

Kalinga University Atal Nagar (C.G.)



SCHEME OF EXAMINATION & SYLLABUS

Of

M.Tech

Computer Science

(Object Oriented Software Development)

UNDER

Faculty of Engineering and Technology

w.e.f. Session 2021-22

Kalinga University, Raipur
Master of Technology (M.Tech) Computer Science
(Object Oriented Software Development)
(2 yrs Programme)
w.e.f 2021-22 session

Semester –I					
Code No.	Paper	Credits	End Semester Exam	Internal Marks	Total Marks
MTOOSD101	Advanced Engineering Mathematics	4	100	50	150
MTOOSD102	Object Oriented Analysis And Design Using UML	4	100	50	150
MTOOSD103	Advanced Operating System	4	100	50	150
MTOOSD104	Internet and Web Technology	4	100	50	150
MTOOSD105	Java Programming & Application	4	100	50	150
MTOOSD106-P	Object Oriented Analysis And Design Using UML Lab	1	30	20	50
MTOOSD107-P	Internet and Web Technology Lab	1	30	20	50
	Total	22	560	290	850
Semester – II					
Code No.	Paper	Credits	End Semester Exam	Internal Marks	Total Marks
MTOOSD 201	Compiler Design	4	100	50	150
MTOOSD 202	Object Oriented Software Engineering	4	100	50	150
MTOOSD 203	Analysis & Design of Algorithms	4	100	50	150
MTOOSD 204	Distributed Operating System	4	100	50	150
MTOOSD 205	Design & Development of Cloud Applications	4	100	50	150
MTOOSD 206-P	Compiler Design Lab	1	30	20	50
MTOOSD 207-P	Object Oriented Software Engineering Lab	1	30	20	50
	Total	22	560	290	850

Semester – III					
Code No.	Paper	Lecture	End Semester Exam	Internal Marks	Total Marks
MTOOSD 301	Information Storage & Management	4	100	50	150
MTOOSD 302	Communication & Research Methodology	4	100	50	150
	Elective – III	4	100	50	150
MTOOSD 303A	Advanced Computer Architecture				
MTOOSD 303B	Advanced Software Project Management				
MTOOSD 304	Preliminary Work on Dissertation	9	100	50	150
MTOOSD 305	Seminar Based on Dissertation	1	100	50	150
	Total	22	500	250	750
Semester - IV					
Code No.	Paper	Lecture	End Semester Exam	Internal Marks	Total Marks
MTOOSD 401	Dissertation	18	300	200	500
	Total	18	300	200	500

SEMESTER I

Advanced Engineering Mathematics

UNIT I

Discrete Mathematics Basics

Set Theory, Relations, Function and Algorithms, Logic and Propositional Calculus, Vector and Matrices. Probability Theory, Graph Theory, Permutations, Combinations, Generation of permutation and Combinations, Algebraic Systems, Boolean Algebra.

UNIT II

Differential Equation

Differential Equation of first order, Applications of differential equations of first order, Linear Differential Equation, Non Linear Differential Equation: Iterative, Variational and Perturbation Methods; Applications of Differential Equations: Ordinary differential equations with constant coefficients, Ordinary differential equations with variable coefficients, Simultaneous ordinary differential equations, Applications to mechanics, Applications to electrical circuits, Applications to beams.

UNIT III

Laplace Transforms

Properties of Laplace Transforms, Transform: Periodic Functions, Special Functions, Derivatives, Integrals, Applications to Differential Equations. Inverse Transform: Method of Partial Fractions.

Fourier Transforms: Fourier Integral Theorem, Properties of Fourier Transforms, Applications of Transformation to Boundary Value Problems.

UNIT IV

Fourier Analysis of Continuous-Time Signals and Systems

Fourier series Representation of Periodic Signals, The Fourier Transform, Properties of the Continuous-Time Fourier Transform, The Frequency Response of Continuous-Time LTI Systems, Filtering, Bandwidth.

UNIT V

Fourier Analysis of Discrete-Time Signals and Systems

Discrete Fourier Series, The Fourier Transform, Properties of the Fourier Transform, The Frequency Response of Discrete-Time LTI Systems, System Response to Sampled Continuous-Time Sinusoids, Simulation, The Discrete Fourier Transform.

