T.E. Sem. VI [CMPN]

Advanced Computer Network

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Practical & Oral : 50 Marks

1. **Introduction :**
   Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models : The OSI model, TCP/IP protocol suite, Addressing, IP versions, Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways, etc. H/W selection.

2. **Optical Networking :**
   SONET/SDH standards, dense Wavelength division multiplexing (DWDM), Performance and design considerations.

3. **ATM :**
   The WAN Protocol : Faces of ATM, ATM Protocol operations (ATM cell and Transmission) ATM Networking basics, Theory of Operations, B-ISDN reference model, PHY layer, ATM layer (Protocol model), ATM layer and cell, Traffic Descriptor and parameters, Traffic congestion and control defined, AAL Protocol model, Traffic contract and QoS, User Plane overview, Control Plane AAL, Management Plane, Sub-DS3 ATM, ATM public services.

4. **Packet Switching Protocol :**
   X.25, theory of Operation and Network Layer functions, X.75, Internetworking protocols, SMDS, Subscriber Interface and Access Protocol, Addressing and Traffic Control.

5. **Common Protocols and Interfaces in Upper Layer :**
   TCP/IP suite, Network Layer, Transport Layer, Applications Layer, Addressing and routing design, Socket programming.

6. **Routing in the Internet :**
   Intra and interdomain routing; Unicast Routing Protocols : RIP, OSPF, BGP; Multicast Routing Protocols : MOSPF, DVMRP. Drawbacks of traditional routing methods, Idea of TE, TE and Different Traffic classes. IP over ATM, Multi protocol Label switching (MPLS), Storage Area Network (SAN).

7. **Network Management and Services :**
   SNMP : Concept, Management components, SMI, MIB, SNMP format, Messages.

8. **Traffic Engineering and Capacity Planning :**
   Traffic Engineering Basics : Requirement Definitions : Traffic sizing, characteristics, Protocols, Time Delay considerations, Connectivity, Reliability, Availability and Maintainability, Throughput calculations.

   Quality of Service : Introduction, Application, Queue Analysis: M/M/1 as a packet processing Model, QoS Mechanisms Queue management Algorithms, Feedback, Resource, reservation; Queued data and Packet switched traffic modeling. Application and QoS.
   Network Performance Modelling, Creating Traffic Matrix, Capacity Planning and Network vision, Design Tools.

9. **Multi-media over Internet :** RTP, RSVP, IP Multicasting, Voice Digitization standards, G.729 and G.723 and H.323.
   Enterprise Network Security : DMZ, NAT, SNAT, DNAT, Port Forwarding, Proxy, Transparent Proxy, Packet Filtering and Layer 7 Filtering.
   Backbone Network Design : Backbone Requirements, Network Capacities Topologies, Topologies Strategies, Tuning Networks.

References :

1. TCP/IP Protocol Suite, *(B. A. Forouzan),* Tata McGraw Hill edition, Third Edition.
2. Computer Networks: Principles, Technologies and Protocols for Network design, *(N. Olifer, V. Olifer)*, Wiley India Edition (1st Edition).
3. TCP/IP Volume 1, 2, 3, *(W. Richard Stevens)*, Addison Wesley.
4. TCP/IP Volume I and II, *(D. E. Comer),* Pearson Education.
5. Unix Network Programming *(W. R. Stevens)*, Vol. 1, Pearson Education.
6. High Performance Communication Networks, *(J. Walrand, P. Varaiya)*, Morgan Kaufmann
7. Computer Networks, *(A. S. Tanenbaum)*, Pearson Education, Fourth Edition.

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Advanced Microprocessors

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Practical & Oral : 25 Marks

1. **Introduction to Pipelined Processors:**
   Pipelining: An Overlapped Parallelism, Linear pipelining, Classification of Pipelined Processors, Principles of designing pipeline processor, Data flow computers, Systolic architecture, Superscalar, Super pipeline and VLIW processors.

2. **Intel 80386DX Processor :**
   Detailed study of Block diagram, Signal interfaces, Bus cycles, Programming model, Operating modes, Address translation mechanism in protected mode, Memory management, Protection mechanism.

3. **Intel P5 Micro architecture :**
   Pentium Processor Block diagram, Superscalar operation, Integer pipeline stages, Floating point pipeline stages, Branch prediction logic, Cache unit.

