ADIKAVI NANNAYA UNIVERSITY

UNIVERSITY COLLEGE OF ENGINEERING
RAJAMAHENDRAVARAM

Department of Computer Science and Engineering

MCA

Syllabus
& Model Question Papers

II & III Year

Board of Studies
University College of Engineering

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MASTERS IN COMPUTER APPLICATIONS (AB 2019-20)

COURSE STRUCTURE

Semester III (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19301	Operations Research	75	25	100	4	-	4
MCA-19302	Design and Analysis of Algorithms	75	25	100	4	-	4
MCA-19303	Computer Networks	75	25	100	4	-	4
MCA-19304	Artificial Intelligence and Expert systems	75	25	100	4	-	4
MCA-19305	Database Management Systems	75	25	100	4	-	4
MCA-19306	Computer Networks Lab	50	50	100	-	3	2
MCA-19307	Database Management Systems Lab	50	50	100	-	3	2
	Total Credits						24

Semester IV (Second Year Curriculum)

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA -19401	Information Security and Cryptography	75	25	100	4	-	4
MCA- 19402	Cloud Computing	75	25	100	4	-	4
MCA-19403	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-19404	Object Oriented Software Engineering	75	25	100	4	-	4
MCA-19405	Elective-I 1.Distributed Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-19406	Data Mining Concepts and Techniques Lab	50	50	100	-	3	2
MCA-19407	Object Oriented Software Engineering Lab	50	50	100	-	3	2
	Total Credits						24

Semester V (Third Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19501	Big Data Analytics	75	25	100	4	-	4
MCA-19502	Cyber Security and Forensics	75	25	100	4	-	4
MCA-19503	Elective II 1. Blockchain Technology 2. Foundations of Data Science 3. Human-Computer Interaction	75	25	100	4	-	4
MCA-19504	Elective-III 1.Python Programming 2.Perl Programming 3.PHP programming	75	25	100	4	-	4
MCA-19505	Elective-IV 1.Machine Learning 2.Embedded Systems 3.Robotics	75	25	100	4	-	4
MCA-19506	Big Data Analytics Lab	50	50	100	-	3	2
MCA-19507	Mini Project	50	50	100	-	3	2
	Total Credits						24

Semester VI (Third Year) Curriculum

code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA -19601	Project					-	16

Branch/Course: Master of Computer Applications

Semester III (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19301	Operations Research	75	25	100	4	-	4
MCA-19302	Design and Analysis of Algorithms	75	25	100	4	-	4
MCA-19303	Computer Networks	75	25	100	4	-	4
MCA-19304	Artificial Intelligence and Expert systems	75	25	100	4	-	4
MCA-19305	Database Management Systems	75	25	100	4	-	4
MCA-19306	Computer Networks Lab	50	50	100	-	3	2
MCA-19307	Database Management Systems Lab	50	50	100	-	3	2
	Total Credits						24

Course Code &Title: MCA-19301 OPERATIONS RESEARCH
Semester & Year of study: III & 2020-2021
Course Index: C301

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Operations Research and Linear Programming.
To learn about the concept of Dual problems and Transportation Model.
To learn about Network Models, Integer Programming, Dynamic Programming.
To learn about the concept of Deterministic Inventory Models, Game theory.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C301.1	Understand Operations Research and Linear Programming.
C301.2	Understand the concept of Dual problems and Transportation Model.
C301.3	Understand about Network Models, Integer Programming, Dynamic Programming.
C301.4	Understand the concept of Deterministic Inventory Models, Game theory.

MCA-19301 OPERATIONS RESEARCH

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Overview of Operations Research: OR models – OR Techniques

Linear Programming: Introduction – Graphical solution; Graphical sensitivity analysis- The standard form of linear programming problems – Basic feasible solutions- unrestricted variables – simplex algorithm – artificial variables – Big M and two phase method – Degeneracy - alternative optima – unbounded solutions – infeasible solutions.

UNIT II

Dual Problems: Relation between primal and dual problems – Dual simplex method

Transportation Model: Starting solutions, North West corner Rule - lowest cost method, Vogels approximation method – Transportation algorithms – Assignment problem – Hungarian Method.

UNIT-III

Network Models: Definitions – CPM and PERT – Their Algorithms

Integer Programming: Branch and Bound Algorithms cutting plan algorithm.

Dynamic Programming: Recursive nature of dynamic programming – Forward and Backward Recursion

UNIT-IV

Deterministic Inventory Models: Static EOQ Models – Dynamic EOQ models.

Game theory: Two person Zero Sum Games – Mixed strategy games and their Algorithms.

Text Books:

1. Operations Research – An Introduction, Handy A Taha – Pearson Education.
2. Operations Research Panneer Selvan Prentice Hall of India.