Text Books:

1. Seymour Lipschutz and Marc Lars Lipson “Discrete Mathematics” Schaum’s Outlines, TMH, New Delhi.
2. Murray R. Spiegel “Laplace Transform” Schaum’s Outline Series McGraw –Hill.
3. Hwei P. Hsu “Theory and Problems of Signals and Systems” Schaum’s Outline Series McGraw –Hill.
4. Dr. B. S. Grewal “Higher Engineering Mathematics” Khanna Publishers, New Delhi.

Reference Books:

1. Seymour Lipschutz and John Schiller “Introduction to Probability and Statistics” Schaum’s Outlines, TMH, New Delhi.
2. Raisinghania, M.D.: Ordinary and Partial differential Equations – S. Chand, India.

Object Oriented Analysis and Design Using UML

UNIT I

Object Oriented Design and Modelling

Object Oriented Fundamentals, Objects and object classes, object oriented design process, importance of modelling, principles of modelling, object oriented modelling.

UNIT II

Introduction to UML and Behavioral Modeling:

Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, UML Diagrams , software development life cycle. Behavioral modeling: Interactions use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams, Modeling Concepts - Diagram Organization - Diagram Extension

UNIT III

Basic Structural Modeling:

Classes, relationships, common mechanisms, class and object diagrams. Advanced structural Modeling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams.

UNIT IV

Collaboration Diagrams and Sequence Diagrams

Terms, concepts and depicting a message in collaboration diagrams. Terms and concepts in sequence diagrams. Difference between collaboration and sequence. Diagram. Depicting synchronous messages with/without priority call back mechanism.

UNIT V

Advanced Behavioral and Architectural Modelling

Advanced Behavioral: Events and signals, state machines, process and threads, time and space, state chart diagrams. Architectural Modelling: Terms, Concepts, examples, Modelling techniques for component diagrams and deployment diagrams.

Books:

1. Grandy Booch, James Rumbough, Ivar Jacobson. ‘ The Unified Modelling Language User Guide. Pearson Eduataion 2002.
2. Ian Sommerville, ‘ Software Engineering Sixth Edition’ 2003.
3. Meilir Page Jones, ‘ Fundamentals of Object Oriented Design in UML’ , Addison Wesley, 2000

Advanced Operating System

Unit - I

Operating System: Definition, Operating System as Resource Manager. Types of Operating Systems: Simple Batch Processing, Multi-programmed Batch Processing, Time Sharing, Personal Computer systems, Parallel, Distributed and Real Time Operating Systems. Operating System Components, Services, Calls, System Programs, Operating System Structure, Virtual Machines, System Design and Implementation.

Process Management: Concepts, Scheduling, Operations, Co-operating processes, Inter-process Communication. **Threads:** Thread usage, threads in User Space, threads in Kernel, Hybrid Implementation, Scheduler Activation, Pop-up threads, Multithreading.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Algorithms, Multiple-processor Scheduling, Real Time Scheduling, Algorithm Evaluation.

Unit - II

Process Synchronization: Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problem of synchronization, Critical Regions, Monitors. **Deadlock** : Characteristics, Necessary Conditions, Prevention, Avoidance, Detection and Recovery. **Memory Management:** Logical and Physical Address Space, Swapping. **Contiguous Allocation:** Single-partitioned, Multi-partitioned. **Non-contiguous Allocation** : Paging, Segmentation, and Segmentation with Paging.

Virtual Memory: Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation.

Unit - III

File and Directory System: File Concepts, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free Space Management, Directory Implementation, Recovery. **Secondary Storage Management:** Disk Structure, Dedicated, Shared, Virtual, Sequential Access and Random Access Devices, Disk Scheduling, Disk Management, Swap-space Management, Disk Reliability, Stable Storage Management. **Protection and Security:** Threats, Intruders, Accidental Data Loss, Cryptography, User Authentication, Attacks from inside the system, Attacks from outside the system, Protection Mechanism, Trusted Systems, Domain of Protection, Access Matrix, Programs Threats, System Threats.

Unit - IV

Distributed systems, topology network types, design strategies. Network operating structure, distributed operating system, remote services, and design issues. Distributed file system: naming and transparency, remote file access, Stateful v/s Stateless Service, File Replication.

Unit - V

Distributed co-ordinations: Event Ordering, Mutual Exclusion, Atomicity, Concurrency Control, Deadlock Handling, Election Algorithms, Reaching Agreement. Case studies of Unix and MS-DOS operating system.

