ACADEMIC REGULATIONS, COURSE STRUCTURE
AND DETAILED SYLLABUS

M.Tech (SOFTWARE ENGINEERING)

FOR
MASTER OF TECHNOLOGY TWO YEAR POST GRADUATE COURSE
(Applicable for the batches admitted from 2014-2015)

R14

ANURAG
Engineering Engineers

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)
SCHOOL OF ENGINEERING
Venkatapur, Ghatkesar, Hyderabad – 500088
# ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

# M.TECH (SOFTWARE ENGINEERING)

## COURSE STRUCTURE AND SYLLABUS

### I YEAR I SEMESTER

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures</th>
<th>P</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>A31011</td>
<td>Advanced Data Structures and Algorithms</td>
<td>3</td>
<td>0</td>
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<tr>
<td>A31049</td>
<td>Web Technologies and Services</td>
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<tr>
<td>A31050</td>
<td>Software Requirements and Estimation</td>
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<td>A31051</td>
<td>Software Development Methodologies</td>
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<tr>
<td>A31052</td>
<td><strong>Elective-I</strong></td>
<td>3</td>
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<tr>
<td>A31053</td>
<td>Secure Software Engineering</td>
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<tr>
<td>A31054</td>
<td>Cyber Security and Cyber Laws</td>
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<tr>
<td>A31055</td>
<td>Information Security and Audit</td>
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<td>A31055</td>
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<tr>
<td>A31056</td>
<td>Parallel Algorithms</td>
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<tr>
<td>A31057</td>
<td>Advanced Data Mining</td>
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<tr>
<td>A31057</td>
<td>Object Oriented Modeling</td>
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<td>A31211</td>
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<tr>
<td>A31212</td>
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### I YEAR II SEMESTER

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>A32052</td>
<td>Software Architecture and Design Patterns</td>
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<td>A32053</td>
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<td>A32054</td>
<td>Software Quality Assurance and Testing</td>
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<td>A32056</td>
<td>Scripting Languages</td>
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<td>A32020</td>
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## II YEAR I SEMESTER

<table>
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<th>Group</th>
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<tr>
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<tr>
<td>A33217</td>
<td>Project Seminar</td>
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<tr>
<td>A33218</td>
<td>Project Work</td>
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<td></td>
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## II YEAR II SEMESTER

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<td></td>
<td><strong>Total Credits</strong></td>
<td></td>
<td>-</td>
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</table>
Academic Regulations for M. Tech (Regular) Degree Course

(Effective for the students admitted into 1 year from the Academic Year 2014-2015 onwards)

The M.Tech Degree of Jawaharlal Nehru Technological University Hyderabad shall be conferred on candidates who are admitted to the program and fulfill all the requirements for the award of the degree.

1.0 ELIGIBILITY FOR ADMISSIONS:
Admission to the above program shall be made subject to the eligibility, qualifications and specialization prescribed by the university from time to time.

Admissions shall be made on the basis of merit rank obtained by the qualifying candidate at an Entrance Test conducted by the University or on the basis of any other order of merit approved by the University, subject to reservations prescribed by the university from time to time.

2.0 AWARD OF M.TECH DEGREE:
2.1 A student shall be declared eligible for the award of the M.Tech degree, if he pursues a course of study and completes it successfully for not less than two academic years and not more than four academic years.

2.2 A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his admission, shall forfeit his seat in M.Tech course.

2.3 The minimum instruction period for each semester is 90 clear instruction days.

3.0 COURSE OF STUDY
The following specializations are offered at present for the M.Tech Course of study.

1. CAD / CAM
2. Computer Science
3. Computer Science and Engineering
4. Electrical Power systems
5. Electronics and Communication Engineering
6. Embedded Systems
7. Machine Design
8. Power Electronics and Electrical Drives
9. Software Engineering
10. Structural Engineering
11. VLSI System Design
12. Wireless and Mobile Communications
13. Computer Networks and Information Security
14. Construction Management
4.0 ATTENDANCE:

The programs are offered on unit basis with each subject being considered as an unit.

4.1 A candidate shall be deemed to have eligibility to write end semester examinations in a subject if he has put in at least 75% of attendance in the subject.

4.2 Shortage of attendance up to 10% in any subject (i.e. 65% and above and below 75%) may be condoned by the college Academic council on genuine and valid reasons on representation by the candidate with supporting evidence.

4.3 A candidate shall get minimum required attendance at least in three (3) theory subjects in the present semester to get promoted to the next semester. In order to qualify for the award of the M.Tech Degree, The candidate shall complete all the academic requirements of the subjects, as per the course structure.

4.4 Shortage of attendance below 65% shall in no case be condoned

4.5 A stipulated fee shall be payable towards condonation of shortage of attendance.

5.0 EVALUATION:

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practical’s, on the basis of internal evaluation and End semester Examination.

For the theory subjects 60 marks shall be awarded based on the performance in the End semester Examination, 30 marks shall be awarded based on the internal evaluation and 10 marks for assignment.

5.1 For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of one subjective paper and one assignment. The subjective paper is for 30 marks with duration of 2 hours. Subjective paper of each semester shall contain 2 parts Section-A & Section-B. Section-A comprises of five (5) short answer type of questions. The student has to answer all the questions from section-A. Each question carries two marks. A total of ten marks are allocated to section-A. Section-B consists of five (5) essay type of questions from which the student has to answer three questions. Each question carry not more than seven (7) marks. A total of 20 marks are allocated for section-B. The questions in the first midterm examination includes the topics of first 2.5 units while the questions in the second midterm examination includes the topics of remaining 2.5 units. The assignments should be submitted before the conduct of respective midterm examinations.