4. **Intel P6 Micro architectures :**
   Introduction to Pentium– Pro Processor, Special Pentium –Pro features.
   Introduction to Pentium–2 Processor, Pentium– 2 software changes, Pentium–3 processors.

5. **Pentium–4 & IA–64 Architectures :**
   Pentium–4 Net Burst Architecture, IA–64 Itanium Processor architecture.

6. **Sun SPARC Architecture :**
   SPARC Processor, Data Formats, Registers, Memory model. Study of Super SPARC and Ultra SPARC architectures.

7. **Study of System Buses :**
   Features, classifications, applications of the system buses like ISA, ATA, SCSI, PCI and USB. (Study of the buses is without signals and the timing diagrams).

References :

1. Computer Architecture and Parallel Processing *(by Hwang & Briggs)*, McGraw Hill International edition.
2. Pentium Processor System Architecture *(by Tom Shanley & Don Anderson)*, Mindshare Publishing.
3. Intel Microprocessors *(by Barry B. Brey)*, Pearson Education.
4. Advanced Microprocessor *(by Roy & Bhurchandi)*, Tata McGraw Hill.
5. Advanced Microprocessors *(by Daniel Tabak)*, McGraw Hill.
6. The SPARC Architecture Manual (Version 8).
7. Intel Manuals.

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Data Warehousing and Mining

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Practical & Oral : 25 Marks

Data Warehousing

1. **Overview and Concepts :**
   Need for data warehousing, The building blocks of a Data warehouse.

2. **Architecture and Infrastructure :**
   Data Warehouse Architecture, Infrastructure and Metadata Management.

3. **Principles of Dimension Modeling :**
   Introduction to Dimensional Modeling, Advanced Concepts.

4. **Extract Transform Load Cycle :**
   ETL overview, Extraction, Loading, Transformation techniques.

5. **Information Access and Delivery :**
   Matching information to classes of users, OLAP – the need, Design of the OLAP database, OLAP operations: slice, dice, rollup, drill-down etc. OLAP implementations.

6. **Implementation And Maintenance :**
   Physical design process, Aggregates and Indexing. Data Warehouse Deployment.

Data Mining

7. **Introduction :**
   Basics of data mining, related concepts, Data mining techniques. The KDD process.

8. **Concept Description :**
   Class Characterization and comparison, Attribute relevance analysis, Attribute oriented Induction, Mining descriptive statistical measures in large databases.

9. **Classification Algorithms :**
   What is Classification? Supervised Learning, Classifier Accuracy, Decision Tree and Naïve Bayes Classifier.

10. **Clustering :**
    What is clustering? Types of data, Partitioning Methods (K-Means, K-Medoids) Hierarchical Methods(Agglomerative , Divisive).

11. **Association rules :**
    Motivation For Association Rule mining, Market Basket Analysis, Apriori Algorithm, FP tree Algorithm, Iceberg Queries. Advanced Association Rules (just concepts)

12. **Web Mining :**
    Web Content Mining, Web Structure Mining, Web Usage mining.

References :

1. The Data Warehouse Lifecycle toolkit, *(Ralph Kimball)*, 2nd edition, Wiley India.
2. Data Mining Concepts and Techniques, *(Han, Kamber)*, 2nd edition, Elsevier.
3. Data warehousing, *(Reema Theraja)*, Oxford University Press.
4. Introduction to Data Mining, *(Pang–Ning Tan, Vipin Kumar, Michael Steinbach)*, Pearson Education, 1st edition.
5. Data Mining Introductory and Advanced Topics, *(M. H. Dunham)*, Pearson Education.
6. Data Warehousing Fundamentals, *(Paulraj Ponniah)*, Wiley Student edition.
7. Data mining For Business intelligence *(Galit Shmueli, Nitin Patel, Peter Bruce*), Wiley Student Edition.
8. Data Warehousing, Data Mining & OLAP *(Alex berson & Stephen J. Smith)*, Tata McGraw Hill.
9. Data Mining with SQL Server 2008 *(Jamie McLennan & others)*, Wiley Indian Edition.
10. Mastering Data Mining, *(M Berry and G. Linoff)*, Wiley Student Edition.
11. The Data Warehouse Toolkit, *(R. Kimball)*, John Wiley.

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Object Oriented Software Engineering

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Practical & Oral : 50 Marks

1. **Software life cycle models :** Waterfall, RAD, Spiral, Open-source, Agile process.
   Understanding software process : Process metric, CMM levels.