Text Books:

1. Silberschatz and Galvin, "Operating System Concepts", Addison-Wesley publishing, Co., 1999.
2. A. S. Tanenbaum, "Modern Operating Systems", Pearson Education.

References:

1. H.M. Dietel, "An Introduction to Operating System", Pearson Education.
2. D. M. Dhamdhare, "Operating Systems – A Concept Based Approach", Tata McGraw-Hill.
3. M. Singhal, N. G. Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw -Hill.
4. William Stallings, "Operating Systems", Pearson Education

Internet and Web Technology

UNIT I

Web Essentials

Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents Case Study.

UNIT II

Style Sheets and Representing Web Data

CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study.

Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration - Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template-based Transformations: XSLT-Displaying XML Documents in Browsers-Case Study-Related Technologies.

UNIT III

Host Objects

Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window-Case Study.

UNIT IV

Client and Server Side Programming

Client-Side Programming

The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators- Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

Server-Side Programming

Java Servlets-Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies -URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency-Case Study- Related Technologies.

UNIT V

Web Services and JSP

Web Services JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets.

JSP: JSP Technology Introduction-JSP and Servlets- Running JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm-Case Study-Related Technologies.

Text Books:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson

Education, 2006.

Reference Books: 1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.

2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.

3. Marty Hall and Larry Brown, "Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.

Java Programming and Applications

Unit-I

Introduction to Java

Importance and features of Java, Concepts of Java Virtual machine (JVM), JDK, JRE, Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations. Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading. Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes.

Unit-II

Inheritance

Basic types, super classes, Multilevel hierarchy abstract and final classes, object class, Packages and interfaces, Access protection, extending Interfaces, Exception handling, Fundamental exception types, uncaught exception, throw, throws, final methods, creating own exceptions

Unit-III

Multithreaded programming

Review of fundamentals, Java thread model, synchronization, messaging, thread class, Runnable interface, inter thread communication, Monitors, Deadlock, Producer/ Consumer problems, Wait() and notify(), Performance issues.

Unit-IV

Input/output:

Basics, Streams, Byte and Character Streams, predefined streams, reading and writing from console and files, using Java packages.

Networking in Java

Networking fundamentals, Client/server model, Internet addresses, Sockets, networking classes and interfaces, using Java.net package, TCP/IP and data gram programming, HTTP protocol and URLs

Unit-V

Event Handling

Different mechanism, the delegation event model, classes, Event Listener Interfaces, Adapter and Inner classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video Java Applet, Introduction to Swings, JDBC and Servlets.

Text Book:

1. "Java –2 The Complete Reference" Patrick Naughton and Herbertz Schidt, second edition

References:

1. "Programming with Java" E. Balaguruswamy, Second edition, TMH
2. "HTML 4 Unleashed" Rick Dranell, Second edition, Tec media publication
3. "Dyanmic web publishing Unleashed" Shelley Powers, Second edition, Tec media
4. Cay S Horstmann and Gary Cornell, Java 2 Vol I and II-Sun Micro Systems-2001

MTOOSD-106

Object Oriented Analysis and Design Using UML Lab

Practical will be based on theory paper Object Oriented Analysis and Design Using UML.
Some are included below:

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- ✓ Object-oriented CASE tools: Introducing Rational Rose.
- ✓ Class diagrams in Rational Rose.
- ✓ Use-cases in Rational Rose.
- ✓ Interaction diagrams in Rational Rose.
- ✓ State and activity diagrams in Rational Rose.
- ✓ Subsystem diagrams in Rational Rose.

Book: Bennett, Simon; Skelton, John; Lunn, Ken (latest ed). Schuam's Outline of UML.
New York: McGraw-Hill.

Internet and Web Technology Lab

Practicals will be based on theory paper Object Oriented Software Engineering. Some are included below:

1. HTML

- ✓ Simple HTML
- ✓ Hyper Links
- ✓ Using Frames
- ✓ Registration Form with Table

2. CSS

- ✓ Inline Style , Internal Style ,and external Style Sheets 30

3. JAVA SCRIPT

- ✓ Use user defined function to get array of values and sort them in ascending order
- ✓ Demonstrate String and Math Object's predefined methods
- ✓ Demonstrate Array Objects and Date Object's predefined methods
- ✓ Exception Handling
- ✓ Calendar Creation : Display all month
- ✓ Event Handling
 - Validation of registration form
 - Open a Window from the current window
 - Change color of background at each click of button or refresh of a page
 - Display calendar for the month and year selected from combo box
 - On Mouse over event

