Physical Layer

Channel capacity

Channel Impairments: attenuation, dispersion/intersymbol interference/multipath, distortion due to non-linear behaviour.

Amplifiers and repeaters

Digital data encoding & digital modulation (ASK, FSK, QPSK, QAM)

FDM and FDMA

TDM and TDMA

Spread Spectrum

Digital Communication Techniques

Asynchronous and Synchronous Transmission

Parity Checking, Error Correction & Detection, CRC.

Line configuration & topology.

Data Link Control

Flow Control: stop-&-wait, Go-back-N. Calculate line efficiency.

Basics on Data Communication and Networks

Switching & Broadcast networks.

LAN/MAN/WAN

Definition of Autonomous System

Protocol Architecture and Design Principles

OSI & TCP/IP Architectures.

Local rea Networks

Bus/Tree/Ring/Star Topologies

Aloha, Slotted Aloha, CSMA, CSMA/CD, CSMA/CA, Token Ring, FDDI. [You have to know how the protocols work].

Wireless LAN (architecture, problem(s), techniques counter measuring the problem(s))

Repeater, Bridge, Switch, Router. [What they are, how they function]

Circuit and Packet Switching

Circuit/datagram packet/virtual circuit packet switching [how they function, advantages, disadvantages]

Internetwork Protocols

IPv4, IPv6. [What functionality of the fields in header support, how the functionality is implemented]

Fragmentation and Reassembly: how it works, how fragments are structured.

ARP, RARP, ICMP

UDP

TCP [flow control, timer RTO calculation (Jakobson algorithm), flow control, congestion control]

IP addressing, Structure of IP address, Classful/Subnetting/Supernetting CIDR/Classless Addressing Dynamic addressing. NAT.

Processing of IP address and mask using Boolean algebra to determine subnet id, host id. Determine mask producing certain subnets, number subnet host id population.

Routing & outing Protocols

Static/Flooding/Random/Adaptive routing. [How they function, comparison, advantages disadvantages]

Dijkstra/Bellman-Ford Algorithms [how to use them, comparison].

Distance-Vector, Link State.

Routing table [content, built it]

Autonomous Systems [Definition, interconnectivity].

Interior Routing Protocol (IRP), Exterior Routing Protocol (ERP), OSPF, BGP. Functionality, differences.