1a Explain the following terms:
- *circuit-switched* and *packet-switched* networks
- *connection-oriented* and *connectionless* services

Give an example of a connectionless service running over a circuit-switched network.   *10pt*

1b Explain briefly how you can do long-distance communication through microwave transmission.   *5pt*

1c What is *time division multiplexing*?   *5pt*

2a Under which circumstances are *contention* protocols generally better than *collision-free* protocols. Explain your answer.   *5pt*

2b Give an example of a protocol that can behave both like a contention protocol as a collision-free protocol.   *5pt*

2c Explain clearly why 802.3 LANs (Ethernet 10 Mbit) have a minimal frame length specified.   *10pt*

2d Why are *token bus* networks generally considered more suitable for factory automation than, for example, 802.3 networks?   *5pt*

3a What is the difference between *distance vector routing* and *link state routing*?   *10pt*

3b Explain what the *count-to-infinity* problem is with distance vector routing.   *5pt*

3c What is *tunneling* and how was it applied to initially set up the MBone?   *5pt*

4a Why does Tanenbaum state that "without the transport layer, the whole concept of layered protocols would make little sense?"   *10pt*

4b In a new protocol, called *transaction TCP*, communication between a client (C) and a server (S) can proceed as follows:

C: Send a TCP packet with SYN = 1, FIN = 1, and the request (i.. the data).
S: Return a TCP packet with SYN = 1, FIN = 1, ACK = 1, and a reply.
C: Send a TCP packet acknowledging the receipt of the reply.

How does this protocol relate to client/server communication through UDP, and to traditional TCP?   *10pt*

4c Why is a *stop-and-wait* protocol generally lead to low network utilisation in the case of wide-area gigabit networks?   *5pt*

Grading: *The final grade is calculated by accumulating the scores per question (maximum: 90 points), and adding 10 bonus points. The maximum total is therefore 100 points.*