4. ASP

- ✓ Create a welcome Cookie (Hit for a page)
- ✓ List a table of content and navigate within the pages
- ✓ Demonstrate Request and Response object using HTML Form
- ✓ Database Connection to display all the values in the table 68

5. Java Servlets

- ✓ Simple Servlets
- ✓ Servlets with HTML form
- ✓ Cookie creation and retrieval using servlet

6. XML

- ✓ Create a any catalog
- ✓ Display the catalog created using CSS and XSL

7. PHP

- ✓ File operation
- ✓ Regular Expression, Array, Math, Date functions

SEMESTER II

UNIT I**Compiler structure**

Compiler concepts, analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.

UNIT II**Lexical analysis**

Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns. Difficulties in lexical analysis. Error reporting. Implementation. Regular definition, Transition diagrams, LEX.

UNIT III**Syntax analysis**

Syntax analysis: CFGs, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.

UNIT IV**Syntax directed definitions, Type Checking and Run Time System**

Syntax directed definitions: inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.

Type checking: type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

Run time system: storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

UNIT V Intermediate code generation and Instruction selection

Intermediate representations, translation of declarations, assignments, control flow, Boolean expressions and procedure calls. Implementation issues.

Code generation and instruction selection: issues, basic blocks and flow graphs, register allocation, code generation, dag representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

Text Books:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Addison-Wesley, 1988.
2. C. Fischer and R. LeBlanc. Crafting a Compiler, Benjamin Cummings, 1991.
3. C. Fischer and R. LeBlanc. Crafting a Compiler in C, Benjamin Cummings.
4. A. C. Holub. Compiler Design in C, Prentice-Hall Inc., 1993.
5. Appel. Modern Compiler Implementation in C: Basic Design, Cambridge Press.
6. Appel. Modern Compiler Implementation in Java: Basic Design, Cambridge Press.
7. Fraser and Hanson. A Retargetable C Compiler: Design and Implementation, Addison-Wesley.
8. Principles of compiler design by Alfred V. Aho, D. Ullman.

L	T/P	C
4	0	4

UNIT I

Introduction: Life cycle models, Requirement Analysis and specification, Formal requirements specification. Fundamental issues in software design: Goodness of design, cohesions, coupling. Function-oriented design: structured analysis and design. Overview of object oriented concepts.

UNIT II

Software Design Process: Tackling Design Problems, Architectural Design, Abstract Specification, Interface Design, Component Design, Data structure Design, Algorithm Design

Software Design Methodologies: data flow model, Entity Relationship Model, structural mode. Software Design Strategies. Science of Design: Design Quality. Software Tools. Software Design Failure.

Architecture and Designing Software: The process of design, principles leading to good design, techniques for making good design decisions, software architecture, writing a good design document.

UNIT III

Unified Modeling Language (UML). Unified design process. User interface design. Coding standards and guidelines. Code walkthrough and reviews. Unit testing. Black box and white box testing. Integration and system testing. Software quality and reliability. Case Study of UML.

UNIT IV

Software Quality and Standards: Quality Concepts, Quality Control, Quality Assurance, Cost of Quality, SQA Activities, Total Quality Management Principles, Software Reviews, Formal Technical Reviews, Software Reliability, Software Safety, ISO Approaches to Quality Assurance Systems. Standards, Practices, Conventions and Metrics: Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, Six Sigma, Software Quality Assurance Metrics, Advantages, QA Techniques, Introduction to SPICE.

UNIT V

Risk and Software Configuration Management: Software Risks, The RMMM Plan, Software Configuration Management Process: Version Control, Change Control, SEI CMM and ISO 9001. PSP and Six Sigma. Clean room technique. Software maintenance issues and techniques. Software reuse. Client-Server software development.

