DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

I SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Continuous Assessment	End Sem Exam	Total	
1	MCT501	Discrete Mathematics and Graph Theory	4	0	8	40	60	100	3 Hrs.
2	MCT503	Computer Organization & Architecture	4	0	8	40	60	100	3 Hrs.
3	MCT504	Digital Electronics & Microprocessors	4	0	8	40	60	100	3 Hrs.
4	MCP504	Digital Electronics & Microprocessors Lab	0	4	4	25	25	50	-
5	MCP506	Basics of Computer Hardware Lab	0	4	4	10	15	25	-
6	MCT513	Principles of Management	3	0	5	40	60	100	3 Hrs.
7	MCT514	Computer Programming	4	0	8	40	60	100	3 Hrs.
8	MCP514	Computer Programming Lab	0	4	4	25	25	50	-
9	HUT502	Communication Skills	0	2	-	-	-	-	-
		TOTAL	**19**	**14**	**49**				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

II SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Continuous Assessment	End Sem Exam	Total	
1	MCT507	Statistics and Probability	4	0	8	40	60	100	3 Hrs.
2	MCT509	Systems Programming	4	0	8	40	60	100	3 Hrs.
3	MCP512	Computer Workshop-I Lab	0	4	4	25	25	50	-
4	MCT515	Concepts in Data Structures	4	0	8	40	60	100	3 Hrs.
5	MCP515	Concepts in Data Structures Lab	0	4	4	25	25	50	-
6	MCT516	Object Oriented Programming-1	4	0	8	40	60	100	3 Hrs.
7	MCP516	Object Oriented Programming-1 Lab	0	4	4	25	25	50	-
8	MCT517	Financial Accounting	4	0	7	40	60	100	3 Hrs.
9	HUT503	Soft Skills	0	2	-	-	-	-	-
		TOTAL	20	**14**	**51**				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

III SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Continuous Assessment	End Sem Exam	Total	
1	MCT602	Database Management Systems	4	0	8	40	60	100	3 Hrs.
2	MCP602	Database Management Systems Lab	0	4	4	25	25	50	-
3	MCT603	Computer Networks	4	0	8	40	60	100	3 Hrs.
4	MCT604	Design and Analysis of Algorithms	4	0	8	40	60	100	3 Hrs.
5	MCT613	Object Oriented Programming-2	4	0	8	40	60	100	3 Hrs.
6	MCP613	Object Oriented Programming-2 Lab	0	4	4	25	25	50	-
7	MCT614	Introduction to Operating Systems	4	0	8	40	60	100	3 Hrs.
8	MCP615	Computer Workshop-II Lab	0	2	2	25	25	50	-
9	HUT601	Drafting Skills	0	2	-	-	-		-
-		**TOTAL**	**20**	**12**	**50**				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

IV SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Continuous Assessment	End Sem Exam	Total	
1	MCT607	Mobile Computing	4	0	8	40	60	100	3 Hrs.
2	MCP607	Mobile Computing Lab	0	4	4	25	25	50	-
3	MCT608	Data Mining	4	0	8	40	60	100	3 Hrs.
4	MCT616	Concepts in Software Engineering	4	0	8	40	60	100	3 Hrs.
5	MCP616	Concepts in Software Engineering Lab	0	4	4	25	25	50	-
6	MCT617	Distributed Systems	4	0	8	40	60	100	3 Hrs.
7	MCT618	Elective-I	4	0	8	40	60	100	3 Hrs.
8	MCP619	Open Source Software Lab	0	2	2	25	25	50	-
9	MCT612	Software Documentation	2	0	-	-	-	-	-
		TOTAL	**22**	**10**	**50**				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

V SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Continuous Assessment	End Sem Exam	Total	
1	MCT704	Elective - II	4	0	8	40	60	100	3 Hrs.
2	MCT705	Elective - III	4	0	8	40	60	100	3 Hrs.
3	MCT708	Cloud Computing	4	0	8	40	60	100	3 Hrs.
4	MCT709	Internet &Web Technologies	4	0	8	40	60	100	3 Hrs.
5	MCP709	Internet & Web Technologies Lab	0	4	4	25	25	50	-
6	MCP710	Computer Workshop-III Lab	0	2	2	25	25	50	-
7	MCT711	Network Security	4	0	8	40	60	100	3 Hrs.
8	MCT712	E-Commerce and its Applications	2	0	4	40	60	100	3 Hrs.
		TOTAL	**22**	**06**	**50**				

Course Code	Elective-I	Course Code	Elective-II	Course Code	Elective-III
MCT618-1	Advanced Databases	MCT704-1	Distributed Database Management Systems	MCT705-1	Business Intelligence
MCT618-2	Advanced Operation Research	MCT704-2	Artificial Intelligence	MCT705-2	Soft Computing
MCT618-3	Computer Graphics and its applications	MCT704-3	Image Processing	MCT705-3	Pattern Recognition
MCT618-4	Advanced Computer Architecture	MCT704-4	Introduction to Real Time Operating Systems	MCT705-4	Information Retrieval
				MCT705-5	Introduction to IoT

