Syllabus for M.C.A.
(Under Science Faculty)
in affiliated colleges to University of Pune
(To be implemented from Academic year 2014-2015)
Credit Based System
Semester 3 and Semester 4

CA - 301 Design and Analysis of Algorithms

Prerequisites:

1. Data structures.
2. Basic knowledge of Graphs and Algorithms.

Objectives:

1. To provide foundation in algorithm design and analysis
2. Ability to understand and design algorithms in context of space and time complexity.

Syllabus **[Total Lectures=48]**

CHAPTER-1:

Introduction **[5]**

- Definition of Algorithm & its characteristics
- Recursive and Non-recursive Algorithms
- Time & Space Complexity
- Iterative and Recursive Algorithm
- Definitions ofAsymptotic Notations(big-oh, big-omega, big-theta, small theta, small omega)
- Insertion Sort (examples and time complexity)
- Heaps & Heap Sort (examples and time complexity)
- Non-comparison-based Sort: Counting Sort(examples and time complexity)

CHAPTER-2:

Divide and Conquer **[5]**

- Control Abstraction
- Binary Search (recursive)
- Quick Sort (Examples and time complexity)
- Merge sort (Examples and time complexity)
- Comparison between Traditional Method of Matrix Multiplication vs. Strassen's Matrix Multiplication

CHAPTER-3:

Greedy Method **[6]**

- Control abstraction
- Fractional Knapsack problem
- Optimal Storage on Tapes
- Fast Job Sequencing with Deadlines
- Optimal Merge Patterns, Huffman codes
- Concept of Minimum Cost Spanning Tree
- Prim's and Kruskal's Algorithm
  (using both the methods Priority Queue and Set Data Structure)

CHAPTER-4:

Dynamic Programming **[8]**

- The General Method
- Principle of Optimality
- Matrix Chain Multiplication
- 0/1 Knapsack Problem
  i)Merge & Purge
  ii)Functional Method
- Concept of Shortest Path
- Single Source shortest path
  i)Dijkstra's Algorithm
  ii)Bellman Ford Algorithm
- All pairs Shortest Path
  i) Floyd- Warshall Algorithm
- Travelling Salesperson Problem

CHAPTER-5:

Backtracking **[4]**

- General method
- Fixed Tuple vs. Variable Tuple Formulation
- N-Queens Problem (Numerical examples till N=4)
- Sum of Subsets
- Graph Coloring
- Hamiltonian Cycle.

CHAPTER-6:

Branch & Bound **[4]**

- Introduction
- Definitions of LCBB Search
- Bounding Function, Ranking Function
- FIFO BB Search
- Traveling Salesman problem Using Variable tuple
- Formulation using LCBB
- 0/1 knapsack problem using LCBB

CHAPTER-7:

Transform & Conquer: [4]

- The General Method
- Evaluation and Interpolation
- The Fast Fourier Transform
- Horner's Rule
- Binary Exponentiation – Problem Reduction

CHAPTER-8:

Decrease and conquer: [8]

- Definition of Graph Representation of Graph
- By Constant - BFS and DFS, and Insertion
- By Variable Size decrease - Euclid's Algorithm
- By Factor - Binary Search
- Topological Sort/Order
- Strongly Connected Components
- Biconnected Component
- Articulation Point and Bridge edge

CHAPTER-9:

Problem Classification: [4]

- Basic Concepts: Deterministic Algorithm and Non deterministic
- Definitions of P, NP, NP-Hard, NP-Complete problems
- Sorting, Searching and Satisfiability, 0/1 problems discussion
- Cook's Theorem (Only Statement and Significance)
- Max. Clique Decision problem

Reference Books:

1. Book 1- Fundamentals of Computer Algorithms
   Authors - Ellis Horowitz, Sartaz Sahani, Sanguthevar Rajsekaran
   Publication: - Galgotia Publications
2. Book 2 – Introduction to Algorithms (second edition)
   Authors: - Thomas Cormen, Charles E Leiserson, Ronald L.Rivest , Clifford Stein
   Publication: - PHI Publication

Notes: -

- Both the topics from Dynamic Programming Longest Common Subsequence and String Editing are kept for Self Study. And, Internal Evaluation can be done on these topics.
- For Internal Evaluation, any algorithm which is apart from the syllabus can be given for analysis.

CA-301: Design and Analysis of Algorithms

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage in terms of Marks
1 : Introduction	5	6
2 : Divide and Conquer	5	6
3 : Greedy Method	6	6
4 : Dynamic Programming	8	18
5 : Backtracking	4	8
6: Branch & Bound	4	8
7 : Transform & Conquer	4	8
8 : Decrease and conquer	8	16
9 : Problem Classification	4	4

Examiner should note that,

1. Specify name of the method in case of Prim's and Kruskal's Algorithms.

2. Specify name of the method in case of 0/1 Knapsack Problem for Dynamic Programming.

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
  - There should not be more than one sub questions on the same unit
  - There should not be more than one question containing sub questions on the same pair of units.

Paper Pattern for DAA Paper for Credit Base System

Question No.	**Marks**
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-302: Operating System Concepts

Prerequisites:

3. Basic knowledge of computer architecture.
4. Introductory knowledge of different Operating Systems.

Objectives:

1. Understanding of OS architecture, process management and memory management
2. Through knowledge of process synchronization and CPU scheduling

Syllabus **[Total Lectures=48]**

CHAPTER -1

Introduction to Operating System: [1]

Definition of operating system, Services provided by OS, System Calls: definition, implementation

CHAPTER -2

Process Management [3]

Introduction and definition of process, Process state transition, Process Control Block, Process scheduling, Scheduling queues, Types of schedulers, Long Term Schedulers, Middle Term Schedulers, Short Term Schedulers, IO Scheduler, Context Switch.

CHAPTER -3

CPU Scheduling **[8]**

Introduction, Scheduling Concepts, CPU- I/O Burst Cycle, CPU Scheduler, Preemptive and Non-preemptive scheduling, Dispatcher, Scheduling criteria (terminologies used in scheduling), CPU Utilization, Throughput, Turnaround time Waiting time, Response time, Scheduling Algorithms,FCFS,SJF (Preemptive & non-preemptive),Priority Scheduling (Preemptive & nonpreemptive),Round Robin Scheduling, Multilevel Queues, Multilevel Feedback queues, Examples on scheduling algorithms

CHAPTER -4

Threads [2]

Multithreading, Threading Issues, P Threads, Windows 2000, Linux, Java Threads: Introduction only, no coding)

CHAPTER -5

Process Synchronization [6]

Introduction, Critical section problem, Semaphores, Concept, Implementation, Deadlock & Starvation, Binary Semaphores, Problems of synchronization, Bounded buffer problem, Readers & writers problem, Dining Philosophers problem, Critical Sections, Monitors

CHAPTER -6

Deadlocks [8]

Introduction, Deadlock Characterization, Necessary Condition, Resource allocation graph, Examples, Handling Deadlock, Deadlock Prevention, Mutual Exclusion, Hold & wait, No preemption, Circular wait, Deadlock Avoidance, Safe State, Resource allocation graph algorithm, Bankers algorithm, Examples, Deadlock Detection, Single instance of each resource type, Several instances of a resource type, Detection algorithm usage, Recovery from deadlock, Process Termination, Resource Preemption

CHAPTER -7

Memory Management **[8]**

Introduction to memory management, Problems with memory management, Logical vs. physical addresses, Dynamic vs. static linking, Swapping, Paging, Segmentation, Segmentation with paging, Virtual memory, Demand paging Page replacement algorithms, FIFO, MRU, LRU, LRU approximation using reference bit, MFU, LFU, Second Chance algorithm, Optimal replacement, Examples on Page replacement algorithm.

