

## **BTCS 701 (Advanced Computer Networks)**

### **UNIT – I**

Review of Physical & Data link layer, ISDN, Frame Relay, ATM

### **UNIT – II**

Network Layer: ARP and RARP, Routing algorithms and protocols, Congestion control algorithm, Router Operation, Router configuration, Internetworking, IP Protocol, IPv6 (an overview).

### **UNIT – III**

Transport Layer: UDP, TCP (Flow Control, Error Control, Connection Establishment)

### **UNIT – IV**

Application layer: DNS, SNMP, RMON, Electronic Mail, WWW.

Network Security: Firewalls (Application and packet filtering), Cryptography, Virtual Print,

### **TEXT BOOKS:**

1. B. A. Forouzan, "TCP/IP Protocol Suite", TMH, 2<sup>nd</sup> Ed., 2004.
2. A. S. Tananbaum, "Computer Networks", 3<sup>rd</sup> Ed, PHI, 1999.

### **REFERENCE BOOKS:**

1. U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. W. Stallings, "Computer Communication Networks", PHI, 1999.
3. W. Stallings, "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3<sup>rd</sup> Ed., Addison Wesley, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication, 1996.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication, 1999.
6. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

## **BTCS 702 (Advanced Computer Architecture)**

### **UNIT – I**

Parallel computer models: The state of computing , Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks

Program and network properties :Conditions of parallelism, Data and resource dependences,Hardware and software parallelism,Program partitioning and scheduling, Grain size and latency, Program flow mechanisms,Control flow versus data flow,Data flow architecture,Demand driven mechanisms,Comparisons of flow mechanisms

### **UNIT - II**

System Interconnect Architectures : Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory,Multistage and combining network.

Processors and Memory Hierarchy : Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors

Memory Technology :Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

### **UNIT - III**

Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches.

Pipelining :Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines

### **UNIT - IV**

Vector Processing Principles : Vector instruction types, Vector-access memory schemes.

Synchronous Parallel Processing : SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement

### **TEXT BOOKS:**

1. Kai Hwang, “Advanced computer architecture”; TMH, 2000.

### **REFERENCES BOOKS:**

1. J.P.Hayes, “computer Architecture and organization”, MGH, 1998.
2. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”, Narosa Publishing, 1998.
3. D.A.Patterson, J.L.Hennessy, “Computer Architecture :A quantitative approach”, Morgan Kauffmann, 2002.
4. Hwang and Briggs, “ Computer Architecture and Parallel Processing”; MGH, 2000.

**Elective**  
**(Compiler Design)**

**UNIT - I**

Classification of grammars, Context free grammars, Deterministic finite state automata (DFA) Non-DFA.

**UNIT - II**

Scanners, Top down parsing, LL grammars, Bottom up parsing, Polish expression Operator Precedence grammar, IR grammars, Comparison of parsing methods, Error handling.

Symbol table handling techniques, Organization for non-block and block structured languages.

**UNIT - III**

Run time storage administration, Static and dynamic allocation, Intermediate forms of source program, Polish N-tuple and syntax trees, Semantic analysis and code generation.

**UNIT - IV**

Code optimization, Folding, redundant sub-expression evaluation, Optimizatiion within iterative loops.

**TEXT BOOKS:**

1. Tremblay, et. al., "The Theory and Practice of Compiler Writing", McGraw Hill, New York, 1985.
2. A. Holub, "Compiler Design in C", PHI, 2004
3. Aho, Ullman & Ravi Sethi, "Principles of Compiler Design", Pearson Education, 2002

**REFERENCES BOOKS:**

1. Andrew L. Appel, "Modern Compiler Implementation in C", Delhi, Foundation Books, 2000.
2. Dick Grune et. Al., "Modern Compiler Design", Wiley Dreamtech, 2000.

