

**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

FOR

M. Tech.
(COMPUTER SCIENCE & ENGINEERING)
(with effect from 2009 – 10)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
Kukatpally, Hyderabad – 500 085 AP.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (COMPUTER SCIENCE & ENGINEERING)

COURSE STRUCTURE AND SYLLABUS

I SEMESTER

Code	Group	Subject	L	P	Credits
		Advanced Problem Solving	3	0	3
		Computer System Design	3	0	3
		Embedded Systems	3	0	3
		Java and Web Technologies	3	0	3
	Elective -I	Object Oriented Modeling			
		Software Quality Assurance and Testing			
		Software Architecture and Design Patterns	3	0	3
	Elective -II	Software Design and Engineering			
		Advanced Compiler Design			
		Image Processing and Pattern Recognition	3	0	3
	Lab	Java and Web Technologies Lab	0	3	2
		Seminar	-	-	2
		Total Credits (6 Theory + 1 Lab.)			22

II SEMESTER

Code	Group	Subject	L	P	Credits
		Distributed Computing	3	0	3
		Distributed Databases	3	0	3
		Advanced Computer Architecture	3	0	3
		Advanced Computer Networks	3	0	3
	Elective -III	Web Services			
		Information Retrieval Systems			
		Semantic Web and Social Networks	3	0	3
	Elective -IV	Wireless Networks and Mobile Computing			
		Information Security			
		Storage Area Networks	3	0	3
	Lab	Databases and Compiler Lab	0	3	2
		Seminar	-	-	2
		Total Credits (6 Theory + 1 Lab.)			22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

ADVANCED PROBLEM SOLVING

Unit I-

OOP Using Java - Class and Objects, Variables, Operators, Expressions, Methods, Decision statements, Loops, Arrays, OOP concepts - Encapsulation, Inheritance, Polymorphism, Abstraction, Modularity, Exception handling, Input and Output, Java and Pointers, Interfaces, Packages, Abstract classes, Casting in Inheritance hierarchy, Casting with Interfaces, Vectors in java.util, Data Structures and OOP, Writing a java program-Design, coding, testing and debugging. Basic concepts (Review)- Abstract Data Types, Data structures, Algorithms- Characteristics of Algorithms, Performance analysis- Time complexity and Space complexity, Asymptotic Analysis- Big O, Omega and Theta notations.

Unit II

Linear data structures- The List ADT, Array and Linked Implementations, Singly Linked Lists-Operations- Insertion, Deletion, Traversals, Doubly Linked Lists-Operations- Insertion, Deletion, Skip Lists-implementation, Stack ADT, definitions, operations, Array and Linked implementations, applications-infix to postfix conversion, recursion implementation, tail recursion, nontail recursion, indirect recursion, Queue ADT, definitions and operations .Array and Linked Implementations, Priority Queue ADT, Deque ADT, Implementation using doubly linked lists, Stacks and Queues in java.util.

Unit III

Non Linear data structures-Trees-Basic Terminology, Binary tree ADT, array and linked representations, iterative traversals, threaded binary trees, Applications-Disjoint-Sets, Union and Find algorithms, Huffman coding, General tree to binary tree conversion, Realizing a Priority Queue using Heap.
 Search Trees- Binary Search Tree ADT, Implementation, Operations- Searching, Insertion and Deletion, Balanced Search trees-AVL Trees, Operations – Insertion and Searching, B-Trees, B-Tree of order m, Operations- Insertion, Deletion and Searching, Introduction to Red-Black Trees, Splay Trees, B*-Trees, B+-Trees (Elementary treatment), Comparison of Search Trees, Trees in java.util.

Unit IV

Searching- Linear Search, Binary Search, Hashing-Hash functions, Collision-Handling schemes, Hashing in java.util, Dictionary ADT, Linear list representation, Skip list representation, Hash table representation, Comparison of Searching methods.
 Sorting - Bubble Sort, Insertion Sort, Shell sort, Heap Sort, Radix Sort, Quick sort, Merge sort, Comparison of Sorting methods, Sorting in java.util.