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

VI SEMESTER MASTER IN COMPUTER APPLICATION

Sr.No.	Course Code	Course Name	Contact Hours	Credits	Maximum Marks			Exam Duration
					Continuous Assessment	End Semester Examination	Total	
1	MCP707	Project Work-Full Time	20 hours per semester	50	300	300	600	-
	TOTAL		20 hours per semester	**50**				

SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-1 **Course: Elective – II - Distributed Database Management Systems**

L: 4 Hrs., P:0 Hrs., Per week **Total Credits: 8**

Course Objectives

1. To understand the need for distributed database technology to tackle deficiencies of the centralized database systems.
2. To get familiar with the currently available models, technologies and approaches to build distributed database systems and services.
3. To learn basic principles and implementation techniques of distributed database systems.

Course Outcomes

At the end of the course students will be able to:

1. Learn basic concepts of Distributed DBMS and analyze various complexities & dimensions of its architecture and design issues.
2. Acquire various concepts of transaction management, fragmentation, replication and allocation related to Distributed DBMS.
3. Understand concurrency control techniques and distributed object management.

Syllabus

UNIT-I

Introduction: Distributed data processing, Definition and Concepts, Advantages and disadvantages of DDBMS, Transparencies in a distributed DBMS, Problem areas, Overview of RDBMS and Computer Network Concepts.

UNIT-II

Distributed Database Management System Architecture and Database Design: Distributed DBMS architecture, Global directory issues, Alternative design strategies, Distributed design issues, Fragmentation, Data allocation.

UNIT-III

Query Processing: Overview of query processing- Problem, Objectives, Complexity of relational algebra, Characterization of processors, Layers, Query decomposition, Localization of distributed data.

UNIT-IV

Optimizing Distributed Queries and Transaction Management: Query optimization, Centralized and Distributed query optimization, Algorithms.

Transaction Concepts- Model, Definition, Properties, Characterization, Goals of transaction management, Types of transactions, Distributed execution monitor.

UNIT-V

Distributed Concurrency Control: Serializability Theory, Taxonomy of Concurrency Control Mechanisms, Two-Phase Locking, Timestamp-Based Concurrency Control, Optimistic Concurrency Control, Deadlock Management- Detection, Prevention, Avoidance.

UNIT-VI

Distributed Object Management: Object Concepts and Object Models, Object Distribution Design, Architectural Issues, Object Management, Object Storage, Object Query Processing, Object DBMSs Transaction Management.

Text Books:

1. Principles of Distributed Database Systems: M.T. Ozsu and P. Valduriez, Prentice-Hall.
2. Distributed Databases Principles and Systems: S. Ceri and G. Pelagatti, McGraw Hill.

Reference Book:

1. Advances in Object-Oriented Database Systems: A. Dogac, M.T. Ozsu, A. Billiris, and T. Sellis, Springer-Verlag.

SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-2 **Course: Elective – II - Artificial Intelligence**

L: 4 Hrs., P:0 Hrs., Per week **Total Credits: 8**

Course Objectives

1. To study various heuristic techniques for solving AI problems.
2. To study various knowledge representation techniques.
3. To study various reasoning techniques and natural language processing.
4. To design expert system for solving AI problems

Course Outcomes:

At the end of the course students will be able to

1. Identify and specify a problem definition for a given real world problem domain.
2. Apply both deterministic and non-deterministic Artificial Intelligence search techniques to a well defined problem domain.
3. Understand knowledge representation, reasoning techniques, learning methods and Uncertainty methods.
4. Understand recent trends and future applications of Artificial Intelligence.

Syllabus

UNIT-I

Introduction To Artificial Intelligence: Definition and Concepts, History, Overview, Intelligent Agents, Performance Measure, Rationality, Structure of Agents, Problem-solving agents, Problem Formulation, Uninformed Search Strategies

UNIT-II

Search and Exploration: Informed & Uninformed Searching Techniques, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing, Genetic Algorithms, Online search

UNIT-III

Constraint Satisfaction Problems: Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs.

Adversarial Search: Games, The minimax algorithm, Alpha- Beta pruning.

UNIT-IV

Knowledge and Reasoning : Knowledge Based Agents, Logic, Propositional Logic, Inference, Equivalence, Validity and satisfiability, Resolution, Forward and Backward Chaining, Local search algorithms.

First Order Logic: Syntax and Semantics of FOL, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

UNIT-V

Learning and Uncertainty: Rote Learning, learning by taking advice, learning in problem solving, learning from examples: Induction, Explanation based learning, Discovery, Analogy. Basic Probability Notations, Axioms of Probability, Baye's Rule and its use.

