

1. *Indicate whether the following statements are TRUE or FALSE (for each statement, correct answer: 1p, wrong answer: -1p, no answer: 0p):*
 - a) Address resolution protocol (ARP) takes care of determining data link addresses.
 - b) UDP is a connection oriented transport layer protocol.
 - c) Collision detection (CD) strives to avoid hidden terminal problem.
 - d) Frame relay applies virtual circuits.
 - e) V.90 is a modem standard.
 - f) The European 2 Mbit/s PDH system (E1) can carry 32 PCM signals.
 - g) A pointer indicates the location of a "virtual container" within STM-1 frames.
 - h) MSISDN numbers are also called signalling point codes (SPC).
 - i) FDMA, TDMA and CDMA are multiple access methods.
 - j) SCTP (stream control transmission protocol) is always used on top of UDP.

2. *Please answer the following questions using not more than 50 words per topic (subsequent words will be disregarded) and/or a figure: (5 p each)*
 - a) What is the most important difference between TCP and UDP when QoS requirements of applications are concerned? Mention a typical application for both!
 - b) In which layer does HDLC protocol work? Name its major functionalities.

3. *Please answer the following questions using not more than 50 words per topic (subsequent words will be disregarded) and/or a figure: (5 p each)*
 - a) What are the OSI layers? Describe their tasks.
 - b) Describe the function, realization and applications of Point Coordination Function (PCF).

4. *Please answer the following questions with not more than one sentence: (1 p each)*
 - a) What does ISDN user part (ISUP) mean?
 - b) Why must every ISUP message contain a 16-bit circuit identification code (CIC)?
 - c) What does handover (US: handoff) mean in a cellular mobile network?
 - d) Why is paging needed in a cellular mobile network?
 - e) What are the basic tasks of the real time protocol (RTP)?
 - f) What does classless interdomain routing (CIDR) mean?
 - g) What does network address translation (NAT) mean?
 - h) What is the main function of the domain name system (DNS)?
 - i) Write a valid IPv4 address.
 - j) Write a valid IPv6 address.

5. *Please answer the following questions using not more than 50 words per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)*
 - a) Explain the basic idea of common channel signalling (CCS).
 - b) Give 3 examples how a service control point (SCP) can affect the routing of a call.
 - c) Explain the role of GMSC, HLR, and SMSC/VLR in a mobile terminated call (MTC).
 - d) Explain why and how random access is used in a cellular mobile network.