Question B1: Networking

1) Which two signaling protocol families exist in IP networks?
Remark: Signaling protocols are only used to transfer signaling information between users or devices.
2) What is the difference between path protection and section protection?
3) How does a GSM network know in which cells to page in case of an incoming connection? How does this relate to GPRS paging?
4) How is a telephone number translated to a DNS entry?
5) What is ring protection by steering and what is ring protection by wrapping?

Question B2: Circuit-Switching

1) How are clocking differences between two PDH-nodes adjusted?
2) Which are the three major differences between SDH and OTN?
3) How are PDH- and packet-technologies principally mapped onto SDH?
4) What is SDH concatenation and what is with VCAT possible?
5) Which functionality does LCAS provide?
6) What is respectively a lightpath, a lightbus, and a lighttree?

Question B3: Packet-Switching

1) How are ATM cell-boundaries found?
2) How does a Ethernet receiver synchronize on arriving bytes on layer 1 and how are the frame boundaries on layer 2 found?
3) How are options included in the IPv4 header and how in the IPv6 header?
4) Give the architecture and properties of RPR.
5) Which are the **two** methods to assign labels in a LSP within MPLS?

Question B4: Wireless Access

1) Which are the **three** GPRS-specific network elements?
2) Which channel groups (no individual channels) do exist in GSM?
3) Give three characteristics of WiMax.
4) For which network environment MBMS has been developed?
5) What are respectively the duplex modes of WLAN and WiMax?
6) What are WPANs and WRANs?

Question B5: Wired Access

1) Give the properties of a V.90/92 modem.
2) Give the transmission principle and data formating principle of xDSL.
3) Which duplex mechanisms are used on a twisted copper-pair?
4) Which access system uses the standard DOCSIS?
6) What are the properties of powerline?

Question A1: Components for Networking Applications

1) Which structures can be used to produce short optical pulses?
2) Explain the operational principle of an EDFA.
3) What types of fibers are used in optical communications?
4) How are the transmission windows of standard single-mode fiber defined?
5) Draw a block diagram of a basic CAM structure.
6) What is the main networking application of TCAMs?
7) What are the optical properties of optical switches realized by MEMS?
8) How does an acousto-optic switch work?
9) What are the main differences between a Fabry-Perot (FP) laser and a distributed feedback (DFB) laser?

Question A2: Interconnects and Systems

1) Give a classification of interconnects.
2) What are the main differences between System Packet Interface (SPI) and DERDES Frame Interface (SFI)?
3) What is Internet SCSI (iSCSI)?
4) Which coding scheme is used in 10GBASE-R?
5) What are the main applications of the Common Switch Interface (CSIX)?
6) What are the main components of an InfiniBand subnet?
7) Describe briefly the nonlinear effects in single mode fibers.
8) Describe the transmission hierarchy and the concept of flow control used in Fibre Channel (FC).
9) Describe the evolution of interconnection technologies during the last decades.

Question A3: High-performance Network Elements

1) Which technologies and components can be used to implement high-performance network elements?
   Remark: *Only itemize the main classes of electrical, optical and optoelectronic components and the applications in which they can be used.*
2) Describe methods that can be used to increase performance of a CPU (Central Processing Unit).
3) Characterize network processors.