UNIT-VI

Applications of Artificial Intelligence:

Expert Systems: Introduction, Characteristics, Knowledge Representations, Inference Techniques and Rule based architecture, Expert System design using PROLOG.

Robotics: Introduction, Robot Hardware, Robotic Perception, Robotic Software Architectures Application domains.

Text Books:

1. Artificial Intelligence: A Modern Approach: Stuart Russel and Peter Norving, Prentice Hall Series in AI.

2. Artificial Intelligence: E.Rich and Knight, Tata McGraw Hill.

Reference Books:

1. Artificial Intelligence: E. Charniack and D. Mcdermott, Addison Wesley.
2. Introduction to Knowledge Systems: Mark Stefik, Morgan Kaufmann.

SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-3 **Course: Elective – II - Image Processing**

L: 4 Hrs., P:0 Hrs., Per week **Total Credits : 8**

Course Objectives:

1. To learn the fundamental concepts and applications of digital image processing.
2. To learn the concepts of and how to perform Intensity transformations and spatial filtering.
1. To understand the concepts of and how to perform Image segmentation, restoration and reconstruction, color image processing, image compression and watermarking.

Course Outcomes:

At the end of the course students will be able to:

1. Acquire and relate the fundamental concepts of a digital image processing system.
2. Understand and apply different image Filtering Models, segmentation algorithms and image compression standards for Computer vision & image analysis.
3. Understand and demonstrate the role of Image restoration, reconstruction, representation and description Techniques.

Syllabus

UNIT-I

Introduction – Fundamental steps in Digital Image Processing, Components of an Image Processing System. **Digital Image Fundamentals –** A Simple Image Formation Model, Image Sampling and Quantization, Basic relationship between pixels, Neighbors of pixel, Adjacency, Connectivity, Regions, Boundaries: Labeling of connected components, Distance measure, Application of image processing.

UNIT-II

Intensity Transformations and Spatial Filtering-Some Basic Intensity Transformation Functions, Histogram equalization and histogram matching, Fundamentals of Spatial Filtering, Introduction to Smoothing and Sharpening Spatial Filters.

Filtering in the Frequency Domain-Discrete Fourier Transform (DFT), The Basics of Filtering in the Frequency Domain,

Image Smoothing Using Frequency Domain Filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters,

Image Sharpening Using Frequency Domain Filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters.

UNIT-III

Image Restoration and Reconstruction - Degradation model, Restoration in the Presence of Noise Only—Spatial domain, Periodic Noise Reduction by Frequency Domain, Inverse filtering, Weiner filtering, Geometric Mean Filter.

Color image processing- Color Models, Pseudo Color Image Processing,

UNIT-IV

Image Compression –Coding Redundancy, Spatial and Temporal Redundancy, Fidelity Criteria, Image Compression Models, Huffman Coding, LZW Coding, Lossy Compression, Digital Image Watermarking.

UNIT-V

Image Segmentation–Detection of Discontinuities, Edge Linking and Boundary Detection,

Thresholding: Foundation, Basic Global Thresholding,

Region Based Segmentation: Region Growing, Region Splitting and Merging.

UNIT-VI

Representation and Description –

Representation Schemes like Chain Coding, Polygonal Approximation Approaches, Signatures, Boundary Segments, Skeletons, Boundary Descriptors, Regional Descriptors.

Text Books:

1. Digital Image Processing: R.C.Gonzalez & R.E. Woods, Addison Wesley Pub.
2. Fundamentals of Digital Image Processing: A.K.Jain, PHI Pub.
3. Fundamentals of Electronic Image Processing: A.R.Weeks.

Reference Books:

1. Digital Image Processing: S.Sridhar, Oxford Uni. Press.

SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-4 **Course: Elective – II-Introduction to Real Time Operating Systems**

L: 4 Hrs., P:0 Hrs., Per week **Total Credits: 8**

Course Objectives:

1. To get familiar with the principles and design methods of real-time operating systems.
2. To learn how to address the fundamental problems of real-time operating systems.
3. To study various scheduling techniques of real-time operating systems.
4. To learn about resource allocation and resource access control.

Course Outcomes:

At the end of the course students will be able to:

1. Clearly differentiate the issues that arise in designing real-time systems; analyze a variety of real-time scheduling techniques, prove correctness of the resulting schedule; implement basic scheduling algorithms.
2. Apply real-time scheduling theory to the design and implementation of a real-world system.

Syllabus

UNIT-I

Real time applications: Hard and soft real time systems, timing constraints, A Reference model of Real-time systems, temporal parameters, precedence constraints & dependencies, scheduling Hierarchy, Commonly used approaches to scheduling, cyclic and priority drive approaches, Optimality of EDF and LST.

