

Question B1: Networking

What is the difference between

- 1) Isochronous, synchronous, and asynchronous connections?
- 2) Structure and operation of multi-stage connection networks within switching nodes for circuit-switching and those for multi-stage connection networks within high-performance routers?
- 3) The operation of soft-state routing tables and that of hard-state switching tables for circuit-switching?
- 4) Message switching, packet switching, frame switching, and cell switching?
- 5) Ring protection by wrapping and that by steering?

Question B2: Circuit-Switching

- 1) What is the fundamental difference in delay performance between a transmission tunnel and a packet embedding tunnel?
- 2) How are network elements synchronized in PDH, SDH, and OTN?
- 3) How are packet-switched systems mapped onto these transmission network systems?
- 4) How are traditional transmission systems, now used as access links, mapped onto current synchronous transmission network systems?
- 5) What are the packet transfer properties of packet flows over a circuit-switched tunnel?
- 6) What must be done to emulate circuit-switched flows over packet-switched networks?

Question B3: Packet-Switching

- 1) Which are the five transmission units that can be labeled in GMPLS?
- 2) How are options included in the IPv4 header and how in the IPv6 header?
- 3) How many bytes has a ATM cell on the link and how many above the physical layer?
- 4) How are ATM cell-boundaries found?
- 5) Which are the two methods to assign labels in a LSP within MPLS?

Question B4: Wireless Access

- 1) Characterize the physical structure of the radio interface of GSM/GPRS. What is the mechanism in GSM/GPRS to synchronize mobile stations with the base transceiver station?
- 3) Which physical structure is used in the DECT radio interface?
- 4) What are the properties of WiMax? What does the abbreviation mean?
- 5) Which timing structure is used in the access protocol of IEEE 802.11.
- 6) Give three categories of wireless media that requires a MAC.

Question B5: Wired Access

- 1) What is the difference between an CWDM and DWDM?
- 2) Which influence has CWDM on component requirements?
- 3) Which duplex mechanisms are used on a twisted copper-pair?
- 4) Give three categories of wired media that requires a MAC.

Handwritten notes:
 ? MPLS?
 ?
 Aufbau Technologie?

Question A1: Components for Networking Applications

- 1a) What technologies and semiconductor materials are used to manufacture integrated circuits for communications applications?
- 1b) How can integrated circuits be classified according to their flexibility and performance?
- 2a) How does a thermo-optic switch work?
- 2b) What are micro-electro-mechanical system (MEMS) switches?
- 2c) Why interferometric structures are used for optical switches?
- 3a) How the transmission windows of standard single-mode fiber are defined?
- 3b) Are there any new fiber types and what are the trends in optical communications?
- 4a) What are the main differences between a Fabry-Perot (FP) laser and a distributed feedback (DFB) laser?
- 4b) Which structures can be used to produce short optical pulses?
- 5a) Describe the main parameters and applications of optical filters.
- 5b) Which types of optical filters are used in communication networks?

Question A2: Interconnects and Systems

- 1a) Describe evolution of interconnection technologies during the last decades.
- 1b) Which types of interconnects do you know?
- 1c) In which way interconnects can be classified?
- 1d) Describe benefits and drawbacks of three typical interconnection solutions:
- 2a) What is Internet SCSI (iSCSI)?
- 2b) Describe encapsulation of storage data into TCP/IP packets by using the iSCSI protocol
- 3a) What are the main components of an InfiniBand subnet?
- 3b) Describe the functions of local (LID) and global (GID) identifiers?
- 4a) What are the main applications of the Common Switch Interface (CSIX)?
- 4b) Describe the main functions of the physical, interconnection, and logical/message CSIX levels.
- 4c) What is a CFrame?
- 5a) Describe SONET/SDH interfaces developed by the Optical Internetworking Forum (IOF).
- 5b) What are the main differences between System Packet Interface (SPI) and DERDES Frame Interface (SFI)?