



Faculty of Arts & Sciences  
Department of Computer Sciences  
CMPS 396B  
Fall 2004–2005  
Monday, January 24, 2005

## Final Exam

Name: \_\_\_\_\_ Student Id: \_\_\_\_\_

Signature: \_\_\_\_\_

Duration: 100 minutes

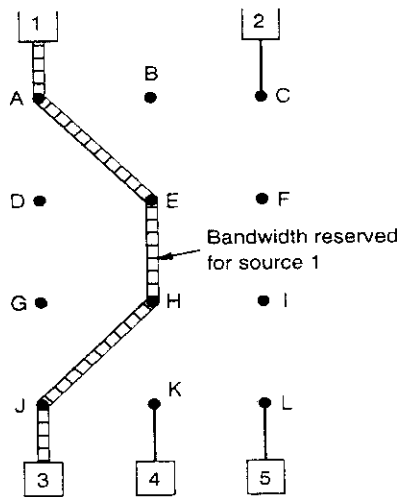
### Instructions

- There are 6 problems and 12 pages. Make sure you have all of them.
- The exam is closed book, closed notes, closed calculators, and closed neighbors.
- Answer questions in the space provided.
- The questions are **not sorted by difficulty**. Scan the whole exam before you start working.
- Your handwriting should be readable so it can be graded. Include all work or justification for partial credit.

Problem 1	18	
Problem 2	19	
Problem 3	13	
Problem 4	13	
Problem 5	25	
Problem 6	12	
Total	100	

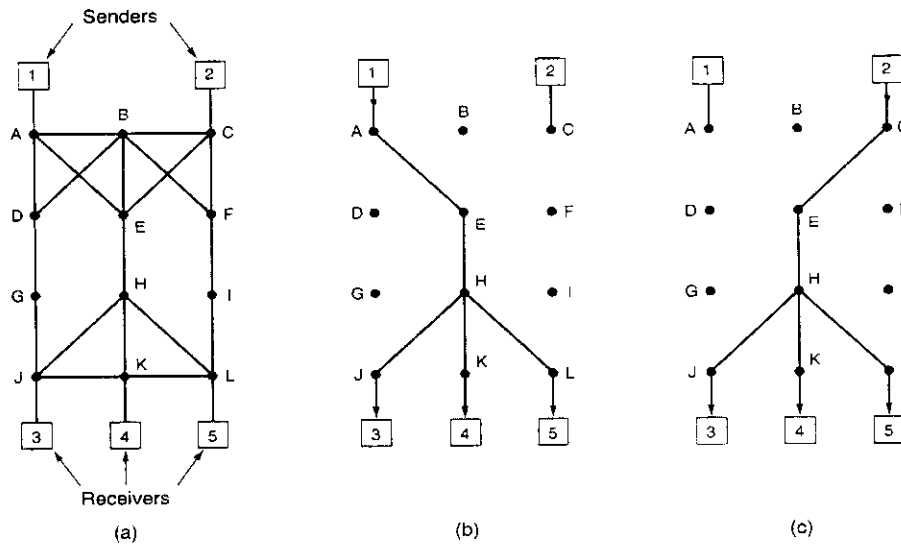
**Problem 1 [18 points]**

1. The figure below shows the path from host 1 to host 3. Assume that a flow will be generated from host 1 to host 3. Show how the RSVP protocol can be used in order to guarantee that all routers on the path from host 1 to host 3 reserve the required resources for this flow. [5 points]



2. Suppose that Router E in the figure above loses its reservation state, but remains running.
- 2.1. What will happen to the existing reserved flow if the router handles reserved and non-reserved flows via a single FIFO queue? [2 points]
- 2.2. What might happen to the existing reserved flows if the router used weighted fair queuing to segregate reserved and non-reserved traffic? [3 points]

3. The network in the figure below uses RSVP with multicast trees for host 1 and host 2. Suppose that host 3 requests a channel of bandwidth 2 MB/sec for a flow from host 1 and another channel of bandwidth 1 MB/sec for a flow from host 2. At the same time host 4 requests a channel of bandwidth 2 MB/sec for a flow from host 1 and host 5 requests a channel of bandwidth 1 MB/sec for a flow from host 2. How much total bandwidth will be reserved for these requests at routers A, B, C, E, H, J, K, and L? [8 points]





3.1 What is the main task of the following components? [6 points]

MSC	
VLR	
HLR	
SS7	

3.2 Describe the sequence of event messages needed when the mobile node  $N$  initiates a call to the mobile node  $M$  (call delivery procedure). [4 points]

3.3 In cellular networks, when and why location update procedure is performed? [3 points]



**Problem 4 [13 points]**

1. Describe the "exposed terminal problem". You can use the figure below to illustrate your answer. [4 points]



A



B



C

2. Explain why Ethernet-type collision detection algorithm won't work in a mobile ad hoc network. [3 points]

3. How IEEE 802.11 resolves the hidden terminal problem? You can use the figure below to illustrate your answer. [4 points]



A



B



C

4. In IEEE 802.11 what is the purpose of using **Net Allocation Vector (NAV)**? [2 points]









**Problem 6 [12 points]**

Write T if you think that the answer is mostly correct and F if you think that the answer is mostly incorrect.

Note that two wrong answers cancel a correct one.

1. Before sending any data over GPRS network, an mobile station must attach to it to establish a logical link with a SGSN
2. An IPv4 Address has 4 octets and an IPv6-Address has 12 octets.
3. The /48 in IPv6 address FEDC:BA99:5500::/48 means that this address has only 6 octets.
4. IPv6 defines 3 address-categories: unicast, multicast and anycast.
5. In IPv6, site-local addresses can be routed into the Internet
6. In GSM networks, each RNS is controlled by RNC and comprises several components called node B
7. An IPv6 base header length is 40 octets while an IPv4 header length can be 40 octets
8. An IPv4 header contains less information than an IPv6 base header.
9. GPRS supports both packet-switched (PS) and circuit-switched (CS) data transmission.
10. The header length field in IPv6 header is used to store the length of the IPv6 base header and the extension headers
11. In IPv6, hop-by-hop options must be examined by every node the packet traverses, except the destination node.
12. In IPv6, routers fragment datagrams larger than the MTU size.