**Elective**  
**(Mobile Computing)**

**UNIT – I**

**Introduction to Personal Communications Services (PCS):** PCS Architecture, Mobility management, Networks signalling.

**Global System for Mobile Communication (GSM) system overview:** GSM Architecture, Mobility management, Network signalling.

**General Packet Radio Services (GPRS):** GPRS Architecture, GPRS Network Nodes.

**UNIT – II**

**Mobile Data Communication:** WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

**Wireless Application Protocol (WAP):** The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

**UNIT – III**

**Third Generation (3G) Mobile Services:** Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

**Wireless Local Loop(WLL):** Introduction to WLL Architecture, wireless Local Loop Technologies.

**UNIT – IV**

**Global Mobile Satellite Systems;** case studies of the IRIDIUM and GLOBALSTAR systems.

**Wireless Enterprise Networks:** Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

**TEXT BOOKS:**

1. Yi-Bing Lin & Imrich Chlamtac, “Wireless and Mobile Networks Architectures”, John Wiley & Sons, 2001.
2. Raj Pandya, “Mobile and Personal Communication systems and services”, Prentice Hall of India, 2001.
3. Hansmann, “Principles of Mobile Computing”, Wiley Dreamtech, 2004.

**REFERENCE BOOKS:**

1. Mark Ciampa, “Guide to Designing and Implementing wireless LANs”, Thomson learning, Vikas Publishing House, 2001.
2. Ray Rischpater, “Wireless Web Development”, Springer Publishing, 2000.
3. Sandeep Singhal, “The Wireless Application Protocol”, Pearson Education Asia, 2000.
4. P.Stavronlakis, “Third Generation Mobile Telecommunication systems”, Springer Publishers, 2001.
5. Mobile Computing: Technology Application & Service creation “Talukder” TMH.

**Elective**  
**(Digital Image Processing)**

**UNIT - I**

**Introduction And Digital Image Fundamentals:** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**UNIT - II**

**Image Enhancement in the Frequency Domain:** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.

**Image Restoration:** A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**UNIT - III**

**Image Compression:** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

**Image Segmentation:** Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

**UNIT - IV**

**Representation and Description:** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

**Object Recognition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

**TEXT BOOKS:**

1. Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2<sup>nd</sup> edition, Pearson Education, 2002.
2. A.K. Jain, "Fundamental of Digital Image Processing", PHI, 1989.

**REFERENCES:**

1. Bernd Jahne, "Digital Image Processing", 5<sup>th</sup> Ed., Springer, 2002.
2. William K Pratt, "Digital Image Processing: Paks Inside", John Wiley & Sons, 2001.

**Elective**  
**Software Testing and Quality Assurance**

- Unit 1:** Introduction/Overview/What is Software Quality, Quality Assurance, Quality Assurance in Context, Quality Engineering.
- Unit 2:** Testing: Concepts, Issues and techniques, Test Activities, Management, and Automation, Coverage and Usage Testing Based on Checklists and Partitions, Input Domain Partitioning and Boundary Testing, coverage and Usage Testing Based on Finite-State Machines and Markov Chains, Control Flow, Data Dependency, and Interaction Testing, Testing Techniques: Adaptation, Specialization, and Integration.
- Unit 3:** Defect Prevention and Process Improvement, Software Inspections, Formal Verification, Faulty Tolerance and Failure Containment, Comparing Quality Assurance Techniques and Activities.
- Unit 4:** Feedback Loop and Activities for Quantifiable Quality Improvement, Quality Models and Measurements, Defect Classification and Analysis, Risk Identification for Quantifiable Quality Improvement, Software Reliability Engineering.

**TEXTBOOK:**

Software Quality Engineering: Testing, Quality Assurance and Quantifiable Improvement, by Jeff Tian, published by Wiley, ISBN 0-471-71345-7, is the required text.

**REFERENCE:**

Rapid **Testing**” by Robert Culbertson, Chris Brown and Gary Cobb; Prentice-Hall, 2002. ISBN 0-13-091294-8