ACADEMIC REGULATIONS
&
COURSE STRUCTURE

Master of Computer Applications
(MCA)

(Applicable for the batches admitted from 2016-17)

SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY
Seetharampuram, Narsapur – 534 280, W.G.Dt.
Andhra Pradesh

MCA Course Structure R16

(Applicable for the Batches admitted from 2016-17)

First Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	E	TM
1	16MC1T01	Computer Programming using C	4		4	40	60	100
2	16MC1T02	Digital Logic and Computer System Organization	4		4	40	60	100
3	16MC1T03	Discrete Mathematical Structures and Graph Theory	4		4	40	60	100
4	16MC1T04	Probability and Statistical Applications	4		4	40	60	100
5	16MC1T05	Accounting and Financial Management	4		4	40	60	100
6	16MC1L01	Digital Logic and Computer System Organization Lab		4	2	40	60	100
7	16MC1L02	C Programming Lab		4	2	40	60	100
8	16MC1L03	Communication Skills Lab		4	2	40	60	100
		Total			26	320	480	800

Second Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	E	TM
1	16MC2T01	OOPS through JAVA	4		4	40	60	100
2	16MC2T02	Operating Systems	4		4	40	60	100
3	16MC2T03	Data Structures using C	4		4	40	60	100
4	16MC2T04	Operations Research	4		4	40	60	100
5	16MC2T05	Perspectives of Organization and Management	4		4	40	60	100
6	16MC2L01	OOPS through Java Lab		4	2	40	60	100
7	16MC2L02	Data Structures using C Lab		4	2	40	60	100
		Total			24	280	420	700

Third Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	E	TM
1	16MC3T01	Database Management Systems	4		4	40	60	100
2	16MC3T02	Computer Networks	4		4	40	60	100
3	16MC3T03	Design and Analysis of Algorithms	4		4	40	60	100
4	16MC3T04	Unix Programming	4		4	40	60	100
5	16MC3T05	Software Engineering	4		4	40	60	100
6	16MC3L01	Database Management Systems Lab		4	2	40	60	100
7	16MC3L02	Unix Programming Lab		4	2	40	60	100
8	16MC3S01	Seminar		-	2	50	-	50
Total					26	330	420	750

Fourth Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	E	TM
1	16MC4T01	Data Warehousing and Data Mining	4		4	40	60	100
2	16MC4T02	Web Technologies	4		4	40	60	100
3	16MC4T03	Software Testing Methodologies	4		4	40	60	100
4	---	**Elective – I**	4		4	40	60	100
5	---	**Elective – II**	4		4	40	60	100
6	16MC4L01	Data Warehousing and Data Mining Lab		4	2	40	60	100
7	16MC4L02	Web Technologies Lab		4	2	40	60	100
8	16MC4L03	Soft Skills / Aptitude Lab		4	2	50	-	50
Total					26	330	420	750

Elective-I			Elective-II		
S. No	Subject Code	SUBJECT TITLE	S. No	Subject Code	SUBJECT TITLE
1	16MC4TE1	Human Computer Interaction	1	16MC4TE5	Computer Graphics
2	16MC4TE2	ERP and Supply Chain Management	2	16MC4TE6	Scripting Languages
3	16MC4TE3	Management Information Systems	3	16MC4TE7	Cloud Computing
4	16MC4TE4	Distributed Systems	4	16MC4TE8	Artificial Intelligence

Fifth Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	E	TM
1	16MC5T01	Cryptography and Network Security	4		4	40	60	100
2	16MC5T02	Object Oriented Analysis and Design Using UML	4		4	40	60	100
3	16MC5T03	Mobile Computing	4		4	40	60	100
4	---	**Elective – III**	4		4	40	60	100
5	---	**Elective – IV**	4		4	40	60	100
6	16MC5L01	UML Lab		4	2	40	60	100
7	16MC5L02	Mobile Application Development Lab		4	2	40	60	100
8	16MC5M01	Mini Project		-	2	50	-	50
		Total			26	330	420	750

Elective-III				Elective-IV	
S. No	Subject Code	SUBJECT TITLE	S. No	Subject Code	SUBJECT TITLE
1	16MC5TE1	E-Commerce	1	16MC5TE5	Software Project Management
2	16MC5TE2	Animation and Gamming	2	16MC5TE6	Internet of Things
3	16MC5TE3	Computer Forensics	3	16MC5TE7	Big Data Analytics
4	16MC5TE4	Multimedia Application Development	4	16MC5TE8	Cyber Security

Sixth Semester

S.NO	Subject Code	SUBJECT TITLE	L	P	C	I	TM
1	16MC6Q01	Term Paper	-	-	2	50	50
2	16MC6P01	Dissertation/Thesis	-	-	-	--	Excellent/Good /Satisfactory/ Unsatisfactory

S.NO	Semester	Credits	Internal Marks	External Marks	Total Marks
1	Semester – I	26	320	480	800
2	Semester – II	24	280	420	700
3	Semester – III	26	330	420	750
4	Semester – IV	26	330	420	750
5	Semester – V	26	330	420	750
6	Semester – VI	2	50	---	50
Total		130	1640	2160	3800

Control. 802.3, 802.4, 802.5

UNIT- III

Network Layer Design Issues-Store and Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service , Comparison of Virtual-Circuit and Datagram Subnets, The Optimality Principle Routing Algorithms - Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing.

