CODE	SUBJECT	T	P
MCA09.4.1	Software Engineering	4	-
MCA09.4.2	Advanced JAVA & Web Technologies	4	-
MCA09.4.3	Data Warehousing and Mining	4	-
MCA09.4.4	Elective-I MCA09.4.4.1 Embedded Real Time Systems MCA09.4.4.2 Human Computer Interaction MCA09.4.4.3 ERP & Supply Chain Management	4	-
MCA09.4.5	Elective-II MCA09.4.5.1 Distributed Operating system MCA09.4.5.2 Mobile computing MCA09.4.5.3 Compiler Design	4	-
MCA09.4.6	Advanced JAVA & Web Technologies Lab	-	4
MCA09.4.7	Data Warehousing and Mining Lab	-	4

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MCA09.4.1 SOFTWARE ENGINEERING

UNIT I : Introduction to Software Engineering :
The evolving role of software, Changing Nature of Software,Software myths.
A Generic view of process : Software engineering- A layered technology, a process framework, The
Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

UNIT II : Process models :
The waterfall model, Incremental process models, Evolutionary process models, The Unified process.
Software Requirements : Functional and non-functional requirements, User requirements, System
requirements, Interface specification, the software requirements document.

UNIT III : Requirements engineering process :
Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.
System models : Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT IV : Design Engineering :
Design process and Design quality, Design concepts, the design model.
Creating an architectural design : Software architecture, Data design, Architectural styles and patterns,
Architectural Design.

UNIT V : Object-Oriented Design :
Objects and object classes, An Object-Oriented design process, Design evolution.
Performing User interface design : Golden rules, User interface analysis and design, interface analysis,
interface design steps, Design evaluation.

UNIT VI : Testing Strategies : A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.
Product metrics : Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for
source code, Metrics for testing, Metrics for maintenance.

UNIT VII : Metrics for Process and Products :
Software Measurement, Metrics for software quality.

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Risk management : Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk
projection, Risk refinement, RMMM, RMMM Plan.

UNIT VIII : Quality Management :
Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, 7/e , Roger S.Pressman , TMH
2. Software Engineering ,8/e, Sommerville, Pearson.

REFERENCE BOOKS
3. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
4. Software Engineering, Kassem A. Saleh, Cengage.
5. Software Engineering principles and practice, W S Jawadekar, TMH
6. Software Engineering, James ,PHI
7. Software Engineering concepts, R Fairley, TMH

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MCA09.4.2ADVANCED JAVA FOR WEB TECHNOLOGIES

UNIT I: Review of HTML4 ;
Common tags ,HTML Tables and formatting internal linking, Complex HTML forms.

UNIT II :Introduction to Scripting Languages:
Java Scripts, Control structures,functions, arrays & objects, DHTML, CSS, event model, filters & transitions.

UNIT III: Review of Applets, Class, Event Handling, AWT Programming:
Introduction to Swing: Japplet, Handling Swing Controls like Icons, Buttons, Text Boxes, Combo Boxes, Tabbed Pains, Scroll Pains, Trees, Tables, Differences between AWT Controls & Swing Controls, Developing a Home page using Applets & Swing.

UNIT IV :Java Beans:
Introduction to Java Beans, Advantages of Java Beans, BDK,   Introspection, Using Bound properties, Bean Info Interface, Constrained   properties, Persistence, Customizers, Java Beans API.

UNIT V: Introduction to Servelets:
Lifecycle of a Servelet, JSDK, The Servelet API, The javax.servelet Package, Reading   Servelet   parameters,   Reading   Initialization   Parameters,   The javax.servelet.HTTP package, Handling,   Http Request & responses, Using Cookies, Session Tracking, Security Issues.

UNIT VI :Introduction to JSP:
The Problem with Servelets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.
Setting Up the JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

UNIT VII: JSP Application Development:
Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data

Between   Pages – Sharing   Session   and Application Data Memory Usage
Considerations.

UNIT VIII: Database Access:
Database Programming using JDBC, Studying Javax.sql.* package. Accessing a
Database from a JSP Page, Application – Specific Database Actions Deploying JAVA
Beans in a JSP Page.

TEXT BOOKS:

1. Internet and World Wide Web: How to program,6/e, Dietel, Dietel , Pearson.
2. The Complete Reference Java2, 3/e, Patrick Naughton,   Herbert Schildt,
   TMH.
3. Java Server Faces, Hans Bergstan, O'reilly.

