DTD:

```
<!ELEMENT NAME (SURNAME, GIVENNAME, INTIALS, GENERATION)>
<!ELEMENT SURNAME (#PCDATA)>
<!ELEMENT GIVENNAME (#PCDATA)>
<!ELEMENT INITIALS (#PCDATA)>
<!ELEMENT GENERATION (#PCDATA)>
```

BER data (34 octets):

10	21									
00	1A	16	07	K	e	n	n	e	d	y
01	1A	16	04	J	o	h	n			
02	1A	16	02	F	.					
03	1A	16	03	J	r	.				

XML data (172 octets):

```
<?xml version="1.0"?>
<!DOCTYPE NAME SYSTEM "NAME.DTD">
<NAME>
    <SURNAME>Kennedy</SURNAME>
    <GIVENNAME>John</GIVENNAME>
    <INTIALS>F.</INITIALS>
    <GENERATION>Jr.</GENERATION>
</PERSON>
```

No.	Question in English	Question in Swedish	Max points
3	SMTP-protokollet inkluderar många interaktioner fram och tillbaka mellan sändande och mottagande agent. Ett brev med flera mottagare, sänds till exempel en mottagaradress i taget, och denna måste bekräftas innan nästa adress kan sändas. Vad är nackdelen med detta, och vad kan man göra åt saken inom ramen för gällande standarder?	The SMTP protocol includes many interactions back and forward between the sending and recipient agent. For example, for a multi-recipient message, the recipient addresses are sent one at a time, with an acknowledgement from the recipient before the next recipient name can be sent. What is the disadvantage with this, and how can it be overcome using facilities provided by existing standards?	6
	Disadvantage: Each turnaround takes time, so sessions will take longer time to complete. Methods to overcome this: Send the next command without waiting for response on the previous command. This is often called "Pipelining". Disadvantage: If something goes wrong, you will have to retract to the last successful command. You should not do this unless you have agreed with the server to do this, and not all mail servers do not support pipelining. There is an ESTMP method of indicating if you want to use pipelining.		
4	Antag att du vill tillhandahålla en tjänst via Internet, som användare kan koppla sig till både anonymt och icke-anonymt. Du vill använda olika cookies för dessa två användningar. Hur kan du åstadkomma det?	Suppose you want to provide a service to users, to which the user can connect either anonymously or non-anonymously. You want to use different cookies for these two uses. How can this be achieved?	6
	Cookies are limited to a specific domain name. By using different domain names for the anonymous and non-anonymous service, they will have different cookies, so that a user can switch between using the anonymous and the non-anonymous service without having to specify a login name and password more than once. Example: Use anon.foo.bar as the domain name for anonymous ratings, and non-anon.foo.bar as the domain name for non-anonymous ratings. Both domain names can still refer to the same physical server host.		