UNIT-II

Clock Driven Scheduling : Static timer driven scheduler, Cyclic Executives, Improving Average Response times of Aperiodic Jobs, Scheduling Sporadic jobs, Practical Considerations, Pros and Cons of Clock Driven Scheduling.

UNIT-III

Priority-driven scheduling of periodic tasks: Fixed priority vs Dynamic Priority schemes, Maximum schedulable Utilization, Optimality of the RM and DM algorithms, As Schedulable Test for Fixed Priority Tasks, Practical Factors.

UNIT-IV

Scheduling Apriodic and Sporadic Jobs in Priority - driven scheduling: Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth, and Weighted Fair-Queuing Servers, Scheduling of Sporadic Jobs

UNIT-V

Resources and resource access control: Non-preemptive critical sections, basic priority-inheritance, ceiling protocol, multiprocessor scheduling, predictability and validation of dynamic multiprocessor systems flexible applications, tasks with temporal distance constraints.

UNIT-VI

Real time Operating systems: Overview, Time Services and Scheduling Mechanisms, Basic Operating System Functions, Processor Reserves and Resource Kernel, Open System Architecture, Capabilities of Commercial RTOS.

Text Books:

1. Real-Time Systems: Jane W.S. Liu, Pearson Education Asia Pub.

Reference Books:

1. Real time Systems: C.M. Krishna & Kang G. Shin, McGraw Hills.

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT705-1 **Course: Elective-III- Business Intelligence**

L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives

1. To get familiar with the basics of Business Intelligence and its components.
2. To understand technology and processes associated with Business Intelligence framework.
3. To understand Data Warehouse implementation methodology and project life cycle.
4. To learn various open source tools used in Business Intelligence.

Course Outcomes

At the end of this elective, student will be able to:

1. Realize the need of Business Intelligence.
2. Apply technology and processes associated with Business Intelligence framework.
3. Analyze multidimensional data in real life applications.
4. Use various open source Business intelligence tools.

Syllabus:

UNIT- I

Types of Digital Data: structured, unstructured and semi-structured data, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP).

UNIT -II

Introduction to Business Intelligence: Evolution of BI, BI value chain, introduction to business analytics, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, **BI Infrastructure Components** - BI Process, BI Technology, BI Roles & Responsibilities.

UNIT- III

Basics of Data Integration: Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, data integration technologies, Introduction to data quality, data profiling concepts and applications.

UNIT-IV

Multi-Dimensional Data Modeling: Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs.

UNIT- V

Basics of Enterprise Reporting: Introduction to enterprise reporting, concepts of dashboards, balanced scorecards.

UNIT- VI

Study of open source BI tools.

Text books:

1. Fundamentals of Business Analytics: RNPrasad and S Acharya ; Wiley India, 2011.
2. Business Intelligence: A Managerial Approach: Ephraim Turban et.al; 2nd Edition, Prentice Hall, 2010.

Reference Books:

1. Business intelligence for the enterprise by Mike Biere
2. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT705-2 **Course: Elective-III- Soft Computing**

L: 4 Hrs, P: 0 Hrs, per week **Total Credits: 8**

Course Objectives

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system, basics of genetic algorithms and their applications in optimization and planning.

Course Outcomes

At the successful completion of this course students will be able to:

1. Understand Artificial Neural Networks and learning methods for neural networks.
2. Learn basics of Fuzzy Logic System, genetic algorithms and their applications in optimization and planning.
3. Theoretical and practical aspects of Soft Computing

Syllabus

UNIT-I

Introduction to Soft Computing : Basic Concepts of Soft Computing, Combination of Constituents of Soft Computing.

Constituent Methodologies of Soft Computing:Elements of Fuzzy Sets Theory: Fuzzy Sets and Operations Over Them, Mathematics of Fuzzy Computing, Fuzzy Logic and Approximate Reasoning, Probability and Fuzziness, Fuzzy Sets and Possibility Theory

UNIT-II

Foundations of Neurocomputing: Basic Types and Architectures of Neural Networks, Learning Algorithms of Neural Networks

UNIT-III

Evolutionary Computing: Evolutionary Programming and Genetic Algorithms, Computation with Genetic Aigorithms.

UNIT-IV

Emerging Combined Soft Computing Technologies: Neuro-Fuzzy Technology, Neuro-Genetic Approach, Fuzzy Genetic Paradigm, Genetic Algorithms with Fuzzy Logic, Neuro-Fuzzy-Genetic Paradigm

UNIT-V

Soft Computing in Finance: Soft Computing Based Stock Market Predicting System, Fuzzy Nonlinear Programming Approach to Portfolio Selection, Neuro-Fuzzy Approach to Modeling of Credit Risk in Trading Portfolios.

UNIT-VI

Soft Computing in Electronic Business:A Multi-Agent System for E-Commerce Decisions, Soft Computing and Personalization of Electronic Commerce,.

Text Books:

1. Soft Computing and Its Applications: *R.A. Aliev, R.R. Aliev*, World Scientific
2. Introduction to Artificial Neural Systems,J. M. Zurada, Second Ed. (1994),Jaico Publishing House
3. Fuzzy Logic with Engineering Applications:*Timothy Ross*, McGraw-Hill
4. An Introduction to Genetic Algorithms (Complex Adaptive Systems), Melanie Mitchell, MIT Press.

Reference Books:

1. Introduction to The theory of Neural Computation:*John Hertz, Anders Krogh, Richard Palmer, Addison Wesley*
2. Neuro-Fuzzy and soft Computing: A computational Approach to Learning & Machine Intelligence:*Roger Jang, Tsai Sun, EijiMizutan*,, PHI
3. Elements of Artificial Neural Networks:*KishanMehrotra, C. K. Mohan, S. Ranka*Penram International Publishing (India)

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT705-3 **Course: Elective-III- Pattern Recognition**

L: 4 Hrs, P: 0 Hrs, per week **Total Credits: 8**

Course Objectives

1. Pattern recognition algorithms generally aim to provide a knowledge about statistical, Classification, unsupervised and supervised classification, Clustering.
2. Understand how to generate pattern features using various transforms based on data.
3. Emphasize on different algorithms of artificial neural networks and various transformation techniques.

Course Outcomes

At the end of the course students will be able to:

1. Understand the basics of pattern recognition.
2. Analyze & study different pattern recognition technique.
2. Apply the pattern recognition theories to real time applications of interest.
4. Understand different algorithms of artificial neural networks and various transformation techniques.

Syllabus:

UNIT-I

Applications of pattern recognition, statistical decision theory, probability of events, Random variables, moments of random variables, Estimation of parameters, Minimum Risk Estimators.

UNIT-II

Bay's Theorem, conditionally independent features. Decision boundaries, Estimation of error rates, characteristics curves.

UNIT-III

Histograms, Kernel and window estimators, Nearest Neighbor classification techniques, Adaptive Decision boundaries

UNIT-IV

Artificial Neural Networks: Biological Motivation and Back-Propagation
Non-Metric Methods: Recognition with Strings, String Matching.

UNIT-V

Clustering-Introduction, hierarchical clustering, partition clustering, fuzzy c-means clustering.

UNIT VI - Problem of dimensionality, Principal component analysis, Hidden Markov models, Support vector machines, Expectation Maximization, Applications of Pattern Recognition.

Text Books:

1. Pattern Classification : *Richard O.Duda, Peter E.Hart, David G.Shork, John Wiley & Sons* 200, 2nd Edition
2. Pattern Recognition and Image Analysis: *Earl Gose, Richard Johnsonbough , Steve Jost*, Prentice Hall of India
3. Pattern Recognition and Image Processing : *Sing Tze bow; Marcel Dekker*

Reference Books:

1. Pattern Recognition and Machine Learning: *C.M. Bishop*

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT705-4 **Course: Elective-III- Information Retrieval**

L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives

1. To understand the basic concepts of Information Retrieval Systems like Boolean retrieval, vocabulary and dictionaries.
2. To emphasize on different index construction and compression techniques, different score computing techniques.
3. To Analyze and study evaluation in IR, Probabilistic Information retrieval techniques, classification techniques and Latent Semantic Index.
4. To understand Web basics for IR and Link Analysis.

Course Outcomes

At the end of the course students will be able to:

1. Understand the basics of Information Retrieval Systems.
2. Learning different index construction and compression techniques, different score computing techniques.
3. Analyze and study evaluation in IR, Probabilistic Information retrieval techniques, Classification technique and Latent Semantic Index.
4. Understand web basics for IR and Link Analysis.

Syllabus:

UNIT-I

Boolean Retrieval: An example information retrieval problem, A first take at building an inverted index, Processing Boolean queries. **The term vocabulary and postings lists:** Document delineation and character sequence decoding. **Determining the vocabulary of terms:** Tokenization, Dropping common terms: stop words, Stemming and lemmatization

UNIT-II

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction, Phonetic correction. **Introduction to index construction and index compression**: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression

UNIT-III

Scoring, term weighting and the vector space model: Term frequency and weighting, Inverse document frequency**,** The vector space model for scoring, **Computing scores in a complete search system:** Efficient scoring and ranking, Components of an information retrieval system.

UNIT-IV

Evaluation in information retrieval: Information retrieval system evaluation. Evaluation of unranked retrieval sets, **A broader perspective: System quality and user utility:** System issues, User utility.