Reference Books:

1. Operations Research, SD Sharma
2. Operations Research Kanti Swaroop, PK Gupta, Man Mohan – Sultan Chand & Sons Education

Course Code &Title: MCA-19302 DESIGN AND ANALYSIS OF ALGORITHMS **Semester & Year of study: III & 2020-2021** **Course Index: C302**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and sorting techniques.	
To learn about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.	
To learn about the Dynamic Programming and Greedy Technique	
To learn about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.	
Course Outcomes: By the end of the course, the student will be	
C302.1	Understand about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.
C302.2	Understand about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
C302.3	Understand the Optimal Binary Search Trees, The Knapsack Problem Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.
C302.4	Understand about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

MCA-19302 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction:4Periods/week	**Time: 3Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction: Fundamentals of algorithmic problem solving, important problem types, fundamental data structures.

Fundamentals of analysis of algorithms and efficiency: Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization.

Brute Force: Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.

UNIT II

Divide-and-Conquer: Merge Sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties.

Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First Search-Topological Sorting, Decrease-by-a-Constant-Factor Algorithms, Variable-Size-Decrease Algorithms.

Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heap sort, Problem Reduction.

UNIT III

Space and Time Tradeoffs: Sorting by Counting, Hashing, B-Trees.

Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees

UNIT IV

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NP-complete problems.

Coping with the Limitations of Algorithms Power: Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Text Book:

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ron ald R. Rivest& Clifford Stein, Prentice Hall of India, NewDelhi.
2. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education, New Delhi, 2003
3. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India, NewDelhi

Course Code &Title: MCA-19303 COMPUTER NETWORKS
Semester & Year of study: III & 2020-2021
Course Index: C303

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basics of computer networks and Data Communication.
To learn about Data Link Layer, IEEE Standards, design issues in networks.
To learn about Internet Transport Protocols and different types of protocols.
To learn about various types of Network Devices and different types of Networks

Course Outcomes:
By the end of the course, the student will be

C303.1	Understand the basics of computer networks and Data Communication.
C303.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C303.3	Understand Internet Transport Protocols and different types of protocols.
C303.4	Overview of various types of Network Devices and different types of Networks

MCA-19303 COMPUTER NETWORKS

Instruction:4Hrs/week	**Time:3 Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill Co Ltd, Second Edition

Reference Books:

1. Computer networks, Mayank Dave,Cengage.
2. Computer Networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie,Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Course Code &Title: MCA-19304 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
Semester & Year of study: III & 2020-2021
Course Index: C304

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basic concept of Artificial Intelligence.
To learn about the algorithms and logics in Artificial Intelligence.
To learn about the theories and functions related to Artificial Intelligence.
To learn about the concept, characteristics and applications of Expert Systems.

Course Outcomes:
By the end of the course, the student will be

C304.1	Understand the basic concept of Artificial Intelligence.
C304.2	Understand the algorithms and logics in Artificial Intelligence.
C304.3	Understand about the theories and functions related to Artificial Intelligence.
C304.4	Understanding the concept, characteristics and applications of Expert Systems.

MCA-19304 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

What is AI, The Foundations of AI, The History of AI, Agents and Environments, The Concept of Rationality, The Nature of Environments, The Structure of Agents, Problem Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies: Breadth First, Depth First, Depth Limited; Informed Search Strategies: Greedy Best First, A* Algorithms

UNIT II

Heuristic Functions, Local-Search Algorithms and Optimization Problems: Hill Climbing, Simulated Annealing, Genetic Algorithms; Constraint Satisfaction Problems, Backtracking Search For CSPs, Games, Optimal Decisions in Games

Knowledge Based Agents, The Wumpus World, Logic, Propositional Logic, Reasoning Patterns in Propositional Logic, Syntax and Semantics of First Order Logic, Using First Order Logic, Inference in First-Order Logic: Unification, Resolution.

UNIT III

Acting Under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distribution, Independence, Bayes Rule and Its Use, Other Approaches To Uncertain Reasoning: Dempster Shafer Theory, Fuzzy Sets and Fuzzy Logic

Combining Beliefs Under Uncertainty, The Basis of Utility Theory, Utility Functions, Multi Attribute Utility Functions, Decision Theoretic Expert Systems

UNIT IV

Expert System, Concepts and Characteristics, Applications and Domains of Expert System, Elements of an Expert System, Stages in the Development of an Expert System, Semantic Nets, Frames

Speech Recognition, Forms of Learning, Inductive Learning, Learning Decision Trees, Single Layer Feed Forward, Multi-Layer Feed Forward Neural Networks.

Text Books:

1. Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig, Pearson Education 2nd Edition.
2. Expert Systems: Principles and Programming. Joseph C Giarratano, Gary D Riley Thomson Publication, 4thEdition.

Reference Books:

1. Elaine Rich and Kevin Knight: Artificial Intelligence, Tata McGrawHill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India.
3. David W Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill.

Course Code &Title: MCA-19305 DATABASE MANAGEMENT SYSTEMS
Semester & Year of study: III & 2020-2021
Course Index: C305

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
To learn about Relational Database Design, Indexing Structures for files
To learn about Transaction Processing, Concurrency Control Techniques

Course Outcomes:
By the end of the course, the student will be

C305.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C305.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C305.3	Able to understand Relational Database Design, Indexing Structures for files
C305.4	Able to understand Transaction Processing, Concurrency Control Techniques

MCA-19305 DATABASE MANAGEMENT SYSTEMS

Instruction:4Periods/week **Time:3 Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Database and Database Users: Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/ server architectures for DBMSs, Classification of database management system.

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model, Entity types, entity sets Attributes and keys, Relationships types, relationship sets, roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

Relational data model and relational database constraints: Relational model constraints and relational schemas, update operations.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Domain Relational Calculus.

Relational database design by ER and EER Relational Mapping: Relational database design using ER to Relational Mapping, Mapping EER Model Construct to Relations, **Schema Definition, Basic Constraints and Queries:** SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

File Organization and Indexes: Introduction, Secondary Storage Devices, Buffering Blocks, placing file records on disk, Operations on Files, Hashing Techniques, Parallelizing Disk Access using RAID Technology, Indexing Structures for files.

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Process, Transaction and System Concepts, Characterizing Schedules, Concurrency Control Techniques, Database Recovery Concepts, Recovery Techniques.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.
2. Database Concepts, Abraham Silberschatz ,Henry FKorth, SSudarshan, McGraw-Hill

Course Code &Title: MCA-19306 COMPUTER NETWORKS LAB
Semester & Year of study: III & 2020-2021
Course Index: C306

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to implement data framing methods
Learn how to implement error detecting techniques
Learn how to implement routing algorithms
Learn how to implement security encryption algorithms

Course Outcomes:
By the end of the course, the student will be

C306.1	Able to implement data framing methods
C306.2	Able to implement error detecting techniques
C306.3	Able to implement routing algorithms
C306.4	Able to implement security encryption algorithms

MCA-19306 COMPUTER NETWORKS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

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1. Implement the data link layer framing methods such as character, character stuffing, and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra‘s algorithm to compute the Shortest Path through a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table for each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit plain text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding.
8. Using RSA algorithm encrypt a text data and Decrypt the same.

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 4, PHI.

2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill CoLtd, Second Edition.

Course Code &Title: MCA-19307 DATABASE MANAGEMENT SYSTEMS LAB
Semester & Year of study: III & 2020-2021
Course Index: C307

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write SQL queries using DDL, DML, DCL commands
Learn how to write SQL queries on aggregate and conversion functions
Learn how to write PL/SQL programs on exception handling, control structures
Learn how to write PL/SQL programs on cursors, procedures, triggers.

Course Outcomes:
By the end of the course, the student will be

C307.1	Able to write SQL queries using DDL, DML, DCL commands
C307.2	Able to write SQL queries on aggregate and conversion functions
C307.3	Able to write PL/SQL programs on exception handling, control structures
C307.4	Able to write PL/SQL programs on cursors, procedures, triggers.

MCA-19307 DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

SQL

1) Simple queries to understand DDL, DML and DCLcommands
2) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
3) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
4) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
5) Queries using Conversion functions like (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions like (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char,to_date)

PL/SQL

1) Simple programs to understand PL/SQL
2) Write a PL/SQL program to demonstrate exception–handling
3) Demonstrate the working of COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
4) Develop a program that includes the features NESTED IF, CASE and CASE expression.
5) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATIONERROR.
6) Programs using CURSORS
7) Programs development using creation of procedures and functions.
8) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers

Text Books:

1. Oracle Database 11g, Jason Price, Oracle Press
2. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.

Semester IV(Second Year Curriculum)

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA -19401	Information Security and Cryptography	75	25	100	4	-	4
MCA- 19402	Cloud Computing	75	25	100	4	-	4
MCA-19403	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-19404	Object Oriented Software Engineering	75	25	100	4	-	4
MCA-19405	Elective-I 1.Distributed Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-19406	Data Mining Concepts and Techniques Lab	50	50	100	-	3	2
MCA-19407	Object Oriented Software Engineering Lab	50	50	100	-	3	2
	Total Credits						24

Course Code &Title: MCA-19401 INFORMATION SECURITY AND CRYPTOGRAPHY
Semester & Year of study: IV & 2020-2021
Course Index: C401

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the security approaches and techniques, Introduction to number theory
To learn about Symmetric key and Asymmetric key cryptographic algorithms
To learn about User Authentication Mechanisms ,System security
To learn about Internet Security Protocols and Network Security

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C401.1	Able to understand the security approaches and techniques, Introduction to number theory
C401.2	Able to Symmetric key and Asymmetric key cryptographic algorithms
C401.3	Able to understand the User Authentication Mechanisms ,System security
C401.4	Able to understand the Internet Security Protocols and Network Security

MCA-19401 INFORMATION SECURITY AND CRYPTOGRAPHY

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction: The need for security-security approaches-principles of security-Plain Text and Cipher Text-substitution and Transposition Techniques-Encryption and Decryption-Symmetric and Asymmetric Cryptography-Steganography-key range and key size-types of attacks.