2. **Planning & Estimation :** Product metrics, Estimation- LOC, FP, COCOMO models.
   Project Management : Planning, Scheduling, Tracking.

3. **Workflow of Software life cycle**
   Requirement Workflow : Functional , Nonfunctional; Characteristics of Requirements; Requirement Elicitation Techniques; Requirement Documentation –Use case specification, Activity Diagram.
   Analysis workflow : Static Analysis; Identifying Object – Methods of identifying objects and types - Boundary, Control, Entity; Dynamic Analysis : Identifying Interaction – Sequence and Collaboration diagrams, State chart diagram.
   Design Workflow : System Design Concept – Coupling and Cohesion; Architectural Styles; Identifying Subsystems and Interfaces; Design Patterns.

4. **Implementation Workflow :**
   Mapping models to Code; Mapping Object Model to Database Schema; Testing; FTR – Walkthrough and Inspection; Unit Testing, Integration, System and Regression Testing; User Acceptance Testing; Software Quality – Quality Standards , Quality Matrices; Testing & SQA: FTR, unit testing, integration testing, product testing, and acceptance testing.

5. **Software Configuration Management :**
   Managing and controlling Changes; Managing and controlling versions.

6. **Maintenance :**
   Types of maintenance; Maintenance Log and defect reports; Reverse and re-engineering.

References :

1. Object oriented software engineering, *(Bernd Bruegge)*, Second Edition, Pearson Education.
2. Object oriented software engineering, *(Stephan R. Schach)*, Tata McGraw Hill.
3. Software Engineering, *(Roger Pressman)*, sixth edition, Tata McGraw Hill.
4. Object –Oriented Software Engineering – A Practical software development using UML and Java, *(Timothy C. Lethbridge, Robert Laganiere)*, Tata McGraw–Hill, New Delhi.

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System Programming and Compiler Construction

SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks
Term Work : 25 Marks
Oral : 25 Marks

1. **System Software :**
   Concept, introduction to various system programs such as assembler, loaders, linkers, macro processors, compilers, interpreters, operating systems, device drivers.

2. **Assemblers :**
   Basic assembler functions, Elements of Assembly language programming, Overview of the assembly process, Design of Single pass and multipass assemblers. Examples : SPARC Assembler.

3. **Macros & Macro Processors :**
   Macro definition and examples, Definitions and concept of parameterized macro, nested macros, conditional marco expansion, recursive macro. Design of simple macro processor.

4. **Loaders and Linkers :**
   Basic loader functions, Linking and Relocation concept, Concept of linkage editors, dynamic linking loader.

5. **Compilers :**
   Introduction to Compilers, Phases of a compiler, comparison of compilers and interpreters.

6. **Lexical Analysis :**
   Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Finite Automata, Designing a lexical analyzer generator, Pattern matching based on NFA's.

7. **Syntax Analysis :**
   Role of Parser, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.

8. **Syntax Directed Translation :**
   Syntax and directed definitions, construction of syntax tree, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed definitions.

9. **Run Time Storage :**
   Activation record, handling recursive calls, management of variable length blocks, garbage collection and compaction, storage allocation strategies.

10. **Intermediate Code Generation :**
    Intermediate languages : graphical representations, DAGs, Three address code, types of three address statements, syntax directed translation into three address code, implementation of three address statements.

11. **Code Generation :**
    Semantic stacks, attributed translations, evaluation of expressions, control structures and procedure calls.

12. **Code Optimization :**
    Machine dependent and machine independent code optimization, Sources of optimization.

13. **Compiler-Compilers :**
    JAVA compiler environment, YACC compiler-compiler.

References :

1. Principles of compiler construction, *(A. V. Aho, and J. D. Ullman)*, Pearson Education.
2. Compilers – Principles, Techniques and Tools, *(A. V. Aho, R. Shethi and Ulman)*, Pearson Education
3. System Software, *(Leland Beck)*, Addision Wesley
4. Systems programming & Operating systems, *(D. M. Dhamdhere),* Tata McGraw Hill
5. Systems Programming, *(J. J. Donovan)*
6. Modern Complier Design, *(Dick Grune, Koen G. L, Henri Bal)*, Wiley Publications
7. Complier Construction, Principles and Practice, *(Cengage Learning)*, Kenneth C. Louden.
8. Linkers and Loaders, *(John R. Levine)*, Morgan Kaufman.

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