

1. Are the following sentences "true" or "false"?

(Correct answer: 1p, wrong answer: -1p, no answer: 0p):

- a) Token ring networking supports heavy loads.
- b) ATM is superior to MPLS due to its smaller overheads.
- c) P2P prefers symmetrical traffic channels.
- d) Network layer takes care of end-to-end flow control.
- e) Triple-play refers to VoIP+DVB-T and Internet.
- f) Up to 63 E1 signals can be carried in a single STM-1 system.
- g) Channel-associated signalling is generally used for signalling to/from databases.
- h) Intelligent peripheral (IP) can receive voiceband DTMF digits dialled by the user.
- i) SCTP (stream control transmission protocol) is always used on top of TCP.
- j) SIP (session initiation protocol) is related to the user plane of an IP network.

2. Please answer the following questions using not more than 30 words per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)

- a) List the differences of design philosophy of X.25 and Frame Relay.
- b) Describe the functionalities of Digital Circuit Multiplexing Equipment (DCME).
- c) List the functions of functions of Line Interface Circuit (LIC).
- d) What is meant by guard interval and why it is used in DMT?

3. Please answer the following questions using not more than 30 words per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)

- a) Explain the basic functionalities of HDLC.
- b) Explain the general criteria in selection of MAC protocol.
- c) Listen before talk (LBT) gives rise to a couple of problems i) What are they ? ii) How can they be overcome?
- d) List the FDDI Station-attachment types.

4. Please explain the following: (10p)

Explain the main signalling events of a mobile terminated call (MTC) originating in the PSTN. At least the roles of the following terms should be described: Random access, paging, alerting, HLR (home location register), VLR (visitor location register), GMSC (gateway mobile switching center), MSISDN number, IAM (initial address message), ACM (address complete message), ANM (answer message).

5. Please answer the following questions using not more than 30 words per topic (subsequent words will be disregarded) and/or a figure: (2.5 p each)

- a) Explain the structure of an E1 frame with a bitrate of 2.048 Mbit/s.
- b) Explain the meaning of PDP context.
- c) What does "tunneling" mean (as related to IP transport)?
- d) What does Network Address Translation (NAT) mean? Why and how is this technique used?