Testing and inspecting to ensure high quality: Basic definitions of defect, error and failure, effective and efficient testing, defects in ordinary and numerical algorithms, defects in timing and coordination, defects in handling stress and unusual situations, documentation defects, writing formal test cases and test plans, strategies for testing large software, inspections, quality assurance in general

Book Recommended:

1. Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge & Robert Langanieri TMH.
2. Ian Sommeriele, "Software Engineering", Addison Wesley.
3. C. Eastal and G. Davis, Software Engineering Analysis and Design, Tata McGraw Hill.
4. Pressman, Software Engineering –A Practitioner’s Approach.
5. Richard Fairley, Software Engineering Concepts, Tata Mcgraw Hill.
6. Pankaj Jalote , An Integrated Approach to Software engineering, Narosa Publication.
7. Ali Bahrami: Object-oriented systems Development, McGrawHill, 1999

L	T/P	C
4	0	4

UNIT I**Introduction of Algorithms:**

Definitions and notations: standard notations - asymptotic notations – worst case, best case and average case analysis; big oh, small oh, omega and theta notations; Recursive algorithms, analysis of nonrecursive and recursive algorithms, solving recurrence equations, analysing control structures. Analysis of Sorting and Searching: Heap, shell, radix, insertion, selection and bubble sort; sequential, binary and Fibonacci search.

UNIT II**Divide and Conquer & Greedy Methods**

Divide and Conquer: General Method – binary search – finding maximum and minimum – merge sort and quick sort – Strassen's Matrix multiplication. Greedy Method :General method – knapsack problem – minimum spanning tree algorithms – single source shortest path algorithm – scheduling, optimal storage on tapes, optimal merge patterns.

UNIT III**DYNAMIC PROGRAMMING & Graph Algorithms**

General method – multi-stage graphs – all pair shortest path algorithm – 0/1 Knapsack and Travelling salesman problem – chained matrix multiplication – approaches using recursion – memory functions. Basic Search and Traversal technique: Techniques for binary trees and graphs – AND/OR graphs – biconnected components , Graph algorithms: Representation of graphs, Breadth first search, Depth first search, Topological sort, strongly connected components, Growing a minimum spanning tree- Kruskal and Prims algorithms, Single source shortest paths in directed acyclic graphs-The Bellman-Ford Algorithm, Dijkstra's Algorithm. All pairs shortest paths and matrix multiplication- The Floyd-Warshall algorithm, Johnson's algorithm for sparse matrices.

UNIT IV**Backtracking and Bound Method**

Back tracking and Recursive back tracking, applications of Back tracking paradigm, The general method – 8-queens problem – sum of subsets – graph coloring – Hamiltonian cycle – Knapsack problem. Branch And Bound Method:Least Cost (LC) search – the 15-puzzle problem – control abstractions for LCSearch – Bounding – FIFO Branch-and-Bound - 0/1 Knapsack problem – travelling salesman problem.

UNIT V**Np-Completeness And String Matching**

NP-completeness :Polynomial time and its verification-NP-completeness-reducibility proofs and NP-complete problems- The vertex cover problem, The set cover problem-Randomization and linear programming.String Matching: the naïve string matching algorithm, the Rabin Karp algorithm, string matching with finite automata, the Knuth-Morris-Pratt algorithm.

Text Book:

1. Introduction to Algorithms, by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, Prentice Hall of India, New Delhi, New Delhi.

Reference Books:

1. The Design and Analysis of computer Algorithms, by Aho, Hopcroft & Ullman, Pearson Education.
2. Algorithm Design by Michel T. Goodrich & Roberto Tamassia, John Wiley and Sons.
3. Fundamentals of sequential and parallel algorithms, by Kenneth A. Berman & Jerome L. Paul, Vikas Publishing House.

UNIT I

Distributed computing systems fundamentals: Introduction to Distributed computing systems, Models, Popularity. Distributed computing system, Design issues of Distributed operating system. Distributed computing environment, security.

UNIT II

Message Passing: Features of a good Message Passing System. Issues in IPC by Message Passing Synchronization, Bullring, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure handling, Group Communication.

UNIT III

Remote Procedure Calls: RPC Model, Implementing RPC Mechanism. Stub Generation. RPC Messages, Marshaling Arguments and Results. Server Management, Parameter-Passing semantics, call semantics, Communication protocols for RPCs, Client- Server Building, Exception handling, Security RPC in Heterogeneous Environments, Lightweight RPC.

UNIT IV

Resource and Process Management: Features of global scheduling algorithm. Task assignment approach, Load-Balancing and Load approach. Process Management: Introduction, Process Migration, Threads.

UNIT V

Distributed Shared Memory: General Architecture of DSM systems. Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space. Consistency models, Replacement strategy, Thrashing, Synchronization: Clock Synchronization. Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms.

Distributed File Systems: Features of good DFS, File models, File Accessing models. File-Sharing Semantics, File-Caching schemes, File Replication, Fault Tolerance, Automatic Transactions, Design Principles, Case study: DCE Distributed File Service.