The total marks secured by the student are out of 40 marks (30marks from midterm examination and 10 marks from assignment) in an internal examination for a subject. The average of marks secured in two midterm examinations shall be taken as final marks. If he/she is absent for any test / assignment, he/she are awarded zero marks for that test / assignment.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End Semester Examinations, 40 marks shall be awarded based on the day-to-day performance as internal marks.

5.3 There shall be two seminar presentations during I year I semester and II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on
a topic and critically review the literature and submit it to the department in a report from and shall make an oral presentation before the departmental committee. The departmental committee consists of Head of the department, supervisor and two other senior faculty members of the department. For each seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.

5.4 There shall be a Comprehensive Viva-Voce in II year I Semester. The comprehensive Viva-Voce will be conducted by a committee consisting of Head of the Department and two Senior Faculty members of the Department. The comprehensive Viva-Voce is aimed to assess the students’ understanding in various subjects he/she studies during the M.Tech course of study. The Comprehensive viva-voce valued for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-Voce.

5.5 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.6 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 4.3) he has to reappear for the End Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and he has failed in the end examination. In such case candidate must re-register subject(s) and secure required minimum attendance. Attendance in the re-registered subject(s) has to be calculated separately to become eligible to write the end examination in the re-registered subject(s). The attendance of re-registered subject(s) shall be calculated separately to decide upon the eligibility for writing the end examination in those subject(s). In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified.

5.7 In case the candidate secures less than the required attendance in any subject(s), he shall not be permitted to appear for the End Examination in that subject(s). He shall re-register the subject when next offered.

5.8 Laboratory examination for M.Tech courses must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be other Laboratory Teacher.

6.0 EVALUATION OF PROJECT /DISSERTATION WORK:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the project review committee.

6.1 A Project Review Committee (PRC) shall be constituted with Principal as chair person, Heads of all the departments which are offering the M.Tech programs and two other senior faculty members.

6.2 Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).

6.3 After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Departmental
Committee for its approval. Only after obtaining the approval of Departmental Committee the student can initiate the Project work.

6.4 If a candidate wishes to change his supervisor or topic of the project he can do so with the approval of Departmental Committee. However, the Departmental Committee shall examine whether the change of topic/supervisor leads to a major change of his initial plans of project proposal. If so, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5 A candidate shall submit status report (in a bound-form) in two stages at least with a gap of 3 months between them.

6.6 The work on the project shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate is permitted to submit project thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal (through Head of the Department) and shall make an oral presentation before the PRC.

6.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

6.8 The thesis shall be adjudicated by one examiner selected by the Institution. For this, Chairmen, BOS of the respective departments shall submit a panel of 5 examiners, who are eminent in that field with the help of the concerned guide and senior faculty of the department.

6.9 If the report of the examiner is not favourable, the candidate shall revise and resubmit the thesis, in the time frame as prescribed by PRC. If the report of the examiner is unfavourable again the thesis shall be summarily rejected.

6.10 If the report of the examiner is favourable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner who adjudicated the Thesis.

The Board shall jointly report candidates work as:

A. EXCELLENT
B. GOOD
C. SATISFACTORY
D. UNSATISFACTORY

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination. If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree.
7.0 AWARD OF DEGREE AND CLASS

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of M.Tech Degree, he shall be placed in one of the following four classes.

<table>
<thead>
<tr>
<th>Classes Awarded</th>
<th>% of marks to be secured</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>70% and above</td>
</tr>
<tr>
<td>First Class</td>
<td>Below 70% but not less than 60%</td>
</tr>
<tr>
<td>Second Class</td>
<td>Below 60% but not less than 50%</td>
</tr>
</tbody>
</table>

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

8.0 WITH-HOLDING OF RESULTS:

If the candidate has not paid any dues to the institution or if any case of in-discipline is pending against him, the result of the candidate will be withheld and he will not be allowed into next higher semester. The issue of the degree is liable to be withheld in such cases.

9.0 TRANSITORY REGULATIONS:

Candidate who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for admission to the same or equivalent subjects as and when subjects are offered, subject to 5.5 and 2.0

10.0 GENERAL:

10.1 The academic regulations should be read as a whole for purpose of any interpretation.

10.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

10.3 The institution may change or amend the academic regulations and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the institution.

10.4 Wherever the word he, him or his occur, it will also include she, her and hers. There shall be no transfers within the constituent colleges of Jawaharlal Nehru Technological University.
## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1. (a) Possesses of keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm, computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only</td>
</tr>
<tr>
<td>(b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the candidate is to be cancelled and sent to the controller of examinations, AGI.</td>
</tr>
<tr>
<td>3. Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical’s and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>4. Smuggles in the Answer book or</td>
<td>Expulsion from the examination hall and</td>
</tr>
<tr>
<td>No.</td>
<td>Action</td>
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<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td>6.</td>
<td>Refuses to obey the orders of the Chief Superintendent/Assistant-Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any office relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
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<tr>
<td></td>
<td>Posses any lethal weapon or firearm in the examination hall.</td>
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<td>------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 9 | If student of the college, who is not a candidate for the particular examination or any person not connected with college indulges in any malpractice or improper conduct mentioned in clause 6 to 8   | Student of the college’s expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.  
Person(s) who do not belong to the College will be handed over to police and a police case will be registered against them. |
| 10 | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11 | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of the semester/year examinations. |
| 12 | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Malpractices committee, AGI for further action to award suitable punishment. | |
ADVANCED DATA STRUCTURES AND ALGORITHMS

Objectives:
- The fundamental design, analysis, and implementation of basic data structures.
- Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction.
- Significance of algorithms in the computer field
- Various aspects of algorithm development
- Qualities of a good solution

UNIT I
Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples.
Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists - insertion, deletion, search operations, doubly linked lists - insertion, deletion operations, circular lists.
Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT II
Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, LinkedList, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT III
Sorting – Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT IV
Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, threaded binary trees.
Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-DFS and BFS, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal’s algorithm, Dijkstra’s algorithm for Single Source Shortest Path Problem.