UNIT-V

Probabilistic information retrieval: Review of basic probability theory, The Probability Ranking Principle, The Binary Independence Model. **Text classification and Naïve Bayes:** The text classification problem, Naive Bayes text classification. **Feature selection:** Mutual information, ***c*** Chi2 Feature selection

UNIT-VI

Matrix decompositions and latent semantic indexing: Linear algebra review, Term-document matrices and singular value decompositions, Latent semantic indexing. **Web search basics:** Web characteristics, Search user experience. **Web crawling and indexes:** Overview, Crawling. **Link analysis:** The Web as a graph, PageRank

Text Books:

1.An Introduction to Information Retrieval: Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge University Press, Cambridge, England, 2009

2. Information Retrieval: Implementing and evaluating search engines: Stefan Büttcher, Charles L. A.Clarke, Gordon V. Cormack, MIT Press, 2010

Reference Books:

1. Information Retrieval: Algorithms and Heuristics: David A. Grossman, Ophir Frieder, Springer.

2. Information Retrieval: Data Structures and Algorithms by Frakes, Pearson.

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT705-5 **Course: Elective-III- Introduction to Internet of things**

L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives:

1. To understand the vision and purpose of IoT.
2. To learn Data and Knowledge Management using Devices in IoT Technology.
3. To understand State of the Art – IoT Architecture.
4. To get familiar with real world IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes

At the end of the course students will be able to:

1. Understand the vision of IoT from a global context and its Market perspective.
2. Analyze and study different H/W devices, Gateways and Data Management in IoT.
3. Built state of the art architecture in IoT.
4. Conceptualize applications of IoT in industrial and commercial building automation and real world design constraints.

Syllabus:

UNIT-I

Introduction to Internet of Things: IoT basics, Connected devices evolution, Introduction to communication mechanisms in IoT, Challenges with IoT, Applications of IoT.

UNIT-II

Hardware in IoT: Introduction to RFID, Types of RFID, Simple and programmable Beacons, Various sensors prominently used in mobile devices.

UNIT-III

Communication in IoT: Physical layer protocols used in IoT communication. IP Protocols used in communication such as HTTP based protocols - CoAP and MQTT, Specific aspects of protocols covering IoT communication.

UNIT-IV

Sensor networks and M2M Architecture: High level M2M requirements, ETSI M2M services architecture, ZigBee network and its architecture. 6LoWPAN related standards.

UNIT-V

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **Real-World Design Constraints-** Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT-VI

Applications of IoT: Case Studies of IoT Applications: IoT in Cities/Transportation, IoT in the Home, IoT in Retail, IoT in Healthcare and IoT in Sports.

Text Books:

1. Learning Internet of Things By: Peter Waher Publisher: Packt Publishing

Reference Books:

1. The Internet of Things: Key Applications and Protocol By: Olivier Hersent; David Boswarthick; Omar Elloumi, Publisher: John Wiley & Sons
2. M2M Communications: A Systems Approach By: David Boswarthick; Omar Elloumi; Olivier Hersent, John Wiley & Sons

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT708 **Course: Cloud Computing**

L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives

1. To learn the principles of distributed systems and their extension to grid and cloud computing.
2. To familiarize with current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms, including grid and cloud computing.
3. To understand key issues related to multi-level interoperability across a distributed infrastructure across multiple heterogeneous and distributed resources in a dynamically changing computing environment.

Course Outcomes

At the end of the course students will be able to:

1. Identify the key dimensions and basics of Cloud Computing.
2. Understand different aspects of cloud services.
3. Apply the knowledge of grid computing in business environment.

Syllabus

UNIT- I

Understanding Cloud Computing: History of Cloud Computing - Cloud Architecture - Cloud Storage - Why Cloud Computing Matters - Advantages of Cloud Computing - Disadvantages of Cloud Computing - Companies in the Cloud Today - Cloud Services.

UNIT- II

Developing Cloud Services: Web-Based Application - Pros and Cons of Cloud Service Development - Types of Cloud Service Development - Software as a Service - Platform as a Service - Web Services - On-Demand Computing - Discovering Cloud Services Development Services and Tools - Amazon Ec2 - Google App Engine - IBM Clouds

UNIT- III

Cloud Computing for Everyone:

Centralizing Email Communications - Collaborating on Schedules - Collaborating on To-Do Lists - Collaborating Contact Lists - Cloud Computing for the Community - Collaborating on Group Projects and Events - Cloud Computing for the Corporation.

UNIT- IV

Using cloud services: Collaborating on Calendars, Schedules and Task Management - Exploring Online Scheduling Applications - Exploring Online Planning and Task Management - Collaborating on Event Management - Collaborating on Contact Management - Collaborating on Project Management - Collaborating on Word Processing - Collaborating on Databases - Storing and Sharing Files.

UNIT- V

Other ways to collaborate online: Collaborating via Web-Based Communication Tools - Evaluating Web Mail Services - Evaluating Web Conference Tools - Collaborating via Social Networks and Groupware - Collaborating via Blogs and Wikis.

UNIT- VI

GRID Computing: Introduction to Grid Computing & its value in business computing, Grid technologies, issues and solutions.