Number Theory: Introduction to number theory- Modular Arithmetic, Euclidean algorithm, Euler theorem, Fermat Theorem, Totient Function, Multiplicative and Additive Inverse.

UNIT II

Symmetric Key Cryptographic Algorithms: Algorithm types and modes-overview of symmetric key cryptography – DES – IDEA – Blowfish – AES-Differential and Linear Cryptanalysis.

Asymmetric Key Cryptographic Algorithms: Overview of asymmetric key cryptography-RSA algorithm-symmetric and asymmetric key cryptography together-digital signatures.

UNIT III

User Authentication Mechanisms: Introduction-Authentication basics – passwords-authentication tokens-certificate based authentication-biometrics authentication-Hash functions-SHA1.

System Security: Intruders, Viruses, Related Threats, Trusted Systems.

UNIT IV

Internet Security Protocols: Basic concepts-SSL-SHTTP-TSP-SET-SSL versus SET- 3D secure protocol-Electronic money-Email security-WAP security-security in GSM.

Network Security: Brief Introduction to TCP/IP -Firewalls -IP security-Virtual Private Networks.

Text Books:

1. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi

Reference Books:

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes - Ousley, Keith Strass berg Tata McGraw-Hill.

Course Code &Title: MCA- 19402 CLOUD COMPUTING
Semester & Year of study: IV & 2020-2021
Course Index: C402

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
To learn about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobile device Integration
To learn about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
To learn about Migrating the Cloud, Cloud Services

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C402.1	Able to understand about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
C402.2	Able to understand about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobile device Integration
C402.3	Able to understand about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
C402.4	Able to understand about the Migrating the Cloud, Cloud Services

MCA- 19402 CLOUD COMPUTING

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Cloud Computing Basics - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.

Organization and Cloud Computing - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM Partnerships.

UNIT II

Hardware and Infrastructure - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs,Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.

Software as a Service - Overview, Driving Forces, Company Offerings, Industries Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.

UNIT III

Developing Applications - Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management.

Local Clouds and Thin Clients - Virtualization in Your Organization, Server Solutions, Thin Clients, Case Study: McNeilus Steel.

UNIT IV

Migrating to the Cloud - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration, Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MKElsevier.
2. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

Course Code &Title: MCA-19403 DATA MINING CONCEPTS AND TECHNIQUES
Semester & Year of study: IV & 2020-2021
Course Index: C403

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
To learn about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
To learn about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Itemset
To learn about the Basic Concepts of Classification ,Different Methods of Classification

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C403.1	Able to understand about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
C403.2	Able to understand about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
C403.3	Able to understand about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Item set
C403.4	Able to understand about the Basic Concepts of Classification ,Different Methods of Classification

MCA-19403 DATA MINING CONCEPTS AND TECHNIQUES

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Data Warehouse and OLAP Technology: An overview Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

UNIT II

Introduction to Data Mining: Motivation and importance, what is Data Mining, Data Mining on what kind of data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI, AOI for Class comparisons. Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format, Mining Closed and Max Patterns.

UNIT IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support Vector Machines. Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchal methods, Density based methods-DBSCAN and OPTICS.

Text Book:

1. Data Mining Concepts and Techniques—JiaweiHan, Micheline Kamber and Jian Pei, Morgan Kaufman Publications 3rd edition.

Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K.Pujari, University Press

Course Code &Title: MCA-19404 OBJECT ORIENTED SOFTWARE ENGINEERING
Semester & Year of study: IV & 2020-2021
Course Index: C404

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Introduction to Object Oriented Software Engineering, Object Orientation, Requirements Engineering
To learn about the Unified Modeling Language & Use Case Modeling, Class Design and Class Diagrams
To learn about the Software Design , Architecture and Design Patterns
To learn about the Software Testing, Software Project Management, Software Process Models

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C404.1	Able to understand about the Introduction to Object Oriented Software Engineering, Object Orientation, Requirements Engineering
C404.2	Able to understand about the Unified Modeling Language & Use Case Modeling, Class Design and Class Diagrams
C404.3	Able to understand about the Software Design and Architecture, Design Patterns
C404.4	Able to understand about the Software Testing, Software Project Management, Software Process Models

MCA-19404 OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction:4Periods/week **Time: 3Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Introduction to Object Oriented Software Engineering: Nature of the Software, Types of Software, Software Engineering Activities, Software Quality

Introduction to Object Orientation: Data Abstraction, Inheritance & Polymorphism, Reusability in Software Engineering, Examples: Postal Codes, Geometric Points.