UNIT V
Search trees- Binary search tree-Binary search tree ADT ,insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util-TreeSet, TreeMap Classes, Trees(examples only), Comparison of Search trees.
Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

TEXT BOOKS:
1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.

REFERENCE BOOKS:
1. Java for Programmers, Deitel and Deitel, Pearson education.
6. Classic Data structures in Java, T. Budh, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I Year – I Sem. (Software Engg.)

WEB TECHNOLOGIES AND SERVICES

Objectives:
The student who has knowledge of programming with Java should be able to develop web-based solutions using multi-tier architecture. She / He should have good understanding of different technologies on client and server side components as follows:
- Client Side: HTML, CSS, Javascript, Ajax, JQuery and JSON
- Server Side: Servlets, JSP
- Database: MySQL with Hibernate and Connection Pooling
- Framework: Struts with validation framework, Internationalization (18N)
- SOA: Service Oriented Architecture, Web services fundamentals, Axis framework for WS

UNIT I
Client Side Technologies:
Overview of HTML - Common tags for text formatting, Lists, Tables, Images, Forms, Frames etc., XHTML
Cascading Style sheets, linking to HTML, Pages, Classes in CSS, General CSS statements for Text, Table, List and Page formatting
Introduction to JavaScripts, variables, arrays, methods and string manipulation, BOM/DOM (Browser/Document Object Model), accessing elements by ID, Objects in JavaScript
Dynamic HTML with JavaScript and with CSS, form validation with JavaScript, Handling Timer Events, JQuery

UNIT II: Introduction to Java Servlets:
Introduction to Servlets: Lifecycle of a Servlet, Reading request and initialization parameters, Writing output to response, MIME types in response, Session Tracking: Using Cookies and Sessions
Steps Involved in Deploying an application
Database Access with JDBC and Connection Pooling
Introduction to XML, XML Parsing with DOM and SAX, Parsers in Java
Ajax - Ajax programming with JSP/Servlets, creating XML Http Object for various browsers, Sending request, Processing response data and displaying it.
Introduction to Hibernate

UNIT III: Introduction to JSP:
JSP Application Development Types of JSP Constructs (Directives, Declarations, Expressions, Code Snippets), Generating Dynamic Content, Exception Handling, Implicit JSP Objects, Conditional Processing, Sharing Data Between JSP pages, Sharing Session and Application Data, Using user defined classes with jsp:useBean tag, Accessing a Database from a JSP

UNIT IV: Introduction to Struts Framework:
Introduction to MVC architecture, Anatomy of a simple struts application, struts configuration file, Presentation layer with JSP, JSP bean, html and logic tag libraries, Struts Controller class, Using form data in Actions, Page Forwarding, validation framework, Internationalization

UNIT V: Service Oriented Architecture and Web Services
Overview of Service Oriented Architecture – SOA concepts, Key Service Characteristics, Technical Benefits of a SOA
Introduction to Web Services – The definition of web services, basic operational model of web services, basic steps of implementing web services.
Core fundamentals of SOAP – SOAP Message Structure, SOAP encoding, SOAP message exchange models,
Describing Web Services – Web Services life cycle, anatomy of WSDL
Introduction to Axis – Installing axis web service framework, deploying a java web service on axis.
Web Services Interoperability – Creating java and .Net client applications for an Axis Web Service
(Note: The Reference Platform for the course will be open source products Apache Tomcat Application Server, MySQL database, Hibernate and Axis)
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TEXT BOOKS:

2. The complete Reference Java 7th Edition, Herbert Schlikit, TMH.
3. Java Server Pages, Hans Bergsten, SPD, O'Reilly.

REFERENCE BOOKS:

2. Core SERVLETS AND JAVA SERVER PAGES VOLUME 1: CORE
3. TECHNOLOGIES, Marly Hall and Larry Brown Pearson
4. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson.
5. Jakarta Struts Cookbook, Bill Siggeikow, S P D O'Reilly.
7. Java Server Programming, Ivan Bayross and others, The X Team, SPD
9. Beginning Web Programming-Jon Duckett, WROX.
11. Java Script, D. Flanagan, O'Reilly, SPD
SOFTWARE REQUIREMENTS AND ESTIMATION

Objectives:
- Students will demonstrate knowledge of the distinction between critical and non-critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
- Students will author a software requirements document.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will author a formal specification for a software system.
- Students will demonstrate an understanding of distributed system architectures and application architectures.
- Students will demonstrate an understanding of the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will demonstrate proficiency in software development cost estimation.
- Students will author a software testing plan.

UNIT I
Software Requirements: What and Why
Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

Software Requirements Engineering
Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

UNIT II
Software Requirements Management
Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain

Software Requirements Modeling
Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

UNIT III
Software Estimation
Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation

Size Estimation
Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

UNIT IV
Effort, Schedule and Cost Estimation
What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation

UNIT V
Tools for Requirements Management and Estimation
M. TECH, SOFTWARE ENGINEERING-R13 Regulations

TEXT BOOK:


REFERENCE BOOKS:

1. Software Requirements by Karl E. Weigers, Microsoft Press.
SOFTWARE DEVELOPMENT METHODOLOGIES

Objectives:
Your studies will enable you to develop:
- a broad and critical understanding of all the processes for engineering high quality software and the principles, concepts and techniques associated with software development
- an ability to analyze and evaluate problems and draw on the theoretical and technical knowledge to develop solutions and systems
- a range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle
- an awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

UNIT I
Process models: The waterfall model, Incremental process models, Evolutionary process models, specialized process models, The Unified process.

