Question A1: 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).

Question A2: CAMs and TCAMs

1) Draw a block diagram of a basic CAM structure.
2) What is a ternary CAM (TCAM)?
3) Highlight differences between basic (binary) CAMs and ternary CAMs.
4) What is the main networking application of TCAMs?

Question A3: Laser Structures

1) Describe the differences between the gain-guided and the index-guided laser diode structure.
2) What are the main differences between a Fabry-Perot (FP) laser and a distributed feedback (DFB) laser?
3) What structures can be used to produce short optical pulses?

Question A4: Interconnection Technologies

1) Describe evolution of interconnection technologies during the last decades.
2) What are the main applications of the Common Switch Interface (CSIX)?
3) Describe the main functions of the physical, interconnection, and logical/message CSIX levels.
4) What is a CFrame?

Question B1: Networking

1) Explain why there exist four address fields in the IEEE 801.11 WLAN.
   Remark: Consider the different communication possibilities.
2) What is the difference between a peer- and a overlay model in VPNs?
3) Give the name of the frame field to distinguish between group members in a VLAN?
4) Give two signaling protocols in IP networks.

Question B2: Circuit-Switching

1) For what reasons circuit-switching will always remain in a packet-switched world?
2) Give two important technologies.
3) What is the purpose for GFP?
4) Which functionality does LCAS provide?
5) What do the abbreviations GFP and LCAS mean?

Question B3: Packet-Switching

1) To avoid frame looping in LANs one has developed the spanning tree protocol. Give two extensions of this protocol.
2) For what purpose we need the the Fibre Channel Protocol?
3) What are the network components of IMS?
4) What are the network components of GPRS?

Question B4: Wireless Access

1) What are the characteristics of FDD and TDD in UMTS?
2) Which channel groups (no individual channels) do exist in GSM?
3) Mention three characteristics of WiMax?
4) For which network environment MBMS has been developed?

Question B5: Wired Access

1) Which type of access mechanism is needed on a PON?
2) Which access system uses the standard DOCSIS?
3) What is the transmission principle of xDSL?
4) What is inverse multiplex access?