REFERENCE BOOKS:

4. Web Programming, building internet applications, 2/e, Chris Bates, Wiley
   Dreamtech
5. Programming world wide web, Sebesta, PEA
6. Web Tehnologies, 2/e, Godbole, kahate, TMH
7. An Introduction to web Design , Programming ,Wang,Thomson

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MCA09.4.3DATA WAREHOUSING AND DATA MINING

UNIT I : Introduction :
Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Preprocessing : Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II: Data Warehouse and OLAP:
Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT III : Data Mining Primitives, Languages, and System Architectures :
Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

UNIT IV : Concepts Description , Characterization and Comparison :
Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT V : Mining Association Rules in Large Databases :
Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT VI : Classification and Prediction :
Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Backpropagation, Classification

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Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT VII : Cluster Analysis Introduction :
Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

UNIT VIII : Mining Complex Types of Data :
Multimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TEXT BOOKS :
1. Data Mining, Concepts and Techniques , Jiawei Han, Micheline Kamber, Harcourt India.
2. Data Mining, Introductory & Advanced Topics, M H Dunham,S.Sridhar,Pearson.

REFERENCE BOOKS :
3. Data Mining Introductory and advanced topics, Margaret H Dunham, Pearson.
4. Data Mining Techniques, Arun K Pujari, University Press.
5. Data Warehousing Fundamentals , Paulraj Ponnaiah, Wiley.
6. The Data Warehouse Life cycle Tool kit, Ralph Kimball, Wiley .

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MCA09.4.4.1 EMBEDDED SYSTEMS AND REAL TIME SYSTEMS
(Elective I)

Unit I: Introduction to Embedded systems:
What is an embedded system Vs. General computing system, history, classification, major application areas, purpose of embedded systems.
Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT II: 8—bit microcontrollers architecture:
Characteristics, quality attributes, application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT III:
Interrupt, timers and serial ports of 8051
8051 interrupts, interfacing ADC 0801, Timers, serial port, Reset circuit, power saving modes.

UNIT IV: Programming the 8051Micro controller:
Addressing modes, Instruction set, sata transfer instructions, Arithmetic Instructions, Logical Instructions, Arithmetic Instructions, logical instructions, Boolean, Program control transfer instructions.

UNIT V:
RTOS and Scheduling
Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT VI:
Task communication of RTOS
Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

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UNIT VII:
The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT VIII:
 Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOKS:
1. Introduction to Embedded Systems, Shibu K V, TMH,2009.

REFERENCE BOOKS :
2.   Embedded Systems, Rajkamal, TMH,2009.
3.   Embedded Software Primer, David Simon, Pearson.
4.   The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

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MCA09.4.4.2 HUMAN COMPUTER INTERACTION
(Elective I)

UNIT I: Introduction:
Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen design

UNIT II: The graphical user interface:
Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

UNIT III: Design process
Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT IV: Screen Designing :
Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT V: Windows:
Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

UNIT VI: Components :
Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

UNIT VII: Software tools :
Specification methods, interface, Building Tools.

UNIT VIII: Interaction Devices:
Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

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TEXT BOOKS :

1. Human Computer Interaction. 3/e, Alan Dix, Janet Finlay, Goryd, Abowd, Russell Beal, PEA,2004.
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

REFERENCE BOOKS :

3. Designing the user interface. 4/e, Ben Shneidermann , PEA.
4. User Interface Design, Soren Lauesen , PEA.
5. Interaction Design PRECE, ROGERS, SHARPS, Wiley .
6. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.

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MCA09.4.4.3   ERP & SUPPLY CHAIN MANAGEMENT
(Elective I)

UNIT I: Introduction to ERP:
Overview – Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining – On–line Analytical Processing, Supply Chain Management.

UNIT II: ERP Implementation:
Implementation Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring.

UNIT III: Business Modules:
Business Modules in an ERP Package , Finance, Manufacturing, Human Resource, Plant Maintanance, Materials Management, Quality Management, Sales and Distribution.

UNIT IV: Fundamentals of Supply Chain Management:
Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT V: SCM Strategies, Performance:
Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT VI: Planning and Managing Inventories:
Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

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UNIT VII: Distribution Management:
Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT VIII: Strategic Cost Management in Supply Chain:
The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TEXT BOOKS:
1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra, Peter Meindel, PEA, 2002.

REFERENCE BOOKS:
3. Enterprise Resource Planning, Concepts and Planning, Vinod Kumar, Venkata Krishnan, PHI.
4. Enterprise Resource Planning Concepts and Practice, 7/e, Vinod Kumar, PHI.
5. Enterprise Resource Planning,Mary Sumner, PEA.
6. Supply Chain Management with APO, Thomas Dickerssbach,Springer.
7. Supply Chain Management on Demand, An Fromm, Springer.
8. Supply Chain Management and Advanced Planning, 2/e, Stadtler,Kilger, Springer.

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MCA09.4.5.1 DISTRIBUTED OPERATING SYSTEMS
(Elective II)

UNIT I: Processes:
THREADS: Introduction to Threads, Threads in Distributed Systems; CLIENTS: User Interfaces, Client-Side Software for Distribution Transparency SERVERS: General Design Issues, Object Servers; CODE MIGRATION: Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems, Example: D'Agents
SOFTWARE AGENTS: Software Agents in Distributed Systems, Agent Technology.

