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| SRI RAMAKRISHNA P.G. (AUTONOMOUS) COLLEGE :: NANDYAL |
| DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS |
| DETAILED SYLLABUS FOR MCA - IV SEMESTER |
| (w.e.f. 2010-2011 Batch) |

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| --- | --- | --- | --- | --- |
| S.No. | Paper Code | Paper Title | Workload per Week in Hours (For 16 Weeks) | Maximum Marks |
| Internal Assessment | Semester End  | Total |
| 1 | MCA4T1 | Computer Networks | 4 | 25 | 75 | 100 |
| 2 | MCA4T2 | Object Oriented Analysis and Design Through UML | 4 | 25 | 75 | 100 |
|  **Elective – 1** |
| 3 | MCA4T3.1 | Systems Software | 4 | 25 | 75 | 100 |
| MCA4T3.2 | E-Commerce | 4 | 25 | 75 | 100 |
| MCA4T3.3 | Design and Analysis of Algorithms | 4 | 25 | 75 | 100 |
|   **Elective – 2** |
| 4 | MCA4T4.1 | Advanced Database Management Systems | 4 | 25 | 75 | 100 |
| MCA4T4.2 | Distributed Operating Systems | 4 | 25 | 75 | 100 |
| MCA4T4.3 | Computer Graphics | 4 | 25 | 75 | 100 |
| 5 | MCA4T5 | Software Engineering | 4 | 25 | 75 | 100 |
| 6 | MCA4P1 | Unix Network Programming Lab | 4 | 25 | 75 | 100 |
| 7 | MCA4P2 | UML Lab | 4 | 25 | 75 | 100 |
|   | 32 | 175 | 525 | 700 |

MCA4T1: COMPUTER NETWORKS

**UNIT – 1**

COMPUTER NETWORKS AND THE INTERNET: What is the Internet?, What is a Protocol?, The Network Edge, The Network Core, Access Networks and Physical Media, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models, Internet Backbones, NAPs, and ISPs, A Brief History of Computer Networking and the Internet.

###### UNIT – 2

APPLICATION LAYER: Principles of Application Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS - The internet’s Directory Service.

###### UNIT – 3

TRANSPORT LAYER: Transport-Layer Services and Principles, Multiplexing and Demultiplexing Applications, Connectionless Transport: DDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control.

###### UNIT – 4

NETWORK LAYER AND ROUTING: Introduction and Network Service Models, Routing Principles, Hierarchical Routing, Inter Protocol, Routing in the Internet, what’s Inside a Router?

###### UNIT – 5

LINK LAYER AND LOCAL AREA NETWORKS: The Data Link Layer: Introduction, Services, Error Detection and Correction Techniques, Multiple Access Protocols and LAN’s, LAN Addresses and ARP, Ethernet, Hubs, Bridges, and Switches, IEEE 802.11 LANs, PPP: The Point-to-Point Protocol, Asynchronous Transfer Mode (ATN), X.25 and Frame Relay**.**

Text Book:

James F. Kurose and Kejth W.Ross: COMPUTER NETWORKING A Top-Down Approach Featuring the Internet, Pearson Education

Reference Books:

1. Fitz Gerald: Business Data Communication & Networks, Jhon Wiley
2. Forouzan: Computer Networks 2nd Edition, TMH
3. Computer Networks: Tanenbaum 3rd Edition, PHI.
4. Black: Data Communication And Distributed Networks 3rd Edition, PHI.

 5 Stallings: Data Communications, 6th Edition, PHI.

###### MCA4T2: OBJECT ORIENTED ANALYSIS AND DESIGN THROUGH UML

**UNIT – 1**

Introduction – OO Themes – Modeling as a design technique: Modeling – Abstraction – The three models – Class Modeling: Object and Class concepts – Link and association concepts – Generalization and Inheritance – A sample class model – Navigation of Class Models

**UNIT – 2**

Advanced Class Modeling: Advanced object and class concepts – association ends – N-ary associations – Aggregation – abstract classes –multiple inheritance – metadata – Reification –constraints –derived data – packages. (Chapters 1,2,3,4)