Congestion Control Algorithms - General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control, How Networks Differ, How Networks can be Connected, Concatenated Virtual Circuits, Connectionless Internetworking, Tunneling, Internetwork Routing, Fragmentation. The IP Protocol - IP Addresses, Internet Control Protocols, IPv6

UNIT -IV

Elements of Transport Protocols - Addressing, Establishing a Connection, Releasing a Connection, Flow Control and Buffering, Multiplexing, Crash Recovery; UDP, RPC;

TCP - Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control

UNIT-V

DNS-The DNS Name Space, Resource Records, Name Servers E MAIL - Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery WWW - Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, MIME

Text Books :

1. Computer Networks, Andrew Tanenbaum, 4/e, Pearson

Reference Books :

1. Data Communications and Networking Forouzan, 4/e, TMH
2. Data and Computer Communications, Stallings, 8/e, PHI
3. Computer Networks – A System Approach , Peterson ,Bruce Davie,2/ e, Harcourt Asia
4. Compute Communications and Networking Technologies, Gallo, Hancock,Cengage
5. An Engineering approach to Computer Networking, Kesha ,Pearson
6. Communication Networks, 2/e , Leon-Garcia, TMH
7. Computer Networks, Anuranjan Misra, ACME Learning
8. Computer Networks, C R Sarma, Jaico, Understanding data communications, Held,7/e , Pearson

DESIGN AND ANALYSIS OF ALGORITHMS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/III **External Marks: 60**

Credits: 4 **Subject Code: 16MC3T03**

Course Objectives: The course content enables students to:

- Know asymptotic runtime complexity of algorithms including formulating recurrence relations using divide and conquer process.
- Understand and design algorithms using greedy strategy and dynamic programming, to arrive at local best solution.
- Understand and design of algorithms using search space and optimization problem techniques for finding globally best solution.
- Identify basic computability concepts and the complexity classes like P, NP, and NP-Complete and Relate real world problems to abstract mathematical problems.

Course Outcomes: At the end of the course students are able to:

- Analyze the asymptotic runtime complexity of algorithms for real world problems developed using different algorithmic methods.
- Find the optimal solutions by using advanced design and analysis of algorithm techniques like greedy method and dynamic programming.
- Apply the search space and optimization problem techniques like backtracking and branch and bound method to solve problems optimally where advanced algorithm design techniques fail to find solution.
- Distinguish the problems and its complexity as polynomial and NP problems and can formulate some real world problems to abstract mathematical problems.

UNIT-I

Introduction: Algorithm, Psuedo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis. Disjoint

Sets - disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components

UNIT-II

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-III

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-V

Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.

3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.

REFERENCE BOOKS:

1. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, PEA
2. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu B Alachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGraw Hill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

UNIX PROGRAMMING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/III **External Marks: 60**

Credits: 4 **Subject Code: 16MC3T04**

Course Objectives

- Understand the evolution of UNIX operating system.
- Develop programs using commands and shell scripts.
- Know the various methods to share information using system calls and IPC mechanism.

Course Outcomes

- To learn and practice internal and external commands with examples.
- Automate tasks using shell scripts and Ability to work with system calls.
- Develop application programs (API) using IPC mechanisms.

Unit - I

History of UNIX operating system, structure of Unix, features of Unix, Unix file system, internal structure of file system, internal and external commands, directory commands, File Processing Commands.

Unit - II

Protection and security commands, communication commands, information processing commands, process management commands, I/O redirection.

Shell programming: shell variables, positional parameters, decision control structures, loop control structures, set statement, shift statement, command grouping.

Unit – III

File and directory maintenance: file access functions-open, crate, read, write, close, file control functions-fcntl, lseek, stat, lstat, fstat, dup, ioctal, directory maintenance-chmod,

chown, link, unlink, symlink, mkdir, rmdir, chdir,getcwd.

Process: process structure, fork(), wait(), vfork(), orphan process, zombie process, waitpid(), getpid(), getppid().

Unit - IV

Memory management, file and record locking, signals-signal(), kill(), raise(), alaram(), pause(), sleep(), abort(), inter process communication-communication among unix processes, pipes, named pipes.

Unit - V

Message queues: message structure, creating a message queue, writing message onto message queue, reading messages from message queue, controlling message queue operations.

Shared memory: allocating a shared memory segment, attaching and detaching a shared memory segment, placing data in a shared memory, destroying a shared memory segment.

Semaphores: creating a semaphore set, setting and getting semaphore values, using semaphore for mutual exclusion.

Text Books:

1. Unix Programming the first drive- Kumar Saurabh
2. UNIX concepts and applications-Sumitahba Das, TMH, 3/E.

Reference Books:

1. Introduction to unix and shell programming – M.G. VenkateshMurthy
2. Unix and shell programming- N B Venkateswaralu.
3. Unix and shell programming- Stephen G kochan, Patrick wood, Pearson,3/E.

SOFTWARE ENGINEERING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/III **External Marks: 60**

Credits: 4 **Subject Code: 16MC3T05**

Course Objectives:

- Understanding of software process models such as waterfall and evolutionary models.
- Understanding of software requirements and SRS document.
- Analyze of different software architectural styles.
- Understanding of software testing approaches such as unit testing and integration testing.
- Know about quality control and how to ensure good quality software.

Course Outcomes:

- Ability to Develop the minimum requirements for the development of application.
- Ability to Design and Architectural Style of Software Systems
- Ability to develop, maintain, efficient, reliable and cost effective software solutions.
- Propose Testing Strategy for a Software Application

UNIT – I

The software problem: Cost, schedule and quality, Scale and change.

Software Processes: Process and project, component software processes, Software development process models : Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project. Project Management Process.

UNIT – II

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use cases, other approaches for analysis, validation.

Planning a software project: Effort estimation, project schedule and staffing, quality

planning, risk management planning, project monitoring plan, detailed scheduling.

UNIT – III

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, function-oriented design, object-oriented design, detailed design, verification, and metrics

UNIT- IV

Coding and Unit Testing: Programming principles and guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, metrics.