UNIT II
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.
System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT III
Design Engineering: Design process and Design quality, Design concepts, the design model, pattern based software design.
Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture.
Modeling component-level design: Designing class-based components, conducting component-level design, Object constraint language, designing conventional components.
Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT IV
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, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT V
Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.
Configuration Management: Configuration Management planning, Change management, Version and release management, System building, CASE tools for configuration management.
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TEXT BOOKS:


REFERENCE BOOKS:

3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
10. Introduction to Software Engineering, R.J. Leach, CRC Press.
M. TECH. SOFTWARE ENGINEERING-R13 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I Year – I Sem. (Software Engg.)

SECURE SOFTWARE ENGINEERING
(ELECTIVE-I)

Objectives:
- Students will demonstrate knowledge of the distinction between critical and non-critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
- Students will author a software requirements document.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will author a formal specification for a software system.
- Students will demonstrate an understanding of distributed system architectures and application architectures.
- Students will demonstrate an understanding of the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will be able to identify specific components of a software design that can be targeted for reuse.
- Students will demonstrate proficiency in software development cost estimation.
- Students will author a software testing plan.

UNIT – I

UNIT – II
Requirements Engineering for secure software: introduction, the SQUARE process Model, Requirements elicitation and prioritization

UNIT – III
Secure Software Architecture and Design: Introduction, software security practices for architecture and design; architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns
Secure coding and Testing: Code analysis, Software Security testing, Security testing considerations throughout the SDLC

UNIT – IV
Security and Complexity: System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security

UNIT – V
Governance and Managing for More Secure Software: Governance and security, Adopting an enterprise software security framework, How much security is enough?, Security and project management, Maturity of Practice

TEXT BOOK:

REFERENCE BOOKS:
1. Developing Secure Software: Jason Grembi, Cengage Learning
Objectives:
- To learn Internet, E-commerce and E-governance with reference to Free Market Economy
- To learn International Efforts relating to Cyberspace laws and Cyber crimes
- To learn Law relating to electronic records and intellectual property rights in India
- To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
- To learn Miscellaneous provisions of IT Act and Conclusions

UNIT-I
Internet, E-commerce and E-governance with reference to Free Market Economy
Understanding Computers, Internet and Cyber laws, Conceptual Framework of E-commerce: E-governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

UNIT-II
Law relating to electronic records and intellectual property rights in India
Legal aspects of Electronic records / Digital signatures, The roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

UNIT-III
International Efforts relating to Cyberspace laws and Cyber crimes
International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

UNIT-IV
Penalties, Compensation and Offences under the Cyberspace and Internet in India
Penalties, Compensation and Adjunction of violations of provisions of IT Act and Judicial review, Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India.

UNIT-V: Miscellaneous provisions of IT Act and Conclusions
The role of Electronic Evidence and miscellaneous provisions of the IT Act.

TEXT BOOK:

REFERENCE BOOKS:
M. TECH. SOFTWARE ENGINEERING-R13 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I Year – I Sem. (Software Engg.)

INFORMATION SECURITY AND AUDIT
( ELECTIVE-1 )

Objectives:
To introduce the fundamental concepts and techniques in computer and network security, giving
students an overview of information security and auditing, and to expose students to the latest trend
of computer attack and defense. Other advanced topics on information security such as mobile
computing security, security and privacy of cloud computing, as well as secure information system
development will also be discussed.

UNIT I
A model for Internetwork security, Conventional Encryption Principles & Algorithms (DES, AES, RC4,
Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution.
Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman,
ECC), public Key Distribution.

UNIT II
Approaches of Message Authentication, Secure Hash Functions (SHA-512, MD5) and HMAC, Digital
Signatures, Kerberos, X.509 Directory Authentication Service,
Email Security: Pretty Good Privacy (PGP)
Payload, Combining Security Associations and Key Management.

UNIT III
Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure
Electronic Transaction (SET),
Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

UNIT IV
Auditing For Security:
Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in
Organization, Organizational Roles and Responsibilities for Security Audit, Auditors Responsibility In
Security Audits, Types Of Security Audits.

UNIT V
Auditing For Security:
Approaches to Audits, Technology Based Audits Vulnerability Scanning And Penetration Testing,
Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other
aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors
for security audits.

TEXT BOOKS:

REFERENCE BOOKS:
2006.
M. TECH. SOFTWARE ENGINEERING-R13 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I Year – I Sem. (Software Engg.)

PARALLEL ALGORITHMS
(ELECTIVE-II)

Objectives:
- To understand the role of computation models in parallel computation;
- To understand the circuit and comparison network models;
- To design Parallel Matrix Transportation and Multiplication Algorithm;
- To understand the PRAM and BSP models and their theoretical foundations;

UNIT-I:
Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

UNIT-II:
Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost optimality, Example to illustrate Cost-optimal algorithm such as summation, Min/Max on various models.

UNIT-III:
Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, Parallel Sorting Networks on CREW/EREW/MCC/, linear array

UNIT-IV:
Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

UNIT-V:
Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms - Permutation, Combinations, Derangements.

TEXT BOOK:

REFERENCE BOOKS:
ADVANCED DATA MINING
(ELECTIVE-II)

Objectives:
- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining.
- To understand the strengths and limitations of various data mining models.

UNIT-I
Data mining Overview and Advanced Pattern Mining
Data mining tasks – mining frequent patterns, associations and correlations, classification and regression for predictive analysis, cluster analysis, outlier analysis; advanced pattern mining in multilevel, multidimensional space – mining multilevel associations, mining multidimensional associations, mining quantitative association rules, mining rare patterns and negative patterns.

UNIT-II
Advance Classification
Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, fuzzy set approach;

UNIT-III
Advance Clustering
Density-based methods – DBSCAN, OPTICS, DENCLUE; Grid-Based methods – STING, CLIQUE; Exception – maximization algorithm; clustering High-Dimensional Data; Clustering Graph and Network Data.