## UNIT – 3

State Modeling: events – states – transitions and conditions – state diagram behavior Advanced state modeling: nested state diagrams – nested states – signal generalization –concurrency – a sample state model – relation of class and state models – Interaction modeling: Use case models – sequence models – activity models. (Chapters 5,6,7)

## UNIT – 4

Process overview: Development stages – life cycle System conception: devising a system concept – elaborating a concept – preparing a problem statement

Domain analysis: Overview of analysis – domain class, state and interaction models – iteration the analysis

Application analysis: Application interaction, class and state models – adding operations

(Chapters 10,11,12,13)

## UNIT- 5

System design: Overview of system design – Estimation performance – making a reuse plan – breaking a system into subsystems – identifying concurrency – allocation of subsystems – management of data storage – handling global resources – choosing a software control strategy – handling boundary conditions – common architectural styles – architecture of the ATM system

Class design: Overview of Class design – bridging the gap – realizing use cases – designing algorithms – design optimization –organizing a class design – ATM example. (Chapters 14,15)

**TEXT BOOK**:

Object –Oriented Modeling And Design with UML by Michael Blaha & James Rumbaugh, 2nd edition Pearson Education, 2006

# REFERENCE BOOKS:

1. Applying UML and Patterns by Craig Larman, Pearson Education, 2000
2. Object Oriented Analysis & Design by Atul Kahate, Tata McGraw Hill
3. Object Oriented Analysis and Design by Mahesh P.Matha, PHI 2008
4. The Unified Modeling Language Reference Manual by James Rumbaugh, Ivar Jacobson and Grady Booch, Pearson Education, 2006
5. Object-Oriented Systems Analysis and Design using UML by Simon Bennett, Steve McRobb and Ray Farmer, TMH, 2004
6. Fundamentals of Object-Oriented Design in UML by Page Jones, Pearson Education
7. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh & Ivar Jacobson, Pearson Education

8 Object-Oriented Analysis and Design with Applications 3rd edition by Grady Booch, Robert A.Maksimchuk, Michael W.Engle , Pearson Education

###### MCA4T3.1: SYSTEMS SOFTWARE

# UNIT – 1

Simplified Instructional Computer – Architecture SIC/XE Architecture – Programming Examples. Assemblers: Data structures and logic flow for a simple two-pass assembler, Addressing modes – program counter relative, base-relative, immediate, indirect; Relocatable programs; Literals; Symbol-defining statements (EQU); Expressions; Control sections and program linking; One-pass assemblers; Effect of machine architecture on assembler design.

# UNIT – 2

Design of Absolute Loaders and Bootstrap loaders - Machine-Dependence – Relocation – Program Linking – Algorithms and data structures for a linking loader - Machine-Independence – Automatic Library Search – Loader Options - Loader Design Options – Linkage Editors – Dynamic Linking and Bootstrap Loaders - Effect of machine architecture on loader design – MS-DOS Linker.

# UNIT – 3

Macro processors – Macro definition and expansion – Macro processor algorithm and Data Structures. Machine-independence – Concatenation of Macro parameters – Generation of Unique Labels – Conditional Macro expansion - Keyword Macro Parameters. Macro Processor Design options – Recursive Macro expansion, General purpose Macro Processors, Macro Processing within Language Translators, MASM Macro Processor.

# UNIT – 4

Structure of a simple one-pass compiler – Grammars - Lexical Analysis – Modeling Scanners as Finite Automata. Syntactic Analysis ( parsing) techniques – Operator-precedence Parsing, Recursive Descent Parsing, Code Generation. Machine-Dependence - Intermediate Form of the Program.

**UNIT – 5**

Code Optimization. Machine-Independence – Compilation of structured variables – Code Optimization Storage Allocation – Block Structured Languages. Design Options - Multi-pass compilers – Interpreters – P-code compilers – Compiler-compilers. SunOS C Compiler

**TEXT BOOK:**

Leland L. Beck: System Software – An Introduction to Systems Programming. (Pearson Education)

**REFERENCE BOOK:**

System Programming, Donovan – TMH

**MCA4T3.2: E – COMMERCE**

# UNIT – 1

Introduction to Electronic Commerce – Benefits and impact of E-Commerce –classification of E-Commerce –Application of E-Commerce technologies – E-Commerce Business models – Electronic Data Interchange – conventional trading process, building blocks of EDI systems: Layered architecture – Valued added networks – Benefits and applications of EDI – E-Commerce: Architectural framework