UNIT II: Naming Systems:
NAMING ENTITIES: Names, Identifiers, and Addresses, Name Resolution, The Implementation of a Name Space, Example: DNS, X.500
LOCATING MOBILE ENTITIES: Naming versus Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches
REMOVING UNREFERENCED ENTITIES: The Problem of Unreferenced Objects, Reference Counting, Reference Listing, Identifying Unreachable Entities.

UNIT III: Synchronization:
Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, distributed transactions.

UNIT IV: Consistency and Replication:
Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Distribution Protocols, Consistency Protocols, Examples: Orca and Causally-Consistent Lazy Replication.

UNIT V: Fault Tolerance:
Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

UNIT VI: Distributed Object-Based Systems:
CORBA, Distributed Com, Globe and Comparison of CORBA, DCOM, and Globe.

UNIT VII: Distributed File Systems:
Sun Network File System, Coda File System, Plan~9, XFS and SFS, Scalable Security, Comparison of Distributed File Systems.

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UNIT VIII: Distributed Document-Based Systems and Coordination-Based Systems:
Distributed Document-Based Systems: The World Wide Web, Lotus Notes, Comparison of WWW and Lotus Notes.
Distributed Coordination-Based Systems: Introduction to Coordination Models, TIB/Rendezvous, JINI, Comparison of TIB/Rendezvous and JINI.

TEXT BOOKS:

1.   Distributed Systems , Principles and Paradigms, 2/e, Tanenbaum, Maarten Van Steen, PHI.
2.   Advanced concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, TMH, 2005.

REFERENCE BOOKS:

3.   Distributed Operating Systems and Algorithm Analysis, Chow, Johnson, PEA
4.   Distributed Systems Concepts and Design, 4/e, George Coulouris, Dollimore, Kindberg, PEA.
5.   Distributed Operating Systems, Pradeep K. Sinha, PHI,2009.
6.   Operating Systems, Internals & Design Principles, 6/e, William Stallings, PEA.

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MCA09.4.5.2 MOBILE COMPUTING
(Elective II)

UNIT I : Introduction to Mobile Communications and Computing:
Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT II : (Wireless) Medium Access Control:
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT III: Mobile Network Layer:
Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT IV: Mobile Transport Layer:
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit V : Database Issues:
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT VI : Data Dissemination:
Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT VII : Mobile Ad hoc Networks (MANETs):
Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT VIII: Protocols and Tools:

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Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TEXT BOOKS:
1. Mobile Communications, 2/e, Jochen Schiller, 2004, *Addison Wesley*.
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic , Cacute, *Wiley*, 2002
3. Adhoc Wireless Networks, 2/e, Sivaram murthy, Manoj, PEA, 2009

REFERENCE BOOKS:
4. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Reza Behravanfar, Cambridge, University Press, 2004.
5. Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober, *Springer*, 2003.
6. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley *DreamTech*, 2003
7. Mobile Computing, Rajkamal, Oxford, 2008

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MCA09.4.5.3 **COMPILER DESIGN**
(Elective II)

UNIT I : Overview of Compilation:
Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

UNIT II : Parsing:
Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.
Bottom up parsing: - Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC – automatic parser generator.

UNIT III : Semantic analysis:
Intermediate forms of source Programs – abstract syntax tree, Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

UNIT IV : Symbol Tables:
Symbol table format, organization for block structured languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

UNIT V : Code Generation :
Processing the intermediate Code- Interpretation, Code generation, Simple code generation, code generation for basic blocks, BURS Code generation and dynamic programming, Register allocation by graph coloring, Evaluation of code generation techniques Preprocessing the intermediate code, post processing the target code, machine code generation.

UNIT VI : Code optimization:
Consideration for Optimization, Machine dependent and machine independent code optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

UNIT VII : Data flow analysis:
Dataflow Analysis, Intermediate representation for flow analysis , Various dataflow analyses , Transformations using dataflow analysis Speeding up dataflow analysis , Alias analysis.

UNIT VIII : Loop Optimizations:

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Dominators, Loop-invariant computations, Induction variables, Array bounds checks, Loop unrolling

TEXT BOOKS:
1. Principles of Compiler Design, A.V. Aho, J.D.Ullman, PEA.
2. Compilers Principles , Techniques and Tools , A.V. Aho, Ravi Sethi, J.D. Ullman, PEA.

REFERENCE BOOKS :
3. Modern Compiler Design, Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
4. LEX & YACC , John R. Levine, Tony Mason, Doug Brown, O'reilly
5. Modern Compiler Implementation in C, Andrew N. Appel, Cambridge University Press.
6. Engineering a Compiler, Cooper, Linda, Elsevier.
7. Compiler Construction, Louden, Thomson.

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