## Scheme of Teaching and Examination

### M.Tech. (Software Engineering)

**Semester - II**

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Periods per week</th>
<th>Scheme of Exam</th>
<th>Total Marks</th>
<th>Credit</th>
<th>L+(T+P)/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer Sc. &amp; Engg.</td>
<td>568211(22)</td>
<td>Software Architecture and Design Pattern</td>
<td>3 1</td>
<td>100 20 20</td>
<td>140 4</td>
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<tr>
<td>2</td>
<td>Computer Sc. &amp; Engg.</td>
<td>522212(22)</td>
<td>Advanced Database Management System</td>
<td>3 1</td>
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<td>140 4</td>
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<tr>
<td>3</td>
<td>Computer Sc. &amp; Engg.</td>
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<td>Real Time Systems</td>
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<td>4</td>
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<td>5</td>
<td>Computer Sc. &amp; Engg.</td>
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<td>Elective –II</td>
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<td>6</td>
<td>Computer Sc. &amp; Engg.</td>
<td>568221(22)</td>
<td>Advanced DBMS Lab</td>
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<td>7</td>
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<td>Software Engineering Case Studies Lab</td>
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<td>150 2</td>
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<td><strong>650 100 250</strong></td>
<td><strong>1000 24</strong></td>
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</table>

L-Lecture, T- Tutorial, P - Practical, ESE- End Semester Examination, CT- Class Test, TA- Teacher's Assessment

Note: Duration of all theory papers will be of Three Hours.

### Elective –II

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Board of Study</th>
<th>Code</th>
<th>Subject Name</th>
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<tbody>
<tr>
<td>1</td>
<td>Computer Science &amp; Engineering</td>
<td>522232(22)</td>
<td>Cryptography &amp; Network Security</td>
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<tr>
<td>2</td>
<td>Computer Science &amp; Engineering</td>
<td>554231(22)</td>
<td>Neural Network &amp; Fuzzy Logic</td>
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<tr>
<td>3</td>
<td>Computer Science &amp; Engineering</td>
<td>568232(22)</td>
<td>Software Testing &amp; Quality Assurance</td>
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</table>
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Subject: Software Architecture and Design Pattern Code: 568211(22)
Total Theory Periods: 40 Total Tut. Periods: 12
Total Marks in End Semester Exam: 100 Minimum number of class tests to be conducted: 02

Unit - I

Envisioning and Creating an Architecture


Unit II

Analyzing Software Architecture

Analyzing Development Qualities at the Architectural level, SAAM, ATAM, CBAM, Architecture Reviews.

Unit III

Moving from Architecture to Systems

Software Product Lines, Building systems from Off the Shelf Components, Reuse of Architectural Assets within an Organization.

Unit IV

Design Patterns Catalog

What is Pattern? Pattern Categories, Pattern Description, Patterns and Software Architecture, Pattern Systems, Classification, Selection, Creational Pattern, Structural Pattern, Behavioral Patterns, Pattern Community, Designing a Document Editor

Unit V

Case Studies

Key word in Context, The World Wide Web - a Case study in Interoperability, Instrumentation Software, Cruise Control, Three Vignettes in Mixed styles, CORBA - a case study on Industry Standard Computing Infrastructure, Flight Simulation – A case study in architecture for integration, Celsius Tech – a case study in product line development,

Text Books

2. Erich Gamma, “Design Patterns”, Pearson Education.
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.  
Subject: Advanced Database Management System  
Total Theory Periods: 40  
Total Tut. Periods: 12  
Total Marks in End Semester Exam: 100  
Minimum number of class tests to be conducted: 02

Unit-I

Relational Databases

Integrity Constraint revisited: Functional, Multivalued and Join Dependency, Template Algebraic, Inclusion and Generalized Functional Dependency, Chase Algorithms.

Query Processing and Optimization: Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

Unit-II

Deductive Databases

Datalog and Recursion, Evaluation of Datalog program, Recursive queries with negation.

Objected Oriented and Object Relational Databases

Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Case Studies: Gemstone, O2, Object Store, SQL3, Oracle xxi, DB2

Unit-III

Parallel and Distributed Databases

Distributed Data Storage – Fragmentation & Replication, Location and Fragments Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

Unit-IV

Advanced Transaction Processing


Unit-V

Active Database and Real Time Databases

Triggers in SQL, Event Constraint and Action : ECA Rules, Query Processing and Concurrency Control, Compensation and Databases Recovery

WEB Database

Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems –Oracle xxi, DB2

Data Warehousing

Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.