# UNIT – 2

Electronic Commerce: Network Infrastructure – LAN, Ethernet( IEEE standard 802.3) LAN, WAN – Internet – TCP/IP Reference model – DNS – Internet Industry Structure – E Commerce : Information distribution and messaging – FTP applications – E mail –WWW Server – Electronic Commerce : Information Publishing Technology – web browsers – HTML - CGI – multimedia content – E Commerce : Securing the business on internet – security policy, procedures and practices – site security – protecting the network and services –firewalls – Transaction security – cryptographic algorithms

## UNIT – 3

Electronic Payment Systems – online, prepaid and postpaid electronic systems – requirements metrics of payment systems – Influence on marketing: product, physical distribution, price, promotion, marketing communication and common e-marketing tools – Search engines and directory services - search engine marketing – formulating a good search strategy

**UNIT – 4**

 Internet advertising – models of internet advertising, banner advertisements, sponsoring content, screen savers and push broadcasting – corporate website – weakness in internet advertising.

**UNIT – 5**

Mobile Commerce: Introduction, framework and models – benefits - impediments in mobile commerce – Agents in Electronic commerce – need for agents, types of agents, agent technologies, agent standards and protocols and agent applications

**Text Book:**

1. Electronic Commerce – Framework technologies and applications by Bharat bhaskar, TMH

Reference Books:

1. World wide web design with HTML by C.Xavier
2. Creating a winning E-business by Napier , Judd, Rivers, Wagner- course technology, Thomson learning, 2001
3. E-Commerce – Cutting Edge of Business by Kamlesh K Bajaj Debjani Nag, Tata McGraw Hill
4. Hill - Kamlesh K Bajaj, Debjani Nag – Tata McGraw Hill, 1/e, 2003
5. Global Electronic Commerce- Theory and Case Studies by J Christopher Westland, Thodre H.K.Clark, Theodre.H.K Clark - University Press
6. E-Commerce – an Indian perspective by P T Joseph, Prentice Hall, 2/e
7. E-Commerce concepts, Models, Strategies by C S V Moorthy, Himalaya Publications

 8) Electronic Commerce – Gari P Schneider – Thomson Course Technology, 4/e, 2004

###### MCA4T3.3: DESIGN AND ANALYSIS OF ALGORITHMS

**UNIT – 1**

Introduction – Algorithm specification, Psuedo code for expressing algorithms - Performance Analysis - Space complexity, Time complexity, Asymptotic Notation - Big oh notation, Omega notation, Theta notation and Little oh notation - Amortized analysis - Disjoint Sets- disjoint set operations - union and find operations - spanning trees - connected components and biconnected components.

**UNIT – 2**

Divide and conquer - General method - Binary search - finding maximum and minimum - Quick sort - Merge sort - Strassen’s matrix multiplication - Greedy method: General method, applications - Job sequencing with deadlines - 0/1 knapsack problem - Minimum cost spanning trees - Single source shortest path problem.

**UNIT – 3**

Dynamic Programming- General method, applications - Matrix chain multiplication - Optimal binary search trees - 0/1 knapsack problem - All pairs shortest path problem - Traveling sales person problem - Reliability design - Backtracking- General method, applications - 8-queen problem - sum of subsets problem - graph coloring , Hamiltonian cycles.

**UNIT – 4**

Branch and Bound: General method, applications - Traveling sales person problem - 0/1 knapsack problem- LC Branch and Bound solution - FIFO Branch and Bound solution.

**UNIT – 5**

NP-Hard and NP-Complete problems - Basic concepts - non deterministic algorithms, NP - Hard and NP-Complete classes - Cook’s theorem.