Text Book:

1. Web-Based Applications That Change the Way You Work and Collaborate Online: Michael Miller; Cloud Computing, Que Publishing; August 2008.

2. Haley Beard; Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs; Emereo Pty Limited; July 2008

Reference Books :

1. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese; O'Reilly Media, 2009.
2. Cloud Computing Explained: Implementation Handbook for Enterprises: John Rhoton, Second Illustrated Edition, Recursive Limited, 2009

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT709 **Course: Internet & Web Technologies**

L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives

1. To understand the basics of HTTP protocol & HTML and XML languages.
2. To learn the server side programming skills with market leading technologies.
3. To learn the client side scripting using JavaScript and AngularJS.

Course Outcomes

On successful completion of the course, students will be able:

1. To get the basic knowledge of HTTP, HTML & XML.
2. To get the essential knowledge for creation of web applications using server side programming.
3. To apply the client side programming techniques on the websites.

Syllabus

UNIT - I

Internet Basics & HTML- Overview of Internet, History, Web system architecture, Uniform Resource Locator, HTTP protocol basics, HTTP request & response, HTTP status codes, HTML tags, Stylesheets (CSS) implementation.

UNIT – II

XML- Intro & features of XML, Differences between XML & HTML, Writing XML elements &attributes, XML well-formedness, XML with CSS, XML Namespaces, Validation of XML files using DTD.

UNIT – III

Server Side Programming with ASP :ASP .NET file Types, Page Class, Auto Postback, WebControls, Validation Controls, Master Pages, State Management, web.config, Creating Simple Component, Custom Controls &User Controls. Caching & Authentication.

UNIT – IV

Server Side Programming with PHP:PHP Place in Web World, Basic Rules of PHP Programs, PHP functions, using Cookies and Sessions, Debugging, Working with files.

UNIT –V

Client Side Programming with JavaScript: Introduction to Java script, Java script and HTML DOM, Advanced Java Script and HTML Forms.

UNIT – VI

AngularJS : Basics of AngularJS, Introduction to MVC, AngularJS Filters and Modules, AngularJS Directives, Data Binding, Services and Server Communication, AngularJS Animation

Text Books:

1. Web Technologies by Uttam K. Roy - *Oxford Uni. Press.*
2. Asp.Net Complete Reference – *Mathew McDonald.*
3. Learning PHP 5 by David Sklar - O'Reilly.

Reference Books:

1. Beginning AngularJS, Andrew Grant – *Apress.*

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCP709 **Course: Internet and Web Technologies Lab**

L:0 Hrs, P: 4 Hrs, per week **Total Credits: 4**

Course Objectives

1. To understand different web technologies trends available in industry.
2. To learn data storing and formatting methods by using XML.
3. To get familiar with different platforms & coding languages for web technologies.
4. To learn Server and Client side scripting.

Course Outcomes

At the end of the course students will be able to:

1. Analyze performance of various web technological trends available in industry.
2. Implement data storing and formatting methods by using XML and its supported technologies.
3. Design web technologies using various coding languages.
4. Implement Server side and Client side scripting.

Syllabus

At least 8 practicals based on theory contents

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCP710 **Course: Computer Workshop-III**

L: 0 Hrs., P: 2 Hrs., Per week **Total Credits: 2**

Course Objectives

1. To understand basic principles of API level programming and its programming concepts.
2. To get familiar with different approaches & coding languages for creating APIs.
3. To learn how to develop and use APIs for different business domains.

Course Outcomes

On successful completion of the course, students will be able to:

1. Learn the basics of API level Programming
2. Implement API's in Procedural as well as Object oriented languages.
3. Develop a digitally enabled business using API.

Syllabus

Minimum 8 practicals and assignments based on but not limited to the following topics:

- Introduction to API Level Programming.
- API Environments
- API Parameters
- API in Procedural Languages
- API in OO Languages
- API libraries & frameworks
- Web APIs
- Building an efficient & agile digitally enabled business using API
- RESTful web APIs & Amazon API

Reference Books:

1. API for Dummies: Clans T. Jenson,By John Wiley & Sons,Inc.

SYLLABUS OF SEMESTER -V, M.C.A. (Master in Computer Application)

Course Code: MCT 711 **Courses: Network Security**
L:4 Hrs, P: 0 Hrs, Per week **Total Credits: 8**

Course Objectives

1. To understand the basic concept of cryptography and their mathematical foundation required for various cryptographic algorithms.
2. To study signature schemes using well-known signature generation and verification algorithms.
3. To be able to describe and analyze existing authentication protocols for two party communications and analyze key agreement algorithms.

Course Outcomes

At the end of the course students will be able to:

1. Describe and apply appropriate encryption techniques to solve problems.
2. Develop a mathematical model and implement security schemes designed to protect the network systems.
3. Differentiate between private and public key cryptography.