Text Books

References Books

1. C. J. Date, “An Introduction to Database System”, Addison Wesley Longman Publisher.
Unit - I
Introduction to Real Time System

Unit - II
Task Scheduling and Petrinets

Unit - III
Programming Languages, Tools & Databases
Language Characteristics, Data Typing, Control Structures, Facilitating Hierarchical Decomposition, Packages, Error Handling, Overloading & Generics, Use of POSIX Programming API in RTS. Basic Definition of Databases, Real Time versus General Purpose Databases, Main memory Databases, Transaction Priorities, Aborts, Concurrency control issues, Two phase Approach to Improve Predictability, Maintaining Serialization Consistency, Databases for hard Real Time Systems.

Unit - IV
Real Time Operating Systems
Time Services and Scheduling Mechanism, Processor Reserves and Resource Kernel, Open Systems Architecture, Capabilities of Commercial RTOS, Predictability of General Purpose OS.

Unit –V
Fault Tolerance and Reliability

Text Books

References Books
UNIT - I

UNIT - II

UNIT - III

UNIT - IV
Model Based Software Architecture: Management Perspective and Technical Perspectives, Milestone Analysis, Software Process Workflows, Iteration Workflow, Reviews, Inspections and Walkthroughs, Seven Core Metrics, Management indicators.

UNIT - V

Text Books

Reference Books
Unit-I
Foundations of Cryptography and Security

Unit-II
Conventional Symmetric Encryption Algorithms
Theory of Block Cipher Design, Feistel Cipher Network Structures, DES and Triple DES Modes of Operation (ECB, CBC, OFB, CFB), Strength (or Not) of DES, Modern Symmetric Encryption Algorithms, IDEA, CAST, Blowfish, Twofish, RC2, RC5, Rijndael (AES).

Unit-III
Key Distribution

Unit-IV
Hashes and Message Digests
Message Authentication, MD5, SHA, RIPEMD, HMAC, Mid-term Exam, Digital Signatures, Certificates, User Authentication, Digital Signature Standard (DSS and DSA), Security Handshake Pitfalls, Elliptic Curve Cryptosystems, Authentication of Systems, Kerberos V4 and V5, X.509 Authentication Service

Unit-V
Electronic Mail Security:
Pretty Good Privacy (PGP), S/MIME, X.400, IP and Web Security, IPSec and Virtual Private Networks, Secure Sockets and Transport Layer (SSL and TLS), Electronic Commerce Security

Text Books

Reference Books
Unit – I

History, Overview of Biological Neural Network, Mathematical Models of Neurons, ANN Architecture, Artificial Feed forward and feedback neural network, neural network learning paradigms - Supervised, Unsupervised and Reinforcement learning, learning rules - Hebbian rule, perceptron rule, delta rule, Widrow Hoff rule, Correlation Rule, Winner take all rule, Instar and outstar learning rule.

Unit-II


Unit -III

Self organization maps: Basic feature mapping models, Self Organization map, SOM algorithm, Properties of Feature map, Learning vector quantization, Adaptive pattern Classification, ART network. Principal Component Analysis.

Unit - IV


Unit -V

Classical and Fuzzy sets: Introduction to classical sets – properties, operations and relations; Fuzzy sets, Membership, Uncertainty, operations, properties, Fuzzy relations, cardinalities, Membership functions, Fuzzy logic System Components - Fuzzification, Membership value assignment, Development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods

Text Book

1. Simon Haykins “Neural Networks A Comprehensive Foundations” Pearson Education
2. Timothy R Ross “Fuzzy Logic with Engineering Applications, Wiley India Pearson Edition

Reference Books

1. B.Yegnarayana “Artificial Neural Networks” Prentice Hall of India
2. Li Min Fu,”Neural Networks in Computer Intelligence “, Tata McGraw Hill.
Semester: M. Tech. II Sem.  
Subject: Software Testing and Quality Assurance  
Total Theory Periods: 40  
Total Tut. Periods: 12  
Minimum number of class tests to be conducted: 02

Unit- I  

Unit-II  

Unit-III  

Unit-IV  
System Test design, Test design Factors, Requirement Identification, Test Objective Identification, Structure of a System Test Plan, Assumptions, Test Approach, Test Suite Structure, Types Of Acceptance Testing, .

Unit-V  
Five Views of Software Quality, Quality Control, Quality assurance, Cost of quality, Software Quality Assurance, SQA Plan, ISO 9000, Capability Maturity Model, McCall’s Quality Factors.