UNIT-IV
Web and Text Mining
Introduction, web mining, web content mining, web structure mining, web usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

UNIT-V
Temporal and Spatial Data Mining
Introduction: Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis, Spatial Mining – Spatial Mining Tasks, Spatial Clustering. Data Mining Applications.

TEXT BOOKS:
1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann.
2. Data Mining Techniques – Arun K Pujari, Universities Press.

REFERENCE BOOKS:
1. Introduction to Data Mining – Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson.
OBJECT ORIENTED MODELING
(ELECTIVE-II)

Objectives:

- Concisely define the following key terms: class, object, state, behavior, object class, class diagram, object diagram, operation, encapsulation, constructor operation, query operation, update operation, scope operation, association, association role, multiplicity, association class, abstract class, concrete class, class scope attribute, abstract operation, method, polymorphism, overriding, multiple classification, aggregation, and composition.
- To describe the activities in the different phases of the object-oriented development life cycle.
- State the advantages of object-oriented modeling vis-a-vis structured approaches.
- Compare and contrast the object-oriented model with the E-R and EER models.
- Model a real-world application by using a UML class diagram.
- Provide a snapshot of the detailed state of a system at a point in time using a UML (Unified Modeling Language) object diagram.
- Recognize when to use generalization, aggregation, and composition relationships.
- Specify different types of business rules in a class diagram.

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.


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.
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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:

2. UML 2 Toolkit by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado WILEY-Dreamtech India Pvt. Ltd.
3. The Unified Software Development Process by Ivar Jacobson, Grady Booch, James Rumbaugh, Pearson Education

REFERENCE BOOKS:

3. Practical Object-Oriented Design with UML By Mark Priestley, TATA McGraw Hill
4. Object Oriented Analysis & Design By Brett D McLaughlin, Gary Pollice and David West, O'REILY.
7. UML and C++,R.C.Lee, and W.M.Tepfenhart, PHI.
WEB TECHNOLOGIES AND SERVICES LAB

Objectives:

- Write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields.
- Discuss differences between URIs, URNs, and URLs, and demonstrate a detailed understanding of http-scheme URLs, both relative and absolute.
- Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address.
- Install a web server and perform basic administrative procedures, such as tuning communication parameters, denying access to certain domains, and interpreting an access log.
- Write a valid standards-conformant HTML document involving a variety of element types, including hyperlinks, images, lists, tables, and forms.
- Use CSS to implement a variety of presentation effects in HTML and XML documents, including explicit positioning of elements.
- Demonstrate techniques for improving the accessibility of an HTML document.

List of Sample Problems:

i) Web Technologies

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. 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.
5. 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.
6. Implement the “Hello World!” program using JSP Struts Framework.

ii) Additional Assignment Problems

Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.

Write a java swing application that takes a text file name as input and counts the characters, words and lines in the file. Words are separated with white space characters and lines are separated with new line character.

Write a simple calculator servlet that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands. It should check in a database if the same expression is already computed and if so, just return the value from database. Use MySQL or PostgreSQL.
Write an HTML page that contains a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

Write a servlet that takes name and age from an HTML page. If the age is less than 18, it should send a page with “Hello <name>, you are not authorized to visit this site” message, where <name> should be replaced with the entered name. Otherwise it should send “Welcome <name> to this site” message.

Write a calculator program in HTML that performs basic arithmetic operations (+, -, /, * and %). Use CSS to change the foreground and background color of the values, buttons and result display area separately. Validate the input strings using JavaScript regular expressions. Handle any special cases like division with zero reasonably. The screen may look similar to the following:

<table>
<thead>
<tr>
<th>Value 1</th>
<th>Operator</th>
<th>Value 2</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Write a Java program that creates a calculator GUI, as shown in figure. Extra components may be added for convenience:

The Color Scheme may be Black on White or Blue on Yellow (selectable) and accordingly all components colors must be changed. The values can be either entered or increased or decreased by a step of 10. The operators are +, -, / and * (selectable). Once any change takes place, the result must be automatically computed by the program.

Write a Java Application that will read an XML file that contains personal information (Name, Mobile Number, age and place). It reads the information using SAX parser. After reading the information, it shows two input Text Fields in a window, one for tag name and the other for value. Once these two values are given, it should list all the records in the XML file that match the value of the given field in a text area (result box). For example, if the two text boxes are entered with “name” and “ABCD” then it should show all the records for which name is “ABCD”?

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>mobile</td>
<td>9449449449</td>
<td>abc, 22, Hyd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>def, 23, Delhi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xxx, 44, Chennai</td>
</tr>
</tbody>
</table>

Consider the following web application for implementation:

The user is first served a login page which takes user’s name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions.

If name and password matches, serves a welcome page with user’s full name.
If name matches and password doesn’t match, then serves "password mismatch" page.
If name is not found in the database, serves a registration page, where users full name, present user name (used to login) and password are collected. Implement this application in:

1. Pure JSP
2. Pure Servlets
3. Struts Framework
Implement a simple arithmetic calculator with +, -, *, % and = operations using Struts Framework.
The number of times the calculator is used should be displayed at the bottom (use session variable).