Unit - V

Testing: Testing concepts, Testing Process, Black-Box Testing, White-Box Testing, and Metrics.

TEXT BOOKS:

1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley-India

REFERENCE BOOKS:

1. Software Engineering, 3/e ,& 7e Roger S.Pressman , TMH
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering principles and practice, W S Jawadekar, TMH
4. Software Engineering concepts, R Fairley, TMH

DATABASE MANAGEMENT SYSTEMS LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/III **External Marks: 60**

Credits: 2 **Subject Code: 16MC3L01**

Course Objectives:

- This lab enables the students to practice the concepts learnt in the subject Database management systems.

Course Outcomes:

- Ability to design and implement a database schema for given problem.
- Be capable to Design and build a GUI application.
- Apply the normalization techniques for development of application software to realistic problems.
- Ability to formulate queries using SQL DML/DDL/DCL commands.

1. Create table for various relations.
2. Implement the query in SQL for a) insertion b) retrieval c) updation d) deletion
3. Execute a single line and group functions for a table.
4. Execute DCL and TCL Commands.
5. Create and manipulate various DB objects for a table.
6. Create views, partitions and locks for a particular DB.
7. Write PL/SQL procedure for an application using exception handling.
8. Write PL/SQL procedure for an application using cursors.
9. Write a PL/SQL program for an application using functions.
10. Write a PL/SQL block for transaction operations of a typical application using triggers.

11. Write a PL/SQL block for transaction operations of a typical application using package.
12. Implementing operation on relations using PL/SQL
13. Writing Assertions.
14. Generating Forms
15. Generating Reports

UNIX PRGRAMMING LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/III **External Marks: 60**

Credits: 2 **Subject Code: 16MC3L02**

Course Objectives

- Working with internal and external commands.
- Writing programs using shell scripts.
- To familiarize students with system calls and IPC mechanisms.

Course Outcome: After completion of the course students will be able to

- Work confidently in Unix environment
- Write shell scripts to automate various tasks.

1. Information processing commands.
2. File processing commands.
3. Directory processing commands.
4. Text Processing commands.
5. Program using system calls: **create**, **read**, **write**, **close**, **stat**, **fstat**, **lseek**.
6. Create two processes to run a **for loop**, which adds numbers **1** to **n**, say one process adds odd numbers and the other even.
7. Create a file that is shared among some users, write a program that finds whether a specific user has created read and write operations on the file.
8. Write a program demonstrating semaphore operation on a shared file for reading but not writing.
9. Write a program which reads a source file name and destination file name using command line arguments and then converts into specified format (i.e. either from lower case to upper case or upper case to lower case or inverse of each).

10. Write a program which takes set of file names along with the command line and print them based on their ascending or descending order.

11. Write a program which takes directory name along the command line and displays names of the files which are having more than one link.

12. Write a program to demonstrate the use of exec() family functions.

13. Write a program to display the good morning, good afternoon, good evening and good night depending on the users log on time.

14. Write a program to demonstrate the locking mechanism while accessing the shared files.

15. Write a shell script which works similar to wc command. This script can receive the option –l, -w, -c to indicate whether number of lines/words/characters.

16. Write a program to print prime numbers between **x** and **y**.

17. Write a shell script which deletes all lines containing the word "**UNIX**" in the files supplied as arguments to this shell script.

18. Write a shell script which displays a list of all files in current directory to which you have read. Write and execute permissions.

19. Write a menu-driven program.

20. Program to implement inter process communication using pipes.

21. Write a program which demonstrates the shared memory functions.

22. Write a program which demonstrates the message queue functions.

DATA WAREHOUSING AND DATA MINING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4T01**

Course Objectives: Students undergoing this course are expected to

- Understand the basic principles, concepts and applications of data warehousing & data mining.
- Differentiate Online Transaction Processing and Online Analytical processing.
- Learn Multidimensional schemas suitable for data warehousing.
- Inculcate knowledge on data mining query languages.
- Understand various data mining functionalities & Know in detail about data mining algorithms.

Course Outcomes: After undergoing the course, Students will be able to understand

- Importance of data mining, knowledge discovery process, data preprocessing.
- Describe the various architectures and main components of a data warehouse & Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.
- Develop skills to write queries using DMQL & Extract knowledge using data mining techniques.
- Discover the relationships among data bases, data classification and data clustering.

UNIT - I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems,

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Mining Primitives, Languages, and System Architectures : Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

UNIT - II

Data Warehouse and OLAP: Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

Concepts Description, Characterization and Comparison: Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute **Relevance, Mining Class Comparisons**: Discriminating between Different Classes.

UNIT - III

Mining Association Rules in Large Databases : Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT - IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, and Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, and Classifier Accuracy.

UNIT - V

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, and Partitioning Methods- K means, K mediods, Hierarchical methods- single link, complete link, average link agglomerative clustering methods, Density-Based Methods-DBSCAN.

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

TEXT BOOKS :

1. Data Mining, Concepts and Techniques, Jiawei Han, Micheline Kamber, Harcourt India.

REFERENCE BOOKS :

1. Introduction to data mining Pang-Ning Tan, Vipin Kumar, Michael Steinbacn, Pearson
2. Data Mining Techniques, Arun K Pujari, University Press.
3. Data Warehousing Fundamentals, PaulrajPonnaiah, Wiley.
4. The Data Warehouse Life cycle Tool kit, Ralph Kimball, Wiley.

WEB TECHNOLOGIES

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4T02**

Course Objectives:

- To introduce PHP language for server side scripting.
- To introduce Server side programming with Java Servlets and JSP .
- To introduce Client side scripting with Javascript and AJAX.

Course Outcomes:

- Gain knowledge of client side scripting, validation of forms and AJAX programming Have understanding of server side scripting with PHP language.
- Have understanding of advanced concepts of PHP.
- To introduce Server side programming with Java Servlets and JSP.

UNIT- I

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc.,

Browser-Handling Power: Server Variable, HTTP Headers, Handling From data, Data validation Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories

UNIT- II

OOP through PHP: Creating Class and Objects, Access Specifiers, Constructors, Destructors, Overriding Methods, Overloading Methods, Auto loading Classes

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies – Hard Coded File based, Database based, IP based, Login,

Administration, Uploading Files with PHP, Sending Email using PHP, Building Web sites for the World

UNIT-III

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC

UNIT-IV

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

UNIT-V

Client side Scripting: Introduction to Javascript: Javascript language - declaring variables, scope of variables, functions, event handlers (onclick, onsubmit etc.), Document Object Model, Form validation. Simple AJAX application.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill
3. The Completer Reference JAVA Herbert Schildt Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech.
2. Java Server Pages –Hans Bergsten, SPD O'Reilly.

3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

SOFTWARE TESTING METHODOLOGIES

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4T03**

Course Objectives:

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
- To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
- To understand software test automation problems and solutions.
- To learn how to write software testing documents, and communicate with engineers in various forms.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Course Outcomes:

By the end of the course, the student should:

- Have an ability to apply software testing knowledge and engineering methods.
- Have an ability to design and conduct a software test process for a software testing project.
- Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.

- Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
- Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
- Have basic understanding and knowledge of contemporary issues in software testing, such as component based software testing problems
- Have an ability to use software testing methods and modern software testing tools for their testing projects.

UNIT-I

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to development life cycle Software Testing Methodology

UNIT-II

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation

Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

UNIT-III

Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

Static Testing: inspections, Structured Walkthroughs, Technical reviews

Validation activities: Unit testing, Integration Testing,. Function testing, system testing, acceptance testing

UNIT-IV

Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done? Regression testing types, Regression testing techniques

Efficient Test Suite Management: Test case design Why does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite

Software Quality Management: Software Quality metrics, SQA models

Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira

UNIT-V

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.

Testing Object Oriented Software: basics, Object oriented testing

Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

TEXT BOOKS:

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3. Software Testing- Yogesh Singh, CAMBRIDGE

REFERENCE BOOKS:

1. Software testing techniques - Baris Beizer, International Thomson computer press, second edition.
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
3. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

ELECTIVE – I

HUMAN COMPUTER INTERACTION

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE1**

Course Objectives:

- The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

Course Outcomes:

- Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
- Apply an interactive design process and universal design principles to designing HCI systems.
- Describe and use HCI design principles, standards and guidelines.
- Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
- Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

UNIT - I

Introduction: Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen designs

The graphical user interface: Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics-Principles of user interface.

UNIT - II

Design Process: Human interaction with computers, importance of human characteristics, human consideration, Human interaction speeds, understanding business junctions.

UNIT – III

Screen Designing : Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT - IV

Windows: Windows new and Navigation schemes selection of window, selection of devices based and screen based controls. Components: Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

UNIT - V

Software tools: Specification methods, interface, Building Tools. Interaction Devices: Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

TEXT BOOKS:

1. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

REFERENCE BOOKS:

1. Human Computer Interaction. 3/e, Alan Dix, Janet Finlay, Goryd, Abowd, Russell Beal, PEA,2004

2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, SorenLauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley .
5. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.

ELECTIVE – I

ERP AND SUPPLY CHAIN MANAGEMENT

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE2**

Course Objectives:

- Understand the basic concepts of ERP and Supply Chain Management
- Analyze SCM Strategies
- Understand Strategic Cost Management in Supply Chain Management

UNIT - I

Introduction to ERP: Overview – Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining – On–line Analytical Processing, Supply Chain Management. ERP Implementation: Implementation Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring.

UNIT – II

Business Modules: Business Modules in an ERP Package, Finance, Manufacturing, Human Resource, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Fundamentals of Supply Chain Management: Supply chain networks, Integrated supply chain planning, Decision phases in supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems.

Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT - III

SCM Strategies, Performance: Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain.

Supply chain performance measurement: The balanced score card approach, Performance Metrics.

Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT - IV

Planning and Managing Inventories: Introduction to Supply Chain Inventory Management.

Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

Distribution Management: Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT-V

Strategic Cost Management in Supply Chain: The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TEXT BOOKS:

1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra, Peter Meindel, PEA, 2002.

ELECTIVE – I

MANAGEMENT INFORMATION SYSTEMS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE3**

Course Objectives:

- One of the main aims of this subject is to analyze the system in such a way that a programme description can be made. The student will become conversant with the various ways of analyzing the system. The ultimate aim of the student is to write a system design. There after he is supposed to become conversant with the implementation of the software in the organization and the problems encountered by him. These elements will be useful to the student in career.

- To understand MIS within organization.
- To understand Information Systems and Strategy Formulation
- To understand Conceptual System Design. Understand the basic functioning of the organization, Writing a report.
- To understand Detailed System Design Understand the minute working of the functions of the organization. Writing a report.
- To understand Implementation of software.
- To understand the pitfalls in MIS development.

UNIT - I

Management Information Systems: A Framework: Importance of MIS , MIS: A Definition Nature and Scope of MIS , **Structure and Classification of MIS :** Structure of MIS, MIS Classification

Information and System Concepts: Information: A Definition, Types of Information, Dimensions of Information, System: A Definition, Kinds of Systems, System Related Concepts, Elements of a System, Human as an Information Processing System

Information Systems for Competitive Advantage: Introduction, Changing concepts of Information System, Competitive Advantage, Information systems Strategies for Dealing with competitive Force, Porter's Value Chain Model, Strategic Information Systems (SIS)

UNIT - II

BUSINESS APPLICATIONS OF IS

e – Commerce : Introduction, e – Commerce

ERP Systems : Introduction, Enterprise Information Systems

Decision – Support Systems: Decision – Making: A Concept, Simon's Model of Decision – Making Types of Decisions, Methods for Choosing Among Alternatives, Decision – Making and MIS, Decision Support Systems – Why?, Decision Support Systems: A framework, Characteristics and Capabilities of DSS

Business Intelligence and knowledge Management System : Business Intelligence, Knowledge Management System.

UNIT - III

Information System Planning : Information System Planning: WHY?, Planning Terminology Information System Planning, The Nolan Stage Model, The Four – Stage Model of is planning Selecting A Methodology, Information Resources Management (IRM), Organisation Structure and Location of MIS

System Acquisition : Acquisition of Information Systems , Acquisition of Hardware and Software

UNIT - IV

System Implementation: IMPLEMENTATION PROCESS, Organisational Change

Evaluation & Maintenance of IS: Evaluation of MIS , System Maintenance

IS Security and Control: IS Security Threats, Protecting Information System, IS Security Technology. The Disaster Recovery Plan

UNIT - V

BUILDING OF IS

System Development Approaches: System Development Stages, System Development Approaches

System Analysis and Design: SYSTEM ANALYSIS - Introduction, Requirement Determination, Strategies for Requirement Determination, Structured Analysis Tools

SYSTEMS DESIGN: Design Objectives , Conceptual Design , Design Methods, Detailed System Design

TEXT BOOKS:

1. Management Information System, Managerial Perspecives, D P Goyal, 3 ed, McMillan Publications

REFERENCE BOOKS:

1. Management Information Systems, Managing the Digital Firm Edition by Kenneth C. Laudon, Jane P. Laudon, Pearson Education, 10th Edition.

2. Management information Systems, 4th edition by Robert Schultheis, Mary Sumner, PHI- Seventeenth Reprint 2007.

ELECTIVE – I
DISTRIBUTED SYSTEMS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE4**

Course Objectives:

- Understand the need for distributed systems and their applications.
- Understand the concepts of remote procedure calls, remote file systems, distributed agreement, clock synchronization, and security.
- Analyze the Security Concepts

UNIT-I

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models-Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication.

Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT-II

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture, case study- SUN network file systems.

Name Services-Introduction, Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.500 Directory Service.

UNIT-III

Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware,

Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store, Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT-IV

Transactions and Concurrency control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT-V

Security-Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 Wi-Fi.

Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, Other consistency models, CORBA case study-Introduction, CORBA RMI, CORBA Services.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman& Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS:

1. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.
2. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, TMH.

ELECTIVE – II
COMPUTER GRAPHICS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE5**

Course Objectives:

To make the students to understand

- The fundamentals of Computer Graphics
- The concepts related 2D and 3D Transformations
- Analyze the Visual Surface Detection Algorithms

Course Outcomes:

- Can explain Computer Graphics Display Technologies
- Analyze the basic output primitive algorithms
- Ability to apply 2D and 3D Transformation Techniques on Objects
- Derive the Projection Transformation
- Ability to Design the Computer Animations

UNIT - I

Introduction: Application areas of Computer Graphics, Overview of Graphics Systems: video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

Output primitives : Points and lines, line drawing algorithms: DDA, Bresenhams, Mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT-II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear

transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.(p.nos 204-227 of text book-1).

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, Cohen-Sutherland and Liang-Barsky line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT- III

3-D Object Representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and Surfaces. Basic illumination models. 3-D Geometric transformations: Translation, Rotation, scaling, reflection and shear transformations, composite transformations.

UNIT - IV

3-D Viewing : Viewing pipeline, Viewing Coordinates, View Volume, Projections: Parallel Projection, Perspective Projections Clipping.

Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, Area Sub-division and Octree methods.

UNIT - V

Computer Animation: Design of Animation Sequence, General Computer Animation Functions, Raster Animation, Computer Animation Languages, Key Frame Systems, Motion Specifications.

TEXT BOOKS:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

REFERENCE BOOKS:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2. Computer Graphics, Zhigandxiang, Roy Plastock, Schaum's outlines, 2/E, TMH
3. Procedural elements for Computer Graphics, David F Rogers, 2/ e, TMH

4. Principles of Interactive Computer Graphics, Neuman ,Sproul, TMH.
5. Principles of Computer Graphics, ShaliniGovil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH
7. Computer Graphics, Shirley, Marschner, Cengage
8. Computer Graphics, Rajesh Maurya, Wiley, india
9. Computer Graphics PradeepBhatiya, IK intentional

ELECTIVE – II

SCRIPTING LANGUAGES

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE6**

Course Objectives:

- The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications. The instructor is advised to discuss different examples using scripting languages

UNIT - I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT – II

Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT – III

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML.

Parsing XML Data - DOM and SAX Parsers in java

UNIT - IV

TCL : TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and

uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT - V

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech.).

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.

ELECTIVE – II

CLOUD COMPUTING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE7**

Course Objectives:

- The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas,Paas,Saas, and developing cloud based software applications on top of cloud platforms.

UNIT – I

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT–II

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research.

UNIT – III

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual

machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT–V

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

TEXT BOOKS:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERENCE BOOKS:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

ELECTIVE – II
ARTIFICIAL INTELLIGENCE

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 4 **Subject Code: 16MC4TE8**

Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

Course Outcomes:

After completing this course, students should be able to:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

UNIT-I:

Introduction to artificial intelligence: Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

UNIT-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

UNIT-IV:

Advanced Knowledge Representation Techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-V:

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of

membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXTBOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight,Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCEBOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

DATA WAREHOUSING AND MINING LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 2 **Subject Code: 16MC4L01**

Course Objectives:

- Provide the students with practice on applying data mining solutions using common data mining software tools (e.g. WEKA, R , Data Miner,...)
- Prepare students to work with data preprocessing techniques.
- Prepare students to work with data classification techniques.
- Prepare students to work with data clustering techniques.