Unit V

Graphs-Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multilists, Graph traversals- DFS and BFS, Spanning trees-Minimum cost spanning trees, Kruskal's Algorithm for Minimum cost Spanning trees, Shortest paths- Single Source Shortest Path Problem, All Pairs Shortest Path Problem.
 Text Processing - Pattern matching algorithms- The Knuth-Morris-Pratt algorithm, The Boyer-Moore algorithm, Tries- Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS :

1. Data structures and Algorithms in Java, Adam Drozdek, Cengage Learning.
2. Data structures and Algorithms in Java, Michael T. Goodrich and R. Tomassia, Wiley India edition.
3. Data structures, Algorithms and Applications in Java, S. Sahani, Universities Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

COMPUTER SYSTEM DESIGN

UNIT I

Computer structure – hardware, software, system software, Von-neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines.
Input/Output organization, interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers

UNIT II

Processing Unit: Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control.
Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, RISC architecture introduction.

UNIT – III

Memory: types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies.

UNIT – IV

Processes and Threads: processes, threads, inter process communication, classical IPC problems, Deadlocks.

UNIT – V

File system: Files, directories, Implementation, Unix file system
Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

TEXT BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, pearson/PHI
2. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education .
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
4. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/ PHI

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

EMBEDDED SYSTEMS

UNIT I

Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems

UNIT II

8051 and Advanced Processor Architecture: 8051 Architecture, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization - **Devices and Communication Buses for Devices Network:** Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

UNIT III

Embedded Programming Concepts: Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA

UNIT IV

Real – Time Operating Systems: OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics - **RTOS Programming:** Basic functions and Types of RTOS, RTOS VxWorks, Windows CE

UNIT V

Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-Design - **Testing, Simulation and Debugging Techniques and Tools:** Testing on Host Machine, Simulators, Laboratory Tools

TEXT BOOKS:

1. Embedded Systems, Raj Kamal, Second Edition TMH.

REFERENCE BOOKS :

1. Embedded/Real-Time Systems, Dr.K.V.K.K.Prasad, dreamTech press
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.
3. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. Micro Controllers, Ajay V Deshmukhi, TMH.
6. Microcontrollers, Raj kamal. Pearson Education.
7. Introduction to Embedded Systems, Shibu K. V, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

JAVA AND WEB TECHNOLOGIES

Unit I:

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;
 Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script, CSS

Unit II:

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

Review of Applets, Class, Event Handling, AWT Programming.

Introduction to Swing: JApplet, Handling Swing Controls like Icons – Labels – Buttons – Text Boxes – Combo – Boxes – Tabbed Pains – Scroll Pains – Trees – Tables Differences between AWT Controls & Swing Controls
 Developing a Home page using Applet & Swing.

Unit III:

Java Beans: Introduction to Java Beans, Advantages of Java Beans, JDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API.

Web servers: Tomcat Server installation & Testing.

Introduction to Servlets: Lifecycle of a Servlet, JSDK The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters.

Unit IV:

More on Servlets: The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture. AJAX.

Unit V:

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 Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

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. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT 1,2)
2. The complete Reference Java 2 Fifth Edition ,Patrick Naughton and Herbert Schildt., TMH (Chapters: 25) (UNIT 2,3)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly (UNITs 3,4,5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES , Marty Hall and Larry Brown Pearson

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

OBJECT ORIENTED MODELING
ELECTIVE – I

UNIT I

Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generality, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.

UNIT II

Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT III

The Unified process: use case driven, architecture centric, iterative, and incremental

The Four Ps: people, project, product, and process

Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases

Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

UNIT IV

Iterative incremental process: iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.

The Generic Iteration workflow: phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases

Inception phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

UNIT V

Elaboration Phase: elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.

Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.

Transition phase: early in the transition phase, activities in transition phase

Case Studies: Automation of a Library, Software Simulator application (2-floor elevator simulator)

TEXT BOOKS :

- 1 The Unified Modeling Language User Guide By Grady Booch, James Rumbaugh, Ivar Jacobson 2nd Edition, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech (CSE)

I SEMESTER

SOFTWARE DESIGN AND ENGINEERING
ELECTIVE -II

UNIT I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Legacy 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.

Process models: The waterfall model, Incremental process models, Evolutionary process models, Specialized process models, The Unified process.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT II

Role of Software Design

The nature of the design process, transferring design knowledge, constraints upon the design process and product, recording design decisions, designing with others, context for design, economic factors, assessing design qualities, quality attributes of the design product, assessing the design process.

Transferring Design Knowledge-Representing abstract ideas, design viewpoints, the architecture concept, design methods, design patterns, Design representations, rationale for design methods.

Design Processes and Strategies: The role of strategy in design methods, describing the design process – The D – Matrix, design by top-down decomposition, design by composition, organizational influences upon design.

UNIT III

Designing with objects and components

Designing with objects: design practices for object-oriented paradigm, Object-oriented frame works, Hierarchical object oriented design process and heuristics, the fusion method, the unified process.

Component – based design: The component concept, designing with components, designing components, COTS.

Performing User interface design-The Golden rules, Interface analysis and design models, user and task analysis, analysis of display content and work environment, applying interface design steps, user interface design issues, design evaluation.

UNIT IV

Project Management and Metrics

Project Management : The management spectrum: people, product, process and project, WSHH principle, critical practices.

Metrics for Process and Projects: Process metrics, project metrics, size-oriented metrics, function-oriented metrics, Object-oriented and use-case metrics, metrics for software quality, integrating metrics with in the software process.

UNIT V**Project Scheduling and Risk Management**

Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, timeline charts, tracking the schedule, tracking the progress for an OO project, Earned value analysis.

Risk Management: Reactive Vs. Proactive risk strategies, software risks, risk identification, risk projection, risk refinement, risk mitigation and monitoring, the RMMM plan.

TEXT BOOKS :

1. Software design, David Budgen, second edition, Pearson education, 2003.
2. Software Engineering :A practitioner's Approach, Roger S Pressman, seventh edition. McGrawHill International Edition, 2009.

REFERENCE BOOKS :

1. Applying domain – driven design and patterns, Jimmy Nilsson, Pearson education, 2006
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education, 2004.
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata Mc-Graw Hill, 2006
4. The art of Project management, Scott Berkun, O'Reilly, 2005.
5. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
6. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008
7. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
8. Software Design, Eric Braude, John Wiley & Sons.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech (CSE) I SEMESTER

JAVA AND WEB PROGRAMMING LAB

List of Sample Problems/Experiments:

****1.** Develop static pages (using Only HTML) of an online Book store. The pages should resemble www.amazon.com The website should consist the following pages.

Home page, Registration and user Login

User Profile Page, Books catalog

Shopping Cart, Payment By credit card

Order Conformation

****2.** Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

****3.** Create and save an XML document at the server, which contains 10 users information. Write a program which takes User Id as an input and returns the user details by taking the user information from the XML document.

****4.** Bean Assignments

a. Create a JavaBean which gives the exchange value of INR(Indian Rupees) into equivalent American Canadian/Australian Dollar value.

b. Create a simple Bean with a label - which is the count of number of clicks. Than create a BeanInfo class such that only the "count" property is visible in the Property Window.

c. Create two Beans-a)Keypad .b)DisplayPad .After that integrate the two Beans to make it work as a Calculator.

d. Create two Beans Traffic Light(Implemented as a Label with only three background colours Red,Green,Yellow) and Automobile(Implemented as a TextBox which states its state/movement). The state of the Automobile should depend on the following Light Transition Table.

Light Transition Automobile State

Red → Yellow Ready

Yellow → Green Move

Green → Red Stopped

****5.** Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using Servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

****6.** Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

***7.** Implement the "Hello World!" program using JSP Struts Framework.

NOTE : * - Simple Problems.

** - Moderate Problems.

*** - Complex Problems.

TEXT BOOKS:

1. Java Server Programming for Professionals, 2nd Edition, Bayross and others, O'reilly,SPD, 2007.
2. JDBC, Servlets, and JSP ,Black Book, K. Santosh Kumar, dreamtech.
3. Core Web Programming, 2nd Edition, Volume 1, M.Hall and L.Brown, PHPTR.
4. Core Web Programming, 2nd Edition, Volume 2, M.Hall and L.Brown, PHPTR.
5. Core Java, Volume 1, Horstman and Cornell, 8th Edition, Pearson Education, 2008.
6. Core Java, Volume 2, Horstman and Cornell, 8th Edition, Pearson Education, 2008.
7. Java Programming: Advanced Topics, 3rd Edition, J.Wiggles worth and P.McMillan,Thomson, 2007.