Web Technologies and Services Lab - Additional Problems

Create a web service in Java that takes two city names from the user and returns the distance between these two from data available from a table in MySQL.
Write a Java and a C# client which use the above service.
Write a Java program that takes a file as input and encrypts it using DES encryption. The program should check if the file exists and its size is not zero.
Write a Java program that generates a key pair and encrypts a given file using RSA algorithm.
Write a Java program that finds digest value of a given string.
Consider the following xml file for encryption:

```
<?xml version="1.0"?>
<transaction>
  <from>12345</from>
  <to>564321</to>
  <amount>10000</amount>
  <secretcode>abc123</secretcode>
  <checksum>565</checksum>
</transaction>
```
Replace <from> and <to> values with the RSA encrypted values represented with base64 encoding assuming that the public key is available in a file in local directory "pubkey.dat". Encrypt <secretcode> with AES algorithm with a password "secret". The checksum of all the fields values concatenated with a delimiter character '+' will be inserted in the checksum and the xml file is written to encrypted.xml file.
Assume that a file "config.xml" which has the following information:

```
<users>
  <user>
    <name>abc</name>
    <pwd>pwd123</pwd>
    <role>admin</role>
    <md5>xxy</md5>
  </user>
  <user>
    <name>def</name>
    <pwd>pwd123</pwd>
    <role>guest</role>
    <md5>xxy</md5>
  </user>
</users>
```
Replace name and role with DES encrypted values and pwd with RSA encrypted values (represent the values with base64 encoding). The public key is available in "public.key" file in current directory. Replace xxx with respective MD5 values of all the fields for each user. Write the resulting file back to config.xml.

Write an HTML page that gives 3 multiple choice (a, b, c and d) questions from a set of 5 preloaded questions randomly. After each question is answered change the color of the question to either green or blue using CSS. Finally on clicking OK button that is provided, the score should be displayed as a pop-up window. Use JavaScript for dynamic content.

Write an HTML page that has 3 countries on the left side ("USA", "UK" and "INDIA") and on the right side of each country, there is a pull-down menu that contains the following entries: (Select Answer, "New Delhi", "Washington" and "London"). The user will match the Countries with their respective capitals by selecting an item from the menu. The user chooses all the three answers (whether right or wrong). Then colors of the countries should be changed either to green or to red depending on the answer. Use CSS for changing color.

Write an HTML Page that can be used for registering the candidates for an entrance test. The fields are: name, age, qualifying examination (diploma or 10+2), stream in qualifying examination. If qualifying examination is "diploma", the stream can be "electrical", "mechanical" or "Civil". If the qualifying examination is 10+2, the stream can be "MPC" or "BPC". Validate the name to accept only characters and spaces.

Write an HTML page that has two selection menus. The first menu contains the states ("AP", "TN" and "KN") and depending on the selection the second menu should show the following items: Hyderabad, "Vijayawada", "Kurnool" for AP, "Chennai", "Salem", "Madurai" for TN and "Bangalore", "Bellary", "Mysore" for KN.

Write an HTML page that has phone buttons 0 to 9 and a text box that shows the dialed number. If 00 is pressed at the beginning, it should be replaced with a + symbol in the text box. If the number is not a valid international number (+ followed by country code and 10 digit phone number) the color of the display should be red and it should turn to green when the number is valid. Consider only "+91", "+1" and "+44" as valid country codes. Use CSS for defining colors.

Write an HTML page that has a text box for phone number or Name. If a number is entered in the box the name should be displayed next to the number. If 00 is pressed at the beginning, it should be replaced with a + symbol in the text box. If a name is entered in the text box, it should show the number next to the name. If the corresponding value is not found, show it in red and show it in green otherwise. Use CSS for colors. Store at least 5 names and numbers in the script for testing.

A library consists of 10 titles and each title has a given number of books initially. A student can take or return a book by entering his/her HTNo as user ID and a given password. If there are at least two books, the book is issued and the balance is modified accordingly.
(a) Use RDBMS and implement it with JSP.
(b) Use XML File for data and implement it with JSP.
A Bus Reservation System contains the details of a bus seat plan for 40 seats in 2x2 per row arrangement, where the seats are numbered from 1 to 40 from first row to last row. The customer can visit the website and can reserve a ticket of his choice if available by entering his details (Name, Address, Gender and Age). The customer can cancel the ticket by entering the seat number and his name as entered for reservation.

Implement a simple messaging system with the following details:
- When a student logs in with his/her HTNO and a given password, they should get all the messages posted to him/her from the actual user. Each message may be separated with a comma. There should be a provision for the user to send a message to any number of users by giving the IDs separated with a comma in the "To" text box.
- There is an image of 600x100 size which can be logically divided into 12 button areas with labels (0-9, +, =). Write a JavaScript calculator program that uses this image as a virtual keyboard and three text areas for two input numbers and result of sum of these numbers. Add a CSS that can be used to change the colors of text and background of text areas and the page. The input numbers can be up to 4 digits each.

A web application has the following specifications:
- The first page (Login page) should have a login screen where the user gives the login name and password. Both fields must be validated on client side for a minimum length of 4 characters, name should be lower case a-z characters only and password should contain at least one digit. On submitting these values, the server should validate them with a MySQL database and if failed, show the login page along with a message saying "Login Name or Password Mismatch" in Red color below the main heading and above the form. If successful, show a welcome page with the user's full name (taken from database) and a link to Logout. On logout, a good bye page is displayed with the total time of usage (Logout time – login time). Specify the schema details of table and web.xml file contents.

Implement it using:
- (a) JSP Pages
- (b) Servlets
- (c) Struts

Design a struts based web portal for an international conference with following specifications:
- The welcome page should give the details of the conference and a link to login. If login fails, direct them back to re-login and also provide a link to register. On successful registration/login, the user will be directed to a page where they can see the status (accepted/rejected) of their already submitted papers followed by a form for submitting a doc file to the conference. Provide a logout button on all pages including the home page, once the user logs in. Implement validation framework to check that the user name is in the form of CCGDDCC and password is in the form of (CCSDDD) (C for character, S for special character (one of @, #, $, %, &, and !) and D for digit). Database should be accessed through ConnectionPool for MySqL for user information.
- Provide scope for Internationalization in future. Assume any missing information and mention it first.
SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

Objectives:
After completing this course, the student should be able to:
- To understand the concept of patterns and the Catalog.
- To discuss the Presentation tier design patterns and their affect on: sessions, client access, validation and consistency.
- To understand the variety of implemented bad practices related to the Business and Integration tiers.
- To highlight the evolution of patterns.
- To learn how to add functionality to designs while minimizing complexity.
- To learn what design patterns really are, and are not.
- To know about specific design patterns.
- To learn how to use design patterns to keep code quality high without overdesign.