Text book:

1. Distributed Operating Systems concepts and design- .K. Sinha (PHI).
2. Modern Operating System-Singhal

Reference Books:

1. Distributed Systems concepts and design-G. Coulouris, J. Dollimore & T. Kindberg
2. Modern Operating System-A.S. Tanenbaum (PHI).

UNIT I**Designing Cloud Based Applications and Development:**

Role of business analyst, requirements gathering, UML, use of state diagrams, wire frame prototypes, use of design tools such as Balsamiq. Selecting front end technologies and standards, Impact of growth in mobile computing on functional design and technology decisions.

Cloud Applications Development: Technical architecture considerations – concurrency, speed and unpredictable loads. Agile development, team composition (including roles/responsibilities), working with changing requirements and aggressive schedules. Understanding Model View Controller (MVC).

UNIT II**Advanced tools and Cloud Objects:**

Advanced Ajax and JQuery. Presenting to different browsers and devices. Localization and internationalization; Understanding client location and device type. Mobile application development – Android, iOS, WP, RIM, Symbian.

Cloud objects: Session management. Advanced database techniques using MySQL and SQL Server, blob storage, table storage. Working with Third Party APIs: Overview of interconnectivity in cloud ecosystems. Working with Twitter API, Flickr API, Google Maps API. Advanced use of JSON and REST.

UNIT III**Cloud Applications and Security Issues:**

Understanding cloud based security issues and threats (SQL query injections, common hacking efforts), SSL, encrypted query strings, using encryption in the database. Authentication and identity. Use of OAuth. OpenID.

UNIT IV**Understanding QA and Support:**

Common support issues with cloud apps: user names and passwords, automated emails and spam, browser variants and configurations. Role of developers in QA cycle. QA techniques and technologies. Use of support forums, trouble ticketing.

UNIT V

Use Cases: Design, develop and deploy an advanced cloud app using framework and platform of choice to demonstrate an understanding of database, presentation and logic. Application should demonstrate integration with third party API, sensitivity to geography of user (language, currency, time and date format), authentication of user, security, and awareness of client device/browser. Case Studies: Salesforce, Basecamp, Xero.com, Dropbox.

Reference Books:

1. Jim Webber, Savas Parastatidis, Ian Robinson, “REST in Practice” O'Reilly Media; 1st edition, 2010.
2. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, Matias Woloski, “Developing Applications for the Cloud on the Microsoft Windows Azure Platform” Microsoft Press; 1st edition, 2010.
3. Dan Wellman, “jQuery UI 1.6” Packt Publishing 2009.
4. Peter Lubbers, Brian Albers, Frank Salem, Ric Smith, “Pro HTML5 Programming” A press, 2010.
5. Lee Babin, “Beginning Ajax with PHP” A press; 1 edition, 2006.
6. Richard York, “Beginning JavaScript and CSS development with jQuery”, Wiley Pub. Indianapolis, IN 2009.
7. Edward Benson, “The art of Rails”, Wiley Pub. Indianapolis, IN 2008.

MTOOSD 206 Compiler Design Labs

Practicals will be based on theory paper Compiler Design. Some are included below:

Practicals will be based on theory paper Object Oriented Software Engineering. Some are included below:

	<u>Design tool</u>
1. Introduction to UML and use case diagrams	Rational Rose
2. System modeling (DFD and ER)	Microsoft Word
3. Flow of events and activity diagram	Rational Rose
4. OO analysis: discovering classes	Rational Rose
5. Interaction diagrams: sequence and collaboration diagrams	Rational Rose
6. Software Design: software architecture and object oriented design.	Rational Rose
7. State Transition Diagram	Rational Rose
8. Component and deployment diagrams	Rational Rose
9. Software testing	Testing tool
10 Java based apps design	Eclipse Software

SEMESTER III

MTOOSD 301

Information Storage & Management

UNIT I

Complexity of Information Management: Proliferation of Data, Data Center Evolution, Managing Complexity, I/O and the five pillars of technology, Storage Infrastructure, Evolution of Storage

UNIT II

Storage Systems Architecture: Modern Storage Systems, Storage Systems, Intelligent Disk Subsystems, Physical Disks, Back End ,Cache ,Front End , Host Environment

UNIT III

Introduction to Networked Storage: Storage Networking Overview, Direct Attached Storage, Storage Area Networks, Case study – Applying SAN concepts, Network Attached Storage, Case study – Applying NAS concepts, IP SAN, CAS, Hybrid Network Storage Based Solutions/ Emerging Technologies, Case study – Applying SAN, NAS, IP SAN concepts