## Text Book:

Fundamentals of Computer Algorithms by Ellis Horowitz, Satraj Sahni and

Rajasekharan, OrientLongman University Press( 2nd Edition)

## Reference Books:

1. Algorithm Design: Foundations, Analysis and Internet examples by M.T.Goodrich and R.Tomassia, John wiley and sons.
2. Introduction to Algorithms, 2nd edition by T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, Pearson Education
3. Introduction to Design and Analysis of Algorithms A strategic approach by R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
4. Design and Analysis of algorithms by Aho, Ullman and Hopcroft, Pearson education.
5. Algorithms by Richard Johnson baugh and Marcus Schaefer, Pearson

###### MCA4T4.1: ADVANCED DATABASE MANAGEMENT SYSTEMS

**UNIT – 1**

**Disk Storage:** Disk Technologies and Redundancy Maintenance – buffering of blocks – Placing File Records on disk – Operations on files – Heap files and sorted files - Internal hashing , External hashing, Dynamic file expansion - **Indexing**: Primary Indexes, Clustering Indexes, Secondary Indexes, Multilevel Indexes, Indexed Sequential Access, B-Trees and B+-Trees – Indexes on multiple keys.

**UNIT – 2**

Translation of SQL Queries into Relational Algebra for external sorting , SELECT, JOIN, PROJECT, SET and Aggregate operations - Pipelining – Heuristics in Query Optimization – Cost Estimates – Semantic Query Optimization - Practical Database Design and Tuning.

**UNIT – 3**

**Transactions and Schedules:** ACID properties –– Concurrent execution of transactions – Lock-based concurrency control –Transaction support in SQL – Crash Recovery – Deadlocks – Concurrency control without locking – Timestamp-based concurrency control – System Crash Recovery – Media Recovery.

**UNIT – 4**

**Security Issues** – Discretionary Access Control – Mandatory Access Control – Role-based Access Control - Encryption and Public Key Infrastructure.

**XML and Internet Databases** – Data models, documents, DocumentTypeDefinition files, Schema, Databases. Extraction of XML documents from Relational Databases - XML Querying.

**UNIT – 5**

**Data Mining Technologies** – Association Rules – Classification – Clustering – Patterns – Commercial Data Mining Tools – Characteristics of Data Warehouses – Data modeling – Functionality.

**Text Books:**

1. Raghu Rama Krishnan & Johannes Gehrke:  *Database Management Systems, 3rd Ed.* (McGraw Hill).

######  Remez Elmasri & Shamkanth B. Navathe: *Fundamentals of Database Systems. 4th Ed*. (Pearson Education)

###### MCA4T4.2: DISTRIBUTED OPERATING SYSTEMS

# UNIT – 1

Introduction To Distributed Systems: What is distributed system – Goals – Hardware Concepts – Software Concepts – Design Issues

Communication In Distributed Systems: Layered Protocols – Asynchronous Transfer Mode Networks – The Client-Server Model – Remote Procedure Call – Group Communication.

# UNIT – 2

Synchronization In Distributed Systems:Clock Synchronization – Mutual Exclusion – Election Algorithm – Atomic Transactions – Deadlocks in Distributed Systems.

# UNIT – 3

Process And Processors In Distributed Systems:Threads – System Models – Processor Allocation – Scheduling in distributed systems – Fault Tolerance – Real Time Distributed Systems.

# UNIT – 4

Distributed File Systems: Distributed File System Design – Distributed File System Implementation – Trends in Distributed File Systems

Distributed Shared Memory:Introduction – What is shared memory – Consistency models – Page Based Distributed Shared Memory – Shared Variable Distributed Shared Memory – Object Based Distributed Shared Memory

# UNIT – 5

Case Study - CHORUS: Introduction to Chorus – Process Management in Chorus – Memory Management in Chorus – Communication in Chorus – Unix Emulation in Chorus – COOL: An Object Oriented Sub-System – Comparison of AMOEBA, MACH and CHORUS

**TEXT BOOK:**

Distributed Operating Systems: Andrew S Tanenbaum (Pearson Education)

**REFERENCE BOOK:**

Distributed Operating Systems: Pradeep K Sinha (PHI)

###### MCA4T4.3: COMPUTER GRAPHICS

UNIT – 1

Overview of Graphics - Video display devices, Raster –Scan systems, Random-scan systems, graphic monitors and workstations, input devices, hard-copy devices, graphics software

Output primitives - Points and lines, line-drawing algorithms, loading the frame buffers, line functions - circle generating algorithms - ellipse generating algorithms - curve functions, pixel addressing and object geometry - filled area primitives - character generation. Attributes of output primitives - line and curve attributes, color and gray-scale levels, area-fill attributes, character attributes - antialiasing

UNIT – 2

Two-dimensional b geometric transformations - Basic transformations, metrics representations composite transformations - transformations between co-ordinate systems - transformation functions - raster methods for transformations - Two-dimensional viewing - The viewing pipeline, viewing co-ordinate reference frame - window-to-view port co-ordinate transformation - two-dimensional viewing functions - Clipping operations - point, line, polygon clipping algorithms

UNIT – 3

Structures and hierarchical modeling – basic structure concepts, editing structures, basic modeling concepts, hierarchical modeling with structures. Three dimensional concepts - three dimensional display methods – three dimensional graphic packages. Three dimensional object orientations –polygon surfaces, tables and meshes – Curved lines and surfaces –Quadratic surfaces – super-quadrics – blobby objects – spline representations – cubic spline interpolation methods – Bezier curves and surfaces – B-Spline curves and surfaces

UNIT – 4

Three dimensional Geometric and Modeling Transformations – Translation, rotation, scaling, other transformations. Composite transformations – 3D transformation functions – Modeling and coordinate transformations.

UNIT – 5

Three dimensional viewing – viewing pipeline, viewing coordinates, projections – view volumes and general projection transformations – clipping – 3D viewing functions - Visible-Surface detection methods – Computer animation

**Text Book**:

COMPUTER GRAPHICS by Donald Hearn and M. Pauline Baker, Pearson Education , 2nd Edition 2000

Reference Books:

1. Computer Graphics by Harrington, TMH
2. Computer Graphics Principles & Practice by Foley, Pearson Education.
3. Principles of Computer Graphics by Rogers, TMH

###### MCA4T5: SOFTWARE ENGINEERING

**UNIT – 1**

**Introduction to Software Engineering:** The evolution of role of software – Software – The changing nature of software – Software myths.

**A Generic view of process: Software engineering** – A Layered Technology – A Process Frame

work – The Capability Maturity Model Integration – Process Patterns – Process Assessment – Personal and Team Process Models – Process Technology – Product and Process.

**Process Model:** The Waterfall Model – Increment Process Models – Evolutionary Process Models – Specialized Process Models.

UNIT – 2

**Requirements Engineering:** Requirements Engineering Tasks – Initiating the Requirements Engineering Process – Negotiating Requirements – Validating Requirements.

**Building the Analysis Model:** Requirements Analysis – Analysis Modeling Approaches – Data

Modeling Concepts – Object Oriented Analysis –Flow-Oriented Modeling – Class-Based

Modeling – Creating a Behavioral Model.

**UNIT – 3**

**Design Engineering** : Design with the Context of Software Engineering – Design Process and Design Quality – Design Concepts – The Design Model.

**Creating an Architectural Design** : Software Architecture – Data Design – Architectural Design – Mapping Data Flow into a Software Architecture.

**UNIT – 4**

**Testing Strategies** : A Strategic Approach to Software Testing – Strategic Issues- Test Strategies for Conventional Software – Test Strategies for Object Oriented Software – Validation

Testing – System Testing

**Testing Tactics:** Software Testing Fundamentals – Black-Box and White-Box Testing – White-

Box Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing

**UNIT – 5**

**Project Management:** The Management Spectrum – The People – The Product – The Process –

The Project.

**Metrics for Process and Projects:** Metrics in the Process and Project Domains – Software Measurement

**Estimation:** The Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation

**Project Scheduling:** Basic Concepts – Project Scheduling – Defining Task Set for the Software

Project

**TEXT BOOK :**

1. Software Engineering A Practitioner’s Approach, Sixth Edition, by Roger S. Pressman

 McGraw-Hill International edition

**REFERENCE BOOKS:**

1. Software Engineering By Ghazzi (PHI)

2. Software Engineering By Fairley (Mc.Graw Hill)

3. Software Engineering By James F Peters

4. Software Engineering By Fleeger

5. Software Engineering By Agarval & Yogesh, New Age

6. Software Engineering An Engineering Approach By Witold Redrycz