UNIT I
Envisioning Architecture

Creating an Architecture
Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT II
Analyzing Architectures
Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

Moving from one system to many
Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT III
Patterns
Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creating and Structural patterns
Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT IV
Behavioural patterns
Chain of responsibility, command, Interpreter, Iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT V
Case Studies
A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development,

TEXT BOOKS:

2. Design Patterns, Erich Gamma, Pearson Education.
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REFERENCE BOOKS:

2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
SOFTWARE PROCESS AND PROJECT MANAGEMENT

Objectives:
At the end of the course, the student shall be able to:
- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- To compare and differentiate organization structures and project structures.
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT I
Process Reference Models: Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP.

UNIT II
Life-Cycle Phases and Process artifacts: Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III
Workflows and Checkpoints of process: Software process workflows, iteration workflows, Major milestones, Minor milestones, Periodic status assessments.
Process Planning: Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV
Project Organizations: Line-of-business organizations, project organizations, evolution of organizations, process automation.
Project Control and process instrumentation: The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT V

TEXT BOOKS:
2. Software Project Management, Walker Royce, Pearson Education.

REFERENCE BOOKS:
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
8. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I Year – II Sem. (Software Engg.)

SOFTWARE QUALITY ASSURANCE AND TESTING

Objectives:
The student should be able to:
• To understand software testing and quality assurance as a fundamental component of software life cycle
• To define the scope of SW T&QA projects
• To efficiently perform T&QA activities using modern software tools
• To estimate cost of a T&QA project and manage budgets
• To prepare test plans and schedules for a T&QA project
• To develop T&QA project staffing requirements
• To effectively manage a T&QA project

UNIT I
Software Quality Assurance and Standards
Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMi, PCMM, Malcolm Baldrige, 3 Sigma, 6 Sigma and other latest quality standards (Refer Internet and R11, R12, R13).

UNIT II
Building Software Testing Process: Software Testing Guidelines, workbench concept, Customizing the Software Testing Process, Process Preparation checklist - (Chapters: 2,3) of T1
Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing -(Chapters: 4, 5, 6, 7, 8) of T2

UNIT III
Software Testing Tools
Selecting and Installing Software Testing tools – (Chapter 4) of T1.
Automation and Testing Tools - (Chapter 15) of T2
Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus. (Refer Internet and R9, R10)

UNIT IV
Testing Process
Seven Step Testing Process – I: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing. (Chapters 6, 7, 8, 9, 10) of T1

UNIT V
Seven Step Testing Process – II: Analyzing and Reporting Test results, Acceptance and Operational Testing, Post-Implementation Analysis

TEXT BOOKS:
REFERENCE BOOKS:

Component Based Software Engineering

Objectives:
- To understand the essentials of component-based software engineering
- To know the main characteristics of components and component models
- To be aware of software development processes for component-based systems
- To be aware of the mutual relations between software architecture and component models

UNIT I

The Case for Components: The Business Case for components, COTS Myths and Other Lessons Learned in Component-Based Software Development.

UNIT II


UNIT III


UNIT IV

UNIT V
Component Technologies - Overview of the CORBA Component Model, Overview of COM+, Overview of the EJB Component Model, Bonobo and Free Software GNOME Components, Choosing between COM+, EJB, and CCM, Software Agents as Next Generation Software Components.

TEXT BOOKS:

REFERENCE BOOKS:
SCRIPTING LANGUAGES
(ELECTIVE-III)

Objectives:
- The course demonstrates an in-depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Bio-data.
  The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

UNIT I Introduction to PERL and Scripting
Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance perl - finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT II PHP Basics
PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Datatypes, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT III Advanced PHP Programming
Php and Web Forms, Files, PHP Authentication and Methodologies - Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World - Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

UNIT IV TCL – Tk
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, Input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT V Python

TEXT BOOKS:
1. The World of Scripting Languages, David Barron, Wiley Publications,

REFERENCE BOOKS:
2. Programming Python, M.Lutz, SPD.
4. PHP 5.1.l, Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
7. Perl by Example, E.Qutgley, Pearson Education.
8. Programming Perl, Larry Wall, T.Christiansen and J.Orwant, O'Reilly, SPD.
9. Tcl and the Tk Toolkit, Ousterhout, Pearson Education.
10. PHP and MySQL by Example, E. Guigley, Prentice Hall (Pearson).
12. PHP Programming Solutions, V. Vaswani, TMH.
OBJECTIVES:
On completion of this course you should have gained a good understanding of the foundation concepts of information retrieval techniques and be able to apply these concepts into practice. Specifically, you should be able to:
- To use different information retrieval techniques in various application areas
- To apply IR principles to locate relevant information large collections of data
- To analyse performance of retrieval systems when dealing with unmanaged data sources
- To implement retrieval systems for web search tasks.

UNIT I

UNIT II
Scoring, term weighting and the vector space model. Computing scores in a complete search system. Evaluation in information retrieval. Relevance feedback and query expansion.

UNIT III

UNIT IV
Support vector machines and machine learning on documents, flat clustering, Hierarchical clustering, Matrix decompositions and latent semantic indexing.

UNIT V
Web search basics, Web crawling and indexes, Link analysis.

TEXT BOOKS:
1. Introduction to Information Retrieval, Christopher D. Manning and Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press, 2008.