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing Requirements, Case Studies: GPS based Automobile Navigation System, Simple Chat Instant Messaging System.

UNIT II

Unified Modeling Language & Use Case Modeling: Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use Case Models of Systems, Use Case Diagram, Use Case Descriptions, The Basics of User Interface Design, Usability Principles.

Class Design and Class Diagrams: Essentials of UML Class Diagrams, Associations and Multiplicity, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Process of Developing Class Diagrams, Interaction and Behavioural Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

UNIT III

Software Design and Architecture: Design Process, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Good Design Document, Software Architecture, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns.

Design Patterns: Abstraction-Occurrence, General Hierarchical, Play-Role, Singleton, Observer, Delegation, Adaptor, Façade, Immutable, Read-Only Interface and Proxy Patterns.

UNIT IV

Software Testing: Effective and Efficient Testing, Defects in Ordinary Algorithms, Numerical Algorithms, Timing and Co-ordination, Stress and Unusual Situations, Testing Strategies for Large Systems.

Software Project Management: Introduction to Software Project Management, Activities of Software Project Management, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring.

Software Process Models: Waterfall Model, The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model, Rational Unified Process.

Text Book:

1. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Reference Books:

1. The Unified Modeling Language User Guide. Grady Booch,James Rumbaugh and Ivar Jacobson.Addison-Wesley.
2. Software Engineering; A Practitioner’s Approach. Roger SPressman.
3. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson EducationAsi

Course Code &Title: MCA-19405 DISTRIBUTED SYSTEMS (ELECTIVE I)
Semester & Year of study: IV & 2020-2021
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Introduction to Distributed Systems: Goals, Design Issues, Hardware Concepts
To learn about the Communication in distributed systems, Client-server model, Clock synchronization Algorithms
To learn about the Processes and Processors, Threads , System models, Distributed File Systems
To learn about the Distributed Shared Memory**,** Consistency Models, Page based distributed shared memory, Synchronization

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	Able to understand about the Introduction to Distributed Systems: Goals, Design Issues, Hardware Concepts
C405.2	Able to understand about the Communication in distributed systems, Client-server model, Clock synchronization Algorithms
C405.3	Able to understand about the Processes and Processors, Threads , System models, Distributed File Systems
C405.4	Able to understand about the Distributed Shared Memory**,** Consistency Models, Page based distributed shared memory, Synchronization

MCA-19405 DISTRIBUTED SYSTEMS (ELECTIVE I)

Instruction:4Periods/week **Time: 3Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Introduction to Distributed Systems: Distributed systems: Goals, Hardware Concepts: Bus Multiprocessor Timesharing Systems, Design Issues: Reliability, Performance, Scalability etc.

UNIT II

Communication distributed systems: ATM Networks: Asynchronous Transfer Mode, The ATM Physical Layer, The ATM Layer, The ATM Adaptation Layer, ATM Switching, Applications of ATM for DS, Client-server model: Clients and Servers, Addressing, Blocking versus Nonblocking Primitives, Buffered versus Unbuffered Primitives, Reliable versus Unreliable Primitives, Implementing the Client-Server Model. Remote procedure call:RPC Operation, RPC semantics in the presence of Failures, Implementation issues.

Synchronization: Clock synchronization: Logical Clocks, Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks, Mutual exclusion: Centralized Algorithm, Distributed Algorithm, Token Ring Algorithm, Comparison of the Three Algorithms, Election Algorithms: The Bully Algorithm, A Ring Algorithm, Atomic Transactions: Introduction, The Transaction Model, Implementation, concurrency Control, Dead locks.

UNIT III

Processes and Processors: Threads: Introduction, Thread Usage, Design Issues for Thread packages, implementing a Thread Package, Threads and RPC, System models: The Workstation Model, The Processor pool model, A hybrid model, Processor allocation – Scheduling in Distributed Systems, Fault tolerance: Component Faults, System failures, Real time distributed systems: Design Issues, Real Time Communication, Real Time Scheduling.

Distributed file systems: Distributed File system design: File Service Interface, Directory Server interface, File System Implementation: File Usage, System Structure, Caching, Replication.