Course Outcomes:

- Familiar with a data mining software (WEKA, R) and use it for solving data mining problems
- Can apply association, classification, clustering algorithms on popular data sets.

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses. arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k-means

WEB TECHNOLOGIES LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA II/IV **External Marks: 60**

Credits: 2 **Subject Code: 16MC4L02**

Course Objectives:

- The primary objective of the course is to learn web programming by designing and developing some web based applications.

1. Develop static pages (using Only HTML) of an online Book store. The pages should resemble:
   www.amazon.com. The website should consist the following pages.
   Home page, Registration and user Login
   User Profile Page, Books catalog
   Shopping Cart, Payment By credit card
   Order Conformation

2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
3. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
4. Bean Assignments
   a) Create a JavaBean which gives the exchange value of INR(Indian Rupees) into equivalent American/Canadian/Australian Dollar value.
   b) Create a simple Bean with a label - which is the count of number of clicks. Than create a Bean Info class such that only the "count" property is visible in the Property Window.

c) Create two Beans-a)KeyPad .b)DisplayPad .After that integrate the two Beans to make it work as a Calculator.

d) Create two Beans Traffic Light (Implemented as a Label with only three background colors-Red, Green, Yellow) and Automobile(Implemented as a TextBox which states its state/movement). The state of the Automobile should depend on the following Light Transition Table.

Light Transition	Automobile State
Red	Red Ready
Yellow	Yellow Move
Greed	Greed Stop

5. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using Servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
6. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the
7. Implement "Hello World!" program using JSP Struts Framework.
8. Redo the problem 5 using PHP.
9. Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result
10. Write a java swing application that takes a text file name as input and counts the characters, words and lines in the file. Words are separated with white space characters and lines are separated with new line character.

11. Write a simple calculator servlet that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands. It should check in a database if the same expression is already computed and if so, just return the value from database. Use MySQL or PostgreSQL.(Do the same problem using PHP).

12. Write an HTML page that contains a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

13. Write a servlet that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello <name>, you are not authorized to visit this site" message, where <name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to this site" message. (Do the same problem using PHP).

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

15. Consider the following web application for implementation:

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

If name and password matches, serves a welcome page with user's full name.

If name matches and password doesn't match, then serves "password mismatch" page.

If name is not found in the database, serves a registration page, where users full name, present user name (used to login) and password are collected. Implement this application using:

1. Pure JSP
2. Pure Servlets
3. Struts Framework
4. PHP

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

SOFTSKILLS/APTITUDE LAB

Lecture: 4 Periods/Week **Internal Marks: 50**

Year/Semester: MCA II/IV

Credits: 2 **Subject Code: 16MC4L03**

Objectives:

- To encourage the all-round development of students by focusing on soft skills
- To make students aware about the importance, the role and the content of soft skills through instruction, knowledge acquisition and practice

1	Interpersonal skills and Relationships	1
2	Presentation Skills	1
3	Planning & Stress Management	1
4	Leadership & Facilitation	1
5	Conflict Management and Decision Making	1
6	The art of Negotiation	1
7	Language skills LSRW	2
8	Communication Skills	4
9	Learning Skills : Critical Thinking- Creative Thinking – Communicating- Collaborating	3
	Total	15

References for students for their self-study:

1. You can win by Shiv Khera :Macmillan books
2. The 7 habits of Highly effective people – Stephen Covey
3. Sure Success in Interviews
4. Web resources

CRYPTOGRAPHY AND NETWORK SECURITY

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5T01**

Course Objectives:

- Understand and classify different kinds of attacks and security services.
- Comprehend conventional encryption principles algorithms and its applications.
- Importance of public key encryption principles algorithms and authentication services.
- To learn and implement various security mechanisms like IP security for providing security to the data over the network.
- To be familiar with protocols like SNMP for providing authentication service.

Course Outcomes

- Identify passive attacks, active attacks and how to prevent them.
- Encipher and decipher data using public key algorithms.
- Have adequate knowledge about the security services implemented in network protocols.

UNIT - I

Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT –II

Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT -III

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

SNMP: Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats Fire walls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOKS:

1. Network Security Essentials: Applications and Standards, William Stallings, PEA.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010
2. Fundamentals of Network Security, Eric Maiwald, Dream Tech
3. Network Security: Private Communication in a Public World, Kaufman, Perlman, PEA/PHI.
4. Principles of Information Security, Whitman, Thomson.
5. Cryptography and Network Security, 3/e, Stallings, PHI/PEA
6. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
7. Introduction to Cryptography, Buchmann, Springer

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5T02**

Course objectives: The course content enables students to:

- Develop the different UML diagrams for a software system based on the given requirements.
- Apply forward engineering to convert diagram to code and reverse engineering to convert code to diagram.
- Analyze & Design a Software System in object oriented approach, using unified modeling language.
- Select appropriate models for a Software System depending upon the complexity of the system

Course outcomes: At the end of the course students are able to:

- Understand the use of unified modeling language for object oriented analysis and design
- Know the syntax of different UML diagrams.
- Develop different models for a software system.
- Apply object oriented analysis and design to build a software system
- Apply forward and reverse engineering for a software system

UNIT-I

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle

UNIT- II

Basic Structural Modeling: Classes, Relationships, common Mechanisms, diagrams.

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT- III

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT- IV

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, Time and Space, State Chart diagrams.

UNIT –V

Architectural Modeling: Component diagrams and Deployment diagrams

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, Rambaugh, Ivar Jacobson, PEA
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Addison
3. Hans-Erik Magnus Penker Brain Lyons Dravid Fado: UML 2 TookKit, WILEY-Dreadtech India Pvt. Ltd

REFERENCE BOOKS:

1. Head First Object Oriented Analysis & Design, Mclaughlin,SPD OReilly,2006
2. Object oriented Analysis& Design Using UML, Mahesh ,PHI
3. The Unified Modeling Language Reference Manual, 2/e, Rambaugh, Grady Booch,etc., PEA
4. Object Oriented Analysis & Design, Satzinger, Jackson, Thomson
5. Object Oriented Analysis Design & implementation, Dathan.,Ramnath, University Press

6. Object Oriented Analysis & Design, John Deacon, PEA
7. Fundamentals of Object Oriented Analysis and Design in UML, M Pages-Jones, PEA
8. Object-Oriented Design with UML, Barclay,Savage,Elsevier,2008

MOBILE COMPUTING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5T03**

Course Objective:

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.
- To understand the ad hoc networks and related concepts.
- To understand the platforms and protocols used in mobile environment.

Course Outcomes:

- Able to think and develop new mobile application.
- Able to take any new technical issue related to this new paradigm and come up with a solution(s).
- Able to develop new ad hoc network applications and/or algorithms/protocols.
- Able to understand & develop any existing or new protocol related to mobile environment

UNIT - I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization,

Calling, Handover, Security, New Data Services, GPRS.

UNIT - II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT-III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP

UNIT - IV

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

UNIT- V

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing : WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices,Android.

Text Books:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

References:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

ELECTIVE – III
E-COMMERCE

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE1**

Course Objectives:

- Identify the major categories and trends of e-commerce applications.
- Identify the essential processes of an e-commerce system.
- Identify several factors and web store requirements needed to succeed in e-commerce.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
- Understand the main technologies behind e-commerce systems and how these technologies interact.
- Discuss the various marketing strategies for an online business.
- Define various electronic payment types and associated security risks and the ways to protect against them.

UNIT-I

Electronic Commerce, Frame Work, Anatomy of E-Commerce Applications, E-Commerce Consumer Applications, E-Commerce organization applications. Consumer Oriented Electronic Commerce, Mercantile Process Models.

UNIT- II

Electronic Payment Systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Designing Electronic Payment Systems.

UNIT-III

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT- IV

Corporate Digital Library -Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing, Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT- V

Consumer Search and Resource Discovery, Information Search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia -key multimedia concepts, Digital Video and electronic Commerce, Desktop Video Processing, Desktop video conferencing.

TEXT BOOK :

1. Frontiers of Electronic Commerce ,Kalakata, Whinston, PEA,2006.

REFERENCE BOOKS:

1. E-Commerce Fundamentals and Applications Hendry Chan, Raymond Lee, Dillon, Chang, John Wiley.
2. E-Commerce, A Managerial Perspective, Turban E, Lee J , King, Chung H.M.,PEA,2001.
3. E-Commerce An Indian Perspective , 3/e, P.T. Joseph, PHI,2009.
4. E-Commerce, S.Jaiswal, Galgotia.
5. Electronic Commerce, Gary P.Schneider, Thomson.

ELECTIVE – III
ANIMATION AND GAMING

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE2**

Course Objectives:

- Students should understand basic concepts of Animation. They should learns concepts of Flash software
- Know about how to develop storyboard layout
- Learn Animation Development Techniques

UNIT-I

What is mean by Animation – Uses of Animation – History of Animation – Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects - Creating Animation.

UNIT-II

Creating Animation in Flash: Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation -Working with the Timeline and Tween-based Animation – Understanding Layers

UNIT-III

Concept Development – Story Developing – Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction Production Budgets - 3D Animated Movies.

UNIT –IV

Animation: The Animation Loop, Calculating Frame Rates, Scheduling Tasks at Alternate Frame Rates, Restoring the Background, Double Buffering, Time – Based Motion, Scrolling the Background, Parallax, User Gestures, Timed Animations, Animation Best Practices

UNIT –V

A Game Engine , The Game Loop, Loading Images, Multitask Sound, Keyboard Events, High Scores, The Game Engine Listing, The Ungame, A Pinball Game

TEXT BOOKS:

1. PRINCIPLES OF MULTIMEDIA – Ranjan Parekh, 2007, TMH. (Unit I, Unit III)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication. (Unit II: Chapter 10)
3. Core HTML5 CANVAS, Graphics, Animation and Game Development, David Geary, PEARSON (Unit IV, Unit V)

ELECTIVE – III
COMPUTER FORENSICS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE3**

Course Objectives:

- Examine the fundamental concepts of computer forensics and why it is not strictly a technology based pursuit
- Study real world examples of how computer forensics is integral in investigating computer security related allegations, theft of trade secrets and embezzlement
- Understand Computer Forensics Tools

UNIT-I:

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations, Taking a Systematic Approach, Procedure for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software. **Investor's Office and Laboratory**: Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation

UNIT-II

Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools Processing Crime and **Incident Scenes**: Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, Securing a Computer Incident or Crime Scene, Sizing Digital

evidence at the Scene, Storing Digital evidence, obtaining a Digital Hash.

UNIT-III

Current Computer Forensics Tools: Evaluating Computer Forensics Toll Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software Computer Forensics Analysis and Validation: Determining What Data to Collect and Analyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

UNIT-IV

Recovering Graphics and Network Forensics: Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Understanding Copyright Issues with Graphics, Network Forensic, Developing Standard Procedure for Network Forensics, Using Network Tools, Examining Hiney Project

UNIT-V

E-mail Investigations Cell Phone and Mobile Device Forensics: Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools, Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devices

TEXT BOOK:

1. Nelson, Phillips Enfinger, Steuart, " Computer Forensics and Investigations, Cengage Learning.

ELECTIVE – III

MULTIMEDIA APPLICATION DEVELOPMENT

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE4**

Course objectives:

Students undergoing this course are expected to:

- Represent data in multimedia applications; examine image data, video data, and audio data in detail.
- Apply compression techniques to multimedia content Carry out the multimedia projects using software tools such as Macromedia flash using Object oriented design and Action script.
- Explore network technologies and protocols that make interactive multimedia applications.
- Examine the ideas behind MPEG standards such as MPEG-1, MPEG-2, MPEG-4, and MPEG-7

Course outcomes:

- Apply lossless data compression which involves no distortion of the original signal
- Understand the concepts focusing on the discrete cosine transform and discrete wavelet transform.
- Know various multimedia software tools.
- Design multimedia software that are suitable to Internet applications
- Explore issues and technologies for computer and multimedia network communications

UNIT- I

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide

web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT- II

Fundamental Concepts in Video and Digital Audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT-III

Action Script I: Action Script Features, Object-Oriented Action Script, Data types and Type Checking, Classes, Authoring an Action Script Class.

Action Script II: Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions.

Application Development: An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

UNIT- IV

Multimedia Data Compression: Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding.

UNIT-V

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

Multimedia Networks: Basics of Multimedia Networks Multimedia Network Communications and Applications Quality of Multimedia Data Transmission, Multimedia over IP

TEXTBOOKS:

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/ PEA.
2. Multimedia Systems, Parag Havaldar, Gerard Medioni, cengage, 2009.
3. EssentialsAction Script 3.0, Colin Moock, SPD O, Reilly,2007.

REFERENCEBOOKS:

1. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
2. Digital Multimedia, Nigel Chapman, Jenny Chapman, Wiley- Dreamtech.
3. Multimedia & Communications Technology, Steve Heath, Elsevier .
4. Multimedia Technology & Applications, David Hilman , Galgotia.
5. Multimedia Technologies, Banerji, Mohan Ghosh,MGH.

ELECTIVE –IV
SOFTWARE PROJECT MANAGEMENT

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE5**

Course Objectives:

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

Course Outcomes:

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

UNIT-I

Introduction Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort

UNIT-II

Project Approach Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

UNIT-III

Effort estimation & activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO, Usecase-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

UNIT-IV

Risk Management & Software Quality Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality

UNIT-V

Project Monitoring & Control , Resource Allocation Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling.

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson

REFERENCE BOOKS :

1. Software Project Management, Joel Henry, Pearson Education

ELECTIVE – IV
INTERNET OF THINGS

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE6**

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices.

UNIT- I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT- II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes,

Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)

Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT -V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs, Webserver – Web server for IoT, Cloud for IoT, Python web application frameworkDesigning a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.

2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN 9789350239759

ELECTIVE – IV

Big Data Analytics

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE7**

Course Objectives:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

Course Outcomes:

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT - IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT – V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

Software Links:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

ELECTIVE – IV
CYBER SECURITY

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 4 **Subject Code: 16MC5TE8**

Course Objectives:

- To study essential concepts for cyber security, cyber security applications, cyber crimes, unauthorized crimes and hacking. To study prohibited action on cyber policies, evaluation of crime scene, evidence collection, cyber Crime Mobiles and Wireless Devices
- To understand the Tools used in Cyber Security System

UNIT- I

Introduction to Cybercrime:

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

UNIT –II

Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT –III

Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit

Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT –IV

Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

UNIT –V

Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH

OBJECT ORIENTED ANALYSIS DESIGN USING UML LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 2 **Subject Code: 16MC5L01**

Course Objectives:

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications

Course Outcomes:

- Understand the Case studies and design the Model.
- Construct design solutions by using structural and behavioral patterns

For each case study:

Week 1, 2, 3 & 4:

For each case study:

a) Identify and analyze events
b) Identify Use cases
c) Develop event table
d) Identify & analyze domain classes
e) Represent use cases and a domain class diagram using Rational Rose
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

For each case study:

a) Develop Use case diagrams
b) Develop elaborate Use case descriptions & scenarios
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

a) Develop high-level sequence diagrams for each use case
b) Identify MVC classes / objects for each use case
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing
d) interactions among all the three-layer objects
e) Develop detailed design class model (use GRASP patterns for responsibility assignment)
f) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them
d) Refine domain class model by showing all the associations among classes

Week 13 onwards:

For each case study:

a) Develop other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

MOBILE APPLICATION DEVELOPMENT LAB

Lecture: 4 Periods/Week **Internal Marks: 40**

Year/Semester: MCA III/V **External Marks: 60**

Credits: 2 **Subject Code: 16MC5L02**

Course Objectives:

- Develop menus in J2ME
- Develop J2ME Socket Program
- Develop Android Basic Programs

1. Write a J2ME program to show how to change the font size and color.

2. Write a J2ME program which creates the following kind of menu.
   - cut
   - copy
   - past
   - delete
   - select all
   - unselect all

3. Create a J2ME menu which has the following options (Event Handling):
   - cut - can be on/off
   - copy - can be on/off
   - paste - can be on/off
   - delete - can be on/off
   - select all - put all 4 options on

- unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
    - Area code should be one of the following: 040, 041, 050, 0400, 044
    - There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.

8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
    - Students Marks Enquiry
    - Town/City Movie Enquiry
    - Railway/Road/Air (For example PNR) Enquiry/Status
    - Sports (say, Cricket) Update
    - Town/City Weather Update

- Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.

11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:
    I. LinearLayout
    II. RelativeLayout
    III. TableLayout
    IV. GridView layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development