UNIT IV

Introduction to Information Availability: Business Continuity Overview, Data Availability, Business Continuity – Local, Case study – Applying local information availability strategies, Business Continuity – Remote, Case study – Applying remote information availability strategies, Disaster Recovery

UNIT V

Managing and Monitoring: Monitoring in the Data Center, Case study – Monitoring exercise, Management in the Data Center, Case study – Managing exercise -Case Studies must be supported by laboratory

Text Book:

1. Marc Farley Osborne, "Building Storage Networks", Tata McGrawHill, 2001
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata Mcgraw Hill, 2003
3. NIIT, "Introduction to Information Security Risk Management" , Prentice-Hall of India, 2000

Communication & Research Methodology

Unit I

Concepts of Communications: Definition, Forms of Communication, Objectives of Communication, Characteristics of Communication, Process of Communication, Communication, Roadblocks, Role of Verbal and Non-verbal Symbols in Communication, Barriers to Effective Communication, Overcoming Communication Barriers.

Nonverbal communication: Body Language, Gestures, Postures, Facial Expressions, Dress codes; the Cross Cultural Dimensions of Business Communication; Listening and Speaking, techniques of eliciting response, probing questions, Observation. Business and social etiquettes;

Listening Skills: Definition, Anatomy of poor Listening, Features of a good Listener, Role Play, Group Discussion and Interviews, Meetings: Ways and Means of conducting meetings effectively, Mock Meetings and Interviews

Unit II

Reading and language skills: The reading process, purpose, different kinds of texts, reference material, scientific and technical texts, active and passive reading, strategies - vocabulary skills, eye reading and visual perception, prediction techniques, scanning skills, distinguishing facts and opinions, drawing inferences and conclusions, comprehension of technical material - scientific and technical texts, instructions and technical manuals, graphic information.

Forms of Communication in Written mode: Basics Body language of Business Letters and Memos, Tone of writing, Enquiries, orders and replying to them, sales letters, Job applications and resume, E-mail: How to make smart e-mail, Writing Business Reports and Proposals, Practice for Writing.

Unit III

Referencing and Writing skills: Business letters: Enquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Claims and adjustments, Collection letter, Banking correspondence, Agency correspondence, Bad news and persuading letters, Sales letters, Job application letters - Biodata, Covering Letter, Interview Letters, Letter of Reference, Memos, minutes, Circulars & notices.

Types of Business Reports - Format, Choice of vocabulary, coherence and cohesion, paragraph writing, organization reports by individual, Report by committee.

Unit IV

Introduction to Research and Research Design: Nature and scope of research, information based decision making and source of knowledge. The research process; basic approaches and terminologies used in research. Defining research question and framing of hypotheses, preparing a research plan, qualitative and quantitative research designs, Experimentation, Observational studies, Exploring secondary data.

Measurement and Scaling, Data Source and Data Collection Field research: primary data collection from observations, surveys and experimentation. Measurement and scaling; commonly used scales in reliability and validity of scales. Designing instrument for data collection; testing the instrument, data collection process, Sampling methods and procedures and sample size decisions.

Unit V

Data Analysis and Presentation Editing and coding of data, tabulation, graphic presentation of data, cross tabulation, Testing of hypotheses; type I and II errors, one tailed and two tailed tests of significance, Parametric and nonparametric tests for Univariate and Bivariate data. Tests of association; simple linear regression and other non parametric tests.

Technical Writing: Technical Proposal writing: Definition, Purpose, types, characteristics, Elements of structure, style and appearance, evaluation, exercises, Research report writing, Proposal writing, referencing, forms of reports, bibliography, etc. Research paper, Dissertation, and Thesis, Instruction Manuals, Type of instructions, Writing Instructions, Technical Descriptions, Process descriptions, Guidelines for Writing Good Descriptions.

Text Books:

1. Lesikar, R. V. & Flatley, Basic Business Communication Skills for Empowering the Internet Generation. TMH.

2. Meenakshi Raman, Sangeeta Sharma, Technical Communications, Oxford Latest Edition.
3. D. K. Bhattacharyya, Research Methodology, Excel Books 2nd Edition.

Reference Books:

1. Bowman, J.P. & Branchaw, P.P. Business Communications, Process to Product Dryden Press, Chicago.
2. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill.
3. E. H. McGrath, Basic Managerial Skills, Prentice hall India
4. Sajitha, Technical Writing, Himalaya Latest Edition

Advanced Computer Architecture

UNIT I

The state of computing, Multiprocessors and Multi Computers, Multi-Vector and SIMD Computers. Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures, Network properties and Routing, Static Interconnection Networks and Dynamic Interconnection Networks, MPI and PVM Architecture.

UNIT II

Program and network properties: Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System Interconnect Architectures.

UNIT III

Principles of Scalable Performance: Performance Metrics and Measures, Parallel processing applications, speedup performance laws, scalability analysis and approaches.

UNIT IV

Processors and Memory Hierarchy: Advanced processor technology, Superscalar and Vector Processors, Vector processing principles, Memory hierarchy technology, virtual memory technology.

Pipelining & Superscalar Techniques: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline design.

UNIT V

Parallel & Scalable architectures: Multiprocessor system Interconnects, Cache coherence and synchronization mechanisms, message passing mechanisms, latency hiding techniques, principles of multithreading, scalable and multithreaded architecture

Text Books:

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000

Reference Books:

1. J.P.Hayes, "Computer Architecture and organization"; MGH. 1998
2. V.Rajaraman & C.S.R.Murthy, "Parallel computer"; PHI. 2002
3. Stalling W, "Computer Organisation & Architecture", PHI. 2000
4. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design";

Narosa Publishing. 1998

5. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH. 1999

Advanced Software Project Management

UNIT I

Introduction to Software Project Management: Software development as a project; Stakeholders in software project; Software product, process, resources, quality, and cost; Objectives, issues, and problems relating to software projects.

Overview of Project Planning: Steps in project planning; Defining scope and objectives; work breakdown structure; Deliverables and other products; time, cost, and resource estimation; Alternatives in planning

UNIT II

Project Evaluation: Strategic assessment; Technical assessment; Cost-benefit analysis; Cash flow forecasting; Cost-benefit evaluation techniques; Break-even analysis; Risk evaluation

Selection of Appropriate Project Approach: Choosing development technology and methodology; choice of process model; Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping; Incremental delivery.

UNIT III

Software Effort Estimation: Problem in software estimation; Effort estimation techniques; Expert judgement; Estimation by analogy; Delphi technique; Algorithmic methods; Top-down and bottom-up estimation; Function point analysis; Object points; COCOMO model.

Activity Planning: Network planning model; Activity-on-arrow network; Precedence network; Forward pass; Backward pass; Critical path; Slack and float.

Risk Analysis and Management: Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management; Evaluating schedule risk using PERT.

UNIT IV

Resource Allocation: Nature of project resources; Identifying resource requirement of activities; Allocating and scheduling resources; cost of resources; Standard, planned, and actual cost; Cost variance; time-cost trade-off.

Project Tracking and Control: Measurement of physical and financial progress; Earned value analysis; Status reports; Milestone reports; Change control.

Contact Management: Outsourcing of products and services; Types of contracts; Stages in contract placement; Terms of contract; Contract monitoring; Acceptance testing

UNIT V

Managing People and Organizing Teams: Organizational behaviour; Recruitment and placement; Motivation; Group behaviour; Individual and group decision making; Leadership and leadership styles; forms of organizational structures.

Software Quality Assurance: Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit.

Configuration Management: Configuration management process; Software configuration items; Version control; change control; Configuration audit; Status reporting.

Text:

1. Bob Hughes and Mike Cotterell, "Software Project Management", Third Edition 2002, McGraw-Hill
2. Pankaj Jalote, "Software Project Management in Practice", 2002, Pearson Education Asia.

Reference:

1. Roger S. Pressman, "Software Engineering: A practitioner's Approach", Fifth Edition 2001 McGraw-Hill
2. Robert T. Futrell, Donald F. Shafer, and Linda I. Shafer, "Quality Software Project Management" 2002, Pearson Education Asia.
3. Ramesh Gopalaswamy, "Managing Global Software Projects", 2003, TataMcGraw-Hill

MTOOSD 304

Preliminary Work on Dissertation

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

MTOOSD 305

Seminar based on Dissertation

The student will deliver a seminar on the topic chosen by him and approved by Departmental committee for evaluation at the end of semester

SEMESTER-IV

MTOOSD 401

Dissertation

The student will submit a detailed Project Report on the topic approved by Departmental committee.