

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching and Examination

M.Tech. (Software Engineering)

Semester - II

S.N.	Board of Study	Subject Code	Subject Name	Periods per week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory/Practical				
							ESE	CT	TA		
1	Computer Sc. & Engg.	568211(22)	Software Architecture and Design Pattern	3	1	-	100	20	20	140	4
2	Computer Sc. & Engg.	522212(22)	Advanced Database Management System	3	1	-	100	20	20	140	4
3	Computer Sc. & Engg.	568212(22)	Real Time Systems	3	1	-	100	20	20	140	4
4	Computer Sc. & Engg.	568213(22)	Software Project Management	3	1	-	100	20	20	140	4
5	Computer Sc. & Engg.	Elective –II		3	1	-	100	20	20	140	4
6	Computer Sc. & Engg.	568221(22)	Advanced DBMS Lab	-	-	3	75		75	150	2
7	Computer Sc. & Engg.	568222(21)	Software Engineering Case Studies Lab	-	-	3	75		75	150	2
Total				15	5	6	650	100	250	1000	24

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			
S.N.	Board of Study	Code	Subject Name
1	Computer Science & Engineering	522232(22)	Cryptography & Network Security
2	Computer Science & Engineering	554231(22)	Neural Network & Fuzzy Logic
3	Computer Science & Engineering	568232(22)	Software Testing & Quality Assurance

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.

Subject: Software Architecture and Design Pattern

Total Theory Periods: 40

Total Marks in End Semester Exam: 100

Minimum number of class tests to be conducted: 02

Branch: Software Engineering

Code: 568211(22)

Total Tut. Periods: 12

Unit- I

Envisioning and Creating an Architecture

The Architecture Business Cycle, What is Software Architecture? Designing the Architecture, Documenting the Architecture, Reconstructing Software Architecture. Quality Attributes, Moving from quality to Architecture, Architectural Styles and Patterns, UNIT Operations, Achieving Qualities, Designing the Architecture, Documenting the Architecture, Reconstructing Software Architecture, Shared Information Systems

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

1. Len Bass Paul Clements, and Rick Kazman, “Software Architecture in Practice”, Pearson Edition
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 Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Branch: Software Engineering
Code: 522212(22)
Total Tut. Periods: 12

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 Fragment 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

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

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

1. Ramez Elmarsri and Shmkant B. Navathe, "Fundamentals of Database Systems", Addison Wesley Publisher.
2. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions.
3. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", McGraw Hill International Editions.

References Books

1. C. J. Date, "An Introduction to Database System", Addison Wesley Longman Publisher.
2. S. Abiteboul, R. Hull and V. Vianu, "Foundations of Databases", Addison Wesley Publishing Co., Reading Massachusetts.
3. W. Kim, "Modern Database Systems", ACM Press, Addison Wesley Publication.
4. D. Maier, "The Theory of Relational Databases", Computer Science Press, Rockville, Maryland.
5. Saeed K. Rahimi and Frank S. Haug, "Distributed Database Management Systems: A Practical Approach", Wiley-IEEE Computer Society Press.
6. Bestavros Azer, Lin Kwei Jay and Sang Hyul (Eds.), "Real Time Database Systems", Springer International Series in Engineering and Computer Science Vol. 396.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.

Subject: Real Time Systems

Total Theory Periods: 40

Total Marks in End Semester Exam: 100

Minimum number of class tests to be conducted: 02

Branch: Software Engineering

Code: 568212(22)

Total Tut. Periods: 12

Unit -I

Introduction to Real Time System

Definition of RTS, Issues in Real Time Computing - Constraints, Structure of RTS, Typical Real Time Applications - Digital Control, Signal Processing, Characterizing RTS, Performance Measures of RTS - Properties of Performance measure, Performability - Cost function and Hard deadline - Estimating Program Real Time, Analysis of Source Code, Pipelining, Dependencies.

Unit-II

Task Scheduling and Petrinets

Uniprocessor Scheduling Algorithms-RM, EDFJRS, Task Assignment – Algorithms -RM, EDF, MOS, FAB, Precedence Conditions, Fault Tolerance Scheduling, Elements of Multiprocessor Scheduling Algorithm, Study of 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

Fault types, Detection, Error Containment, Redundancy- Hardware, Software, Time, Information Redundancy, Data Diversity, Reversal Checks, Malicious or Byzantine Failures, Integrated Failure Handling, Reliability Models and Hardware Redundancy and Software Error Models, Fault Tolerance Synchronization in Hardware and Software.

Text Books

1. C.M. Krishna and Kang G. Shin, “Real Time Systems “, Tata McGraw Hill.
2. Jane W. S. Liu, “Real Time Systems”, Pearson Education Asia.

References Books

1. C. Sivaraman Murthy and G. Manimaran, “Resource Management in Real Time Systems & Network”, MIT Press.
2. Stuart Bennet, “Real Time Computer Control, An Introduction”, Pearson Education.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.
Subject: Software Project Management
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Branch: Software Engineering
Code: 568213 (22)
Total Tut. Periods: 12

UNIT - I

Revisiting Software Development Life Cycles, Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The Old Way and the New Way.

UNIT - II

Software Metrics, Software Life Cycle Models, Project Organizations and Responsibilities, Artifacts of the Project Management Process, Cost and Scheduling estimation, Establishing Project Environment, Risk Management, Quality Assurance and Configuration Management.

UNIT - III

Project Planning, Scheduling, Tracking and Control, Time and Cost overruns, Project Organization, Staffing, Group working, Team Dynamics. Project Management and the CMM, Project Management Process Framework.