Text Books  

Reference Books  
Experiment to be performed

1. Introduction to Oracle9i.
2. Introduction to DML commands.
3. Introduction to select command (including sub queries).
4. Consider the following table (ticket_detail table):

<table>
<thead>
<tr>
<th>Name of field</th>
<th>Datatype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ticket_no</td>
<td>Number(5)</td>
</tr>
<tr>
<td>Name</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Sex</td>
<td>Char(5)</td>
</tr>
<tr>
<td>Age</td>
<td>Number(3)</td>
</tr>
<tr>
<td>Fare</td>
<td>Number(5,2)</td>
</tr>
</tbody>
</table>

Write a PL/SQL block to give the details of passengers from ticket_detail table.

5. Consider the following table (item)

<table>
<thead>
<tr>
<th>Name of field</th>
<th>Datatype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order_id</td>
<td>Number(4)</td>
</tr>
<tr>
<td>Item_id</td>
<td>Number(4)</td>
</tr>
<tr>
<td>Detail_price</td>
<td>Number(5)</td>
</tr>
<tr>
<td>Qty</td>
<td>Number(5)</td>
</tr>
<tr>
<td>Prod_id</td>
<td>Number(4)</td>
</tr>
</tbody>
</table>

Write a PL/SQL block (using cursor), which will select only those rows where Order_id is zero from the item table.

6. Write a PL/SQL block (using cursor) that will select only those values from the item table where Item_id is 3000 and calculate total to be price*quantity and print the value of the same. If a value is not to be found then an appropriate message should be displayed.

7. Create a transparent audit system for a table Client_Master. The system must keep track of records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in table audit_client, then the delete or update is allowed to go through.

Client_master table

<table>
<thead>
<tr>
<th>Field name</th>
<th>Datatype(size)</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client_no</td>
<td>Varchar2(6)</td>
<td>Primary key/first letter must start with ‘C’</td>
</tr>
<tr>
<td>Name</td>
<td>Varchar2(20)</td>
<td>Not null</td>
</tr>
<tr>
<td>Address1</td>
<td>Varchar2(30)</td>
<td></td>
</tr>
<tr>
<td>Address2</td>
<td>Varchar2(30)</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>Varchar2(15)</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Varchar2(15)</td>
<td></td>
</tr>
<tr>
<td>Pincode</td>
<td>Number(6)</td>
<td></td>
</tr>
<tr>
<td>Bal_due</td>
<td>Number(10,2)</td>
<td></td>
</tr>
</tbody>
</table>
### Audit_client table

<table>
<thead>
<tr>
<th>Field name</th>
<th>Datatype (size)</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client_no</td>
<td>Varchar2(6)</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Varchar2(20)</td>
<td></td>
</tr>
<tr>
<td>Bal_due</td>
<td>Number(10,2)</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Varchar2(8)</td>
<td></td>
</tr>
<tr>
<td>Userid</td>
<td>Varchar2(20)</td>
<td></td>
</tr>
<tr>
<td>Odate</td>
<td>date</td>
<td></td>
</tr>
</tbody>
</table>

8. Write a PL/SQL code block that will accept
   i. An Account_id, the type of transaction, the amount involved and whether the amount to be debited
ten to or credited to an account number.
   ii. The balance in accounts table for the corresponding account number is updated.
   iii. Before the update is fired, the record is viewed in the ‘for update nowait mode’ so that a lock can be
    acquired on the record to be updated and no other user has access to the same record till the
    transaction is completed.

<table>
<thead>
<tr>
<th>Field name</th>
<th>Datatype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account_id</td>
<td>Varchar2(6)</td>
</tr>
<tr>
<td>Name</td>
<td>Varchar2(30)</td>
</tr>
<tr>
<td>Bal</td>
<td>Number(20)</td>
</tr>
</tbody>
</table>

9. Write a procedure to process a select statement to pass values from database columns to the local
variables, the columns or expressions must be associated with local variables.

10. Introduction to privileged commands.
Experiment to be performed

1. An information system for Library Management - A systems analysis, design, and implementation.

2. An information system for Human Resource Management for an Educational Institute - A systems analysis, design, and implementation.


4. Quantification and implementation of 360° Performance Appraisal and Development System for Teaching Faculty in Engineering and Technology Educational Institutions - A systems analysis, design, and implementation.

5. Computerization of Leaves Maintenance System for an Educational Institute - A systems analysis, design, and implementation (Types of leaves: Casual leave, Special casual leave, Duty leave, Earned leave, Half Pay leave, Commuted leave, Leave not due, Extraordinary leave, Study leave, Sabbatical leave, Medical leave, Maternity leave, Quarantine leave, Vacation leave, etc.).