CHAPTER -8

File System **[6]**

Introduction & File concepts (file attributes, operations on files), Access methods, Sequential access, Direct access, Indexed access, File structure, File system mounting and sharing, Allocation methods, Contiguous allocation, Linked Allocation, Indexed Allocation, Free space management, Bit map or bit vector, Linked list, Grouping, Counting, File protection

CHAPTER -9

Device Management & I/O System [6]

Introduction and I/O Hardware, Interrupt (Maskable and Non-maskable), Kernel I/O Subsystem, I/O Scheduling, Buffering, Caching, Spooling and device Reservation, Error Handling, Kernel Data Structures, Disk Scheduling, First Come First Served, FCFS, Shortest seek time first (SSTF), Scan, C-Scan, LOOK, C-LOOK, Examples on Disk scheduling

Reference Book:

Operating System Concepts – Silberschatz, Galvin, Gagne

CA- 302 : Operating System

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	**No of lectures**	**Weightage in terms of Marks**
1 : Introduction to Operating System	1	2
2 : Process Management	3	7
3 : CPU Scheduling	8	8
4 : Threads	2	4
5 : Process Synchronization	6	15
6: Deadlocks	8	8
7 : Memory Management	8	12
8 : File System	6	12
9 : Device Management & I/O System	6	12

CA-303: Software Engineering

Prerequisites:

Knowledge of system development basics.

Objectives:

Understanding of software development lifecycle.

Syllabus **[Total Lectures=48]**

CHAPTER-1

Introduction To Software Engineering **[4]**

Definition, Characteristics of A Software, Mc Call's Quality Factors.

CHAPTER-2

Software Development process **[10]**

SDLC, Waterfall Model, Spiral Model, prototyping approach, 4GL approach.

Requirement Analysis. i) Definition of System Analysis. ii) Role of system analyst

iii) Requirement anticipation, investigation and specification iv) Feasibility study,

v) Fact finding techniques-interview, questionnaire, record review, observation.

CHAPTER-3

Analysis and design tools **[7]**

E-R analysis, Decision tree and decision tables, DFD (physical and logical), Data dictionary-definition, component, advantages , Input and output design, Case studies(at least 4 should be covered) , i/p and o/p design, structure chart.

CHAPTER-4

System design **[4]**

Cohesion and Coupling, Types of cohesion,Qualities of good design

CHAPTER-5

System testing **[8]**

Testing and debugging definition, Testing objectives and principles , Performance Testing, User acceptance techniques, Stress testing ,Test data generators.

CHAPTER-6

System maintenance **[4]**

Importance of maintenance, Software maintenance, Types of maintenance, Maintenance side effects, Reverse engineering, Re-engineering

CHAPTER-7

Concept of software management **[6]**

The software crisis, Principles of software engineering, Programming in small vs. programming in large, Software measurement.

CHAPTER-8

Project management **[7]**

Relationship of life cycle, project planning , project control, project organization

Risk management, cost models, configuration management , version control, quality assurance, Metrics.

(Only concepts should be taken for following topics. Configuration management, version control, quality assurance)

Reference Books :

1. Software Engineering – Pressman
2. Analysis and Design of Information System – James Senn
3. System Analysis and Design – Parthsarthy – Khalkar.

Notes:

1. For chapter 3 case study should be taken for internal evaluation :
   a. DFD up to 2nd level
   b. i/p and o/p design
   c. Structure chart
2. For types of cohesion assignments must be taken on only four types.

CA- 303 : Software Engineering

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	**No of lectures**	**Weightage in terms of Marks**
1 : Introduction To Software Engineering	4	6
2 : Software Development process	10	16
3 : Analysis and design tools	7	12
4 : System design	4	6
5 : System testing	8	12
6 : System maintenance	4	6

7 : Concept of software management	6	10
8 : Project management	7	12

Paper Pattern for Software Engineering Paper for Credit Base System

Question No.	**Marks**
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

Notes :

1 For chapter 3 case study should be taken for internal evaluation :
   a. DFD up to 2nd level
   b. i/p and o/p design
   c. Structure chart
2 For types of cohesion assignments must be taken on only four types.
3 DFD examples can be asked in university paper

CA-304: JAVA

Prerequisites:

1. Knowledge C programming language.

Objectives:

1. Understanding basic concepts and structures in java.

Syllabus: **[Total Lectures:48]**

CHAPTER-1 **[1]**

Introduction to Java Language

History and Evolution of Java, OOP Principles, Java Platform, JDK Environment, Java Tools, Java Byte Code, Comparison of C++ and Java

CHAPTER-2 **[3]**

Basic Programming Concepts

Keywords, Data Types, Variables, Operators, Naming Conventions, Type Casting, Control Statements, Arrays

CHAPTER-3 **[12]**

Object Oriented Concepts of Java

Introducing classes and objects, Constructors(All types), Garbage Collection and finalize() method , Inheritance Basics , Types of Inheritance , Implementation of polymorphism : Method Overloading and Method Overriding , Nested and Inner classes, Modifiers and Access Control Specifiers, Final variables, methods and classes, Abstract methods and classes, Interfaces, Creating and Importing Packages, Exception Handling

CHAPTER-4 **[5]**

Java Library

String Handling
- String Constructors
- Special String Operations
- Character Extraction
- String Comparison
- Searching Strings
- Modifying a String
- valueOf()
- StringBuffer

Primitive Type Wrappers
- Number

- Double and Float
- Byte, Short, Integer and Long
- Character
- Boolean
- Void

Utility Classes (Only listed below)

- Math
- StringTokenizer
- Date
- Calender
- GregorianCalender
- Random

CHAPTER-5 **[4]**

Files and Streams

Exploring java.io package, File, Byte Streams:

- InputStream & OutputStream
- FileInputStream & FileOutputStream
- ByteArrayInputStream & ByteArrayOutputStream
- DataInputStream & DataOutputStream
- PrintStream
- RandomAccessFile

Character Streams

- Reader & Writer
- FileReader & FileWriter
- BufferedReader & BufferedWriter
- CharArrayReader & CharArrayWriter
- PrintWriter

Serialization

- Serializable
- ObjectInput & ObjectOutput
- ObjectInputStream & ObjectOutputStream

CHAPTER-6 **[14]**

Applets, AWT and Event Handling

Applet Programming

- Applet Basics
- Applet Architecture

- Applet Skeleton
- update() and repaint()
- HTML Applet Tag
- Passing Parameters to an Applet
- Using Status Window

Introducing AWT

- AWT classes
- Windows Fundamentals
- Working with Frame Windows
- Working with Graphics
- Working with Colors and Fonts
- AWT Controls
- Layout Managers
- Menus

Event Handling

- Event Handling Mechanism
- Delegation Event Model
- Event Classes
- Event Listener Interfaces
- Adapter Classes
- Anonymous Inner Classes

CHAPTER-7 **[5]**

Swing

Swing Features, Model View Controller Architecture for Swing, Components & Containers, Swing Controls, JApplet , JFrame, JButton, JCheckBox, JTextField, JTabbedPane, JInternalFrame , JScrollPane,JLabel, JList, JTree, JTable, JDialog, JFileChooser, JProgressBar

CHAPTER-8 **[4]**

Multithreaded Programming

Java Thread Model, The Main Thread, Creating a Thread, Using isAlive() and join(), Thread Priorities, Thread Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads

Reference Book(s):

1. The Complete Reference – Seventh Edition - by Herbert Schildt
2. Core Java (Volume 1 – Fundamentals) Eighth Edition - by Horstman & Cornell
3. Core Java (Volume 2 – Advanced Features) Eighth Edition - by Horstman & Cornell
4. Programming with Java - by Balaguruswamy
5. Java 7 Programming – Black Book - by Kogent Learning Solutions Inc.

CA – 304:Core Java

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	**Number of lectures**	**Distribution of marks**
Chapter 1 – Introduction to Java Language		2
Chapter 2 – Basic Programming Concepts		6 (4+2)
Chapter 3 – Object Oriented Concepts of Java		18 (5+2+4+5+2) or (5+5+4+4)
Chapter 4 – Java Library		8 (2+2+2+2) or (4+4)
Chapter 5 – Files and Streams		8 (4+4) or (4+2+2)
Chapter 6 – Applet, AWT and Event Handling		20 (5+5+4+4+2) or (2+2+4+4+4+4)
Chapter 7 – Swing		10 (5+5) or (4+4+2)
Chapter 8 – Multithreaded Programming		8 (2+4+4)

Core Java Question Paper format

Marks distribution for each question	Marks	Chapter No
Q1	4	2
	4	3
	2	1
Q2	4	4
	4	7
	2	5
Q3	4	6
	4	4
	2	8
Q4	4	7
	4	8
	2	5
Q5	4	3
	4	6
	2	7
Q6	4	5
	4	4
	2	2
Q7	5	3
	5	6
Q8	5	6
	5	3

CA-305: Lab Course

1. The Lab Course is for 100 marks. Out of which 50 marks are for internal evaluation and 50marks are for practical exam slip.
2. For internal evaluation the distribution of marks is as follows:

Sr.No	Description	Marks
1	Core java assignments	15
2	Operating System assignments	15
3	viva	10
4	Internal Evaluator	10

3. External evaluation:

University of Pune

M.C.A. (Science) Semester-III Practical Examination April/Oct

CS-305 General Laboratory-I (Core Java, OS)

Duration: 3 Hours **Maximum marks: 50**

Q.1: << Core java program>> [20]

Q.2: << Operating System program>> [20]

Q.3: Lab book [5]

Q.4: Viva [5]

Project (CA-306)

- The project should be done with any technology.
- Internal evaluation should be done weekly by respective project guide.
- Students should prepare project report on A4 size paper with font 12 for Normal text and font-size 14 for heading and page title.
- Students should prepared one hard copy and one soft copy of project report

Evaluation for Internal (50-Marks):

Sr.No	Description	Marks
1	Analysis and Design Document(ER,DFD)	**10**
2	First Demo	**15**
3	Second Demo	**15**
4	Presentation	**10**

Evaluation for External (50-Marks):

Sr.No	Description	Marks
1	Demo	**20**
2	Report	**10**
3	Presentation	**10**
4	Viva	**10**

CA-307: Numerical Methods

Prerequisites:

Basic knowledge of mathematics

Objectives:

Understanding Computer Based Numerical and Statistical Techniques.

Syllabus: **[Total Lectures:48]**

CHAPTER-1

Errors **[02]**
Accuracy of Numbers, Errors

CHAPTER-2

Algebraic and Transcendental Equation **[05]**
False Position Method , Newton-Raphson Method

CHAPTER-3

Calculus of Finite Differences **[10]**
Differences, Forward Differences , Backward Differences, Central Differences, Other Differences, Properties Differences, Relation between Operators, Fundamental Theorem on Differences of polynomial, Estimation of Error by Difference Table , Technique to determine Missing Term

CHAPTER-4

Interpolation with Equal Interval **[10]**
Newton's Gregory Formula for Forward interpolation, Newton's Gregory Formula for Backward interpolation, Central Difference Formulae, Gauss Forward Difference Formula, Gauss Backward Difference Formula

CHAPTER-5

Interpolation with Unequal Interval **[08]**

Lagrange's Interpolation Formula, Divided Difference , Newton' Divided Difference Formula

CHAPTER-6

Numerical Integration **[06]**

General Quadrature Formula , Trapezoidal Rule , Simpson's one Third Rule , Simpson's Three –Eight Rule, Euler-Maclaurin's Formula,

CHAPTER-7

Numerical Solution of Ordinary Differential Equation [07]

Euler's Method , Euler's Modified Method , Runge- Kutta Method

Text Book-

A textbook of Computer Based Numerical and Statistical Techniques, by A.K. Jaiswal and Anju Khandelwal. New Age international Publishers.

Reference Books –

1. S.S. Sastry ; introductory Methods of Numerical Analysis , 3rd edition, prentice hall of India,1999
2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.
3. K.E. Atkinson; An Introduction to Numerical Analysis, Willey Publications.
4. Balguruswamy; Numerical Analysis

CA- 307: Numerical Methods

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	**No of lectures**	**Weightage Marks**
1 : Errors	2	4
2 : Algebraic and Transcendental Equation	5	8
3 : Calculus of Finite Differences	10	17
4 : Interpolation with Equal Interval	10	17
5 : Interpolation with Unequal Interval	8	12
6 : Numerical Integration	6	10
7 : Numerical Solution of Ordinary Differential Equation	7	12

Paper Pattern for Numerical methods Paper for Credit Base System

Question No	**Marks**
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-308: Multimedia Systems (Elective)

Prerequisites:

1. Introductory knowledge and digital images and videos.

Objectives:

1. To understand concept of multimedia, synchronization, application of multimedia.
2. To learn data hiding with images and video.

Syllabus: **[Total Lectures: 48]**

CHAPTER-1

Introduction: Multimedia, Image and Documents **[07]**

Introduction: Definitions of multimedia, Bit/pixel,2. Image type/Format of images, Basic steps for Image Processing, Color Management System(CMS), Multimedia Documents: i) Document, ii) Architecture of document, iii) designing multimedia Interchange Format, SGML, MHEG, HyTime, OMF.

CHAPTER-2

Digital Audio Representation and processing [07]

Uses of Audio in computer applications, Digital Representations of sound, Transmission of digital sound, Digital Audio signal Processing

CHAPTER-3

Digital Video and Image Compression [12]

Text Compression: Compression Principles – Source Encoder and Destination Decoder, Lossless and Lossy Compression, Entropy Encoding, Source Encoding. Text Compression – Static and Dynamic Huffman Coding, Arithmetic Coding. Image Compression: Graphics Interchange Format (GIF), Tagged Image File Format (TIFF),Digitised Documents, JPEG.

Audio Compression: Differential Pulse Coded Modulation (DPCM), Adaptive Differential PCM (ADPCM), Adaptive Predictive Coding and Linear Predictive Coding, MPEG Audio Coding.

Video Compression: Principles, H.261 Video Compression, MPEG 1, MPEG 2 and MPEG 4. Compression – Static and Dynamic Huffman Coding, Arithmetic Coding. Standardization of algorithms

CHAPTER-4

Time Based Media Representation and Delivery [02]

Models of time, Time and Multimedia Requirements, Support for System timing Enforcement – Delivery

CHAPTER-5

Middle Systems Services Architecture [03]

Goals of Multimedia Systems Services, Some views of the Multimedia Systems Services Architecture, Media Stream Protocol, Audio and Video Capture with Synchronized Play

CHAPTER-6

Multimedia Interchange [05]

QuickTime Movie File (QMF) format, OMFI, MHEG (Multimedia and Hypermedia Information Encoding Expert Group), Format Function and Representation Summery, Track model and Object Model, Real-Time Interchange, Towards a Performance Model

CHAPTER-7

Synchronization [04]

Notion of Synchronization, Multimedia Systems, Basic Synchronization Issues, Intra-and Inter-Object Synchronization, Presentation Requirements, The Synchronization Reference Model, Case Study- HyTime, Synchronization in MHEG

CHAPTER-8

Multimedia Applications [04]

Inter- personnel Communication, Interactive Applications over the Internet, Entertainment Applications and Multimedia Conferencing.

CHAPTER-9

Data Hiding For Image and Video **[**04]

Data Hiding in Binary Image: Proposed Scheme – Applications-Robustness and Security considerations-Multilevel embedding- Multilevel image data hiding: Spectrum

Partition- System Design-Refined Human visual model Multilevel video data hiding: Embedding Domain-System Design.

Reference Books

1. Chapman, Nigel and Chapman, Jenny. “Digital Multimedia”. 2000. John Wily & Sons.
2. Steinmaetz, Ralf and Nahrstedt, Klara. Multimedia : “Comunications and Applications”. 2003. Pearson Education.
3. Min Wu, Bede Liu, “Multimedia Data Hiding”, Springer-Verlag NewYork Inc., 2002.
4. Multimedia Systems - John F. Koegel Buford
5. Multimedia in Practice - Jeffcoate.
6. Principles of Multimedia by Ranjan Parekh

TEXT BOOK:

1. Halshall, Fred. “Multimedia Communications – Applications, Networks, Protocols and Standards”. 2001. Pearson Education.

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CA 308 : Multimedia

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	**No of lectures**	**Weightage Marks**
1 : Introduction: Multimedia, Image and Documents	8	14(4+4+4+2)
2 : Digital Audio Representation and processing	8	14(4+4+4+2)
3 : Digital Video and Image Compression	12	22(5+5+4+4+4)
4 : Time Based Media Representation and Delivery	2	4(2+2/4)
5 : Middle Systems Services Architecture	3	4
6: Multimedia Interchange	5	7(5+2)
7 : Synchronization	4	5
8 : Multimedia Applications	4	5
9 : Data Hiding For Image and Video	4	5

Paper Pattern for Multimedia Paper for Credit Base System

Question No	**Marks**
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-309 Dot Net (Elective)

Prerequisites:

Knowledge of C, C++ programming language

Objectives:

Understanding different concepts in .Net programming and ASP.

Syllabus **[Total Lectures=48]**

CHAPTER-1

Overview of .NET **[3] BOOk3**

Building Blocks of .NET Framework, .NET Compatible Languages, CLS (Common Language Specification), CTS (Common Type System),CLR (Common Language Runtime), Working of CLR, Assembly and Components of Assembly

CHAPTER-2

The C# Programming Language **[3] BOOK 1,2**

Structure of C# Program, Passing Command line arguments, System. Console class, Sytem.Object Class, Value Types and Reference Types, Implicit and Explicit Conversion, Boxing and Unboxing, .NET Enumerations, Method Parameter Modifiers (ref, out and params), Array types, System Data Types, System String DataType

CHAPTER-3

Inheritance and Polymorphism **[4] BOOK 1, 2**

Pillars of Object oriented, Programming, Class and Class Members, Access Modifiers, Constructor, Destructor, Property, Indexer, Methods, Interface, Structure, Inheritance, Polymorphism

CHAPTER-4

Exception Handling **[4] BOOK 1, 2**

Exception Handling, Exception Class, User Defined Exception

CHAPTER-5

Understanding Garbage Collection **[4] BOOK 1, 2**

Memory Management Basics, Garbage Collection, Garbage Collection Phases, Generational

CHAPTER-6

Delegates and Events **[3] BOOK 1, 2**

Delegate, Unicast Delegate, Multicast Delegate, Delegate Chaining, Event

CHAPTER-7

Collection Classes **[2] BOOK 1, 2**

Collections, System. Array Class, Collection Interfaces, Non-Generic Classes, ArrayList

CHAPTER-8

Reflection Late Binding **[2] BOOK 1,2**

Reflection, Sytem.Type Class, System. Reflection Class, Assembly Class, MemberInfo Class, Late Binding,