Syllabus

Unit – I

Classical Encryption Techniques: Substitution Cipher, Transposition Ciphers, Stream and block Ciphers**; Modern Symmetric Key Ciphers:** Modern Block cipher, Modern Stream Ciphers;
Data Encryption Standers (DES) : Structure of DES, Analysis of DES, Strength of DES, Differential and Linear Cryptanalysis., 3-DES, IDEA, Blowfish

Unit -II

Number Theory and Finite Fields: Integer Arithmetic, Modular Arithmetic, Polynomial Arithmetic, Euclidean Algorithm, Groups, Rings and Fields, GF(p), $GF(2^n)$.
Mathematics of Asymmetric Key Cryptography:- Prime Numbers, Fermat's and Euler's Theorems, Testing of Primality, Chinese Reminder Theorem,

Unit -III

Public Key Cryptography:- Principles of Public Key Cryptosystem, RSA algorithm. Diffie-Hellman Key Exchange, ElGamal Cryptographic System, Elliptic Curve Cryptograph,
Key Management and Distribution : Key Distribution using Symmetric Encryption and Asymmetric Encryption, Distribution of public key, X.509 Certificates, Public key Infrastructures.

Unit-IV

Cryptographic Hash Function: Application of Hash Function, Description of MD and SHA family, cryptanalysis
User Authentication: Authentication principles, Remote user Authentication using Symmetric and Asymmetric Encryption, Kerberos, Federated Identity Management,

Unit- V

Message Authentication Codes (MAC): Requirements, Functions, Security of MAC, HMAC. CMAC
Digital Signature: Process, Services, Attacks on digital Signature, RSA Digital Signature Scheme, ElGamal Digital Signature Scheme, Digital Signature Standard (DSS).

Unit - VI

Transport Layer Security: SSL Architecture, Four Protocols, Message Formats. IP Security: Security Overview, Policy, Encapsulating Security Payload (ESP). **E-Mail Security:-** Pretty Good Privacy, S/MIME. **System Security:** Intruders, Malicious Software, Firewalls.

Text Book:

1. Cryptography and Network Security Principles and Practice: Fifth Edition, William Stallings.

Reference Book:

1. Cryptography and Network Security: 2nd Edition, Behrouz A. Forouzan and Debdeep Mukhopadhyay.
2. Cryptography and Network Security: 2nd Edition, Atul Kahate, Mc Graw Hill.

SYLLABUS OF SEMESTER –V, M.C.A. (Master in Computer Application)

Course Code: MCT712 **Course: E-Commerce and its Applications**

L: 2 Hrs., P: 0 Hrs., Per week **Total Credits: 4**

Course Objectives

1. To assess the impact of the Internet and Internet technology on business-electronic commerce and electronic business.
2. To identify and fulfill the major management challenges for building and using information systems.
3. To define an IT infrastructure and describe its components and effectively managing the change environment.
4. To learn the security and legal aspects of electronic commerce.

Course Outcomes

At the end of the course students will be able to:

1. Understand the basic concepts, technologies used and the processes of developing and implementing E-Commerce.
2. Learn about the importance of managing organizational change associated with an E-Commerce implementation.
3. Be aware of the ethical, social, and security related aspects of e-commerce systems.

Syllabus

UNIT-I

Overview of E-Commerce: Introduction, EDI, E-Commerce types, Internet Connectivity

UNIT-II

Electronic Communication: PCs and networking, Email, The internet and Intranets.

UNIT-III

Building Blocks of E-Commerce: Electronic Data Interchange, The UN/EDIFACT Standard, Internet and Extranet, Identification and Tracking Tools.

UNIT-IV

Reengineering: Business process reengineering, Management of Change.

UNIT-V

Concerns for E-Commerce Growth: Legal Issues, Cyber Security, Cyber Crimes.

UNIT-VI

Assurances in E-Commerce: Information Technology act 2000, Public Key Infrastructure, Electronic Payment systems and Internet Banking.

Applications :E-Commerce applications with case studies of Amazon, ebay.

Text Books:

1. E-Commerce: The cutting Edge of Business: *Bajaj &Nag, Second Edition, Tata McGraw-Hill.*
2. E-Commerce-An Indian Perspective:*P.T. Joseph, S.J., Third Edition*
3. Electronic Commerce: *Greenstein and Feinman, Tata McGraw-Hill.*

Reference Books:

1. E-Business: A beginners Guide: *Elsenpeter, Tata McGraw-Hill.*
2. Electronic Commerce From Vision to Fullfillment: *E.M. Awad,* Third EditionPHI
3. E-Commerce: *Bhushan Dewan, S. Chand*
4. E-Commerce: *Strategy Technology and Application- David Whiteley, TMH*
5. Introduction to Computers: *Peter Norton's, TMH Fourth Edition.*