UNIT IV

Distributed Shared Memory: Introduction, Bus based multi processors, Ring based multiprocessors, Switched multiprocessors, Comparison of shared memory Systems, Consistency Models: Strict Consistency, Sequential Consistency, Causal Consistency, PRAM Consistency and Processor Consistency, Weak Consistency, Release Consistency, Entry Consistency, Page based distributed shared memory: Replication, Granularity, Achieving Sequential Consistency, Finding the owner, finding copies, page replacement, Synchronization.

Text Book:

1. Andrew S. Tanenbaum: Distributed Operating System, Prentice Hall Intl Inc. 1995.

Reference Book:

1. Distributed Systems – Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Pearson Education.

Course Code &Title: MCA-19405 INTERNET OF THINGS (ELECTIVE I)
Semester & Year of study: IV & 2020-202
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
To learn about the IOT & M2M, SNMP
To learn about the IoT Platforms Design Methodology
To learn about the IoT Physical Devices & Endpoints

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	Able to understand about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
C405.2	Able to understand about the IOT & M2M, SNMP
C405.3	Able to understand about the IoT Platforms Design Methodology
C405.4	Able to understand about the IoT Physical Devices & Endpoints

MCA-19405 INTERNET OF THINGS (ELECTIVE I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**

Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT-I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle

UNIT-II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol (SNMP) , Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG,NETOPEER

UNIT-III

IoT Platforms Design Methodology: IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python, IoT Systems - Logical Design using Python, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations , Classes ,Python Packages of Interest for IoT

UNIT-IV

IoT Physical Devices & Endpoints: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication APIs , WAMP - AutoBahn for IoT , Xively Cloud for IoT , Python Web Application Framework - Django , Designing a RESTful Web API , Amazon Web Services for ,SkyNet IoT Messaging Platform

Text Book:

1.Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Book:

1. Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012

Course Code &Title: MCA-19405 IMAGE PROCESSING (ELECTIVE I)
Semester & Year of study: IV & 2020-2021
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
To learn about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
To learn about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
To learn about the Image Segmentation, Morphology

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	Able to understand about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
C405.2	Able to understand about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
C405.3	Able to understand about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
C405.4	Able to understand about the Image Segmentation, Morphology

MCA-19405 IMAGE PROCESSING (ELECTIVE I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship Between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film.

Histogram: Definition, Decision Of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

UNIT II

Image Transforms: A Detail Discussion On Fourier Transform, DFT, FFT,

Image Enhancement:

a) Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations,
b) Smoothing Filters-Mean, Median, Mode Filters – Comparative Study
c) Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity
d) Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study

UNIT III

Image Enhancement: Design of Low Pass, High Pass, EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

Image Compression: Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on:-Image Compression Standards.

UNIT IV

Image Segmentation: Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation.

Morphology: Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray – Scale Images, Application of Morphology inIP

Text Book:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Addison Wesley

Reference Books:

1. Fundamentals of Electronic Image Processing By Arthyr– R – Weeks, Jr.(PHI)
2. Image Processing, Analysis, And Machine Vision by Milan Sonka Vaclan Halava Roger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan & T. Veera Kumar,TMH
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell

Course Code &Title: MCA-19406 DATA MINING CONCEPTS AND TECHNIQUES LAB
Semester & Year of study: IV & 2020-2021
Course Index: C406

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the aware of usage of few packages, functions and libraries of R
To learn about the basic R commands, Interact data, Clean Data, Visualize statistical measures, data frame
To learn about how to Apply group of functions, rbind, cbind and some more libraries
To learn about the K-medoids and density based clustering, decision trees

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C406.1	Able to aware of usage of few packages, functions and libraries of R
C406.2	Able to implement basic R commands, Interact data, Clean Data, Visualize statistical measures, data frame
C406.3	Able to implement Apply group of functions, rbind,cbind and some more libraries
C406.4	Able to implement K-medoids and density based clustering, decision trees

MCA-19406 DATA MINING CONCEPTS AND TECHNIQUES LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

Students should be aware of usage of few packages and libraries of R. They should also be familiar with few functions used in R for visualization.

1. Implement all basic R commands
2. Interact data through .csv files (Import from and export to .csv files).
3. Get and Clean data using swirl exercises. (Use 'swirl' package, library and install that topic from swirl).
4. Visualize all Statistical measures (Mean, Mode, Median, Range, Inter Quartile Range etc., using Histograms, Boxplots and Scatter Plots).
5. Create a data frame with the following structure.

EMP ID	EMP NAME	SALARY	START DATE
1	Satish	5000	01-11-2013
2	Vani	7500	05-06-2011
3	Ramesh	10000	21-09-1999
4	Praveen	9500	13-09-2005
5	Pallavi	4500	23-10-2000

a. Extract two column names using column name.
b. Extract the first two rows and then all columns.
c. Extract 3rd and 5th row with 2nd and 4th column.

6. Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into
   i. 0 to 1 range with min-max normalization.
   ii. a value around 0 with z-score normalization.
7. Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind' function.
8. Create a function to discretize a numeric variable into 3 quantiles and label them as low, medium, and high. Apply it on each attribute of iris dataset to create a new data frame. 'discrete_iris' with Categorical variables and the class label.
9. Create a simple scatter plot using toothgrowth dataset using 'dplyr' library. Use the same data to indicate distribution densities using boxwhiskers.
10. Write R program to implement linear and multiple regression on 'mtcars' dataset to estimate the value of 'mpg' variable, with best R^2 and plot the original values in 'green' and predicted values in 'red'.
11. Write R Programs to implement k-means clustering, k-medoids clustering and density based clustering on iris dataset.
12. Write a R Program to implement decision trees using 'readingSkills' dataset.
13. Implement decision trees using 'iris' dataset using package party and 'rpart'.

References:

1. www.tutorialspoint.com/r
2. www.r-tutor.com
3. R and Data Mining: Examples and Case Studies Yanchang Zhao.

Course Code &Title: MCA-19407 OBJECT ORIENTED SOFTWARE ENGINEERING LAB
Semester & Year of study :IV & 2020-2021
Course Index: C407

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn how to specify, visualize, construct and document the artifacts of software systems.
To learn how to use Rational Rose Enterprise Edition for modeling
To learn about the Software Project Management and Software Engineering activities to specify customized according to the features of the project.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C407.1	Able to understand how to specify, visualize, construct and document the artifacts of software systems
C407.2	Able to understand how to use Rational Rose Enterprise Edition for modelling
C407.3	Software Project Management and Software Engineering activities specified can be customized according to the features of the project.

MCA-19407 OBJECT ORIENTED SOFTWARE ENGINEERING LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

The Unified Modeling Language (UML) is a standard language for specifying, visualizing, constructing and documenting the artifacts of software systems. The primary goal of UML is to provide users a ready-to-use, expressive visual modeling language so that they can develop and exchange meaningful models.

This lab deals with object oriented analysis and design of a software problem using UML concepts and notations. The tool used is Rational Rose Enterprise Edition. Any other open source tool is also recommended.

Document the Software Project Management and Software Engineering activities for any two of the following projects. Any other project of interest also can be chosen.

1. Student Result Management System
2. Library Management System
3. Payroll System
4. Bank Loan System
5. Railway Reservation System
6. Automatic Teller Machine
7. Hostel Management System
8. Hospital Management System
9. Online Shopping System
10. Blood Bank Management System
11. GPS
12. Journal Publication System
13. Chatroom Application
14. Social Media Application

Software Project Management and Software Engineering activities specified below can be customized according to the features of the project.

- Problem Statement
- Feasibility Study
- Software Requirements Specification Document
- Estimation of Project Metrics
- Entity Relationship Diagram
- Use Case Diagrams
- Class Diagram
- Sequence Diagrams
- Activity Diagrams
- State Chart Diagrams
- Test coverage

References:

1. The Unified Modeling Language User Guide. Grady Booch,James Rumbaugh and Ivar Jacobson. Addison-Wesley.
2. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Semester V (Third Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19501	Big Data Analytics	75	25	100	4	-	4
MCA-19502	Cyber Security and Forensics	75	25	100	4	-	4
MCA-19503	Elective II 1. Blockchain Technology 2. Foundations of Data Science 3. Human-Computer Interaction	75	25	100	4	-	4
MCA-19504	Elective-III 1.Python Programming 2.Perl Programming 3.PHP programming	75	25	100	4	-	4
MCA-19505	Elective-IV 1.Machine Learning 2.Embedded Systems 3.Robotics	75	25	100	4	-	4
MCA-19506	Big Data Analytics Lab	50	50	100	-	3	2
MCA-19507	Mini Project	50	50	100	-	3	2
	Total Credits						24

Course Code &Title: MCA-19501 BIG DATA ANALYTICS
Semester & Year of study: V & 2021-2022
Course Index: C501

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about introduction to Big Data and Hadoop
To learn about Real Time Analytics, Map Reduce Programming
To learn about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
To learn about Graph Representation in Map Reduce, Graph Analytics in Spark, Programming with RDDs-Basics, Spark SQL overview

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C501.1	Understand about introduction to Big Data and Hadoop
C501.2	Understand about Real Time Analytics, Map Reduce Programming
C501.3	Understand about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
C501.4	Understand about Graph Representation in Map Reduce, Graph Analytics in Spark, Programming with RDDs-Basics, Spark SQL overview

MCA-19501 BIG DATA ANALYTICS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Data structures in Java: Java concepts required for developing Map Reduce Programs: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization.
Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Validity), Importance of Big Data, Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop[Zikopoulos]

UNIT II

Introduction to Hadoop: Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop—running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker
HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduce program, Reading and writing the Hadoop Distributed File system -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File system, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives.