CHAPTER-9

.NET Assemblies Assembly **[2] BOOK 1,2**

Components of Assembly, Private Assemblies, Shared Assemblies

CHAPTER-10

Threading

Thread Synchronization **[2] BOOK 1,2**

CHAPTER-11 **[3] BOOK2,3**

File I/O and Synchronization

System.IO Namespace, Stream Class, Serialization, Binary Serialization

CHAPTER-12

System.Window s.Forms **[4] BOOK 2,3**

Windows Application,Windows Form Namespace, Form, Common members of Form class, Controls, Properties and Events, Dialog Boxes, Graphics Class

CHAPTER-13

ADO.NET **[4] BOOK 2,3,4**

Data Providers, ADO.NET Components, ADO.NET Objects, ADO.NET Interfaces, Connected and Disconnected architecture

CHAPTER-14

ASP.NET Architecture **[3] BOOK 3**

ASP.NET Architecture, IIS (Internet Information Services), HTTP Pipeline, Postback and ViewState, Page Life Cycle

CHAPTER-15

ASP.NET Controls **[2] BOOK 3**

HTML Control, Web ServerControl, Validation Control, Rich Web Server Control

CHAPTER-16

State Management and Caching **[3] BOOK 3**

Client Side, View state,Cookies, Querystring, Server Side, Application variable, Session Variable, Session State Management using SQL Server, Caching

Reference Books:

1. InsideC#byTomArcherandAndrewWhitechapel
2. ProfesionalC#2005/2008byWroxPublication
3. ProfesionalASP.NET2005/2008byWroxPublication
4. Database Programming with C#, By Carsten Thomsen, Apress

CA – 309 : Dot Net

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	**No of lectures**	**Weightage in terms of Marks**
1 : Overview of .NET	3	5
2 : The C# Programming Language	3	5
3 : Inheritance and Polymorphism	4	6
4 : Exception Handling	4	6
5 : Understanding Garbage Collection	4	6
6 : Delegates and Events	3	5
7 : Collection Classes	2	4
8 : Reflection Late Binding	2	4
9 : .NET Assemblies Assembly	2	4
10 : Threading	2	4
11 : File I/O and Synchronization	3	5
12 : System.Windows.Forms	4	6

13 : ADO.NET	4	6
14 : ASP.NET Architecture	3	5
15 : ASP.NET Controls	2	4
16 : State Management and Caching	3	5

Paper Pattern for Multimedia Paper for Credit Base System

Question No	**Marks**
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-401: Computer Graphics

Syllabus Total Lecture [48]

Pre – Requisites

1. Computer programming skills in C programming language
2. Basic understanding of use of data structures
3. Basic Mathematical concepts related to matrices and geometry

Objectives

1. To study how graphics objects are represented in Computer
2. To study how graphics system in a computer supports presentation of graphics information
3. To study how interaction is handled in a graphics system
4. To study how to manipulate graphics object by applying different transformations
5. To provide the programmer's perspective of working of computer graphics

CHAPTER 1

Introduction to Computer graphics [4]

Introduction to computer graphics & graphics systems, Four components of Computer Graphics Representation, Presentation , Interaction and Transformations,Uses of Computer Graphics, Graphics Primitives – Pixel/Point ,Raster v/s Vector ,RGB color model, intensity, Programming essentials – event driven programming. OpenGL library

CHAPTER II

Input devices and Interaction tasks [4]

Essential Functionalities for Interaction – Locator, valuator , pick and choice; Hardware used for interaction – Input devices – keyboard, mouse, trackball, tablets, light pen;Basic Interaction tasks – Position, Selection

CHAPTER III

Presentation and Output devices [4]

Presentation Graphics - frame buffer, display file, lookup table;Display devices, Random and Raster scan display devices; CRT, Plotters and Printers

CHAPTER IV

Point, Line and Polygon primitives [10]

Scan conversions, run length encoding , Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm;4.3 Scan converting polygons, fill algorithms, Boundary fill algorithm, flood fill algorithm

CHAPTER V

2D Transformations and viewing [10]

Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, Reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline; Window to viewport co-ordinate transformation , clipping operations , point clipping , line clipping; Cohen Sutherland algorithm, Midpoint subdivision algorithm, Cyrus beck algorithm; Polygon clipping , Sutherland Hodgman algorithm, Weiler-Atherton Algorithm

CHAPTER VI

3D transformation & viewing [4]

3D transformations: translation, rotation, scaling & other transformations; Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; Three dimensional viewing, Parallel and Perspective projections

CHAPTER VII

Curves and Surfaces [6]

Polygon meshes, Representing polygons; Parametric curves, Hermite Curves, Bezier curves, B-spline curves

CHAPTER VIII

Hidden surfaces Elimination [6]

Depth comparison, Z-buffer algorithm, Back face detection; BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal – geometry; Color & shading models Light & color model; interpolative shading model; Texture;

Text Books:

1. Hearn, Baker – " Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Foley, Vandam, Feiner, Hughes – "Computer Graphics principles (2nd Ed.) – Pearson Education.

Reference Books:

1. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – TMH.
2. D. F. Rogers, J. A. Adams – " Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH
3. F. S. Hill, Stephen Kelly, Computer Graphics using OpenGL, PHI Learning
4. Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH

CA-402: SDK

Syllabus Total Lecture [50]

Pre – Requisites

1. User level knowledge of Windows OS
2. Working Knowledge of C

Objectives

1. To understand the Windows programming environment
2. To study Windows programming concepts like messages and queues
3. To study Text input and output
4. To understand how user input and output is facilitated via input-output devices, various Windows controls and menus
5. To understand advanced concepts like multitasking, database connectivity and dynamic linked library

CHAPTER-1

Getting Started [2]

Aspects of Windows, Dynamic Linking, Windows Programming Options, APIs and Memory Models, Language Options, The Programming Environment, API Documentation, Your First Windows Program, A Character-Mode Model, The Windows Equivalent, The Header Files, Program Entry Point, The MessageBox Function, Compile, Link, and Run.

CHAPTER-2

An Introduction to Unicode [2]

Unicode to the Rescue, Wide Characters and C, The char Data Type, Wider Characters, Wide-Character Library Functions, Maintaining a Single Source, Wide Characters and Windows, Windows Header File Types, The Windows Function Calls, Windows' String Functions, Using printf in Windows, A Formatting Message Box.

CHAPTER-3

Windows and Messages [4]

A Window of One's Own, An Architectural Overview, The HELLOWIN Program, Thinking Globally, Registering the Window Class, Creating the Window, Displaying the Window, The Message Loop, The Window Procedure, Processing the Messages, Playing a Sound File, The WM_PAINT Message, The WM_DESTROY Message, Queued and Nonqueued Messages.

CHAPTER-4

An Exercise in Text Output **[3]**

Painting and Repainting, The WM_PAINT Message, Valid and Invalid Rectangles, An Introduction to GDI, The Device Context, Getting a Device Context Handle: Method One, The Paint Information Structure, Getting a Device Context Handle: Method Two, TextOut: The Details, The System Font, The Size of a Character, Text Metrics: The Details, Formatting Text, The Size of the Client Area, Scroll Bars, Scroll Bar Range and Position, Scroll Bar Messages.

CHAPTER-5

Basic Drawing **[4]**

The Structure of GDI, The GDI Philosophy, The GDI Function Calls, The GDI Primitives, Other Stuff, The Device Context, Getting a Device Context Handle, Getting Device Context Information, Drawing Dots and Lines, Setting Pixels, Straight Lines

CHAPTER-6

The Keyboard **[3]**

Keyboard Basics, Ignoring the Keyboard, Who's Got the Focus?, Queues and Synchronization, Keystrokes and Characters, Keystroke Messages, System and Nonsystem Keystrokes, Virtual Key Codes, The lParam Information, Shift States, Using Keystroke Messages, Character Messages, The Four Character Messages, Message Ordering, Control Character Processing, The Caret (Not the Cursor), The Caret Functions.

CHAPTER-7

The Mouse **[2]**

Mouse Basics, Some Quick Definitions, The Plural of Mouse Is…, Client-Area Mouse Messages, Mouse Double-Clicks, Nonclient-Area Mouse Messages, The Hit-Test Message, Messages Beget Messages, Capturing the Mouse, The Capture Solution.

CHAPTER-8

The Timer **[2]**

Timer Basics, The System and the Timer, Timer Messages Are Not Asynchronous, Using the Timer: Three Methods: Method One, Method Two, Method Three.

CHAPTER-9

Child Window Controls **[6]**

The Button Class, Creating the Child Windows, The Child Talks to Its Parent, The Parent Talks to Its Child, Push Buttons, Check Boxes, Radio Buttons, Group Boxes, Changing the Button Text, Visible and Enabled Buttons, Buttons and Input Focus, The Static Class, The Scroll Bar Class, The Edit Class, The Edit Class Styles, Edit Control Notification, Using the Edit Controls, Messages to an Edit Control, The Listbox Class, List Box Styles, Putting Strings in the List Box, Selecting and Extracting Entries, Receiving Messages from List Boxes, A Simple List Box Application, Listing Files, A head for Windows.

CHAPTER-10

Menus and Other Resources **[4]**

Menus, Menu Concepts, Menu Structure, Defining the Menu, Referencing the Menu in Your Program, Menus and Messages, A Sample Program, Menu Etiquette, Using the System Menu, Changing the Menu, Other Menu Commands, Keyboard Accelerators, Why You Should Use Keyboard Accelerators, Some Rules on Assigning Accelerators, The Accelerator Table, Loading the Accelerator Table, Translating the Keystrokes, Receiving the Accelerator Messages.

CHAPTER-11

Dialog Boxes **[4]**

Modal Dialog Boxes, Creating an "About" Dialog Box, The Dialog Box and Its Template, The Dialog Box Procedure, Invoking the Dialog Box, Modeless Dialog Boxes, Differences Between Modal and Modeless Dialog Boxes

CHAPTER-12

The Clipboard **[3]**

Simple Use of the Clipboard, Memory Allocation, Transferring Text to the Clipboard, Getting Text from the Clipboard, Opening and Closing the Clipboard

CHAPTER-13

ODBC **[3]**

Header Files used for ODBC, ODBC Architecture, Variables used for ODBC, ODBC APIs, ODBC Connection Program

CHAPTER-14

The Multiple-Document Interface **[3]**

MDI Concepts, The Elements of MDI, MDI Support

CHAPTER-15

Multitasking and Multithreading **[2]**

Modes of Multitasking, Nonpreemptive Multitasking, Windows Multithreading, Thread Synchronization, The Critical Section, Event Signaling, The Event Object, Thread Local Storage.

CHAPTER-16

Dynamic-Link Libraries **[2]**

Library Basics, Library: One Word, Many Meanings, A Simple DLL, Shared Memory in DLLs, The Library Entry and Exit Point, Miscellaneous DLL Topics, Dynamic Linking Without Imports, Resource-Only Libraries

CHAPTER-17

A Taste of the Internet **[1]**

Windows Sockets, Sockets and TCP/IP, Network Time Services, WinInet and FTP, Overview of the FTP API

Textbook(s):

1. Programming Windows®, Fifth Edition, by Charles Petzold, Microsoft
2. ODBC Programmer's Reference, MSDN

CA-403: Advanced JAVA

Syllabus Total Lecture [48]

Pre – Requisites

1. Knowledge of core Java (CA-304)

Objectives

1. To understand java concepts for database programming, use of collections and networking
2. To study web development concepts using servlets, JSP and JavaBeans

CHAPTER-1

Database Programming [10]

The design of JDBC, jdbc configuration, Types of drivers, Executing sql statements, query execution, Batch execution, Scrollable and updatable result sets, Rowset,Metadata, transactions.(Databases : Mysql/ SQL Server/ PostgreSQL/Oracle/MS-Access)

CHAPTER-2

Collections [6]

Collections, Introduction to the Collection framework (Interfaces, Implementation and algorithms), Interfaces, collection classes : Set, List, Queue and Map, Set : HashSet, TreeSet, and LinkedHashSet,Interfaces such as Lists, Set, Vectors, Stack, LinkedList, Comparator, Iterator, Enumerators, hash tables, Working with Maps: Map Interface and Map classes

CHAPTER-3

Networking [7]

The java.net package, Connection oriented transmission – Stream Socket Class, Internet Addressing , Inet Address, Factory methods , Instance methods,TCP/IP client socket, TCP/IP Server sockets, Creating a Socket to a remote host on a port (creating TCP client and server), URL, URL Connection, Datagrams , Developing small application with sockets.

CHAPTER-4

Servlet [10]

Introdution to Servlet (HTTP Servlet), Life Cycle of servlet, GenericServlet Class Handing get and post request(HTTP),Data handling using Servlet, Creating cookies, Session tracking using HTTP servlet, Servlet - JDBC,Security Issues.

CHAPTER-5

Web development using JSP **[8]**

Introduction to JSP, JSP Architecture, JSP Directives, JSP scripting elements, Default objects in JSP, JSP Actions,JSP with Database, Error handling in JSP, Session tracking techniques in JSP, Introduction to custom tags.

CHAPTER-6

JavaBeans Components **[7]**

What is Bean?, Advantages, Using the Bean Development Kit (BDK), The Bean Writing process ,The Java Beans API, Enterprise Java Beans: Introduction to Enterprise java beans, Types of EJB ,(session bean ,entity bean and message driven bean), Sample program on EJB

Reference Books:

1. Complete reference Java by Herbert Schildt(5^{th} edition)
2. Java 2 programming black books, Steven Horlzner
3. Java servlet Programming by Jason Hunter,O'Reilly
4. Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press.
5. Commercial web development using java 2.0, Ivan Byaross, BPB
6. Enterprise JavaBeans (3rd Edition) by Richard Monson-Haefel, Orelly
7. Book Complete Reference J2EE by Jim Keogh

CA-404 : Object Oriented Software Engineering

Syllabus Total Lecture [48]

Pre – Requisites

- Knowledge of Software Engineering (CA-303)

Objectives

- To understand the object oriented modelling and development concepts
- To study UML models
- To study object oriented development process

CHAPTER-1

Object Oriented Concepts and Modeling [6]

What is Object Orientation? (Introduction to class, Object, inheritance, polymorphism), Model & Domain, Importance of Modeling, Principles of Modeling, Object Oriented Modeling

CHAPTER-2

Object Oriented System Development [2]

Introduction to Function/data, Object Oriented Analysis, Object Oriented Design, Object Oriented Testing

CHAPTER-3

Introduction to UML [3]

Overview of UML, Conceptual Model of UML, Architecture, S/W Development Life Cycle

CHAPTER-4

Basic and Advanced Structural Modeling [6]

Classes, Relationship, Common mechanism, Diagrams, Class Diagrams, Interfaces, Types, and Roles, Packages, Instances, Object diagrams

CHAPTER-5

Basic Behavioral Modeling [4]

Interactions, Use cases, Use case diagram, Interaction diagram, Activity Diagram, State Chart diagram

CHAPTER-6

Architectural Modeling & Re-Engineering [4]

Components, Component diagram, Deployment diagram, Reverse Engineering, Forward Engineering

CHAPTER-7

Object Oriented Analysis [4]

Inception, Categories of Requirement, Use case model, Actor, Kinds of Actor, Use cases in Iterative Method, Elaboration, Construction, Transition

CHAPTER-8

Object Oriented Design [6]

Generic components of OO Design model, System Design process, Partitioning the analysis model, Concurrency and subsystem allocation, Task Mgmt component, Data Mgmt component, Resource Mgmt component, Inter sub-system communication, Object Design process, Introduction to Design Patterns

CHAPTER-9

Object Oriented Testing [4]

Overview of Testing and object oriented testing, Types of Testing, Object oriented Testing strategies, Test case design for OO software, Inter class test case design

CHAPTER-10

Iterative, Evolutionary and Agile [5]

Unified Process, Rational Unified Process, UP Phases, UP Disciplines, Agile UP, Agile Methods and Attitudes, Agile Modeling

CHAPTER-11

Case Studies Using UML. [4]

Text Books:

1. The Unified Modeling Language User Guide by Gr.Booch, Rumbaugh, Jacobson
2. The Unified Software Development Process by Ivar Jacobson, Booch, James Rumbaugh
3. Applying UML and Patterns by Craig Larman

Reference Books:

1. UML in NutShell by O'Reilly
2. Object Oriented Software Engineering by Ivar Jacobson

CA-405: Lab Course

4. The Lab Course is for 100 marks. Out of which 50 marks are for internal evaluation and 50marks are for practical exam slip.
5. For internal evaluation the distribution of marks is as follows:
    a. For Graphics and SDK mini projects must be assigned to students in group of min.2 and max. 3 by respective teacher guide.
    b. For internal evaluation practical exam should be conducted by respective teachers.

Sr.No	Description	Marks
1	Graphics assignments	10
2	SDK assignments	10
3	Advanced Java assignments	10
4	Internal evaluation	10
5	Viva	10

6. External evaluation:
    a. External examiner should evaluate the project with demo.

University of Pune

M.C.A. (Science) Sem-IV Practical Examination April/Oct

CS-405 General Laboratory-II (Advanced Java, Graphics, SDK)

Duration: 3 Hours **Maximum marks: 50**

Q.1: Evaluation of Graphics mini project by external examiner	**[10]**
Q.2: Evaluation of SDK mini project by external examiner	**[10]**
Q.3: <<Advance Java program >>	**[20]**
Q.4: Lab book	**[05]**
Q.5: Viva	**[05]**

CA-406 : Project

- The project can be Language independent, platform independent, Technology independent.
- Project should be based on real life Problem.
- Internal evaluation should be done weekly by respective project guide.
- Students should prepare project report on A4 size paper with font 12 for Normal text and font-size 14 for heading and page title.
- Students should prepared one hard copy and one CD of project report.

Evaluation for Internal (50-Marks):

Sr.No	Description	Marks
1	Analysis and Design Document(ER,UML)	10
2	First Demo	15
3	Second Demo	15
4	Presentation	10

Evaluation for External (50-Marks):

Sr.No	Description	Marks
1	Demo	20
2	Report	10
3	Presentation	10
4	Viva	10

CA-407: Cyber Law

Syllabus Total Lecture [48]

CHAPTER-1

Introduction to Cyber Law [5]

Meaning, Nature &Scope of Cyber Laws, Objectives of Cyber Law, Salient features of IT Act,

CHAPTER-2

Cyber Crime & Information Technology Act, 2000 [25]

Extent & Application of IT Act , Definitions, Digital & Electronic Signature, Electronic Governance, Attribution, Acknowledgement & Dispatch of Electronic Record , Security Concerns & Preventive Measures, Various Authorities under IT Act , Penalties, Compensation & Adjudication, Offences & Criminal Investigation Procedure .

Impact of IT Act on other Related Acts :i) Amendments to Indian Penal Code, 1860 (Sec.354,354A,354B,354D,415,417,463,464,466,468,469,470,471,476,477A,499 &500) , ii)Amendments to Indian Evidence Act,1872**(**Sec.3,17,22,34,35,39,47, 61,62,65A,65B,67A,73A,81A,85A,85B,88A 90A & 131)Am c) Amendments to Bankers Books Evidence Act,1891 (Sec.2)

CHAPTER-3

Intellectual Property Rights and Cyber Law [13]

Meaning of Intellectual Property, Need of Protection of Intellectual Property, Meaning of Copyright & Trade Mark, Acquisition of Copyright & Trade Mark, Remedies for Infringement of Copyright& Trade Mark, Intellectual Property Rights in Cyber Space Domain Name Dispute, Cyber Squatting & Typo squatting , Linking, In-line Linking, Framing

CHAPTER-4

Case Study [05]

Yahoo case, Gold Case, Napster Case, Griffis Case

Reference Books:

1. **Cyber Laws**by Justice Yatindra Singh
   Universal Law Publishing Co. New Delhi
   (Ph No.011-47082254, 27438103, 27215334)

2. **Cyber Laws & E-commerce Laws**by P.M. Bakshi & R.K.Suri
   Bharat Publishing House, New Delhi
   (Ph.No. 011-7910001-03)

3. **Intellectual Property Rights & the Law**byDr. G.B. Reddy
   Gogia Law Agency, Hyderabad
   (Ph.No. 040-24525689 24560631, 66730500)

4. **Bare Text**
   Indian Penal Code, 1860
   Indian Evidence Act, 1872
   Bankers Books Evidence Act,1891

CA-408 : Soft Computing

Syllabus Total Lecture [50]

CHAPTER-1

Introduction to Soft Computing: [1] Book 1

What is soft computing, Principle of soft computing (SC Paradigm), How is it different from hard computing, Constituents of SC (Fuzzy Neural, Machine Learning, Probabilistic reasoning)

CHAPTER-2

Fuzzy Logic - Classical Sets and Fuzzy Sets: [3] Book 1, 2

Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets: cardinality, operations

CHAPTER-3

Classical Relations and Fuzzy Relations: [2] Book 1, 2

Cartesian Product, Classical relations – Cardinality, operations, Properties, composition, Fuzzy Relations - Cardinality, operations, Properties, composition, Max product

CHAPTER-4

Membership functions: [4] Book 1, 2

Features of membership functions, standard forms and boundaries, fuzzification methods, problems on Inference method of fuzzification

CHAPTER-5

Fuzzy to Crisp conversions: [4] Book 1, 2

Fuzzy Tolerance and equivalence relations, lambda (alpha) cuts for fuzzy sets and relations, Defuzzification methods – Max-membership, centroid, weighted average method, mean-max membership, center of sums, center of largest area, first of maxima

CHAPTER-6

Fuzzy Arithmetic and Fuzzy Numbers: [2] Book 1, 2

Fuzzy Arithmetic, Fuzzy numbers, Extension Principle

CHAPTER-7

Logic and fuzzy systems: [4] Book 2

Fuzzy Logic, Approximate reasoning, Fuzzy Implication, Fuzzy systems

CHAPTER-8

Fuzzy Rule based Systems: [4] Book 1, 2

Linguistic Hedges, Aggregation of fuzzy Rules

CHAPTER-9

Artificial Neurons, Neural Networks and Architectures: [2] Book 3

Neuron abstraction, Neuron signal functions, Definition of Neural Networks, Architectures: feedforward and feedback, Salient properties and application domains

CHAPTER-10

Binary Threshold neurons: [6] Book 3

Convex sets, hulls and linear separability, Space of Boolean Functions, Binary neurons, Pattern dicotomizers, TLN's, XOR problem

CHAPTER-11

Perceptrons and LMS: [14] Book 3

Learning and memory, Learning Algorithms, Error correction and gradient descent rules, The learning objectives for TLNs, Pattern space and weight space, Perceptron learning algorithm, Perceptron convergence algorithm, Perceptron learning and Non-separable sets, α-Least Mean Square Learning, MSE Error Surface and its Geometry, Steepest Descent Search with Exact Gradient Information, μ-LMS: Approximate Gradient Descent, Backpropagation Learning algorithm, Difference between α-LMS and μ-LMS,Applications of Neural Networks ,Pattern Recognition and classification

CHAPTER-12

Genetic Algorithms (GA): [4] Book 1, 4

What are GA's, Why GA's? Brief introduction to traditional optimization and search techniques, GA and search space, Steps in GA, Operators in GA, Genetic Algorithms Vs. Traditional Methods, Basic terminologies in GA, Schema Theorm, Problem solving using GA, Application of Genetic Algorithm: Travelling salesman problem

Reference Books

1. Principles Of Soft Computing (With CD)by S. N. Sivanandam, S. N. Deepa, Wiley India, ISBN:9788126527410

2. Fuzzy Logic: With Engineering Applications by Timothy J Ross, Wiley India, Third Edition ISBN : 978-81-265-3126-4
3. Neural Networks: A Classroom Approach,1/e by Kumar Satish, TMH, ISBN:9780070482920, 2008 reprint
4. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg, Pearson Education, ISBN:81-7808-130-X

CA-409: Artificial Intelligence

Syllabus Total Lecture [48]

CHAPTER-1

Introduction to Artificial Intelligence [2]

What is AI?
Early work in AI
AI and related fields
AI problems and Techniques
(Book 1: Pgs:4-22 OR Book 2: Pgs 3-27)

CHAPTER-2

Problems, Problem Spaces and Search [6]

Defining AI problems as a State Space Search: example
Production Systems
Search and Control Strategies
Problem Characteristics
Issues in Design of Search Programs
Additional Problems
(Book 1: Pgs. 25-47 OR Book 2: 57-82)

CHAPTER-3

Heuristic Search Techniques [8]

Generate-and-test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Mean-Ends Analysis
(Book 1: Pgs. 50-72, Book 2: 83, 92-114)

CHAPTER-4

Knowledge Representation [10]

Representations and Mappings, Approaches to Knowledge Representation, Knowledge representation method, Propositional Logic, Predicate logic, Representing Simple facts in Logic, Representing Instances and Isa relationships, Computable Functions and Predicates, Resolution, Forward and backward chaining
(Book 1: 79 - 96, Book 2: 217-264, 265-311, 323)

CHAPTER-5

Slot – and – Filler Structures [8]

Weak Structures, Semantic Networks, Frames, Strong Structures, Conceptual Dependencies, Scripts
(Book 1 : Pgs 118 - 204, 207-215 **)**

CHAPTER-6

Game Playing **[2]**

Minimax Search Procedures, Adding alpha-beta cutoffs
(Book 1: 231-239 OR Book 2: 122-139)

CHAPTER-7

Planning **[4]**

An example Domain: The Blocks world, Component of a planning system, Goal stack planning, Nonlinear planning ,Hierarchical Planning
(Book 1: 250 – 268 OR Book 2 :343-349, 359, 371-391)

CHAPTER-8

Learning **[2]**

What is learning, Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation based learning
(Book 1: 347-365 OR Book 2: 525-532, 629-632)

CHAPTER-9

Introduction to AI Programming Language **[6]**

PROLOG: Introduction to TURBO PROLOG, PROLOG variables, Simple Input and Output, Basic Rules of Recursion, Arithmetic Operations
(Book 4)

Reference Books:

1. Artificial Intelligence, Tata McGraw Hill, 2nd Edition, by Elaine Rich and Kevin Knight
2. Artificial Intelligence: A Modern Approach by Stuart Russell, Peter Norvig, Prentice Hall, ISBN 0-13-103805-2
3. Introduction to Artificial Intelligence and Expert System, Prentice Hall of India Pvt. Ltd., New Delhi, 1997, 2nd Printing, by Dan Patterson.
4. .Introduction to TURBO PROLOG, BPB Publication, by Carl Townsend