Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology)**

Semester V

Course Code: **IT3011**   **Course Title: Operating Systems (Theory)**

Teaching Scheme: L- 3   T-0   P-0   Credits: 3

Evaluation Scheme: ISE-20%   Unit Test I-15%   Unit Test II-15%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Elaborate the basic structure of operating systems and key characteristics of different types of operating system.
2. Illustrates the benefits of the multiprocessing, concurrency in operating systems.
3. Explain the cause and effect related to deadlocks and analyze them related to common circumstances in operating systems.
4. Discuss issues involved in the main memory management and file management.
5. Demonstrate the commands of UNIX and implement shell programming.

UNIT 1: Introduction   (4)

Introduction to operating system, Types of Operating System-Serial, Batch operating systems, Multiprogramming operating system, Time sharing systems, Real time system, Distributed system, Different views of Operating Systems.

UNIT 2: Process and Process Scheduling   (7)

Process concept, Process scheduling-Basic concept,Scheduling criteria,Types of Schedulers - Long terms, Medium term and Short term Scheduler,Scheduling algorithms, Algorithm evaluation, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling, Threads.

UNIT 3: Inter Process Synchronization & Communication   (7)

Background, The Critical Section problem, Synchronization hardware, Mutual exclusion, Semaphores, Classical problems of synchronization, Monitors, Messages.

UNIT 4: Deadlocks (5)

Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT 5: Memory and File Management (7)

Background, Address Binding, Logical Versus Physical Address space, Swapping Contiguous Memory Allocation, Paging, Structure of Page Tables, Segmentation. File Management- File concept, Directory Structure, Protection, Allocation Methods.

UNIT 6: UNIX and Shell Programming (6)

UNIX kernel architecture, Basic Commands, Managing file and directories, Simple filters, file permissions, piping and redirection, AWK Tool, process control, Overview of shell, Basics of Shell scripting, Shell programming.

Text Books:

1. Milan Milenkovic, "Operating Systems – Concepts and Design" ,TMGH Publication
2. Silberschatz Galvin Gagne, "Operating System Concepts", WILEY Publication
3. Sumitabha Das, "UNIX –Concepts and Applications", 4th Edition., Tata McGraw Hill, 2006

Reference Books:

1. Madnick Domnovan, "Operating Systems", MGH Publication
2. Tanenbaum, "Operating Systems Design and Implementation" PHI Publication
3. Behrouz Fourozan and Richard Gilberg ,"UNIX and Shell Programming" , Cengage Learning

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology**)

Semester V

Course Code: IT3031   **Course Title: Computer Algorithms (Theory)**

Teaching Scheme: **L- 3**   **T-1**   **P-0**   **Credits: 4**

Evaluation Scheme: ISE-20%   **Unit Test I-15%**   **Unit Test II-15%**   **ESE-50%**

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Understand and apply the mathematics needed for the analysis of algorithms.
2. Apply algorithm for real life problems like change making problem, shortest path, and minimum spanning tree etc.
3. Compute asymptotic notations to determine and analyze the performance of algorithm.
4. Identify appropriate algorithm design strategy that is applicable to a given contextual problem.
5. Implement and compare various searching and sorting algorithms.

UNIT 1: Introduction   **(6)**

Role of algorithm, Growth of functions – Asymptotic notations, standard notations and common functions, Introduction to Probabilistic analysis and randomized algorithms.

UNIT 2: Recursion   **(5)**

Introduction, Design of recursive algorithm, Recurrences – substitution, revision tree, master method.

UNIT 3: Algorithm Design Techniques – I   **(7)**

Divide and conquer- General method, finding maximum and minimum number

Greedy Method - The general method, Knapsack problem, Job sequencing with deadlines, optimal storage on tapes, optimal merge pattern.

UNIT 4: Algorithm Design Techniques – II   **(5)**

Dynamic Programming- The general method, Multistage graph, Optimal binary search trees, 0/1 Knapsack, Traveling Sales person problem.

UNIT 5: Searching and Sorting Methods   **(7)**

Linear Search, Binary Search, Bubble sort, Quick Sort, Merge Sort, Selection Sort, Insertion sort, Radix Sort, Bucket Sort, Complexity issues of these algorithms.

UNIT 6: Graph and Tree Algorithms   **(6)**

Single source shortest path, All pair shortest path, Minimum cost spanning tree- Prim's and Kruskal's Algorithms, Connected components, Bi-connected components.

Text Books:

1. Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran, "Fundamentals of Computer Algorithms", Universities Press, Second Edition. ISBN: 978-81-7371-612-6
2. Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", 2nd ed., ISBN: 978-81-203-2141-0

Reference Books:

1. Sara Baase & Allen VanGelder (Addision Wesley), "Computer Algorithms: Introduction to Design & Analysis" , ISBN-13: 978-0201612448
2. Alfred V. Aho ,"The design and analysis of computer algorithms" ,(Addison-Wesley Pub)

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology**)

Semester V

Course Code: **IT3051**   **Course Title: Internetworking Protocols (Theory)**

Teaching Scheme: **L-3**   **T-0**   **P-0**   **Credits: 3**

Evaluation Scheme: ISE-20%   **Unit Test I-15%**   **Unit Test II-15%**   **ESE-50%**

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Implement the client server programs for network services.
2. Explain IPv6 Addressing, DHCP and domain name systems
3. Demonstrate remote login and file transfer protocols
4. Identify the different types World Wide Web documents.
5. Examine packet capturing, analyzing and simulation tools

Unit 1: Client Server model   **(7)**

Client Server Model & Software Design, Concurrent processing in client-server software, Algorithms and issues in Client-Server design, Multiprotocol Servers, Multiservice Servers, Unix/Internet Super Server (inetd).

Unit 2: Next Generation IPv6 and ICMPv6   **(6)**

IPV6 addressing: Address Space allocation, Global unicast addresses, Auto configuration, renumbering; IPv6 Protocol: Packet format, Transition from IPv4 to IPv6; ICMPV6.

Unit 3: DHCP, Domain Name System   **(8)**

DHCP: operation, Configuration; Domain Name System: Name Space, DNS in the Internet,Resolution, Messages and types of records, Distribution of name space, and DNS in internet, Resolution, DNS messages, Types of records, Compression examples, encapsulation

Unit 4: Remote Login and File Transfer   **(9)**

TELNET: Time Sharing environment, NVT, embedding, options, symmetry, sub-option negotiation, controlling the server, Out-of-band signaling, Escape character, modes of operation, user interface; FTP: Connections, Communication, Command processing, File transfer, User interface, Anonymous FTP, TFTP.

Unit 5: WWW, HTTP and Electronic mail (12)

WWW: Architecture, Web Documents, HTTP Transaction, Request & Response messages: header & examples, Proxy Servers. Electronic Mail: Architecture, User agent, MTA, MAA, MIME, Web based mail.

Unit 6: Protocol analyzing and Simulation tools (6)

Wire-shark, ethereal, Study of Network Simulator 2 (NS-2) - installation, configuration, NS simulator preliminaries,example TCL scripts, working with trace files.

Text Books:

1. D. E. Comer, David L. Stevens, "Internetworking with TCP/IP, Vol. III, Client-Server Programming and Applications",2nd Edition, Pearson Education, 2008.
2. Behrouz A. Forouzen, "TCP/IP Protocol Suite", 4th edition, Tata Mag. Hill, 2010.

Reference Books:

1. W. Richard Stevens, G. Gabrani ," TCP/IP Illustrated, The Protocols", Vol. I, Pearson Education, 2002.
2. D. E. Comer , "Internetworking with TCP/IP, Vol. I, Principles, Protocols, and Architectures" ,4th Edition, Pearson Education, 2008.
3. NS Simulator for beginners - Lecture Notes by Eiten Altman and Tania Jimenez (http://www-sop.inria.fr/maestro/personnel/Eitan.Altman/COURS-NS/n3.pdf)

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology**)

Semester V

Course Code: IT3071   **Course Title: Database Engineering (Theory)**

Teaching Scheme: L- 3   T-0   P-0   Credits: 3

Evaluation Scheme: ISE-20%   Unit Test I-15%   Unit Test II-15%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Discuss nature and purpose of the database system and storage structure.
2. Sketch E-R diagram and design database according to organization requirement.
3. Write and estimate cost of SQL query for various operations like retrieval, insertion of data, join etc.
4. Apply concepts of indexing on database.
5. Describe concurrent execution of transaction.

UNIT 1: Introduction to database concepts (4)

Purpose of Database Systems, Data abstraction, Data Models, Overall System Design, Entities and Entity sets, Mapping Constraints, E-R Diagram, Reducing E-R Diagrams to Tables, Generalization, and Aggregation.

UNIT 2: Relational Model (8)

Structure of Relational Databases, the Relational Algebra, the Tuple Relational Calculus, Structured Query Language (SQL), PL/SQL – Stored Procedures, functions, trigger, cursor.

Unit 3: Integrity Constraint (6)

Domain Constraints, Referential Integrity, Functional Dependencies, Canonical cover, Pitfalls in Relational database Design, Decomposition and Normalization using Functional Dependencies.

Unit 4: File Structure and Record Access Mechanisms (6)

File Organization, Organization of Records in Files, Data Dictionary Storage. B+ Tree Index Files, B-Tree Index Files, Static Hash Functions, Dynamic Hash Functions

UNIT 5: Query Processing and Optimization (4)

Overview (Query Interpretation), Measure of Query cost, Transformation of relational expression.

UNIT 6: Concurrency Control and Crash Recovery (8)

Transaction concept, Transaction state, Concurrent Executions, Serializability, Testing for Serializability, Lock-Based Protocols, Graph based Protocols, Time-Stamp Based Protocols, Validation Techniques and Multiple Granularity, Failure Classification, The storage structure, Log-Based Recovery, Buffer Management, Checkpoints, Shadow Paging.

Text Books -:

1. F. Korth, Abraham Silberschatz, Sudarshan, "Data Base System Concept" (McGraw Hill Inc.), Sixth Edition,2000.

2. Ram Krishnan and Johanses Gehrke, "Database Management System", Third Edition

Reference Books -:

1. J.D. Ullman, "Principles of DataBase Systems", Galgotia Publications

2. Wiederhold,l "Database Design", McGraw Hill Inc.

3. Masri, Navathe, "Fundamentals of Database Systems", Bengamin Cummings Publications.

4. Michael V, "Database design, application development & administration" Mannino's Publications.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology**)

Semester V

Course Code: IT3511   Course Title: Java Programming Laboratory

Teaching Scheme: L- 3   T-0   P-4   Credits: 5

Evaluation Scheme: ISE-50%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Understand the fundamentals of programming such as variables, execution, methods, etc.

2. Implement object oriented features of java.

3. Use Netbeans IDE to develop desktop applications.

4. Implement file handling & multi-threaded programs in java.

5. Implement Collection classes, Networking and DB connectivity.

UNIT 1: Introduction & Object Oriented Programming in Java   (5)

Java buzzwords, The Java Virtual Machine, Variables and data types, Conditional and looping constructs, Arrays Fields and Methods, Constructors, Overloading methods, Garbage collection, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Abstract classes and methods, Interface.

UNIT 2:Collection & Exception Handling   (7)

List, Set, Map (Hash Table, Hash Map, Concurrent Map), Queues, Array, Vector, Operation on String. The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow In Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling. In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.

UNIT 3:Packages, Applet   (6)

Organizing Classes and Interfaces in Packages, Package as Access Protection Defining Package, CLASSPATH Setting for Packages, Naming Convention For Packages. Applet & Application,

Applet Architecture, Parameters to Applet, Embedding Applets in Web page.

UNIT 4: GUI Programming and Event Handling (7)

Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Event-Driven Programming in Java Event- Handling Process, Event-Handling Mechanism, The Delegation Model of Event Handling Event Classes, Event Sources, Event Listeners, Adapter Classes.

UNIT 5: Threads and I/O Basics (6)

Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities, Synchronizing Threads, Inter Communication of Threads, Critical Factor in Thread – Dead Lock. Understanding Streams, The Classes for Input and Output, The Standard Streams, Working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel.

UNIT 6: Database connectivity and Networking (5)

Basic design of JDBC, JDBC Programming Concepts, Executing Queries. Networking.

Text Books -:

1. Herbert Schildt, "Complete Reference JAVA 2", TMGH Publication.
2. James Gosling,"The Java Programming Language", 4th Edition, Sun Systems.
3. Cay S. Horstmaan, Gary Cornell, "Core Java 2 volume II –Advanced Features", Pearson.

Reference Books -:

1. Deitel and Deitel, "Java How to Program", Pearson.
2. Niemeyer & Knudsen, "Java How to Program", O'REILLY (SPD).

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology**)

Semester V

Course Code: IT3531   **Course Title: Operating Systems Laboratory**

Teaching Scheme: L- 0   T-0   P-2   Credits: 1

Evaluation Scheme: ISE-100%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Develop an ability to use the basic and advanced commands in UNIX platform.

2. Demonstrate the use of simple and advanced filters of UNIX system using regular expression.

3. Develop an ability to write and execute shell scripts and shell programs for defined problems.

It should consist of experiments based on the experiment list mentioned below.

List of Practical

1. Introduction to UNIX operating system, Kernel-Shell relationship and Basic commands.

2. File , directory utility

3. Pipes and redirection

4. Simple filters

5. File permissions

6. User management

7. Overview of shell, Basics of Shell scripting

8. Arrays and Functions

9. Shell programming

Text Books -:

1. Sumitabha Das, "UNIX –Concepts and Applications", 4th Edition, Tata McGraw Hill, 2006.

2. Behrouz Fourozan and Richard Gilberg,"UNIX and Shell Programming" , Cengage Learning.

Course Code: IT3551   Course Title: Internetworking Protocols Laboratory

Teaching Scheme: L- 0   T-0   P-2   Credits-1

 Evaluation Scheme: ISE-100%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Implement the client server program to illustrate the concept of socket programming.

2. Configure DNS server and study of DNS Utilities

3. Demonstration and implementation of TFTP protocol for File transfer

4. Study and implementation of SMTP commands to send a mail and design a personal web site

5. Demonstrate the Packet Capturing and Analyzing tool and simulate simple protocol using NS2.

It should consist of minimum 10 experiments based on the syllabus and experiment list mentioned below.

List of Practical

1. **Concurrent communication:**

    Implementing Client & concurrent Server program using TCP to connect to well-known services (echo, time of the day service).

2. **Iterative communication:**

    Implementing iterative Client Server programs using UDP to connect to well known services (echo, time of the day service, chargen, Arithmetic calculator etc)

3. **Super Server:**

    Configure xinetd server and implement UDP/TCP parameterized Client programs.

4. **IPV6:**

    Implementation of Client Server programs using TCP & UDP and IPV6 addressing to connect to well known services (echo, time of the day service, chargen, arithmetic calculator etc).

5. **DNS:**

   Configuration of DNS and Study DNS Tools with all its options like nslookup, dig, host, who is.

6. **TFTP:**

   Write socket programs or use tool for demonstrating TFTP.

7. **SMTP:**

   Write a SMTP client program or SMTP tool to send a mail in PHP/Java.

8. **WWW:**

   Implement a webpage with database connectivity to store and retrieve data.

9. **Packet Capturing and Analyzing tool:**

   Capturing & Analyzing operation of various application layer protocols using network protocol analyzer. (Wireshark/tcpdump)

10. **Network Simulator (NS2):**

    Installation, configuration of NS-2 and Simulation of simple protocols using NS-2 tcl scripts

Text Books:

1. Unix Network Programming, 18th Printing, W. Richard Stevens, PHI, 2002.

Reference Books:

1. TCP/IP protocol suite – Behrouz A. Forouzen, 4th edition, Tata Mag. Hill, 2010.
2. Internetworking with TCP/IP, Vol. III, Client-Server Programming and Applications (2nd Ed.) – D. E. Comer, David L. Stevens (Pearson Ed.)
3. NS Simulator for beginners - Lecture Notes by Eiten Altman and Tania Jimenez (http://www-sop.inria.fr/maestro/personnel/Eitan.Altman/COURS-NS/n3.pdf)

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology)**

Semester V

Course Code: IT3571 **Course Title: Database Engineering Laboratory**

Teaching Scheme: L-0 **T-0** **P-2** **Credits: 1**

Evaluation Scheme: ISE-50% **ESE-50%**

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Sketch E-R diagram of database of given database schema.

2. Write SQL query for various operations like retrieval, insertion and manipulation of data etc.

3. Implement PL/SQL cursor, procedure/function and trigger.

4. Apply hashing mechanism to build hash index file on given records.

5. Implement a program to connect database to application program.

It should consist of minimum 12 experiments based on the syllabus and experiment list mentioned below.

List of Practical

1. **ER Diagrams:**

    Demonstrate the ER Model by Drawing Diagram using open source tool.

2. **Data Definition Language (DDL):**

    Implement the Queries based on creating, destroying databases and database objects.

3. **Data Modeling Language (DML):**

    Implement the Queries based on inserting, deleting and updating data in a database.

4. **String, Set operations, aggregate functions, Group by, Order by clause:**

    Implement the Queries based on above commands.

5. **Database joins:**

Implement the Queries based on qui-join, inner joins & view creation

6. **Basics of PL/SQL:**

Implement PL/SQL using cursors and triggers.

7. **Constraints:**

Implement the Queries based on primary key, foreign key, not null, unique, & check constraints.

8. **Functional dependencies and Canonical cover:**

Implementation of closure of Functional dependencies and canonical cover.

9. **Normalization and Normal forms:**

Implementation of Normalization & normal forms.

10. **Indexing & Hashing:**

Implementation of dense and sparse index.

11 **Concurrency Control:**

Write program to simulate any one concurrency control Protocol.

12 **JDBC-ODBC:**

Implementation of student database using JDBC-ODBC

Text Books -:

1. F. Korth, Abraham Silberschatz, Sudarshan, "Data Base System Concept" (McGraw Hill Inc.) Fourth Edition
2. Ram Krishnan and JohansesGehrke, "Database Management System", Third Edition

Reference Books -:

1. J.D. Ullman, "Principles of DataBase Systems", Galgotia Publications

2. Wiederhold,l "Database Design", McGraw Hill Inc.

3. Masri, Navathe, "Fundamentals of Database Systems", Bengamin Cummings Publications.

4. Michael V, "Database design, application development & administration" Mannino's Publications.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Third Year Engineering (**Department of Information Technology**)

Semester V

Course Code: SH3191   **Course Title: Aptitude Training-I**

Teaching Scheme:

L	T	P	C
1	0	2	2

Evaluation Scheme: ISE- 50% ESE- 50% (Minimum Passing Marks: 40%)

Details of the Content		

SECTION	DETAILS	Hrs.
1. BASIC APTITUDE	• Percentage • Average • Ratio-proportion/fraction • Lcm & its applications	14
2. BUSINESS APTITUDE	• Profit & loss • Simple interest • Compound interest	10
3. RELATIVE SPEED	• Speed time & distance • Trains • Boats & streams • Races	14
4. TRW	• Time rate & work • Pipes & cisterns	07
	Total Hrs.	**45**

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S Chand Publishing, New Delhi

2. R. S. Aggarwal, "Logical Reasoning", S Chand Publishing, New Delhi

3. Arun Sharma, "Quantitative Aptitude", McGraw Hill Publishing, New Delhi 7th Edition

4. Arun Sharma, "Logical Reasoning", McGraw Hill Publishing, New Delhi 3rd Edition

Course Learning Outcomes:

After successful completion of the course student will be able to solve aptitude problems within stipulated time with appropriate logic.

Evaluation Method:

Four tests (preferably online) will be conducted as a part of ISE.
ESE will be of 50 marks covering the entire syllabus.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology)**

Semester VI

Course Code: IT3021   **Course Title: System Programming (Theory)**

Teaching Scheme: L-3   T-0   P-0   **Credits: 3**

Evaluation Scheme: ISE-20%   **Unit Test I-15%   Unit Test II-15%   ESE-50%**

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Understand the concept of language processors.

2. Design and understand one pass and two pass assembler.

3. Discuss the concept of macro & design macro preprocessor.

4. Discuss the concept of the compiler, interpreter, linker & loader.

5. To study the different open source system software's.

UNIT 1: Language Processors   (5)

Introduction, language processing activities, Fundamentals of language processing, Fundamentals of language Specification, language Processor development tools, Open source software :gcc, gdb, ddd.

UNIT 2: Assemblers   (9)

Elements of assembly language programming, a simple assembly scheme, pass structure of assemblers, design of a one pass and two pass assembler.

UNIT 3: Macros and Macro Processors   (6)

 Macro definition and call, Macro Expansion, Nested macro calls, Advanced macro facilities, Design of macro preprocessor.

UNIT 4: Compiler Part-I   (7)

Compilers: Structure of Compiler, Lexical Analysis: Role of lexical analyzer, Input buffering,

specification of Token, recognition of token, Syntax Analysis: - Role of parser, Context free grammar, Top down and bottom up parsing, Lexical analysis generator: lex and parser generator: yacc.

UNIT 5: Compiler Part-II (4)

Memory allocation, Compilation of expressions, Compilation of control structures, Code optimization.

UNIT 6: Linker and Loader (5)

Relocation and linking concepts, design of a linker, Self-relocating programs, linking for overlays, Loaders.

Text Books:

1. D.M. Dhamdhere ,"System Programming and operating systems" ,2nd Edition ,TMGH
2. A.V. Aho, R. Shethi and J.D.Ullman ,"Compilers - Principles, Techniques and Tools" , Pearson Education.

Reference Books:

1. Leland L. Beck , D.Manjula , "System Software (An Introduction to system programming)",3rd Edition , Pearson Education
2. J. J. Donovan ,"System Programming", Mc-Graw Hill

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology)**

Semester VI

Course Code: IT3041   Course Title: Cryptography and Network Security(Theory)

Teaching Scheme: L- 3   T-1   P-0   Credits: 4

Evaluation Scheme: ISE-20%   Unit Test I-15%   Unit Test II-15%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Apply number theory to provide the security solutions.
2. Analyze different methods of Data Encryption and Decryption; their advantages & limitations.
3. Comprehend the needs & techniques of Message authentications and Digital Signatures.
4. Discuss different security attacks & security solutions for e-mail & web applications.

UNIT 1: Introduction to Cryptography and Number Theory   **(6)**

Overview – Services, Mechanism and Attacks, The OSI Security Architecture, A model for network security, Prime numbers, Modular Arithmetic's, Euler's Theorem , Euclidean Algorithm, Testing for Primality, Chinese Remainder Theorem .

UNIT 2: Data Encryption Techniques   **(5)**

Introduction, Encryption methods- Principles of Symmetric and Asymmetric cryptosystems, Block and stream ciphers, Substitution ciphers, Transposition ciphers, Cryptanalysis, Steganography.

UNIT 3: Symmetric and Asymmetric ciphers   **(7)**

Symmetric ciphers: Advanced Encryption System (AES), Blowfish encryption algorithm,RC4, RC5, RC6, International data encryption algorithm (IDEA),

Asymmetric ciphers: The RSA Algorithm Key management; Other public key cryptosystems – Key Management, Diffie- Hellman Key Exchange, Elliptical curve cryptography.

UNIT 4: Message Authentication **(5)**

Authentication requirements, Authentication Functions, Requirements Hash functions, Hash Functions: MD5 and SHA-1, Digital Signatures and standards.

UNIT 5: Network Security practice **(6)**

Authentication Applications – Kerberos, X.509 Authentication Service, IP Security – IP Security Overview, IP Security Architecture, WEB Security -Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

UNIT 6: System Security and digital security: **(7)**

Intruders ,Intrusion detection, Intrusion detection system-Anomaly based IDS, Misuse based IDS, Distributed IDS, Malicious Software – Viruses, Worms, Trojan Horse, Spyware and Bots, Types of Attacks, Firewall design principles, Introduction to data Protection by patents, copyrights and trademarks , IT security acts.

Text Books:

1. Williams Stallings – Cryptography and Network security principles and practices. Pearson Education (LPE)
2. V.K.Pachghare - Cryptography and Information Security, 2nd Edition, PHI publication.

Reference Books:

1. Menezes, A.J., "Network Security & Cryptography" Cengage Publications.
2. Atul Kahate, "Cryptography and network security" TMGH Publication.

Term work:-

It should consist of minimum 8 tutorials based on following list,

1. Number Theory
2. Data Encryption Techniques
3. Symmetric Ciphers
4. Asymmetric Ciphers
5. Authentication
6. Digital Signature
7. Network Security
8. Web Security
9. System Security

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering **(Department of Information Technology)**

Semester VI

Course Code: IT3061   **Course Title: Object-Oriented Modeling and Design (Theory)**

Teaching Scheme: **L- 3   T-1   P-0   Credits: 4**

Evaluation Scheme: ISE-20%   **Unit Test I-15%   Unit Test II-15%   ESE-50%**

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Describe concepts of Object, dynamic & functional modeling.
2. Classify types of modeling using advanced concepts in dynamic & functional.
3. Design & use various concepts of OMT technology.
4. Design & implement using structural modeling, behavioral modeling & architectural modeling in UML.

UNIT 1: Introduction to Object Modeling   **(6)**

Object Oriented development & themes, Modeling as a Design Technique, Objects, classes, links and associations, generalization and inheritance,Aggregation, abstract classes, generalization as extension and restriction, multiple inheritance, metadata, candidate keys and inheritance.

UNIT 2: Dynamic & Functional Modeling   **(6)**

Events, states, operations, concurrency, nested state diagrams, advanced dynamic modeling concepts, DFD.

UNIT 3: Design Methodology   **(6)**

Preview of OMT technology, Impact of an object oriented approach, Analysis, System design with examples, combining models, Designing models, Comparing Methodologies using structured analysis and design.

UNIT 4: Structural Modeling using UML   **(4)**

Classes, Relationships, Common mechanisms. Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram

UNIT 5: Behavioral Modeling using UML (7)

Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams,Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.

UNIT 6: Architectural Modeling using UML (7)

Components, Deployment, Collaboration, Patterns and Frame works, Component diagrams and Deployment Diagrams.

Text Books:

1. Rambaugh, Premerlani, Eddy, Lorenson, "Object Oriented Modeling and Desig" (PHI)
2. Grady Booch, JeamsRambaugh, IvarJacotson, "The Unified Modeling Language User Guide" (Addison Wesley)

Reference Books:

1. Andrew High, "Object Oriented Analysis and Design", (TMG).
2. Mark Priestley, "Practical Object Oriented Design with UML".
3. Kahate, "Object oriented Analysis & design", (TMH).

Course Code: IT3521   **Course Title: Mobile Application Development Laboratory**

Teaching Scheme: L- 3   T-0   P-2   **Credits: 4**

Evaluation Scheme: ISE-50%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Set up mobile application development environment with Android SDK to be used with Eclipse IDE.
2. Design User Interfaces (UIs) using controls, layout managers, menus and dialogs.
3. Implement activities, services, content providers, broadcast receivers in Android applications.
4. Use Preferences, SQLite for database storage, Media Player, and telephony APIs in android applications.
5. Perform testing, packaging of mobile applications and deploy Android applications to emulators and physical devices.

UNIT 1: Introduction   **(5)**

Mobility, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator.

UNIT 2: User Interface   **(7)**

App user interface designing – UI Resources-Layout resources, String Resources, Image resources, Ul elements and events, Interaction amongst activities, Action Bar.

UNIT 3: App functionality beyond user interface   **(7)**

Activity-states and life cycle, Threads, Services - states and life cycle, Notifications, Intents, Broadcast receivers, Telephony and SMS APIs.

UNIT 4: Getting Persistent with Data Storage   **(6)**

Storage options, Shared preferences, Creating Your Application's SQLite Database, Managing the database, Content providers

UNIT 5: Adding polish to Mobile Application   **(6)**

Working with Images, animation, Working with Camera, Multimedia - audio/video playback and record

UNIT 6: Testing and Publishing Mobile Application (5)

Testing Mobile Applications, App testing landscape, Signing and packaging mobile apps, distributing apps on mobile market place

The laboratory should consist of minimum 10 experiments based on the syllabus and experiment list mentioned below.

List of Practical

1. **Set up Mobile Application Development Environment:**

   Install and Configure Android SDK with Eclipse IDE.

2. **User Interface –layouts:**

   Create User Interface using different types of Layouts.

3. **Android Widgets:**

   Implement event handling for Android Widgets.

4. **Activity Lifecycle:**

   Implement program to demonstrate managing Activity Lifecycle.

5. **Services:**

   Implement program to demonstrate Services.

6. **Notifications and Broadcast Receivers:**
   Implement program to demonstrate the usage of notifications and broadcast receivers.

7. **Telephony:**
   Implement a program to demonstrate the usage of SMS messaging.
8. **Preferences:**
   Implement a program using preferences and shared preferences.
9. **Working with Database:**
   Implement program to use database in Android application.
10. **Multimedia:**
    Implement a program to demonstrate the usage of Multimedia (Audio/Video/Camera).
11. **Intents:**
    Implement a program using intents.
12. **Location Awareness:**
    Implement program to implements location based services.

Text Books:

1. Anubhav Pradhan, Anil Deshpande,"Composing Mobile Apps using Android", Wiley Publication
2. DonnFelker ,Joshua Dobbs, "Android Application Development for Dummies", WileysPublication

Reference Books:

1. Barry Burd, "Android Application Development All in one for Dummies" ,Wileys Publication
2. Lauren Darcy, "Teach Yourself Android Application Development in 24 Hours", SAMS Publication

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology)**

Semester VI

Course Code: IT3541   Course Title: C# .Net Laboratory

Teaching Scheme: L- 3   T-0   P-4   Credits: 5

Evaluation Scheme: ISE-50%   ESE-50%

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Understand .NET framework & fundamentals.

2. Implement object oriented concept in C#.

3. Develop desktop applications & Multi-threaded programs in C#.

4. Implement ADO.NET concept in C#.

5. Analyze the difference between C# and other programming languages.

UNIT 1: Introduction of .NET framework , Language fundamentals and OOPs   (5)
        Concepts

.NET framework: What is .net, CLR, MSIL, JIT, CLS, CTS, Namespaces, Assembly, Language fundamentals: Data types, Operators, Conditional statements, Looping, statements, Arrays, Structures, and Enumerators? OOPs Concepts: Encapsulation, Abstraction, Inheritance, Overloading Class and object, Types of classes, Creating and using namespaces, Passing arguments to methods – pass by in, out, param, address.

UNIT 2: Windows Forms   (7)

Introduction, Controls: Form, Label, TextBox, Button, CheckBox, RadioButton, DropDownList, ProgressBar, Timer, TreeView, NumericUpDown, ToolTip, RichTexBox etc... MenusStrip, ToolbarStrip, Dialogbox, MDI Applications, Deploying windows application, Creating .dll file.

UNIT 3: Working With Collections and File Handling   (6)

Collection Classes: ArrayList, HashTable, Stack, Queue, Dictionaries etc. Working with Generic Collection Classes. File Handling: Introduction to streams,System.IO namespace, Path,

File, and directory classes, Reading and writing with files, StreamReader and StreamWriter class.

UNIT 4: Database programming with ADO.NET (7)

Overview of ADO.NET, Namespaces, Classes, Data retrieval methods – connected, disconnected, Data table, Dataset, Using the Data Controls.

UNIT 5: Multithreading and XML in C# (6)

Multithreading : Introduction, Application Domains, Creating and Managing Threads, Threads Priority , Thread States, Thread Synchronization & Interthread Communication, Using Monitor. XML: Reading and Writing XML, Important Classes in the System.XML Namespace, Read and Write XML Nodes and Attributes.

UNIT 6: Working with Excel in C# (5)

Creating , Opening , Reading an Excel file in CSharp , Format an Excel file using C# , Insert a picture in excel from C# App , Insert a background picture in excel, Creating Excel Chart from C#, Export excel chart from C#, Export database to excel file, Export DataGridView to excel file.

It should consist of minimum 14 experiments based on the syllabus and experiment list mentioned below.

<div align="center">

List of Practical

</div>

1. **Class & Inheritance:**

   Implement the concept of Class and Inheritance

2. **Passing Arguments & Overloading:**

   Implement concept of Overloading and Passing arguments.

3. **Windows Application:**

   Design Window application for calculator.

4. **Windows Application:**

   Design Window application of Employee salary calculation.

5. **Windows Application:**

   Design login form by using ProgressBar, Timer, Menu control etc...

6. **Deployment & DLL:**

   Deploy the windows application & create .dll file.

7. **Collection:**

   Implement different collection classes by using windows forms.

8. **File Handling:**

   Implement program by using File, File Info & Directory class.

9. **File Handling:**

   Implement program by using File Stream, Stream Reader & Stream Writer class.

10. **Database Programming:**

    Database Programming for Connected Database.

11. **Database Programming:**

    Database Programming for Disconnected Database.

12. **Multithreading:**

    Implement concept of Multithreading.

13. **XML:**

    Implement program for creating, opening, reading, writing contents of XML file.

14 **Excel Application:**

    Develop windows application for generating reports into the Excel sheet.

Text Books -:

1) Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, "Professional C# 2008", Wiley
2) John Sharp, "Microsoft Visual C# 2005 Step by Step", O'REILLY

Reference Books -:

1) Deitel, "C# How to Program", Pearson.
2) Mattew Macdonlads, "Pro ASP.NET 3.5 in C# 2008", Apress.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (**Department of Information Technology**)

Semester VI

Course Code: IT3561   Course Title: Mini Project – II Laboratory

Teaching Scheme: L- 0   T- 0   P- 2   Credits: 2

Evaluation Scheme: ISE-100%

Course Learning Outcomes:

After completion of the course, student will be able to:

1) To demonstrate ability of analysis, design and implementations.

2) To improve ability to work in teams.

1) To take real life problems and provide software based solutions for them.

The batch of four students will carry out a mini/epic project. A batch of practical / tutorial will be divided into mini project groups. Mini project topics and the work for these groups in the batch will be guided by a teacher for the batch. The project topic should be related to design of an application or system level software. The project code should be implemented in programming languages like C, C++, .Net or Java. It should follow practices mentioned in Software Engineering course. The students should complete design of project using Rational Rose software.

The teacher will assess the performance of individual student in the mini/epic project, jointly with a teacher of another batch in the institute. Project group will submit hard copy project report along with project demonstration software in CD and/or project hardware gadget.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)
Third Year Engineering (**Department of Information Technology**)

Semester VI

Course Code: SH3222   **Course Title: Aptitude Training-II**

Teaching Scheme:

L	T	P	C
1	0	2	2

Evaluation Scheme: ISE- 50% ESE- 50% (Minimum Passing Marks: 40%)

Details of the Content		.
SECTION	**DETAILS**	**Hrs.**
1. **GEOMETRY**	• Geometry • Mensuration •	**06**
2. **COMBINOTORICS**	• P & C • Probability	**10**
3. **SEATING ARRANGEMENTS**	• Linear • Circular • Complex	**06**
4. **SYLLOGISMS**		**04**
5. **IMAGE COMPLETION**		**04**
6. **DIRECTION SENCE**		**02**
7. **CODING DECODING/SERIES**		**04**
8. **ANALOGY**		**12**
9. **CLOCK & CALENDER**		**02**
10. **BLOOAD RELATIONS**		**05**
	Total Hrs.	**45**

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S Chand Publishing, New Delhi

2. R. S. Aggarwal, "Logical Reasoning", S Chand Publishing, New Delhi

3. Arun Sharma, "Quantitative Aptitude", McGraw Hill Publishing, New Delhi 7th Edition

4. Arun Sharma, "Logical Reasoning", McGraw Hill Publishing, New Delhi 3rd Edition

Course Learning Outcomes:

After successful completion of the course student will be able to solve aptitude problems within stipulated time with appropriate logic.

Evaluation Method:

Four tests (preferably online) will be conducted as a part of ISE.
ESE will be of 50 marks covering the entire syllabus.

Rajarambapu Institute of Technology, Sakharale

(An Autonomous Institute)

Third Year Engineering (Department of Information Technology)

Semester VI

Course Code: IT3581   **Course Title: Professional Training**

Teaching Scheme: L- 0   P-0   T-0   Audit Course : P/NP

Course Learning Outcomes:

After completion of the course, student will be able to:

1. Develop software system to solve problems.

2. Apply modern software tools to design systems.

3. Realize importance and scope of new technologies.

4. Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.

5. Demonstrate the ability to work in teams.

The "Professional Training" Audit Course is introduced in the curriculum to improve professional skills of students and increase interactions with Industries. As part of this course, each student needs to complete a professional training in at least one Technology.

The Professional Training will be of approximately 40 Hours; though it may vary in some cases. The course training has to be taken by TY (IT) students during December or June vacation. The Institute will announce list of offered training programs with details. The student may choose any training program given in the list and complete it as per schedule given for corresponding training.

This is mandatory course for all students of autonomous batch. The course being an "Audit Course"; the student gets passed in the course on successful completion of training. The meaning of "successful completion of training" should be one of following:

1) The student completes a certification in the area of training which is recognized internationally or issued by a reputed Industry.

2) The student implements a project / case study which demonstrate the skills acquired by him/her during the training.