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

Productivity, Business Process Reengineering. Dynamics of Software Project Management, CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

Text Books

1. Walker Royce, "Network Software Project Management", Pearson Education.
2. Watts S. Humphery, "Managing the Software Process", Pearson Education.

Reference Books

1. Watts S. Humphery, "A Discipline to Software Engineering", Pearson Education.
2. Chris Kemerer, "Software Project Management Readings and Cases", Pearson Education.
3. Pankaj Jalote, "Software Project Management in Practice", Pearson Education.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY; BHILAI

Semester: M. Tech. II Sem.
Subject: Cryptography and Network Security
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Branch: Software Engineering
Code: 522232(22)
Total Tut. Periods: 12

Unit-I

Foundations of Cryptography and Security

Ciphers and Secret Messages ,Security Attacks and Services , Mathematical Tools for Cryptography ,Substitutions and Permutations, Modular Arithmetic, Euclid's Algorithm Finite Fields, Polynomial Arithmetic, Discrete Logarithms.

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

Stream Ciphers and Pseudo Random Numbers: Pseudo Random Sequences, Linear Congruential Generators, Cryptographic Generators, Design of Stream Cipher, One Time Pad, Public Key Cryptography. Prime Numbers and Testing for Primarily, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal Key Exchange Algorithms, Public-Key Cryptography Standards.

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

1. William Stallings, "Cryptography and Network Security", PHI.

Reference Books

1. Schneier and Bruce, "Applied Cryptography: Protocols & Algorithms", MGH International.
2. Johannes A Buchman , "Introduction to Cryptography " , Springer – Verlag
3. Atul Kahate , Cryptography and Network Security, Tata McGraw Hill.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M.Tech. II Sem.
Subject: Neural Network and Fuzzy Logic
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Branch: Software Engineering
Code: 554231 (22)
Total Tut. Periods: 12

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

Single layer perceptron ,Least mean square algorithm ,Learning curves, Learning rate annealing schedule, Linearly separable classification, XOR problem ,Multilayer perceptron ,linearly non separable pattern classification, delta learning rule for multilayer perceptron, Backpropagation neural network, Generalized Delta rule.

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

Recurrent Neural Network , Hopfield neural network ,Continuous and Discrete Hopfield Network, Associative Memories ,Auto Associative and Hetero associative Neural Network. Radial Basis function neural Network and its application in function Approximation.

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.
3. James A Freeman and David M Skapura, “Neural Networks “Addision Wesley.
4. George J.Klir and Bo Yuan ,”Fuzzy Sets and Fuzzy logic: Theory and Application “ Prentice Hall
5. Neural Network ,Fuzzy logic and Genetic Algorithm by Rajshekharan and Pai,Prentice Hall

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.
Subject: Software Testing and Quality Assurance
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Branch: Software Engineering
Code: 568232(22)
Total Tut. Periods: 12

Unit- I

Quality Revolution, Software Quality, Role of Testing, Objectives of Testing, Concept of Complete Testing, Central Issue of Testing, Sources of Information for Test Case selection, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management.

Unit-II

Basic Concepts of Testing Theory, Theory of Goodenough and Gerhart, Theory of Weyuker and Ostrand, Theory of Gourlay, Adequacy of Testing, Limitations of Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Debugging.

Unit-III

Outline of Control Flow Testing, Control Flow Graph, Paths in Control Flow Graphs, Path Selection Criteria, Data Flow Testing criteria, Comparison of Data Flow and Test Selection Criteria, Domain Error, Testing of Domain Errors.

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

1. Kshirasagar Naik, "Software Testing and Quality Assurance", John Wiley & Sons.
2. William Perry, "Effective Methods for Software Testing", John Wiley & Sons.

Reference Books

1. Cem Kaner and Jack Falk, "Testing Computer Software", Wiley.
2. Ron Patton, "Software Testing", SAMS Publications.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.

Subject: Advanced Database Management System Lab

Total Practical Periods: 40

Total Marks in End Sem. Exam: 75

Branch: Software Engineering

Code:568221(22)

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):

Name of field	Datatype
Ticket_no	Number(5)
Name	Varchar2(20)
Sex	Char(5)
Age	Number(3)
Fare	Number(5,2)

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

5. Consider the following table(item)

Name of field	Datatype
Order_id	Number(4)
Item_id	Number(4)
Detail_price	Number(5)
Qty	Number(5)
Prod_id	Number(4)

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*auantity 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

Field name	Datatype(size)	Attributes
Client_no	Varchar2(6)	Primary key/first letter must start with 'C'
Name	Varchar2(20)	Not null
Address1	Varchar2(30)	
Address2	Varchar2(30)	
City	Varchar2(15)	
State	Varchar2(15)	
Pincode	Number(6)	
Bal_due	Number(10,2)	

Audit_client table

Field name	Datatype (size)	Attributes
Client_no	Varchar2(6)	
Name	Varchar2(20)	
Bal_due	Number(10,2)	
Operation	Varchar2(8)	
Userid	Varchar2(20)	
Odate	date	

8. Write a PL/SQL code block that will accept
- An Account_id, the type of transaction, the amount involved and whether the amount to be debited to or credited to an account number.
 - The balance in accounts table for the corresponding account number is updated.
 - 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.

Field name	Datatype
Account_id	Varchar2(6)
Name	Varchar2(30)
Bal	Number(20)

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.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: M. Tech. II Sem.

Subject: Software Engineering Case Studies Lab

Total Practical Periods: 40

Total Marks in End Sem. Exam: 75

Branch: Software Engineering

Code: 568222(22)

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.
3. Computerization of Financial Accounting of an Educational Institute - A systems analysis, design, and implementation.
4. Quantification and implementation of 360⁰ 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 .).