REFERENCE BOOKS:
5. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.
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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – 1 Year – II Sem. (Software Engg.)

SEMANTIC WEB AND SOCIAL NETWORKS
(ELECTIVE-III)

Objectives:
- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

Unit -I: Web Intelligence

Unit -II: Knowledge Representation for the Semantic Web

Unit-III: Ontology Engineering
Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit-IV: Semantic Web Applications, Services and Technology

Unit-V: Social Network Analysis and semantic web
What is social networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

REFERENCE BOOKS:
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.
CLOUD COMPUTING
(ELECTIVE-IV)

Objectives:

Prerequisite: Computer Networks and Operating Systems

Course Description:
Cloud computing has evolved as a very important computing model, which enables information, software, and shared resources to be provisioned over the network as services in an on-demand manner. This course provides an insight into what is cloud computing and the various services cloud is capable.

UNIT I
Systems Modeling, Clustering and Virtualization
Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

UNIT II
Foundations
Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT III
Infrastructure as a Service (IaaS) & Platform as a Service (PAAS / SAAS)

UNIT IV
Monitoring, Management and Applications

UNIT V
Governance and Case Studies

TEXT BOOKS:


REFERENCE BOOKS:

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I Year – II Sem. (Software Engg.)

ADVANCED DATABASES
(ELECTIVE-IV)

Objectives:
By the end of the course, you will know:
- History and Structure of databases
- How to design a database
- How to convert the design into the appropriate tables
- Handling Keys appropriately
- Enforcing Integrity Constraints to keep the database consistent
- Normalizing the tables to eliminate redundancies
- Querying relational data
- and processing the queries
- Storage Optimizing Strategies for easy retrieval of data through index
- Triggers, Procedures and Cursors, Transaction Management
- Distributed databases management system concepts and Implementation

UNIT I
Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams, Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers

UNIT II

UNIT III
Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL.
Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques – Concurrency Control without Locking.
Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT IV
Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing
Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.
Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM)
B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable Vs Linear Hashing.

UNIT V
Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing
Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery

TEXT BOOKS:


REFERENCE BOOKS:

1. Introduction to Database Systems, C.J.Date, Pearson Education.
2. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
9. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Polagati, TMH.
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M. Tech – I Year – II Sem. (Software Engg.)

BUSINESS PROCESS MANAGEMENT
(ELECTIVE-IV)

Objectives:

- To recognize the role of business processes within an Infiniity based application
- To understand the importance of parameter sets to a business process
- To learn common patterns and best practices for formatting and restricting the output from a business process
- To understand the difference between a business process and a business process instance
- To learn how data processing occurs within a business process
- To list the Infiniity SDK software developer responsibilities for building and supporting the functionality required for a business process
- To describe the database tables used by Blackbaud Enterprise CRM to manage business processes
- To describe how a QueryViewSpec can be used to define the output format for a business process
- To describe how a selection can be used to limit the rows processed by a business process

UNIT I
UNDERSTANDING BPM - I:
How can we demystify business process management?
What is business process management?
Why is it important to improve business processes before automating them?
When should you do BPM - what are the main drivers and triggers?
Who should be involved in BPM?

UNIT II
UNDERSTANDING BPM - II:
Why are organizational strategy and process architecture important in BPM implementation?
How do you sell BPM technology to the organization?
What are the critical success factors in a BPM project?
What are the critical implementation aspects for a BPM solution?

UNIT III
FRAMEWORK - I:
Framework overview, Guidelines on how to use the framework, Organization strategy phase, Process architecture phase, Launch pad phase, Understand phase, Innovate phase.

UNIT IV
FRAMEWORK – II:
People phase, Develop phase, Implement phase, Realize value phase, Sustainable performance phase, Essentials introduction, Project management, People change management, Leadership.

UNIT V
BPM AND THE ORGANIZATION:
BPM maturity, Embedding BPM within the organization.

TEXT BOOKS:

REFERENCE BOOK:
M. TECH. SOFTWARE ENGINEERING-R13 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I Year – II Sem. (Software Engg.)

SOFTWARE TESTING LAB

Objectives:
The student should be able to:
- To understand software testing and quality assurance as a fundamental component of software life cycle
- To define the scope of SW TQA projects
- To efficiently perform TQA activities using modern software tools
- To estimate cost of a TQA project and manage budgets
- To prepare test plans and schedules for a TQA project
- To develop TQA project staffing requirements
- To effectively manage a TQA project

Software Testing Objectives:
To learn to use the following (or Similar) automated testing tools to automate testing:
- a. Win Runner/QTP for functional testing.
- b. Load Runner for Load/Stress testing.
- c. Test Director for test management.
- d. JUnit,HTMLUnit,CPPUnit.

Sample problems on testing:
1. Write programs in ‘C’ Language to demonstrate the working of the following constructs:
   i) do...while ii) while ...do iii) if... else iv) switch v) for
2. "A program written in ‘C’ language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
4. Write the test cases for any known application (e.g Banking application)
5. Create a test plan document for any application (e.g. Library Management System)
6. Study of any testing tool (e.g. Win runner)
7. Study of any web testing tool (e.g. Selenium)
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)
11. Take a mini project (e.g. University admission, Placement Portal) and execute it. During the Life cycle of the mini project create the various testing documents* and final test report document.

Additional problems on testing:
1. Test the following using JUnit and CPPUnit:
   i) Sorting problems     ii) Searching problems
   iii) Finding gcd of two integers   iv) Finding factorial of a number.
2. Test web based forms using HTMLUnit.
3. Test database stored procedures using SQLUnit.
(Use sufficient number of test cases in solving above Problems)

*Note: To create the various testing related documents refer to the text “Effective Software Testing Methodologies by William E. Perry”

REFERENCE BOOKS: