DR.B.R.AMBEDKAR UNIVERSITY
College of Science
Department of Computer Science
M.Sc., (Computer Science)

General Regulations relating to

POST GRAUDATE AND PROFESSIONAL COURSES

Syllabus under Credit Based Semester System

(With effect from 2020-2021 admitted batch)

1. Candidates seeking admission for the Masters/Professional Degree Courses shall be required to have passed the qualifying examination prescribed for the course of any University recognized by Dr. B.R. Ambedkar University, Srikakulam as equivalent there to.

2. The course and scope shall be as defined in the Scheme of Instruction and syllabus prescribed.

3. The course consists of 2/4/6 semesters, @ two semesters/year, unless otherwise specified.

4. The candidates shall be required to take an examination at the end of each semester of the study as detailed in the Scheme of Examination. Each semester theory paper carries a maximum of 100 marks, of which 80 marks shall be for semester-end theory examination of the paper of three hours duration and 20 marks shall be for internal assessment

4.(a) Internal Assessment for 20 Marks: Three mid-term exams, two conventional (descriptive) for 15 marks and the third – 'on-line' with multiple choice questions for 5 marks for each theory paper shall be conducted. The average of these first two mid-term and the marks in the online mid exams shall be taken as marks obtained for the paper under internal assessment. If any candidate appears for only one mid-term exam, the average mark, dividing by two shall be awarded. If any candidate fails to appear for all the midterm exams of a paper, only marks obtained in the theory paper shall be taken into consideration for declaring the result. Each mid-term exam shall be conducted only once.

(b) Candidates shall be declared to have passed each theory paper if he/she obtains not less than E Grade ie., an aggregate of 40 % of the total marks inclusive of semester-end and internal assessment marks in each paper.

5. A candidate appearing for the whole examination shall be declared to have passed the examination if he/she obtains a Semester Grade Point (SGP) of 5.0 and a CGPA of 5.0 to be declared to have passed the Course.

6. Notwithstanding anything contained in the regulations, in the case of Project Report/Dissertation/ Practical/Field Work/Viva-voce etc., candidates shall obtain not less than D grade, i.e., 50% of marks to be declared to have passed the examination.

7. ATTENDANCE: Candidates shall put in attendance of not less than 75% of attendance, out of the total number of working periods in each semester. Only such candidates shall be allowed to appear for the semester-end examination.

(a) A candidate with attendance between 74.99% and 66.66% shall be allowed to appear for the semester-end examination and continue the next semester only on medical and other valid grounds, after paying the required condonation fee.

(b) In case of candidates who are continuously absent for 10 days without prior permission on valid grounds, his/her name shall automatically be removed from the rolls.

(c) If a candidate represents the University at games, sports or other officially organized extra-curricular activities, it will be deemed that he/she has attended the college on the days/periods

8. Candidates who put in a minimum of 50% attendance shall also be permitted to continue for the next semester. However, such candidates have to re-study the semester course only after completion of the course period for which they are admitted. The candidate shall have to meet the course fees and other expenditure.

9 Candidates who have completed a semester course and have fulfilled the necessary attendance requirement shall be permitted to continue the next semester course irrespective of whether they have appeared or not at the semester-end examination, at their own cost. Such candidates may be permitted to appear for the particular semester-end examination only in the following academic year; they should reregister/ reapply for the Semester examination.

The above procedure shall be followed for all the semesters

10. Candidates who appear and pass the examination in all the papers of each and every semester at first appearance only are eligible for the award of Medals/Prizes/Rank Certificates

11. BETTERMENT: Candidates declared to have passed the whole examination may reappear for the same examination to improve their SGPA, with the existing regulations without further attendance, paying examination and other fees. Such reappearance shall be permitted only with in 3 consecutive years from the date of first passing the final examination. Candidates who wish to appear thereafter should take the whole examination under the regulations then in vogue.

12. The semester-end examination shall be based on the question paper set by an external paper setter and there shall be double valuation for post-Graduate courses. The concerned Department has to submit a panel of paper-setters and examiners approved by the BOS and the Vicechancellor nominates the paper-setters and examiners from the panel.

13. In order to be eligible to be appointed as an internal examiner for the semester-end examination, a teacher shall have to put in at least three years of service. Relaxation of service can be exempted by the Vice-Chancellor in specific cases.

14. If the disparity between the marks awarded in the semester-end examination by internal and external examiners is 25% or less, the average marks shall be taken as the mark obtained in the paper. If the disparity happens to be more, the paper shall be referred to another examiner for third valuation. In cases

of third valuation, of the marks obtained either in the first or second valuation marks, whichever is nearest to the third valuation marks are added for arriving at the average marks.

15. Candidates can seek revaluation of the scripts of the theory papers by paying the prescribed fee as per the rules and regulations in vogue.

16. The Project Report/Dissertation/ Practical/Field Work/Viva-voce etc shall have double valuation by internal and external examiners.

17. A Committee comprising of the HOD, one internal teacher by nomination on rotation and one external member, shall conduct viva-voce examination. The department has to submit the panel, and the Vice-chancellor nominates viva-voce Committee.

18. Grades and Grade Point Details (with effect from 2009-10 admitted batches)

S.No.	Range of Marks %	Grade	Grade Points	
01	>90 ≤100	O	10	Out Standing
02	>80 ≤90	A+	9	Excellent
03	>70 ≤80	A	8	Very Good
04	>60 ≤70	B+	7	Good
05	>55 ≤60	B	6	Above Average
06	≥50 ≤55	C	5	Average
07	≥40 < 50	D	4	Pass
08	<40	F	0	Fail
09			0	AB (Absent)

Terms used and their explanation:

Credit Point: It is the product of grade point and number of credits for a course.

Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of Practical work/ field work per week.

Grade Point: It is a numerical weight allotted to each letter grade on a 10- point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O,A+, A, B+, B, C, D and F.

19. Calculation of SGPA (Semester Grade Point Average) & CGPA (Cumulative Grade Point Average):

For example, if a student gets the grades in one semester A+,A+,A,A,A,B in six subjects having credits 2(S1), 4(S2), 4(S3), 4(S4), 4(S5), 2(S6), respectively. The SGPA is calculated as follows:

$$SGPA = \frac{\{9(A+)\times2(S1)+9(A+)\times4(S2)+8(A)\times4(S3)+8(A)\times4(S4)+8(A)\times4(S5)+6(B)\times2(S6)\}}{\{2(S1)+4(S2)+4(S3)+4(S4)+4(S5)+2(S6)\}} = \frac{162}{20} = 8.10$$

i. A student securing 'F' grade thereby securing 0.0 grade points has to appear and secure at least 'E' grade at the subsequent examination(s) in that subject.

ii. If a student gets the grades in another semester B, A+, A, B+, A+, C, A+, in seven subjects having credits 4(S1), 2(S2), 4(S3), 2(S4), 4(S5), 4(S6), 2(S7) respectively,

$$SGPA = \frac{\{6(B)\times4(S1)+9(A+)\times2(S2)+8(A)\times4(S3)+7(B+)\times2(S4)+9(A+)\times4(S5)+5(C)\times4(S6)+9(A+)\times2(S7)\}}{\{4(S1)+2(S2)+4(S3)+2(S4)+4(S5)+4(S6)+2(S7)\}} = \frac{162}{22} = 7.36$$

$$CGPA = \frac{(9\times2+9\times4+8\times4+8\times4+6\times2+6\times4+9\times2+8\times4+7\times2+9\times4+5\times4+9\times2)}{(20+22)} = \frac{324}{42} = 7.71$$

a) A candidate has to secure a minimum of 5.0 SGPA for a pass in each semester in case of all PG and Professional Courses. Further, a candidate will be permitted to choose any paper(s) to appear for improvement in case the candidate fails to secure the minimum prescribed SGPA/CGPA to enable the candidate to pass at the end of any semester examination.

b) There will be no indication of pass/fail in the marks statement against each individual paper.

c) A candidate will be declared to have passed if a candidate secures 5.0 CGPA for all PG and Professional Courses.

d) The Classification of successful candidates is based on CGPA as follows:

i) Distinction –CGPA 7.0 or more;

ii) First Class –CGPA 6.0 or more but less than 7.0

iii) Second Class –CGPA 5.0 or more but less than 6.0

iv) Pass –CGPA 4.0 or more but less than 5.0

e) Improving CGPA for betterment of class will be continued as per the rules in vogue.

f) CGPA will be calculated from II Semester onwards up to the final semester. CGPA multiplied by gives "10" aggregate percentage of marks obtained by a candidate.

PAPER CODE	SUBJECTS	CATEGORY	CREDITS	INTERNAL MARKS	EXTERNAL MARKS	MAX MARKS
MSC 1.1.1	Data Structures in C	Core	4	25	75	100
MSC 1.1.2	Object Oriented Programming with JAVA	Core	4	25	75	100
MSC 1.1.3	Computer Organization	Core	4	25	75	100
MSC 1.1.4	Discrete Mathematical Structures	Core	4	25	75	100
MSC 1.1.5	Software Engineering	Core	4	25	75	100
MSC 1.1.6	Data Structures Lab using C	Core	2	25	50	75
MSC 1.1.7	Java Programming Lab	Core	2	25	50	75
	Skill Development Course-1		2	25	75	100
	Seminar		2	50		50
	Total		28	250	550	800

MCS 1.1.1 - DATA STRUCTURES IN C

UNIT-I

Arrays

  Arrays, Dynamically allocated arrays, Operations on Arrays

Linked List

  Single Linked List , Representing chains in C, Polynomial representation, Adding polynomials,

  Operations on Linked lists, Circularly linked lists, Doubly Linked lists. Sparse Matrices , Sparse Matrix representation

UNIT –II

Stacks: Array Representation, Linked Representation, Applications (Recursive Calls, Infix to Postfix, Postfix Evaluation).

Queues: Array Representation, Linked Representation,Circular Queues

UNIT – III

Introduction- Representation of trees The abstract data type, Properties of binary trees, Binary tree representations.

Binary tree traversals - Inorder traversal, Preorder traversal, Postorder traversal Operations on Binary Search trees
Balanced Search Trees: AVL Trees, and B-Trees.

UNIT-IV

Sorting & Searching

Motivation, Bubble Sort ,Insertion sort, Quick sort, Merge sort, Heap sort, External sorting.

Searching : Linear search ,Binary Search

Hashing: Introduction Static hashing Hash tables, hash functions, Overflow handling

UNIT- V

Graphs : The graph abstract data type - Introduction, definitions, graph representations Elementary graph operations. Searching Methods in Graph - Depth First Search, Breadth First Search

Applications of Graphs : Connected Components, Spanning trees, Biconnected ,Components.

Minimum cost Spanning trees- Kruskals and Prims algorithms.

Shortest paths-Single source problem, All pairs Shortest path.

Prescribed Book:

Horowitz, Sahani, Anderson - Freed,"Fundamentals of Data Structures in C", Chapters 2-8

Reference Book:
1. D SAMANTA, "Classic Data Structures", –PHI
2. Balagurusamy, "C Programming and Data Structures", Third Edition, TMH (2008)

MCS 1.1.2 – OBJECT ORIENTED PROGRAMMONG THROUGH JAVA

UNIT- I:
Java Basics - History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators,operator hierarchy, expressions, type conversion and casting,

enumerated types, control flow-block scope, conditional statements,loops, break and continue statements, simple java program, arrays, input and output, formatting output, Review of OOP concepts, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods,access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings,exploring string class, Enumerations, autoboxing and unboxing,Generics. Inheritance – Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

UNIT- II:
Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.Files – streams- byte streams, character streams, text Input/output,binary input/output, random access file operations, File management using File class, Using java.io.

UNIT- III:
Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch,
throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions. Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication,
thread groups, daemon threads

UNIT- IV :
Event Handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Semantic and Low-level events, Examples:
handling a button click, handling mouse and keyboard events, Adapter classes.Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet - Four methods of an applet, Developing applets and testing, passing parameters to applets, applet security issues.

UNIT- V:

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs. AWT,MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet,
JWindow, JDialog, Light weight containers – JPanel, A simple swing application, Overview of several swing components- Jbutton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JMenu, Java's Graphics capabilities –Introduction, Graphics contexts and Graphics objects, color control, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout manager types – border, grid, flow, box.

Prescribed Text Books:
1. Java: the complete reference, 7th editon, Herbert Schildt, TMH.
2. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education/ Java: How to Program P.J.Deitel and H.M.Deitel ,8th edition, PHI.

Reference Text Books:
1. Core Java, Volume 1-Fundamentals, eighth edition, Cay S.Horstmann and Gary Cornell, Pearson education.
2. Thinking in Java, Bruce Eckel, PHP
3. Object Oriented Programming through Java, P.Radha Krishna,Universities Press.

MCS-1.1.3 COMPUTER ORGANIZATION

UNIT I
Digital logic circuits
Logic gates, Boolean algebra, Map simplification, Combinational logic circuits, Flip flops, Sequential logic circuits.
Digital Components
Integrated circuits, Decoders, Multiplexers, Registers, Shift registers, Binary Counters, Memory unit
Data Representation:
Data types, Complements, Fixed & Floating point representation, Other binary codes, Error Detection codes

UNIT II
Register Transfer and micro operations
Register transfer language, Register transfer, Bus and Memory transfers, Arithmetic micro operations, Logical micro operations, shift micro operations, Arithmetic Logic shift unit
Basic Computer Organization and Design

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-output and Interrupt

UNIT III
Microprogrammed Control
control Memory, Address Sequencing, Microprogram example, Design of control unit.
Central Processing Unit, General Register Organization, Stack Organization, Instruction format, Addressing modes, Data Transfer and Manipulation, Program Control

UNIT IV
Computer Arithmetic
Introduction, Addition and Subtraction, Multiplication Algorithms,Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

Unit-V
Input-Output Organization :
Peripheral Devices, Input Output Interface, asynchronous Data Transfer, Modes of Transfers, Priority Interrupt.
Memory Organization:
Memory Hierarchy, Main memory, Auxiliary Memory, Associative memory, Cache memory.

Prescribed Book:
Morris Mano, "Computer System Architecture", 3rd Edition, PHI.
Reference Books:
1. V. Rajaraman, T. Radha Krishnan, "Computer Organization and
   Architecture", PHI
2. Behrooz Parhami, "Computer Architecture", Oxford (2007)
3. ISRD group, "Computer Organization", ace series, TMH (2007)
4. William Stallings, "Computer Organization and Architecture –
Designing for Performance", Pearson Education (2005)

MCS-1.1.4 DISCRETE MATHEMATICAL STRUCTURES

Unit I
Mathematical Logic and Predicates
Statements and Notations - Connectives - Well-formed Formulas - Truth Tables - Tautology - Equivalence Implication - Normal Forms - Rules of Inference for Statement Logic - Proof Techniques (Equivalence - Converse - Inverse - Contra-positive - and Contradiction - Direct Proofs - Disproving by Counter Example - Proof by Contradiction - Method of Induction) - Consistency Predicative Logic - Quantifiers - Universal Quantifiers - Free & Bound Variables - Rules of Inference for Predicate Logic

Unit II
Binary Relations

Binary Relations-Properties & Operations-Relational Matrix and Relational Graph-Equivalence Relations-Compatibility Relations-Partial Ordering Relations-Hasse Diagram,Lattices-Definition-Types and Properties with examples

Unit III
Functions and Algebraic Structures

Functions-Definition -Types-Inverse Function - Composition of Functions-Recursive Functions Algebraic Structures-Algebraic Systems-Properties with Examples-Semi Groups-Monoids-Groups and Sub Group with Examples (Basic Concepts)

Unit IV
Elementary Combinatorics

Basics of counting, combinations & permutations, With repetitions, constrained repetitions, Binomial Coefficients, Binomial & Multinomial theorems, the principle of inclusion and exclusion. Pigeon hole principles and its application.

Unit IV
Graph Theory

Definition-Representation of Graph-Matrix Representation(Incident and Adjacent Matrices) - Sub-graphs-Graph Traversal Strategies (DFS & BFS) - Planar Graphs - Isomorphism - Multi-graphs - Cut Sets (Vertices & Edges) - Euler Circuit and Hamiltonian Cycle - Chromatic Number.
Definition of Tree - Terminologies - Spanning Trees - Minimal Spanning Tree - Prim's and Kruskal's Algorithm

Textbook (s)

1. Tremblay J.P. and P. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGrawHill, 1997.
2. J. L. Mott, A. Kandel & T. P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, Prentice Hall India, 2nd Edition, 2009.

Reference (s)

1. Kenneth H. Rosen, Discrete Mathematics and Applications, 7th Edition, Tata McGraw Hill, 2011.
2. C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics, A Computer Oriented Approach, 3rd Edition, Tata McGrawHill, 2008.
3. D. S. Chandrasekharaiah, Mathematical Foundation to Computer Science, Prism Books Pvt. Ltd, Hyderabad, 4th Edition, 2012.
4. Seymour Lipschutz and Marc Lipson, Discrete Mathematics, Revised 3rd Edition, Schaum's Outline Series, Tata McGrawHill, New Delhi, 2009.

MCS-1.1.5 SOFTWARE ENGINEERING

Unit –I
Introduction to software engineering (chapter 1)
The Process (chapters 2, 3)
Metrics for Process and Project (chapter 22)

Unit –II
Project Management (chapter 21)
Requirement engineering (chapter 7)

Unit –III
Building the Analysis Modeling (chapter 8)
Design engineering (chapter 9)

Unit –IV
Creating an Architectural Design (chapter 10)
Performing User Interface Design (chapter 12)

Unit –V
Testing Strategies (chapter 13)
Testing Tactics (chapter 14)
Software Quality Assurance(Chapter)

Prescribed Book:
Roger S Pressman, "Software Engineering A Practitioner's Approach",Sixth Edition, TMH International.

Reference Books:
1. Sommerville, "Software Engineering", Seventh Edition Pearson Education (2007)
2.S.A.Kelkar, "Software Engineering A Concise Study", PHI.
3.Waman S.Jawadekar, "Software Engineering", TMH.
4.Ali Behforooz and Frederick J.Hudson, "Software Engineering Fundamentals", Oxford (2008)

MCS 1.1.6: Data Structures Lab Using C

1. Program for Sorting 'n' elements Using bubble sort technique.
2. Sort given elements using Selection Sort.
3. Sort given elements using Insertion Sort.
4. Sort given elements using Merge Sort.

5. Sort given elements using Quick Sort.
6. Implement the following operations on single linked list.
 (i) Creation (ii) Insertion (iii) Deletion (iv) Display
7. Implement the following operations on double linked list.
 (i) Creation (ii) Insertion (iii) Deletion (iv) Display
8. Implement the following operations on circular linked list.
 (i) Creation (ii) Insertion (iii) Deletion (iv) Display
9. Program for splitting given linked list.
10. Program for traversing the given linked list in reverse order.
11. Merge two given linked lists.
12. Create a linked list to store the names of colors.
13. Implement Stack Operations Using Arrays.
14. Implement Stack Operations Using Linked List.
15. Implement Queue Operations Using Arrays.
16. Implement Queue Operations Using Linked List.
17. Implement Operations on Circular Queue.
18. Construct and implement operations on Priority Queue.
19. Implement Operations on double ended Queue.
20. Converting infix expression to postfix expression by using stack.
21. Write program to evaluate post fix expression.
22. Implement Operations on two way stack.
23. Add two polynomials using Linked List.
24. Multiply Two polynomials using Linked List.
25. Construct BST and implement traversing techniques recursively.19
26. Implement preorder traversal on BST non recursively.
27. Implement inorder traversal on BST non recursively.
28. Implement postorder traversal on BST non recursively.
29. To Convert matrix into sparse matrix.
30. Implement binary search techniques recursively.
31. Program to implement graph traversing techniques DFS A**ND DFS.**
32. Program to estimate shortest path for a graph.20

MCS 1.1.7: Java Programming Lab

1. Write a Java Program to define a class, describe its constructor, overload the constructors and instantiate its object.

2. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object

3. Write a java program to practice using String class and its methods

4. Write a java program to implement inheritance and demonstrate use of method overriding

5. Write a java program to implement multilevel inheritance by applying various access controls to its data members and methods.

6. Write a program to demonstrate use of implementing interfaces

7. Design a Java interface for ADT Stack. Develop two different classes that implement this interface, one using array and the other using linked-list. Provide necessary exception handling in both the implementations.

8. Write a Java program to implement the concept of importing classes from user defined package and creating packages

9. Write a program to implement the concept of threading by implementing Runnable Interface

10. write a java program to store and read objects from a file

11. Write a Java program that displays the number of characters,lines and words in a text file.

12. write a java program to illustrate object serialization

13. Create a java program to illustrate user defined exception

14. Write a java program to create a thread using runnable interface

15. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds

16. Write an applet To create multiple threads that correctly implements producer consumer problem using the concept of Inter thread communication

17. Write an applet To handling the mouse events

18. Write a Program That works as a simple calculator using Grid layout to arrange buttons for the digits and +,-,* % operations. Add a text field to print the result.

19. Build and run "CelsiusConverter" sample application using swings

20. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked

CURRICULUM STRUCTURE FOR CHOICE BASED CREDIT SYSTEM (CBCS)

(W.E.F. 2020-21 ADMITTED BATCH)

FIRST YEAR – SEMESTER-II

PAPER CODE	SUBJECTS	CATEGORY	CREDITS	INTERNAL MARKS	EXTERNAL MARKS	MAX MARKS
MSC 1.2.1	Web Technologies	Core	4	25	75	100
MSC 1.2.2	Database Management Systems	Core	4	25	75	100
MSC 1.2.3	Operating Systems	Core	4	25	75	100
MSC 1.2.4	Computer Networks	Core	4	25	75	100
MSC 1.2.5	Design & Analysis of Algorithms	Core	4	25	75	100
MSC 1.2.6	Web Technologies Lab	Core	2	25	50	75
MSC 1.2.7	DBMS Lab	Core	2	25	50	75
	Industrial Visit		2			
	Skill Development Course-2		2	25	75	100
	MOOC		2			
	Total		30	200	550	750

MCS 1.2.1: WEB TECHNOLOGIES

UNIT I

HTML: Common Tags: List, Tables, images, forms, Frames, Cascading Style Sheets;

Java Script: Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT II

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using

XML Processors: DOM and SAX

CGI Scripting: What is CGI? – Developing CGI applications – Processing CGI – Returning a Basic

HTML page – Introduction to CGI.pm – CGI.pm methods – Creating HTML pages dynamically.

UNIT III

JDBC: Introduction to JDBC – Connections – Internal Database Connections – Statements – Results

Sets - Prepared Statements - Callable Statements.

Network Programming and RMI: why networked Java – Basic Network Concepts – looking up

Internet Addresses – URLs and URIs – UDP Datagrams and Sockets – Remote Method Invocation.

UNIT –IV

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet,

JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading

Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses,

Using Cookies-Session Tracking, Security Issues.

UNIT-V

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP

Application Design with MVC Setting Up and JSP Environment: Installing the Java Software

Development Kit, Tomcat Server & Testing Tomcat

Prescribed Textbooks

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech

(units I, II)

2. Java Programming with JDBC ;Donald Bales, O'Reilly (Unit III)

3. Java Network Programming, elliotte Rusty Harold, 3rd Edition, O'Reilly (Unit III)

4. Java Server Pages – Hans Bergsten, SPD O'Reilly (Unit IV)

Reference Textbooks

1. Robert W. Sebesta, "Programming the World Wide Web", Third Edition, Pearson Education

(2007).

2. Anders Moller and Michael schwartzbach, "An Introduction to XML and Web Technologies",

Addison Wesley (2006)

3. Jeffrey C. Jackson, "Web Technologies – A Computer Science Perspective", Pearson Education

(2008).

4. H.M.Deitel, P.J.Deitel, "Java How to Program", Sixth Edition, Pearson Education (2007)

MCS-1.2.2 DATABASE MANAGEMENT SYSTEMS

UNIT - I

Introduction Data Base system applications, Focus of data base systems, view of Data, Data base languages, relational data bases, Data base design, Data storage and query, Transaction management. Data base design and Entity-Relationship model: Overview of the design process, Entity-Relationship model, constraints, Entity- Relationship diagrams, Entity-Relationship design issues, Weak Entity sets.
Relational Model:Structure of relational databases, Fundamental Relational Algebra operations, Modification of the database, Extended Relational Algebra Operations, Null Values.

UNIT - II

SQL:Background, Data definition, Basic structure of SQL queries, set operations, aggregate Functions, null values, Nested sub queries, views, complex queries, modification of the database, joined relations.
Advanced SQL:
SQL data types and schemas, Integrity constraints, Authorization, Embedded SQL, Dynamic SQL

UNIT - III

Storage and File Structure:Overview of physical storage media, Magnetic disks, RAID, Tertiary storage, storage access, file organization, Organization of records in files, data dictionary storage. Indexing and Hashing:Basic Concepts, ordered indices, B+ tree index files, B-tree index files, static hashing, dynamic hashing, compression of ordered indexing & hashing, index definition in SQL, Multiple key Access.

UNIT – IV

Relational database design:

Features of good relational design, Atomic domains and First Normal form, Decomposition using functional dependencies, functional dependency theory, Decomposition using functional dependencies, Decomposition using Multivalued dependencies, more normal forms,database design process, Modeling temporal data.

UNIT - V

Concurrency Control:Lock-based protocols, Timestamp-based protocols, validation based

protocols, multiple granularity, Deadlock handling, Concurrency in Index Structure.

Prescribed Book:

Silberschatz, korth, sudarshan - Database system concepts -McGrawHill - 5th edition

Reference:

1.Fundamentals Of Database Systems – Elmasri & Navathe.

2.Database management systems - Raghu Rama Krishnan, McGraw-Hill

3.Database Management Systems – C.J.Date

4.Oracle DBA Certification Exam Guide – Jason S. Couceman Tata

 McGraw Hill Edition 99.

MCS 1.2.3: OPERATING SYSTEMS

UNIT–I:
Introduction : What Operating Systems Do – Computer System Orgranization – Computer system Architecture – Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security –Distributed Systems – Special purpose Systems – Computing Environments.
System Structure: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs –Operating System Design and Implementation – Operating System Structure – Virtual Machine – Operating System Generation – System Boot.
Process Concept : Overview – Process Scheduling – Operations on Processes – Interprocess Communication – Examples of IPC Systems –Communication in Client Server Systems.
UNIT–II:
Multithreaded Programming : Overview – Multithreading Models –Thread Libraries – Threading Issues – Operating System Examples. Process Scheduling: Basic Concepts – Scheduling Criteria –Scheduling Algorithms – Multiple Processor Scheduling – Thread Scheduling. Synchronization: Background – The Critical Section Problem –Peterson's solution – Synchronization Hardware – Semaphores –Classic Problem of Synchronization – Monitors – Synchronization Examples – Atomic Transaction.
UNIT–III:
Deadlocks : System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance –Deadlock Detection – Recovery from Deadlock. Memory Management Strategies: Background – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table –Segmentation – Example: The Intel Pentium. Virtual Memory Management: Background – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing.
UNIT–IV:

File System : File Concept – Access Methods – Directory Structure –File System Mounting – File Sharing – Protection. Implementing File Systems :File System Structure – File System Implementation – Directory Implementation – Allocation Methods –Free Space Management – Efficiency and Performance – Recovery – Log structured File Systems.

UNIT-V

Secondary Storage Structure : Overview of Mass – Storage Structure –Disk Structure – Disk Attachment – Disk Scheduling – Disk Management – Swap Space Management – RAID structure.I/O Systems: Overview – I/O Hardware – Application I/O Interface –Kernal I/O Interface – Transforming I/O requests to Hardware Operations – Streams – Performance.

Prescribed Book:

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. "Operating System Principles", Seventh Edition, Wiley.(Chapters: 1.1 – 1.12, 2.1 – 2.10, 3.1 – 3.6, 4.1 – 4.5, 5.1 – 5.5, 6.1 – 6.9 , 7.1 – 7.7 , 8.1 – 8.7, 9.1 – 9.6, 10.1 – 10.6, 11.1 – 11.8, 12.1 – 12.7, 13.1 – 13.7)

Reference Book:

1. William Stallings, "Operating Systems – Internals and Design Principles", Fifth Edition, Pearson Education (2007)
2. Achyut S Godbole, "Operating Systems", Second Edition, TMH (2007).
3. Flynn/McHoes, "Operating Systems", Cengage Learning (2008).
4. Deitel & Deitel, "Operating Systems",Third Edition, Pearson Education (2008).

MCS 1.2.4: COMPUTER NETWORKS

UNIT – I

Introduction : Uses of Computer Networks: Business Application, Home Applications, Mobile Users – Social Issues. Network Hardware : Local Area Networks – Metropolitan Area Networks – Wide Area Networks –Wireless Networks – Home Networks – Internetworks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection Oriented and Connectionless Services – Service Primitives – The relationship of Services to Protocols. Reference Models: The OSI Reference Model – The TCP/IP Reference Model – A Comparison of OSI and TCP/IP reference Model – A Critique of the OSI Model and Protocols – A Critique of the TCP/IP reference model. Example Networks: The Internet – Connection Oriented Networks:x.25, Frame Relay, and ATM – Ethernet – Wireless LANs

UNIT-II

Physical Layer: Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer – Framing – Error Control – Flow Control. Error Detection and Correction: Error correcting Codes – Error Detecting Codes. Elementary Data Link Protocols : An unrestricted Simplex Protocol – A simplex Stop- and – wait Protocol – A simplex Protocol for a Noisy channel. Sliding Window Protocols: A one-bit sliding Window Protocol –A Protocol using Go Back N – A Protocol using selective Repeat. Example Data Link Protocols: HDLC – The Data Link Layer in the Internet.

UNIT – III

The Medium Access Control Sublayer : Ethernet : Ethernet Cabling –Manchester Encoding – The Ethernet MAC sublayer Protocol – The Binary Exponential Backoff Algorithm – Ethernet

Performance –Switched Ethernet – Fast Ethernet – Gigabit Ethernet – IEEE 802.2: Logical Link Control – Retrospective on Ethernet. Wireless Lans: The 802.11 Protocol Stack - The 802.11 Physical Layer - The 802.11 MAC sublayer Protocol - The 802.11 Frame Structure. Bluetooth: Bluetooth Architecture – Bluetooth Applications – The Bluetooth Protocol Stack – The Bluetooth Radio Layer – The Bluetooth Baseband Layer – The Bluetooth L2CAP layer – The Bluetooth Frame Structure. Data Link Layer Switching: Bridges from 802.x to 802.y – Local Internetworking – Spanning Tree Bridges – Remote Bridges – Repeaters, Hubs, Bridges, Switches, Routers and Gateways – Virtual LANs.

UNIT – IV

The Network Layer: Network Layer Design Issues : Store – and Forward Packet Switching – Services Provided to the Transport Layer –Implementation of Connectionless Services – Implementation of Connection Oriented Services –Comparison Of Virtual Circuit and Datagram subnets. Routing Algorithms : The Optimality Principle –Shortest Path Routing – Flooding – Distance Vector Routing – Link State Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Routing for Mobile Hosts. Internet Working : How Networks Differ – How Networks can be connected – Concatenated Virtual Circuits – Connectionless Internetworking – Tunneling – Internet work Routing – Fragmentation. The Network Layer in the Internet: The IP Protocol – IP address – Internet Control Protocols – OSPF – The Internet Gateway Routing Protocol – BGP – The Exterior Gateway Routing Protocol.

The Transport Layer: The Transport Service: Services provided to the Upper Layers – Transport Services Primitives – Berkeley Sockets. Elements of Transport Protocols : Addressing – Connection Establishment – Connection Release – Flow Control and Buffering –Multiplexing – Crash Recovery. The Internet Transport Protocols :UDPIntroduction to UDP – Remote Procedure Call – The Real Time Transport Protocol. The Internet Transport Protocols: 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 – TCP Timer Management – Wireless TCP and UDP – Transactional TCP.

UNIT – V:

The Application Layer: DNS : The Domain Name System : The DNS Name Space – Resource Records – Name Servers. Electronic Mail : Architecture and Services –The User Agent – Message Formats –Message Transfer – Final Delivery. The World Wide Web: Architecture Overview – Static Web Documents – Dynamic Web Documents – HTTP – The Hyper Text Transfer Protocol – Performance Enhancements – The Wireless Web. Multimedia: Introduction to Digital Audio – Audio Compression – Streaming Audio – Internet Radio – Voice Over IP –Introduction to Video – Video Compression – Video on Demand.

Prescribed Book:

Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, PHI.

Chapters: 1.1 to 1.6, 2.2, 3.1 to 3.4, 3.6, 4.3, 4.4, 4.6,

 4.7, 5.1, 5.2.1 to 5.2.9, 5.5, 5.6.1 to 5.6.5,

 6.1.1 to 6.1.3, 6.2, 6.4, 6.5, 7.1 to 7.4

Reference Books:

1. James F.Kurose, Keith W.Ross, "Computer Networking",
 Third Edition, Pearson Education
2. Behrouz A Forouzan, "Data Communications and Networking",
Fourth Edition, TMH (2007)
3. Michael A. Gallo, William M. Hancock, "Computer Communications
and Networking Technologies", Cengage Learning (2008)

MCS 1.2.5: DESIGN & ANALYSIS OF ALGORITHMS

Unit I

Introduction to Computer Algorithms- Algorithm Specification, Performance Analysis, Randomized algorithms Elementary Data Structures- Stacks and Queues, Tree, Dictionaries, Priority Queues, Sets and Disjoint Set Union, graphs

Unit - II

Divide - And – Conquer - General Method, Binary Search, Maximum and Minimum, Merge Sort, Quick Sort, Selection, Strassen's Matrix Multiplication, Convex Hull.

Unit-III

The Greedy Method - Knapsack Problem, Tree vertex splitting, Job sequencing, with dead lines, Minimum-cost spanning trees, Optimal storage on tapes, Optimal merge pattern, Single source shortest paths.

Unit-IV

Dynamic Programming - General method, Multistage graph, All pairs shortest path,Single-source shortest path, Optimal Binary search trees, String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem, Flow shop scheduling.Basic Traversal and Search Techniques - Basic traversal & search techniques - Techniques for binary trees, techniques for graphs, connected components & spanning trees, Biconnected components & DFS.

Unit-V

Backtracking - Back tracking - The General Method, The 8-Queens Problem, Sum of subsets, Graph coloring, Hamiltonian cycle, Knapsack problem.Branch and Bound - The method, 0/1 Knapsack problem, Traveling salesperson, Efficiency considerations.

Prescribed Book:

L Ellis Horwitz, Sartaj Sahani , 'Fundamentals of Computer Algorithms', Universities Press, The following topics in the prescribed book Topics 1,2,3,4,5,6,7,8

Reference Books:

1. Bases S. & Gelder A.V - computer Algorithms,Addision Wesley(200)

2. Cormen TH et al - Introduction to Algorithms, PHI(2001)

3. Brassard & Bralley - Fundamentals of Algorithms, PHI(2001)

MCS 1.2.6: WEB TECHNOLOGIES LAB

1.Develop and demonstrate a HTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the <span> tag.

2. Write HTML code to provide intra document linking.

3. Create a form with the following specifications:

a) Our form uses frames, one to hold the links bar at the top

of the browser window.

b) Other is a larger frame that provides the main view.

c) The links bar should contain 5 links, which when clicked,

should display the appropriate HTML file in the larger frame.

4. to create a webpage with the following using html

a. to embed an image in web page

b. to fix the hot spots

c. show all the related information when a hot spot is

5. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.

6. Create a HTML form that has number of Textboxes. When the form clicked in the map

runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.

7. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)

8. Write a JavaScript code to find factorial of N. (Use recursive function)

9. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.

10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the images. Use the onMouseOver and onMouseOut event handlers.

11. Design an XML document to store information about a student in an engineering college affiliated to ANU. The information must include college id, Name of the College, Brach, Year of

Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

12. Create an XML document, which contains 10 users information. Implement a program, which takes User Id as an input and returns the user details by taking the user information from the XML document

13. write a program for implementing student information using XML

14. write a java program to illustrate java to database connectivity using JDBC

15. Write a program to print the Fibonacci numbers using RMI.

16. Write a program using RMI to access the database using the primary key value and return the data to the client.

17. Write a html program for invoking servlet from applet

18. write a java servlet program to conduct online examination and to display student mark list available in a database

19. Create a java program to create an airline reservation service and a travel agent and the travel agent is searching for an airline using web services and database.

20. Write a JSP program to calculate income tax, login and data capture.

MCS 1.2.7: DBMS LAB

SECOND YEAR – SEMESTER-I

PAPER CODE	SUBJECTS	CATEGORY	CREDITS	INTERNAL MARKS	EXTERNAL MARKS	MAX MARKS
MSC 2.1.1	Python Programming	Core	4	25	75	100
MSC 2.1.2	.Net Programming	Core	4	25	75	100
MSC 2.1.3	Object Oriented Modeling & Design using UML	Core	4	25	75	100
MSC 2.1.4/2.1.5	Distributed Systems /Microprocessors & Interfacing	Core	4	25	75	100
MSC 2.1.6/2.1.7	Cryptography & Network Security / Computer Graphics	Core	4	25	75	100
MSC 2.1.8	Python Programming Lab	Core	2	25	50	75
MSC 2.1.9	.Net Programming Lab	Core	2	25	50	75
	MiniProject		2	50		
	Skill Development Course-3		2	25	75	100
	MOOC		2			
	Total		30	200	550	750

MCS 2.1.1: PHYTHON PROGRAMMING

UNIT I

Introduction: The Process of Computational Problem Solving, Python Programming Language, Python Data Types: Expressions, Variables and Assignments, Strings, List, Objects and Classes, Python Standard Library, Imperative Programming: Python programs, Execution Control

Structures, User-Defined Functions, Python Variables and Assignments, Parameter Passing. -

UNIT II

Text Files: Strings, Formatted Output, Files, Errors and Exception Handling, Execution and Control Structures: if Statement, for Loop, Two Dimensional Lists, while Loop, More Loop Patterns, Additional Iteration Control Statements, Containers and Randomness: Dictionaries, Other Built-in Container Types, Character Encoding and Strings, Module random, Set Data Type.

UNIT III

Object Oriented Programming: Fundamental Concepts, Defining a New Python Class, User-Defined Classes, Designing New Container Classes, Overloaded Operators, Inheritance, User-Defined Exceptions, Namespaces: Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces.

UNIT IV

Objects and Their Use: Software Objects, Turtle Graphics, Modular Design: Modules, Top-Down Design, Python Modules, Recursion: Introduction to Recursion, Examples of Recursion, Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.

UNIT V

Numerical Computing in Python: NumPy, Vectorized Algorithms, Graphical User Interfaces: Basics of tkinter GUI Development, EventBased tkinter Widgets, Designing GUIs, OOP for GUI, The Web and Search: The World Wide Web, Python WWW API, String Pattern Matching, Database Programming in Python

TEXT BOOK

Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", Wiley, 2012.

REFERENCES

Charles Dierbach, "Introduction to Computer Science Using Python: A Computational Problem-Solving Focus", Wiley, 2013.

MCS 2.1.2: .NET PROGRAMMING

UNIT-I:

Visual basic 2005: Getting started with Visual Basic 2005: Arithmetic Operators, Data type, Statements, Control Statements, Loops, Arrays,   Structures,Val and Structure functions, Creating Visual studio Applications, Saving Visual Basic 2005 Application. Object Oriented Programming: Basic Principles of Object Oriented Programming, Member Access Modifiers, Define Class,Creating Objects, Constructors, Inheritance, Abstract Classes, Interfaces, Polymorphism Windows Forms: Introduction to the windows forms, Setting the title Bar Text, Minimizing and Maximizing a form, Setting initial position of a form, Working with multiple

forms, Creating adding controls to a form, Setting controls Tab order, Naming Controls, Setting Properties at design time, Setting properties at run time, Creating a message box, Creating a Input box, Creating MDI Applications, Creating Dialog box, Commenting the code Label, TextBox, Button, ComboBox and ListBox Controls: Label Control, Button Control, ComboBox Control, ListBox Control, Project Panel, PictureBox, Progress Bar and Timer Controls: Panel Control, Picture box Control, Progress Bar Control, Timer Control, Project Checkbox, radio button, and group box controls :Checkbox control,Radio button control, Progress bar control, Timer control, Project. Menus, built-in dialog box, printing and tree view controls:Menus, Folder Browser Dialog Control, Open File Dialog Control Save File Dialog Control, Font File Dialog Control, Color File Dialog Control, Print Document Control, Tree View Control, Project Mouse Events and Keyboard Events: Mouse Events, Keyboard Events Handling Errors and Exceptions: Errors, Exceptions

UNIT-II : ASP.NET 2.0 ASP.NET 2.0 Essentials: Introduction to Asp.NET, Benefits of Asp.NET, What's new Asp.NET?, Introduction Asp.NET 2.0 IDE Developing a Web Application :HTML, DHTML, PHP, JSP, PERL, ASP.NET 2.0 Provider Model, ASP.NET 2.0 Coding Model, Code Sharing, Compilation in ASP.NET Standard Controls: Introduction to standard controls, Label 50 Control, TextBox Control, Button Control, Image Button Control ListBox Control, Radio Button Control Navigation Controls: Introduction to Navigation Controls, Site Map Path Controls, Menu Controls, Tree View Controls Validation Controls: Introduction to validation control, Base validator class, Required field validator control, Range validator control, Regular Expression validator control, Compare validator control, Custom validator control, Validation summary control Login controls: Introduction to login controls, Login control Login view control, Login name control, Login status control Password recovery control Master pages and Themes:Need for Master Pages and Themes, Creating a Simple Master Page, Creating a Nested Master Page

Themes, Creating Themes, Applying Themes on controls at Run time

UNIT-III: C# 2005 Introduction to Visual C# 2005:Introduction, Features of Visual C# 2005, Creating Visual C# 2005, Key words, Identifiers, Data Types, Variables, Scope of Variables, Constants, Operators Operator Precedence and Associativity, Expressions, Punctuators Control Statements, Loops, Interrupting Loops using Jump Statements, Creating Arrays, Creating Enumerations, Creating Structures, Methods Object Oriented Programming : Basic Principles of Object Oriented Programming, Member Access Modifiers, Defining a Class, Creating Objects, Constructors, Static Members, Inheritance, Abstract Class, Interfaces, Polymorphism, Operator Overloading

Windows Forms : Introduction to Windows form, Setting the title bar Text, Minimizing or Maximizing a forms, Working with multiple Forms, Setting the startup form, Adding controls to a form, Setting controls Tab order, Setting properties at Design time, Setting properties at Run time, Showing and Hiding controls and Forms, Creating a message box, Commenting the code, Handling Events. Label, TextBox, Button, ComboBox and ListBox Controls:Label Control, TextBox Control, Button Control, ComboBox Control ListBox Control, Project Panel, PictureBox,

Progress Bar and Timer Controls: Panel Control, Picture box Control, Progress bar Control, Timer Control Project Checkbox, Radio button and Group box controls :Checkbox control, Radio button control,GroupBox Control, Project Menus, built-in dialog box, printing and tree view controls:Menus, Folder Browser Dialog Control, Open File Dialog Control Save File Dialog Control, Font File Dialog Control, Color File Dialog Control, Print Document Control, Tree View Control, Project Mouse Events and Keyboard Events: Mouse Events, Keyboard Events Handling Errors and Exceptions: Errors, Exceptions

UNIT-IV : ADO.Net & Data Binding : Accessing Data using ADO.NET (C# 2005): What are Databases? Basic SQL Statements, Working with ADO.NET, Overview of ADO.NET Objects Data Grid View Control, Accessing Data using Server Explorer, Creating a new data connection, Accessing data using data adaptors and data sets, Previewing data from data adaptors Connecting to an MS Jet database

Data Binding(C# 2005): Introduction, Simple Data Binding, Complex Data Binding, Implementing Data Binding, Project Working with Databases (ASP.NET 2.0): What are Databases?, Working with ADO.NET, Overview of ADO.NET Objects, Basic SQL statements, ASP.NET 2.0 data display controls, ASP.NET 2.0 data source controls, Accessing data with server explorer, Creating a web applications using data display controls

UNIT – V:

Accessing data using ADO.NET (Visual Basic 2005): What are Databases?, Basic SQL statements, Working with ADO.NET, Overview of ADO.NET objects, Data Grid View Control, Accessing data using server explorer, Creating a new data connection, Accessing data using Data Adapters and Datasets, Previewing data from Data Adapters, Connecting to an MS Jet database Data Binding (Visual Basic 2005): Introduction, Simple Data Binding, Complex Data Binding, Implementing Data Binding, Project

Prescribed Book:

Vikas Gupta, ".Net Programming", Dream Tech (2008).

Chapters :

UNIT – I - 1 to 8, 11 chapters in Visual Basic 2005

UNIT – II – 1 to 7, 9 chapters in ASP.NET 2.0

UNIT – III – 1 to 8, 11 chapters in C# 2005

UNIT – IV – 9, 10 chapters in Visual Basic 2005

8 chapter in ASP.NET 2.0

9, 10 chapters in C# 200552

Reference Books:

1. Xue Bai, Michael Ekedah, "The Web Warrior Guide to Web

Programming", Thomson (2006).

2. Kogent Solutions Inc.,".Net Programming", Black Book,

 Dream Tech (2008).

3. Joe Duffy, "Professional.Net Programming 2.0", Wiley.

4. George Stepherd, "ASP.NET 3.5 Microsoft", PHI (2008)

MCS 2.1.3: OBJECT ORIENTED MODELING AND DESIGN USNG UML

Unit-I

Introduction: what is Object Orientation, What is OO Development, OO Themes, Evidence for Usefulness of OO Development.Modeling as Design Technique: Modeling, Abstraction, Three Models

Class Modeling: Object and Class Concepts, Link and Association concepts, Generalization and Inheritance, A Sample Class Model.

Advanced Class Modeling: Advanced Object and Class Concepts, Association Ends, N-Ary Association, Aggregation, abstract Classes, Multiple Inheritance, Metadata, Reification, Constraints, Derived data, Packages.

Unit-II

State Modeling: Events, States, Transitions and Conditions, state diagrams, state diagram behavior.

Advanced State Modeling: Nested State Diagrams, Nested states, signal generalization, concurrency, A Sample State Model.

Interaction Modeling: Use Case Models, Sequence Models, Activity Models.

Advanced Interaction Modeling: Use Case Relationships, Procedural Sequence Models, Special Constructs for Activity Models.

Unit-III

Process Overview: Development Stages, Development Life Cycle.

System Conception: Devising a system Concept, Elaborating a Concept, Preparing a Problem Statement.

Domain Analysis: Overview of analysis, Domain Class Model, Domain State model, Domain Interaction Model, Iterating the Analysis.

Application Analysis: Application Interaction Model, Application Class Model, Application State Model, Adding Operations.

Unit-IV

System Design: Overview of system Design, Estimating Performance, Making a Reuse Plan, Breaking a System into Subsystem, Identifying Concurrency, Allocation of Subsystems, Management of data storage, Handling Global Resources, Choosing a Software Control Strategy, Handling Boundary Conditions, Setting Trade-off priorities, Common Architecture of ATM System.

UNIT-V

Class Design: Overview of Class Design, Realizing Use Cases, Designing Algorithms, Recursing Downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of Inheritance, Organizing a class design.

Implementation Modeling: Overview of Implementation, Fine Tuning classes, fine tuning Generalization, Realizing Associations, Testing.

Programming Style: Object Oriented Style, Reusability, Robustness, Extensibility, Programming-in the Large.

Prescribed Book:

Michael Blaha, James Rumbaugh, "Object Oriented Modeling and Design with UML", Second Edition, PHI.

Chapters : 1.1 to 1.4, 2, 3.1 to 3.4,4, 5, 6.1 to 6.5, 7, 8, 10, 11, 12, 13, 14, 15, 17, 20

Reference Books:

1. Meilir Page-Jones, "Fundamentals of Object Oriented Design in

UML", Pearson Education (2008).

2. Hans-Erik Eriksson, "UMLZ Took Kit", Wiley (2008).

3. Pascal Roques, "Modeling Software Systems Using UML2",

Wiley (2008).

4. Simon Benett, Steve Mc Robb, "Object Oriented Systems Analysis

and Design using UML", Second Edition, TMH (2007).

5. Mark Priestley, "Practical Object Oriented Design with UML",

Second Edition, TMH (2008).

6. Grady Booch, James Rumbaugh "The Unified Modeling Language

User Guide", Pearson (2008).

MCS 2.1.4: DISTRIBUTED SYSTEMS

UNIT – I:

Characterization of Distributed systems: Introduction, Examples of Distributed systems, Resource Sharing and the Web, Challenges.System Models: Introduction, Architectural Models – software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models –Interaction Model, Failure Model, Security Model.

UNIT – II:

Inter process Communication: Introduction, The API for the Internet Protocols – The characteristics of Inter process communication, sockets, UDP diagram communication. TCP stream communication; External data representation and marshalling; client server communication; group communication – IP multicast – an implementation of group communication, reliability and ordering of multicast.

UNIT – III:

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects – Object Model, Distributed Objects Modal, Design Issues for RMI, Implementation of

RMI, Distributed Garbage Collection; Remote Procedure Calls, Events and Notifications, Case study: JAVA RMI Operating Systems Support: Introduction, The Operating System Layer, Protection, Processes and Threads – Address Space, Creation of a New Process, Threads.

UNIT – IV:

Distributed File Systems: Introduction, File service Architecture; Peer – to – peer systems; Introduction, Napster and its Legacy, peer – to – peer Middleware, Routing Overlays.Coordination and Agreements: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

UNIT -V

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; ReplicationIntroduction, passive (Primary) Replication, Active Replication.

TEXT BOOKS:

1. Ajay D Kshemkalyani, Mukesh Sighal, "Distributed Computing,

Principles, Algorithms and Systems", Cambridge.

2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed

Systems – Concepts and Design", Fourth Edition, Pearson

Publication.

MCS 2.1.5: MICROPROCESSOR AND INTERFACING

UNIT - I

Introduction : Overview of Microcomputer Systems: Hardware –Software, Addresses – General Operation of a Computer –Microprocessors in Digital System Design.8086 Architecture: CPU Architecture – Internal Operation , Machine Language Instruction: Addressing modes – Instruction Formats.

UNIT-II

Assembler Language Programming: Assembler Instruction Format – Data Transfer Instructions , Arithmetic Instructions: Binary Arithmetic –Packed BCD Arithmetic – Unpacked BCD Arithmetic, Branch Instructions: Conditional Branch Instructions - Unconditional Branch Instructions, Loop Instructions – NOP and HLT Instructions – Flag Manipulation Instructions – Logical Instructions – Shift and Rotate Instructions , Directives and Operators: Data Definition and Storage allocation – Structures – Records – Assigning Names to Expressions –Segment Definitions – Program Termination – Alignment Directives –Value returning attribute operators.

UNIT - III

Modular Programming: Linking and Relocation: Segment Combination –Access to External Identifiers, Stacks , Procedures: calls, returns, and Procedure Definitions – Saving and Restoring Registers –Procedure Communication – Recursive Procedures, Interrupts and Interrupt Routines, Macros: ASM-86 Macro Facilities – Local Labels –Nested Macros – Controlled Expansion and Other Functions.I/O Programming: Fundamental I/O Considerations – Programmed I/O –Interrupt I/O – Block Transfers and DMA.

UNIT - IV

System Bus Structure: Basic 8086/8088 Configurations: Minimum Mode – Maximum Mode, System Bus Timing, Interrupt Priority Management: Interrupt System Based on a Single 8259A.

I/O Interfaces: Serial Communication Interfaces: Asynchronous Communication – Synchronous Communication – Physical Communication Standards – 8251A Programmable Communication Interface, Parallel Communication: 8255A Programmable Peripheral Interface - A/D and D/A

Example, Programmable Timers and Event Counters: Intel's 8254 Programmable Interval Timer – Interval Timer Application to A/D, DMA Controllers.

UNIT - V

Advanced Microprocessors: The 80386 : Introduction – Operating Modes – Processor Model – Programming Model, The 80486 : Introduction –Processor Model – Programming Model, The Pentium : Introduction –Processor Model – Programming Model – The Pentium Evolves – The

Pentium MMX, The P6 Processors : Introduction – Overview – Processor Model – New Architectural Features.

Prescribed Books :

1. Yu-Cheng Liu, Glenn A Gibson, "Microcomputer Systems: The 8086/8088 Family", Second Edition, Pearson Education (2008)Chapters : 1.1, 1.3 – 1.5, 2.1 - 2.3, 3.1 – 3.10, 4.1 – 4.5,

 6.1 – 6.4, 8.1 – 8.2, 8.3.1, 9.1.1, 9.1.2, 9.1.4, 9.2, 9.3, 9.5

2. John Uffenbeck, "The 80x86 Family Design, Programming and Interfacing", Third Edition, Pearson Education(2006) Chapters: 3.3, 3.5 – 3.7

Reference Book:

1. Douglas V Hall, "Microprocessors and Interfacing",Second Edition, TMH

2. N.Mathivanan, "Microprocessors, PC Hardware and Interfacing", PHI(2007).

3. Kenneth J.Ayala, " The 8086 Microprocessor : Programming & Interfacing The PC", Cengage Learning (2008)

4. Barry B.Brey, "The Intel Microprocessors", Seventh Edition, PHI

MCS 2.1.6: CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

Introduction SecurityTrends,OSI security Architecture ,security attacks,security services, security mechanisms,A model for network security

UNIT II

Conventional Encryption : Classical Techniques Symmetric cipher model ,substitution techniques ,transposition techniques,rotor machines ,steganography

Conventional Encryption : Modern Techniques Block cipher principles,DES,strength of DES,Differential and linear cryptanalysis ,Block cipher design principles

UNIT III

Confidentiality using Symmetric encryption   Placement of encryption function,traffic confidentiality,key distribution,random number generation Public - key cryptography & RSA Principles of Public key crypto systems ,RSA algorithm ,Key management ,Diffie Hellman key exchange ,elliptic curve cryptography

UNIT IV

Message authentication and Hash functions Authentication requirements , Authentication functions,Message Authentication codes,Hash functions,Security of MAC's and hash functions Digital signatures and Authentication Protocols Digital signatures , Authentication Protocols,DSS

UNIT V

Electronic Mail Security : PGP, S/MIME IP Security :IP Security Overview, IP Security architecture,Authentication header,encapsulating security payload,combining security associations,key management.

Fire Walls :Firewall design principles ,trusted systems

Prescribed Book:

William Stallings : Cryptography & Network Security Principles

and Practices 4th Edition Pearson Education

Chapters : 1,2,3,7,8,9,10,11,13, 15, 16, 20

Reference Books:

Bruce Schneier - Applied Cryptography - Wiley - second edition

Davies & Price : Security for computer Networks, Wilsey (1984)

MCS 2.1.7: COMPUTER GRAPHICS

UNIT - I

Introduction - Nature & types of computer graphics, features of computer graphics, computer aided design, entertainment, visualization, image processing, graphical user interfaces Overview of Graphics Systems - Video Display Devices, Refresh Cathode Ray tubes, Raster scan displays, Random scan displays, color CRT monitors, Raster scan systems, random scan systems, graphics monitors and workstations, input devices, hard copy devices, graphics software

UNIT-II

Output Primitives and Attributes - Points and lines, Line Drawing algorithms - DDA, Bresenhams, Circle generating algorithm, ellipse generating algorithm, pixel addressing, filled area primitives - inside - outside tests, boundary fill, flood fill, scan line polygon fill algorithm, character generation, antialiasing

Unit - III

Two Dimensional Geometric Transformations and Viewing - Basic transformations, matrix representation and homogeneous coordinates, composite transformations, other transformations, viewing pipeline, window to viewport coordinate transformation, clipping operations, line clipping - cohen sutherland line clipping, polygon clipping - sutherland hodgeman polygon clipping

Unit - IV

Graphical User Interfaces & Interactive Input Methods - Input of graphical data, logical classification of input devices, input functions, input modes, interactive picture construction techniques.3D Concepts and Object Representations :- 3D display methods, parallel projection, perspective projection, visible line and surface identification, polygon surfaces.

UNIT – V

3D Geometric & Modeling transformations:- Translation, Rotation, Scaling, Other Transformations, Composite transformations, Modelling & coordinate transformations, parallel projection, perspective projection.Visible surface detection methods - Classification of visible surface detection methods, Backface detection, Depth buffer method, Scanline method, Depth sorting method, Area subdivison method.

Text Book:

Donald Hearn & Pauline M.Baker - Computer Graphics - 2nd Edition-PHI

Reference Book:

Foley, Van Dam, Feiner and Hughes, Computer Graphics, Principles and Practice - 3rd Edition, 1999

N.Krishnamurthy - Introduction to Computer Graphics

MCS 2.1.8: PHYTHON PROGRAMMING LAB

Simple Programs

1. Write a program using print Pascal triangle.

2. Write a program to find out the roots of the quadratic equations.

3. Write a program to display the Fibonacci series using generators.

4. Write a program to check the given number is palindrome or not.

5. Write a program to find the sum of digits of a given number

6. Write a Python program to remove the punctuations from a string.

7. Write a Python program to implement the simple calculator.

8. Write a Python program to print the lower and upper triangles of a matrix.

9. Write a Python program to merge two mails.

Functions

1. Write a recursive Python function that has a parameter representing a list of integers and returns the maximum stored in the list.

2. Write a recursive Python function to that generates the top 20 even prime numbers in the range 1 to 1000.

3. Write a python function to calculate the multiplication of two matrices.

4. Write a Python function to reverse the given string.

5. Write a Python function that takes an integer n and a character

c, returns a string and displays as "xxxxx" (Ex: the length of the retuned string is 5, then the output as XXXXX)

6. Write Python function that the search the given number in the list of numbers by using binary search.

7. Write a Python function to convert the given decimal number into binary number by using recursion.

8. Write a Python function to sort the list of records in a file.

GUI Programs

1. Construct a GUI application to generate the employee pay slip

2. Construct a GUI application to generate a Bar Graph for a excel data

3. Construct a GUI application to perform the Arithmetic operations

   Read Input Values through input window

   Choose choice and Operation through following windows

```
Choice                    Operations
1. Integer                   1. Addition
   Arithmetic                2. Subtraction
2. Real                      3. Multiplicat
   Arithmetic                   ion
                             4. Division
```

Display the result in Message Box.

MCS 2.1.9: .NET PROGRAMMING LAB

CURRICULUM STRUCTURE FOR CHOICE BASED CREDIT SYSTEM (CBCS)

(W.E.F. 2020-21 ADMITTED BATCH)

SECOND YEAR – SEMESTER-II

PAPER CODE	SUBJECTS	CATEGORY	CREDITS	INTERNAL MARKS	EXTERNAL MARKS	MAX MARKS
MSC 2.2.1	Data Mining And Big Data	Core	4	25	75	100
MSC 2.2.2/2.2.3	Embedded systems / Cloud Computing	Core	4	25	75	100
MSC 2.2.3/2.2.4	Artificial Intelligence /Mobile Computing	Core	4	25	75	100
MSC 2.2.5	Project	Core	10	25	75	100
	Total		22	100	300	400

MCS 2.2.1: DATA MINING AND BIG DATA

Unit – I

Data Warehouse and OLAP Technology: An Overview: What is Data Warehouse? - A Multidimensional Data Model - Data warehouse Architecture - From Data Warehousing to Data Mining

Data mining – Introduction, Data mining on what kind of data , Data mining functionalities classification of Data mining systems, Major issues in Data mining

Unit – II

Mining Association rules in large databases - Association rule mining, Mining single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses

UNIT-III

Classification and Prediction - Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy

Unit – IV

Cluster analysis – Introduction types of data in cluster analysis a categorization of major clustering methods portioning methods, hierarchical methods, Density based methods,: DBSCAN, Grid-based method : STRING , Model based clustering method: Statistical Approach, outlier analysis.

Unit – V

Big Data: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications.

Hadoop: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read., Hadoop MapReduce paradigm. Writing Hadoop MapReduce Programs

Prescribed TextBooks:

1. Jiawei Han Micheline Kamber, "Data mining & Techniques", Morgan

Kaufmann publishers

2. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional

Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

3. Chris Eaton, Dirk deroos et al. , "Understanding Big data ",

McGraw Hill, 2012.

4. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.

MCS 2.2.2: EMBEDDED SYSTEMS

UNIT- I

Introduction.:Embedded system overview,Design challenges,Processor technology.,IC technology,Design technology,Trade offs.Custom single purpose processors: Hardware:Introduction, Combinational logic, Sequential logic, Custom single purpose processor

design,RT-level custom single purpose processor design, Optimizing custom single purpose processor design.

UNIT- II

General purpose processors : Software : Introduction, Basic architecture, Operation, Programmer's view, Development environment, Application specific instruction set processors, Selecting a microprocessor, General purpose processor design Standard single purpose processors: Peripherals: Introduction, Timers, Counters, Watchdog timers, UART, Pulse width modulators, LCD controllers, Keypad controllers, Stepper motor controller, Analog to digital converters, Real time clocks.

UNIT- III

Memory: Introduction, Memory write ability and storage permanence, Common memory types, Composing memory, Advanced RAM

UNIT-IV

Interfacing: Introduction, Communication basics, Microprocessor interfacing –I/O addressing, Microprocessor interfacing –Interrupts, Microprocessor interfacing – DMA, Arbitration, Multi

level bus architectures, Advanced communication principles, Serial protocols, Parallel protocols, Wire less protocols

Unit V

Digital camera example: Introduction, Introduction to simple digital camera, Requirements specifications, Design State machine and concurrent process models: Introduction, Models Vs

languages, text Vs graphics, An introductory example, A basic state machine model-FSM, Finite state machine with data path model-FSMD, Using state machine, HCFSM and stack charts languages, Program state machine model –PSM, The role an appropriate model and language,

Concurrent process model, Concurrent processes, Communication among the processes, Synchronization among the processes, Implementation, Data flow model, Real time systems

Prescribed Book:

Frank Vahid / Tony Givargis, "Embedded System Design", Third edition, Wiley (2008).

Chapters : 1 to 8.

Reference book:

 Raj Kamal, "Embedded Systems", Second Edition , TMH (2008).

MCS 2.2.3: CLOUD COMPUTING

UNIT-I

Introduction: Cloud computing at a glance, Historical Developments, Building Cloud Computing

Environments, Computing Platforms and Technologies.Principles of Parallel and Distributed Computing: Eras of Computing, Parallel Vs Distributed computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing.

UNIT-II

Virtualization: Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

Cloud Computing Architecture: Introduction, Cloud reference model, Types of clouds, Economics of the cloud, open challenges.

UNIT-III

Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container,

Building Aneka Clouds, Cloud programming and Management.

Concurrent Computing: Thread Programming : Introducing Parallelism for Single machine Computation, Programming Application with Threads, Multithreading with Aneka, Programming Applications with Aneka Threads.

UNIT-IV

High- Throughput Computing: Task Programming: Task Computing, Task-based Application

Models, Aneka Task-Based Programming.

Data Intensive Computing: Map-Reduce Programming: What is Data-Intensive Computing, Technologies for Data-Intensive Computing, Aneka MapReduce Programming.

UNIT-V

Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Observations.

Cloud Applications: Scientific Applications, Business and Consumer Applications.

Advanced Topics in Cloud Computing: Energy Efficiency in Clouds, Market Based Management of Clouds , Federated Clouds/ InterCloud, Third Party Cloud Services.

Prescribed Book:

Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing", Mc Graw

Hill Education.

REFERENCES:

1. Michael Miller, "Cloud Computing", Pearson Education, New

2. Haley Beard, Cloud Computing Best Practices for Managing and MeasuringProcesses for Ondemand Computing, Applications and Data Centers in theCloud with SLAs, Emereo Pty

Limited, July 2008.

3. Cloud Application Architectures, George Reese, ISBN: 8184047142,Shroff/O' Reilly, 2009.

MCS 2.2.4: ARTIFICIAL INTELLIGENCE

UNIT -I

What is Artificial Intelligence,AI Problems, ,AI Technique,Defining problem as a state space search,production systems, problem characterstics, production system characterstics.

UNIT-II

Heuristic search techniques:Generation and test - Hill climbing - Best-first search - problem reduction – constraint satisfaction - means–ends analysis.

UNIT III

Knowledge Representation :Issues ,using predicate logic, resoulution,forward versus backward

reasoning, matching, control knowledge.Symbolic reasoning under uncertainity:Introduction to nonmonotonic reasoning,augmenting a problem solver, implementation of depth first search and breadth first search.

UNIT IV

Weak slot-and-filler structures:semantic nets, frames.strong slot-and-filler structures:

conceptual dependency, scripts.

UNIT V

Natural Language Processing:syntatic processing,augmented transition networks,semantic analysis,case grammars.

Common sense: Qualitative physics, commonsense ontologies, memory organization, case based reasoning.

Expert systems - representing using domain knowledge-expert system shell.

Prescribed Book:

Rich E & Knight k : Artificial Intelligence TMH(1991)

Reference Book:

Winston P.H : Artificial Intelligence, Addison Wesley (1993)

Russell & Norvig : Artificial Intelligence A Modern approach, Pearson education Asia

Donald A. Waterman A guide to expert systems, Pearson Education India.

MCS 2.2.5: MOBILE COMPUTING

UNIT – I

Introduction: Mobility of bits and bytes, Wireless – the beginning, mobile computing, dialogue control, networks, middleware and gateways, applications and services, developing mobile computing applications, security in mobile computing, standards – why is it necessary, standard bodies, players in the wireless space

UNIT-II

Mobile computing architecture: History of computers, history of Internet, Internet – ubiquitous network, Architecture of mobile computing, three tier architecture, design considerations for mobile computing, mobile computing through Internet, making existing applications mobile – enabled Mobile computing through telephony: Evolution of telephony, multiple access procedure, mobile computing through telephone, developing an IVR application, voice XML, telephony application programming interface (TAPI)

UNIT – III

Emerging technologies: Introduction, Bluetooth, radio frequency identification {RFid}, wireless broadband {WiMAX}, mobile IP, Internet protocol version 6 {IPv6}, java card Global system for mobile communications (GSM): Global system for mobile communications, GSM Architecture, GSM Entities, Call routing in GSM, PLMN Interfaces, GSM Addresses and identifiers, network aspects in GSM, GSM frequency allocation, Authentication and security Short message service (SMS): Mobile computing over SMS, short message services (SMS), value added services through SMS, accessing SMS bearer

UNIT – IV

General packet radio service (GPRS): Introduction, GPRS and packet data network, GPRS network architecture, GPRS network operations, data services in GPRS, applications for GPRS, limitations of GPRS, billing and charging in GPRS Wireless application protocol (WAP): Introduction, WAP, MMS, GPRS applications CDMA and 3G: Introduction, spread – spectrum technology, Is – 95, CDMA Vs GSM, wireless data, third generation networks, applications on 3G

UNIT –V

Wireless LAN: Introduction, wireless LAN advantages, IEEE 802.11 standards, wireless LAN Architecture, mobility in wireless LAN, 90 deploying wireless LAN, mobile Ad Hoc networks and sensor networks, wireless LAN security, Wi- Fi vs. 3G Voice over Internet protocol and convergence: Voice over IP, H.323 frame work for voice over IP, Session initiation protocol (SIP),comparison between H.323 and SIP, real time protocols, convergence technologies, call routing, voice over IP applications, IP Multi media subsystem (IMS), mobile VoIP Security issues in mobile computing: Introduction, information security, security techniques and algorithms, security protocols, public key infrastructure, trust, security models, security frameworks for mobile environment

Prescribed Book:

Asoke K Talukder and Roopa R Yavagal, "Mobile Computing" TMH (2008) Chapters: 1 to 10, 17,18.

Reference Book :

Rajkamal, "Mobile Computing", Oxford (2008).