MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI
PG - COURSES – AFFILIATED COLLEGES
Course Structure for **Master of Computer Applications (MCA)**
(Choice Based Credit System)
(with effect from the academic year 2020-21 onwards)

Duration :
        TWO Years

Eligibility :

" Passed BCA / Bachelor Degree in Computer Science Engineering or equivalent degree. OR
Passed B.Sc / B.Com/ B.A.with Mathematics at 10+2 level or at Graduation level
(with additional bridge courses as per the norms of the concerned University). Obtained at
least 50% marks (45% marks in case of candidates belonging to reserved category) in the
qualifying Examination

Scheme of Examination

Theory Paper

   Assessment Components (External : Internal – 75 : 25)

Internal Marks --25

        Test   **- 15 marks**

        Assignment   **- 5 marks**

        Seminar   **-- 5 marks**

        Total   **-   25 marks**

External Marks - 75 marks

        Section   A   : 10X 1marks   = 10 marks

        Section B   : 5X 5 marks   = 25 marks

        Section C   : 5X 8 marks   = 40 marks

        Total   75 marks

Practical Paper

  Assessment Components (External : Internal – 50 : 50)

Course Structure

Sem. (1)	Sub. No. (2)	Subject Status (3)	Subject Title (4)	Contact Hrs./Week (5)	Credits (6)
I	1	Core - 1	Design and Analysis of Algorithms using C++	4	4
	2	Core - 2	Object Oriented Analysis and Design using UML	4	4
	3	Core - 3	Advanced Java Programming	4	4
	4	Core - 4	Computer Organization and Architecture	4	4
	5	Core - 5	Distributed Operating System	4	4
	6	Core - 6 Practical - 1	Design and Analysis of Algorithms Lab Using C++	4	2
	7	Core - 7 Practical - 2	Advanced Java Programming Lab	4	2
II	8	Core - 8	Financial and Management Accounting	4	4
	9	Core - 9	Machine Learning using Python	4	4
	10	Core - 10	Open Source Technology	4	4
	11	Core - 11	Advanced Relational Data Base Management System	4	4
	12	Elective - 1	E-Commerce/ Embedded Systems/Software Engineering/Security in Computing	4	3
	13	Core - 12 Practical - 3	Machine Learning using Python Lab	4	2
	14	Core - 13 Practical - 4	Open Source Technology Lab	4	2

* Extra hours for Project

For the Project, flexible credits are b/w 5 - 8 & Hours per week are b/w 10 - 16.

Total number of credits ≥ 90	:	**90**
Total number of Core Courses	:	**20 (13 T + 5 P + 2 Projects)**
Total number of Elective Courses	:	**2**
Total hours	:	**120**

DESIGN AND ANALYSIS OF ALGORITHMS USING C++

L T P C
4 0 0 4

Unit - I
Introduction: Algorithm-Specification-Performance Analysis. Data Structures: Lists – Stacks-Queues – Trees – Graphs – Dictionaries - Priority Queues.   **(12 L)**

Unit - II
Divide And Conquer: General Method-Binary Search- Finding the Maximum And Minimum-Quicksort - Strassen's Matrix Multiplication.   **(12 L)**

Unit - III
The Greedy Method : General Method- 0/1 Knapsack Problem-Job Sequencing with Deadlines – Minimum-Cost Spanning Tree- Single-Source Shortest Paths.
Dynamic Programming : General Method- All-Pairs Shortest Path- 0/1 Knapsack Problem.
(12 L)

Unit - IV
Basic Traversal And Search Techniques : Techniques for Binary Trees-Graphs-Connected Components and Spanning Trees.
Backtracking : General Method- N-Queen Problem- Hamiltonian Circuit Problem.
(12 L)

Unit - V
Branch and Bound : Method- Assignment Problem - Knapsack Problem.
NP-Hard And NP-Complete Problem: Basic Concepts-Cook's Theorem- -Job Shop Scheduling.
(12L)
TOTAL : 60 PERIODS

Reference Books:
1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press(India) Private Ltd., 2008
2. Aho, Hoporoft and Ullman, "The Design and Analysis of Computer Algorithm", Pearson Education, Delhi, 2001.
3. S.Sridhar, " Design and Analysis of Algorithms", Oxford University Press, 2015.
4. Basu S.K., "Design Methods and Analysis of Algorithms", PHI, 2006.
5. M.A.Weiss, "Data Structures and algorithm Analysis in C++", Pearson Education, Asia, 2013.

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

L T P C
4 0 0 4

UNIT I - Introduction
An overview - Object Basics - Object State and Properties – Behavior and Methods – Respond to Message – Encapsulation and Information Hiding – Class Hierarchy – Relationship and Associations – Aggregation – Advanced Topics – Object oriented system development life cycle

(12L)

UNIT II – Methodology and UML
Introduction – Survey – Rumbaugh ,Booch , Jacobson Methods – Patterns – Frameworks- Unified Modeling Language: Introduction - Static and dynamic Models – Modeling - UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic Modeling – Model Management – UML Extensibility

(12L)

UNIT III – Object-Oriented Analysis
Identifying Use cases: Introduction - Business Object Analysis – Use case driven Object oriented analysis – Use-case Model – Documentation – Classification: Introduction – Classification Theory – Naming Classes Language - Constraint– Introduction – Object-Oriented Design Philosophy –UML Object Identifying Object relationships, Attributes and Methods: Super sub class – A part of relationships aggregation – Object responsibility – Methods for ViaNet bank objects.

(13L)

UNIT IV – Object- Oriented Design
Object Oriented Design process and Design axioms: Axioms – corollaries – Design Patterns – Designing Classes : Class visibility – Refining attributes – Methods and protocols – Object – relational system – Multi Database System – Designing Interface Object - Macro and Micro level process – Purpose of a view layer interface.

(13L)

UNIT V – Quality and Testing
Quality Assurance – Testing Strategies – Impact of Object Orientation on Testing – Test Plan – Test cases system usability – Usability Testing.

(10L)
TOTAL: 60 PERIODS

Reference Books:

1.Ali Bahrami, " Object Oriented Systems development",McGraw Hill Education(India) Private Limited, Edition 2008.

2.Jaya Mala, S. Geetha, "Object Oriented Analysis and Design using UML", McGraw Hill Education, 2013

3.Atul Kahate, "Object Oriented Analysis and Design", Tata McGraw Hill Education, 2004.

4.Mahesh P.Matha, "Object-Oriented Analysis and Design Using UML", PHI Learning Private Limited, 2012.

5.F. Margret Sharmila, N.Jayanthi, Dr.R.Vasanthi, A.Surya, Dr.R.Palson Kennedy, "Object Oriented Analysis & Design", Charulatha Publications Private Limited, 2019

ADVANCED JAVA PROGRAMMING

L T P C
4 0 0 4

UNIT I

OOP and Java : Introduction to Java Language – Object Oriented Programming - Classes and Objects – Methods – Constructor - Overloading Methods.

 Inheritance: Introduction – Inheritance Types – General form of subclass – subclass constructor – method overriding – abstract and final classes.

Packages and Interfaces: Defining a package – import statement – setting class path – Interfaces – Defining an interface – implementing interfaces

Enumerations, Autoboxing and Annotations : Enumerations – Type Wrappers – Autoboxing – Annotations (metadata)

(12L)

UNIT II

Input/Output : I/O Basics – Byte Streams and Character Streams – Predefined Streams – Reading console input and writing console output – PrintWriter class – Reading and writing Files –Closing a File

Generics and Collections: Generics– Generics example – Generic class with two type parameters – Bounded types – Wildcard arguments – Generic method – Generic constructors – Generic interfaces

Collections : Collections – Collection interfaces – Collection classes – accessing a collection – Working with Maps –Arrays – Vector – Stack – Dictionary – Hashtable – Properties – Using store( ) and load ( ).

(12L)

UNIT III

Swing : Introduction – Components and Containers – Swing packages – simple Swing application – Event handling – JApplet – Painting in Swing – JLabel – JTextField – JButton – JCheckbox - JRadioButton – JTabbedPane – JScrollPane – JList – JComboBox – Dialogs – JTable – JMenu

JDBC : Java database connectivity, Types of JDBC drivers, Writing JDBC applications – Types of statement objects (Statement, PreparedStatement, and CallableStatement), Types of Resultset – Inserting and updating records – Using Transactions.

(12L)

UNIT IV

NIO : NIO classes – Buffers – Channels – Path Interface – Files class – Paths class – File attribute interfaces – Reading and writing a File via a Channel – Stream-Based I/O – Path and File System operations

Networking : Networking Classes and Interfaces – InetAddress – TCP/IP – UDP

RMI : Introduction – Remote Interface – java.rmi package – Naming Class – RMI Exception – Creating a simple RMI Client/Server application.

(**12L**)

UNIT V

Java Beans: An overview of Java Beans – Properties, Events and Methods – Introspection - Builder Tools – BDK – Persistence – Java Beans API – A Bean Example

Java Servlets : Java Servlets and CGI Programming – Life cycle of a Servlet – Tomcat – A Simple Servlet – javax.servlet - javax.servlet.http – Handling HTTP requests and responses – Working with Cookies – Tracking Sessions.

(**12L**)

TOTAL: 60 PERIODS

References:

1. Herbert Schildt: Java – The Complete Reference, Eleventh Edition, Tata McGraw-Hill, 2019
2. Balagurusamy : Programming with Java, Sixth Edition, Tata McGraw-Hill, 2019
3. Jim Keogh: J2EE – The complete Reference, Second Edition, Tata McGraw-Hill, 2007
4. Patrick Niemeyer and Daniel Leuck : Learning Java, Fourth Edition, O'Reilly Media, 2013

COMPUTER ORGANIZATION AND ARCHITECTURE

L T P C
4 0 0 4

UNIT I
Introduction: Digital Computers-Basic Organization of a Computer-Historical Perspective-**Digital Logic Circuits-**Digital Computers-Logic Gates-Boolean Algebra-Map Simplification-Combinational Circuits – flipflops-**Digital Components-**Integrated Circuits – Decoders – Multiplexers – Registers-Shift Registers-Binary Counters-**Data Representation -**Data Types – Complements-Fixed-Point Representation-Conversion of Fractions-Floating-Point Representation.

(**12L**)

UNIT II
Register Transfer and Microoperations-Register Transfer-Bus and Memory Transfers-Arithnietic Microoperations-Logic Microoperations-Shift Microoperations-Arithmetic Logic Shift Unit-**Basic Computer Organization and Design-** Instruction Codes-Computer Registers-Computer Instructions-Timing and Control-Instruction Cycle-**Programming the Basic Computer-**Machine Language-Assembly Language-The Assembler–Subroutines.

(**13L**)

UNIT III
Microprogrammed Control-Control Memory-Address Sequencing-Design of Control Unit-**Central Processing Unit-**General Register Organization-Stack Organization-Instruction Formats-Addressing Modes-Data Transfer and Manipulation-Program Control-CISC Characteristics-RISC Characteristics. **Pipeline and Vector Processing:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction – RISC Pipeline – Vector processing – Array Processor.

(**13L**)

UNIT IV
Computer Arithmetic: Addition and Subtraction-Multiplication Algorithms-Division Algorithms-Decimal Arithmetic Unit-Decimal Arithmetic Operations-**Input-Output Organization-**Peripheral Devices-Input-Output Interface-Asynchronous Data Transfer-Modes of Transfer-Direct Memory Access (DMA)-Serial Communication-Bus Standards.

(**12L**)

UNIT V
Memory Organization: Memory Hierarchy-Main Memory-Auxiliary Memory-Associative Memory-Cache Memory-Virtual Memory – **Multiprocessors-**Characteristics of Multiprocessors-Interconnection Structures.

(**10L**)

TOTAL: 60 PERIODS

Reference Books:

1.M. Morris Mano, Rajib Mall, "Computer System Architecture– Revised", Third Edition, Pearson India Education Services Pvt. Ltd., 2017.

2.John P Heys, "Computer Architecture and Organiztion", 3rd Edition, McGraw Hill 1998.
3.William Stallings, "Computer Organiztion and Architecture – Designing for Performance",10th Edition, Pearson Education, 2016.
4.Alka Viswa, "Computer Organization and Architecture",Dreamtech Press, 2019.

DISTRIBUTED OPERATING SYSTEM

L T P C
4 0 0 4

UNIT – I
Fundamentals: What is Distributed Operating System? – Evolution of Distributed Computing System – Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity? – What is a Distributed Computing System? – Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment (DCE). Computer Networks: Introduction– Network Types – LAN Technologies–WAN Technologies– Communication Protocols – Internetworking – ATM Technology.

(12 L)

UNIT - II
Message Passing: Introduction –Desirable features of Good Message Passing System – Issues in IPC Message Passing – Synchronization – Buffering – Multi datagram Messages – Encoding and Decoding of Message Data– Process Addressing – Failure Handling – Group Communication

(10L)

UNIT - III
Remote Procedure Calls : Introduction– The RPC Model – Transparency of RPC– Implementing RPC mechanism–Stub Generation–RPC Messages–Marshaling Arguments and Results–Server Management– Parameter Passing Semantic–Call Semantics–Communication Protocol for RPC's – Complicated RPC's –Client Server Binding–Exception Handling–Security–Some Special Types of RPC's –RPC in Heterogeneous Environments – Light weight RPC. Distributed Shared Memory: Introduction – General Architecture of DSM Systems – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory – Consistency Models – Replacement Strategy – Thrashing–Other Approaches to DSM–Heterogeneous DSM –Advantages of DSM.

(14 L)

UNIT – IV
Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms. Process Management: Introduction-Process Migration– Threads.

(11 L)

UNIT – V
 Distributed File System: Introduction – Desirable features of a Good Distributed File System– File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles.

(13 L)

TOTAL: 60 PERIODS

Reference Books:

1.Pradeep K Sinha,"Distributed Operating Systems", PHI Learning, 2012.

2.Andrew S Tanenbaum, "Distributed Operating Systems", First Edition, PHI 2002
3.George Coulouris, Gordon Blair, Jean Dollimore, Tim Kindberg, "Distributed Systems - Concepts and Design", Fifth Edition Pearson 2017.
4.Manish Varshney, Shanoo Agarwal, "Concepts Of Distributed System", CBS Publisher and Distributors, 2016.

DESIGN AND ANALYSIS OF ALGORITHMS USING C++ - LAB

L T P C
0 1 4 2

Programs should include but not limited to:

1. Write a program that implements Stack
2. Write a program to implement Queue
3. Write a program that implements Singly Linked List.
4. Write a program to implement Evaluation of Postfix expression.
5. Write a program to implement Priority Queue.
6. Write a program that implements Binary Tree Traversals.
7. Write a program that implements BFS
8. Write a program that implements DFS
9. Write a program to implement Binary Search using DAC technique.
10. Write a program to implement Quick Sort using DAC technique.
11. Write a program that implements Strassen's matrix multiplication using Greedy Method.
12. Write a program that implements Knapsack problem using Greedy Method.
13. Write a program that implements Prim's Algorithm
14. Write a program that implements Kruskal's Algorithm
15. Write a program that implements All-pairs Shortest path problem
16. Write a program that implements N-Queen Problem

ADVANCED JAVA PROGRAMMING LAB

L T P C
0 1 4 2

1. Write a Java application program to demonstrate class with constructors and method overloading.
2. Write a Java application program to demonstrate inheritance and method overriding.
3. Write a Java application program to demonstrate package with classes and interfaces.
4. Write a Java application program to read and write a file using file I/O.
5. Write a Java application program to find minimum and maximum of integers and characters using Generics.
6. Write a Java application program to implement the Queue operations using the LinkedList Class.
7. Write a Java program using the swing components with event handling.
8. Write a Java program using menus in swing.
9. Write a program in Java to create a table and insert and query records in the table.
10. Write a program in Java to read a file using Channel I/O.
11. Write a program in Java to implement a client/server environment using TCP/IP.
12. Write a program in Java to implement a client/server environment using UDP.
13. Write a program in Java to implement a client/server using RMI.
14. Write a program in Java to create a form and validate a password using Servlet.
15. Write a program in Java to develop a simple Java Bean.

Financial and Management Accounting

L T P C
4 0 0 4

Unit I

Principles, Accounting concepts, Methods of Accounting, Types of Accounting – Accounting Rules. Journal, Rules for Debit and Credit, Compound Journal entry, Advantages of Journal, Ledger, Ledger Account, Ledger Posting, Process of Posting, Balancing of an Account, Significance of Balances, Relation between Journal and Ledger-Subsidiary Books.

(12 L)

Unit II

Trial Balance: Objects, Methods of Preparing Trial balance, how to locate errors, hints for thepreparation of trial balance & problems.

Trading account – individual items posted to the debit of trading account – individual items credited to trading account – advantages of trading account – profit & loss account - advantages of profit & loss account - balance sheet- classification of assets & liabilities.

(12 L)

Unit III

Ratio analysis – meaning – classification of ratios – Liquidity ratios - Profitability ratios– Advantages – Limitations.

Fund flow analysis – Meaning of the term fund – Working capital – statement of changes in working capital – preparation of fund flow statement.

(12 L)

Unit IV

Cost accounting – meaning of costing – scope – importance – cost classification - Marginal costing – Nature – scope – importance Break-even-point – Break even chart – P/V ratio – Marginal costing and management decisions.

(12 L)

Unit V

Standard costing and variance analysis – nature, scope, advantages - Limitations, computation and analysis of variances with reference to material cost and Labour cost.

Budget and Budgetary control: meaning – Budget – Budgetary control – Advantages – Limitations – classification of budgets - preparation of sales budget –Flexible budget.

(12 L)

TOTAL:60 PERIODS

Reference Books:

1. Accounting for Management –N.P.Srinivasan M.Sakthivel Murugan, S.Chand, New Delhi.

2. SP Jain and KL Narang – Advanced accounting, Kalyani publishers, New Delhi.

3. S P Iyengar – Advanced Accounting, Sultan chand and sons New Delhi.

4. Financial management – S N Maheswari and C B Gupta, Sultan chand & sons New Delhi.

5. Management Accounting – S. N. Maheswari and C B Gupta, Sultan chand & sons New Delhi.

MACHINE LEARNING USING PYTHON

L T P C
4 0 0 4

Unit I

Introduction - Why Machine Learning? - Problems Machine Learning Can Solve - Knowing Your Task and Knowing Your Data - Why Python? - scikit-learn - Installing scikit-learn - Essential Libraries and Tools - Supervised Learning - Classification and Regression - Generalization, Over fitting, and Under fitting - Supervised Machine Learning Algorithms. **(12L)**

Unit II

Unsupervised Learning and Preprocessing - Types of Unsupervised Learning - Challenges in Unsupervised Learning - Preprocessing and Scaling - Dimensionality Reduction, Feature Extraction, and Manifold Learning – Clustering. **(12L)**

Unit III

Representing Data and Engineering Features - Categorical Variables - Binning, Discretization, Linear Models, and Trees - Interactions and Polynomials - Univariate Nonlinear Transformations - Automatic Feature Selection – Utilizing Expert Knowledge. **(12L)**

Unit IV

Model Evaluation and Improvement - Cross-Validation - Grid Search - Evaluation Metrics and Scoring. **(12 L)**

Unit V

Algorithm Chains and Pipelines - Parameter Selection with Preprocessing - Building Pipelines - Using Pipelines in Grid Searches - The General Pipeline Interface - Grid-Searching Preprocessing Steps and Model Parameters -Grid-Searching Which Model To Use. **(12L)**

TOTAL: 60 PERIODS

Reference Books:

1.Andreas C. Müller, Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media, Inc, October 2016.

2.Jeremy Watt , Reza Borhani, Aggelos K. Katsaggelos, "Machine Learning Refined - Foundations, Algorithms, and Applications" , Second edition, Cambridge University Press , 2020.

3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, Foundations of Machine Learning, Second Edition, The MIT Press, 2018.

4. John Paul Mueller and Luca Massaron, Machine Learning (in Python and R) For Dummies, John Wiley & Sons, 2016.

OPEN SOURCE TECHNOLOGY

L T P C
4 0 0 4

Unit - I

Getting started – Introduction to UNIX, Linux GNU – Programming Linux.

Shell Programming – Basics – Pipes and Redirection – The Shell as a Programming Language – Shell syntax.

Working with files – Linux File Structure –Low level File Access – The Standard I/O Library.

(12 L)

Unit - II

Working with files – Formatted Input and Output – File and Directory Maintenance – Scanning Directories – Errors.

The Linux Environment – Program Arguments – Environment Variables – Time and Date – Temporary Files – User Information – Host Information.

Terminals- Reading from and writing to the terminal.

(12 L)

Unit - III

Why PHP & MySQL – What is PHP? – What is MySQL?

Server-side Web Scripting – Static HTML – Client-side Technologies – Server-Side Scripting

Syntax and Variables – Comments – Variables – Simple types – outputs.

Control and Functions – Boolean expressions – Branching – Looping – Terminating execution – Using functions – Defining your own function – Functions and variable scope.

(12 L)

Unit - IV

Passing information between Pages – GET Arguments – POST Arguments – Formatting Form Variables – PHP super global arrays.

String – Strings in PHP – String Functions.

Arrays and Array Functions – Creating Arrays – Retrieving Values – Multidimensional Arrays – Deleting from Arrays

Numbers – Numerical Types – Mathematical Operators – Simple Mathematical Functions.

(12 L)

Unit - V

PHP/MySQL Functions – Connecting to MySQL – Making MySQL Queries – Fetching Data Sets – Multiple Connections – Error Checking – Creating MySQL Databases with PHP – MySQL Functions.

Displaying Queries in Tables - HTML Tables and Database Tables – Creating the Sample Tables.

Building Forms from Queries – HTML Forms - Basic Form Submission to a Database – Self Submission – Editing Data with an HTML Form.

(12 L)

TOTAL: 60 PERIODS

Reference Books:
1) Neil Matthew and Richard Stones "Beginning Linux Programming", 4/e; New Delhi: Wiley-India, 2009.
2) Tim Converse and Joyce Park with Clark Morgon, "PHP 5 and MySQL Bible"; New Delhi: Wiley-India, 2008.
3) M.N.Rao, "Fundamentals of Open Source Software", PHI, 2015.
4) Kailash Vadera and Bhavyesh Gandhi, "Open Source Technology", Laxmi Publications, First Edition 2009.
5) Narain Gehani, "The Database Application Book Using the MYSQL Database System", University Press, 2012.

ADVANCED DATABASE MANAGEMENT SYSTEM

L T P C
4 0 0 4

Unit – I

Introduction: Purpose of data base systems – Data Models – Data abstraction - Database Languages – Functional components of a Database System - System structure – DBA – Database Users.
Relational Model: Structure of Relational databases - Database schema – Keys – Schema diagram - Relational Algebra –Integrity constraints.

(12 L)

Unit - II

Data Normalization: First, Second and Third normal forms – Boyce-Codd Normal Form – Fourth and Fifth normal forms – Domain-Key normal form– Database Design.

E-R Model: Entity – Relationship - Attributes— Mapping cardinalities – E-R Diagrams – Extended Entity Relationship Model.

Complex Data Types: Semi-structured data – objected-orientation – Textual data – Spatial data – Temporal data. **(12 L)**

Unit – III

SQL: Introduction to SQL – SQL Data Definition – SQL Queries – where, order by – Set operations – Null values – Aggregate Functions – Nested subqueries – Insert, update, delete – Join – views – SQL data types and schemas – Index – Authorization – Procedures – Functions – Triggers – Advanced aggregation features

(12 L)

Unit - IV

Transactions : Transaction Concept – A simple Transaction model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability.

Concurrency Control : Lock based Protocols – Deadlock Handling – Multiple Granularity – Timestamp Based Protocols – Validation Based Protocols – Multiversion Schemes – Snapshot Isolation – Insert Operations, Delete Operations and Predicate Reads.
Recovery Systems : Failure Classification – Storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management.

(12 L)

Unit - V

Database System Architecture : Centralized and Client Server Architectures – Server System Architectures – Parallel Systems – Distributed Systems.

Parallel Databases : Introduction – I/O parallelism – Interquery parallelism – Intraquery parallelism – Intraoperation parallelism – Interoperation parallelism.

Distributed Databases : Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions.

(12 L)

TOTAL : 60 PERIODS

Reference Books:

1. Abraham Silberschatz, Henry F. Korth, Sudarshan S: Database System Concepts, Seventh Edition, McGraw-Hill, 2019
2. Kevin Loney: Oracle Database 11g - The Complete Reference, McGraw-Hill, 2008.
3. Mathews Leon and Alexis Leon: Database Management Systems, Vikas Publishing 2008.
4. Ramez Elmashree, Shamkant B.Navathe: Fundamentals of Database Systems, Pearson Education, 2011.
5. C. J. Date:Introduction to Database Systems, 8th Edition, Pearson Education, 2003
6. Rajesh Narang: Database Management Systems, 2nd Edition, PHI, 2012.

E-COMMERCE

L T P C
4 0 0 3

UNIT I

History of E-commerce: Advantages of E-Commerce - Disadvantages of E-commerce - Transition to E-commerce in India - Some Pioneering Indian case studies. Business model for E- commerce - E-business model based on relationship of transaction parties - E-Business model based on the relationship oftransactiontypes.   **(9L)**

UNIT II

E-marketing: Traditional marketing - Identifying web presence goals - The browsing behavior model-online marketing - E-Advertising - Internet marketing trends - Target markets - Marketing strategies.   **(9L)**

UNIT III

E-payment system: Digital payment requirements, Digital token based E-payment system - Classification of new payment system - Properties of electronic cash-cheque payment systems on internet - Risk and E-payment systems-Designing E-payment systems - Digital Signature.

(9L)

UNIT IV

E-customer relationship management: Customer relationship management - E-Supply Chain (Benefits, E-supply chain architecture, Major TrendsinE-SCM).   **(9L)**

UNIT V

Mobile commerce: Growth of mobile commerce - Technologies for Mobile commerce- Wireless technologies - Mobile commerce - Intelligent web design - Requirement of intelligent web sites - Setting web sites goals and objectives - Anand online and offline model.   **(9L)**

TOTAL:45 PERIODS

Reference Books:

1. E-Commerce – A Managerial perspective – P.T.Joseph, Prentice Hall of India (P)Ltd., 2002.

2. E-Commerce – David Whitley, Tata McGraw Hill Edition,2005.

3. Frontiers of Electronic Commerce – Kalkota and Whinston, Pearson Education, 2004.

4. E-Commerce-Gray P.Schneider, Thompson Cour4se Technology, 2004.

5. E-Business, ParagKulkarni, SunitaJahirabadkar, PradipChande, Oxford University Press. 2010.

EMBEDDED SYSTEMS

L T P C
4 0 0 3

UNIT I

INTRODUCTION TO MICROPROCESSORS: Evolution Of Microprocessors - 8-Bit Processor - 8085 Architecture – Register Organization - Instruction Set – Timing Diagram- Addressing Modes – Interrupts- Interrupt Service Routines- Assembly Language Programming Using 8085.

(9L)

UNIT II

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded Systems- Processor Embedded Into A System-Embedded Hardware And Software Units-Applications-Design Process – Intel 8051 Architecture- Processor And Memory Organization-Interrupts Of 8051 - Assembly Language Programming Using 8051. **(9L)**

UNIT III

INTERFACING WITH 8051: Input-Output Interfacing – Bus Standards – PCI – ISA – Timing And Control – Input Output Devices –Serial And Parallel Communication – Motor Control-Programming Display Devices – ARMArchitecture. **(9L)**

UNIT IV

REAL TIME OPERATINGSYSTEM: Inter Process Communication – Signal Functions – Socket Programming – Mailbox - Pipes – RTOS – OS Services – Process Management - Timer Function – Event Function – Memory Management –Device, Files And I/O Subsystem – Basic Design of RTOS.

(9L)

UNIT V

RTOS PROGRAMMING: Basic Functions – Types of RTOS – RTOS µCOS – RT Linux – Real Time Linux Functions- Programming with RT Linux –CaseStudy. **(9L)**

TOTAL: 45 PERIODS

Reference Books:

1. Rajkamal, "Embedded System: Architecture, Programming And Design" Tata McGraw-Hill Education, Second Edition,2008.
2. B.KanthRao, "Embedded Systems" PHI Learning Private Limited, 2011.
3. Marilyn Wolf, "Computers As A Components" Third Edition, Morgan Kaufmann Series2012.
4. A.P.Godse & A.O.Mulani "Embedded Systems" Third Edition, Technical Publications,2009.
5. Mohamed Rafiquzzaman, "Microprocessors and Micro computer-based system design", CRC Press, Second Edition, 2013.

SOFTWARE ENGINEERING

L T P C
4 0 0 3

UNIT-I
Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, Requirements analysis using DFD(with case studies), Data Dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS. **(L 9)**

UNIT-II
Software Project Management Concepts: Software Project Management-The Management spectrum, The People, The Problem, The Process, The Project. Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Risk Management.

(L 9)

UNIT-III
Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Layered arrangement of modules, Function Oriented Design, Object Oriented Design- Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics. **(L 9)**

UNIT-IV
Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics. **(L 9)**

UNIT-V
Software Testing: Code Review, Testing Process, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing(Performance Testing and Error Seeding), Debugging Activities. Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. **(L 9)**

TOTAL: 45 PERIODS

Reference Books:

1. Software Engineering, Rajib Mall, PHI Learning Private Ltd, 2010.
2. Software Engineering, Roger S.Pressman, McGraw-Hill International Edition, 2015.
3. Software Engineering Concepts, Richard Fairley, Tata McGraw-Hill Edition, 2016.
4. Software Engineering, S.A.Kelkar, PHI Learning Private Ltd, 2014.

SECURITY IN COMPUTING

L T P C
4 0 0 3

Unit – I

Cryptography: Terminology and Background – Substitution ciphers - The Caesar cipher, The Vernam cipher, Book cipher; Transposition ciphers.

DES – AES - Public key encryption - RSA encryption - Possible attacks on RSA-Uses of Encryption.

(L 9)

Unit – II

Program Security: Secure programs – Fixing faults, Unexpected behavior, Types of flaws; Nonmalicious Program errors

Virus and other malicious code – Kinds of malicious code, How Viruses attach, Document viruses, How viruses gain control, Homes for viruses, Virus Signatures, The source of Viruses, Prevention of Virus Infection.

Targeted malicious code – Trojans, Trapdoors, Salami Attack.

(L 9)

Unit – III

Security in Databases: Security Requirements - Integrity of the database, Element Integrity, Audibility, Access control, User authentication, Availability, SQL injection; Reliability and Integrity – Protection features from the operating system, Two-phase update, Redundancy/Internal consistency, Recovery, Concurrency/Consistency, Monitors; Sensitive data - Access decisions, Types of disclosures, Security versus Precision; Inference – Direct Attack , Indirect Attack; Multilevel databases – Granularity , Security Issues.

(L 9)

Unit – IV

Security in Networks: Threats in Networks – What makes a network vulnerable? Categories of attack, Who attacks Networks?

 Network Security Controls – Security Threat analysis, Effect of security in architecture of network, Encryption, Content integrity, Strong authentication, Access controls, Wireless security, Alarms and alerts, Honeypots, Traffic flow security.

Firewalls – Design of firewalls, Types of Firewalls, Personal Firewalls, Comparison of Firewall Types.

Unit – V

Legal and Ethical Issues in Computer Security : Protecting Programs and data – Information and the law - Redress for software failures – Selling correct software, Reporting software flaws.

Computer Crime: Why a separate category for computer crime is needed, Why computer crime is hard to define, Why computer crime is hard to prosecute, Indian Cyber law offences, Cyber Pornography, Accessing Protected System, Tampering with Computer Source code.

Ethical Issues in Computer Security: Differences between the Law and the Ethics, Studying Ethics, Ethical Reasoning.

(L 9)

TOTAL : 45 PERIODS

Reference Books:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.

2.. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.

3. William Stallings, "Cryptography and Network Security:Principles and Practices", Fifth Edition. PHI, 2010.

4. V.K.Pachghare, "Cryptography and Information Security", PHI, 2013.

Machine Learning using Python

L T P C
0 1 4 2

1. Visualize the dataset using the Python packages

(i) Matplotlib (ii) Seaborn

2. Implement binning operation for

(i) Numerical data   (ii) Categorical data

3. Implement the Linear Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

4. Implement the Logistic Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

5. Write a program to demonstrate the working of the Decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

6. Write a program to implement the Naïve Bayes classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

7. Write a program to implement the k-Nearest Neighbour classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

8. Write a program to implement the Random Forest classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

9. Write a program to implement the Neural Network classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

10. Implement K- Means clustering algorithm for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

11. Implement DBSCAN clustering algorithm for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

12. Implement PCA for dimension reduction and study its impact in classification.

13. Demonstrate the use of cross validation in building a classifier. (use random forest, Naïve Bayes classifiers)

14. Demonstrate the Grid Search method for parameter selection in Random Forest and SVM classifier.

OPEN SOURCE TECHNOLOGY LAB

L T P C
0 1 4 2

1. Create a Relational Database in MySQL , insert values and execute queries using basic and advanced select commands.
2. Perform Join operation on relational tables.
3. Create Queries using aggregate functions.
4. Create Views of the database.
5. Implement a PHP program to display a Welcome page based on client browser.
6. Implement a PHP program to process HTML forms.
7. Implement a PHP program to demonstrate Object Oriented Programming in PHP
8. Implement a PHP program to demonstrate database handing.
9. Write a PHP program to create a directory, and to read contents from the directory.
10. Execute the Linux commands:
    a) ls, cat, chmod, find, sort, bc, cal, wc
    b) pipe and filter
11. Write a C program to generate Fibonacci series and execute in Linux OS
12. Write a shell program to check whether the given number is Armstrong or not.
13. Write a shell program to generate Pay slip of an employee.