Informatika

1. Basic terminology in data transmission and interfaces
   Parallel and serial communications, synchronous versus asynchronous serial communication, modulation, modulation and transmission speed, bandwidth, channel, circuit, link, transmission path.
2. Data transmission security
   Circuit switching, packet switching, data transmission standards, layer models, layers, protocols.
3. Reference model ISO/OSI
   Physical layer, link, network, transport, session, presentation and application layers, routing algorithms, repeater, bridge, router, gateway.
4. TCP/IP network model
   Addressing, routing, names in TCP/IP network, domain name system, protocols - ARP, RARP, IP, TCP, UDP, Telnet, FTP, SMTP, HTTP, NFS,... , port, well-known port, acknowledgement.
5. Interfaces
   PC standard interfaces - serial, parallel, disk, IEEE-488, peripherals handling - software, using interrupt, direct memory access.
6. Why semiconductor lasers in information technology?
   Basic physical principle, laser application, bar code scanners, laser printer, CD player, CD-RW, DVD.
7. Separation of the useful signal from the noise background
   Normal data distribution, non-standard data distributions, characterization of signal versus noise, signal to noise recognition general strategy, correlation to event, autocorrelation method, correlation estimator.
8. Data fitting
   "Best fitting" methods, normal equations, fitting strategy, polynomial fitting.
9. Errors
   Observation vs. measurement, units, types of measurement, measurement errors, precision versus accuracy, random errors and their characteristics, systematic errors, normal distribution of random errors.
10. Physical limitations in data transmission
    Analog vs. digital communication, signal spectrum, sampling theorem, comm. channel bandwidth, bit rate as a function of signal to noise ratio, current and ultimate bit rate using existing lines.
11. Global positioning system and its application
    Principle of operation, computing power requirements, system capabilities, application in IT, global applications.
12. Physical limitations in microprocessor speed
    Factors determining processor speed, clock frequency limitation, number of bits, architecture.
13. Physical limitation in storage media
    Currently used storage media and their bit densities and total capacities, physical limitation of bit density and total capacity in CD versus magnetic media.