UNIT III

MapReduce Programming: Writing basic Map Reduce programs - Getting the patent data set, constructing the basic template of a Map Reduce program, counting things, Adapting for Hadoop's API changes, Streaming in Hadoop.
MapReduce Advanced Programming: Advanced MapReduce - Chaining Map Reduce jobs, joining data from different sources.

UNIT IV

Graph Representation in MapReduce: Modeling data and solving problems with graphs,Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, Bloom Filters.

Text Books:

1. Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data by Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, 1st Edition, TMH,2012.
2. Hadoop in Action by Chuck Lam, MANNING Publishers.
3. Hadoop in Practice by Alex Holmes, MANNING Publishers

Reference Books:

1. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
2. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley &Sons
3. Mining of massive datasets, AnandRajaraman, Jeffrey D Ullman, Wiley Publications.

Course Code &Title: MCA-19502 CYBER SECURITY AND FORENSICS
Semester & Year of study: V & 2021-2022
Course Index: C502

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about information security and Threats, Data Leakage
To learn about Cyber Security Introduction, Cyber Security Evolution
To learn about Cyber Security Objectives, Guidance for Decision Makers, Cyber Governance Issues
To learn about Cyber User Issues, Cyber Conflict Issues, Cyber Management Issues, Cyber Infrastructural Issues

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C502.1	Understand about information security and Threats, Data Leakage
C502.2	Understand about Cyber Security Introduction, Cyber Security Evolution
C502.3	Understand about Cyber Security Objectives, Guidance for Decision Makers, Cyber Governance Issues
C502.4	Understand about Cyber User Issues, Cyber Conflict Issues, Cyber Management Issues, Cyber Infrastructural Issues

MCA-19502 CYBER SECURITY AND FORENSICS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT – I

Information Security and Threats: Information Security, Information Assets, Threats to Information Assets

Fundamentals of Information Security: Elements of information security, Principles and concepts – data security, Types of controls

UNIT – II

Data Leakage: Introduction – Data Leakage, Organizational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection, DLP Limitations, DRM-DLP Conundrum.

Information Security Policies, Procedures, Standards and Guidelines: Information Security Policies, Key Elements of a Security Policy, Security Standards, Guidelines and Frameworks, Laws, Regulations and Guidelines

UNIT – III

Information Security Performance Metrics: Introduction – Security Metrics, Types of Security Metrics, Using Security Metrics, Developing the Metrics Process, Metrics and Reporting, Designing Information Security Measuring Systems

Risk Assessment: Risk Overview, Risk Identification, Risk Analysis, Risk Treatment, Risk Management Feedback Loops, Risk Monitoring

Log Correlation and Management: Event Log Concepts, Log Management and its need Log Management Process, Configuring Windows Event Log, IIS Log Files, Analysis and Response

Data Backup: Data Backup, Types of Backup, Backup Procedures, Types of Storage, Features of a Good Backup Strategy

UNIT – IV

Computer Forensics Analysis and Validation: Determining What Data to Collect and Analyze-Validating Forensic Data-Addressing Data-Hiding Techniques- Performing Remote Acquisitions.

E-mail Investigations: Exploring the Role of E-mail in Investigations- Exploring the Roles of the Client and Server in E-mail- Investigating E-mail Crimes and Violations- Understanding E-mail Servers-Using Specialized E-mail Forensics Tools.

Cell Phone and Mobile Device Forensics: Understanding Mobile Device Forensics-Understanding Acquisition Procedures for Cell Phones and Mobile Devices.

Text Books:

1. NASSCOM, Handbook of Security Analyst, SSC/Q0901,2015.
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph WeissCyber Security Policy Guidebook, John Wiley & Sons2012.

Reference Books:

1. Rick Howard, Cyber Security Essentials, Auerbach Publications2011.
2. Richard A. Clarke, Robert Knake, Cyberwar: The Next Threat to National Security &What to Do About It, Ecco2010.
3. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning2011.
4. Augastine, Paul T., Cyber Crimes and Legal Issues", Crecent Publishing Corporation,2007.

Course Code &Title: MCA-19503 BLOCK CHAIN TECHNOLOGY (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about introduction to Block Chain, Basic Distributed System Concepts
To learn about Cryptography in Blockchain, Cryptography algorithms
To learn about Bitcoin-Cryptography, Hyperledger Fabric
To learn about Use cases of Blockchain, Financial Service, healthcare, energy markets, media, Cyber Crime, e-Governance, Tax payments, land registry trcords and blockchain in IoT

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Understand about introduction to Block Chain, Basic Distributed System Concepts
C503.2	Understand about Cryptography in Blockchain, Cryptography algorithms
C503.3	Understand about Bitcoin-Cryptography, Hyperledger Fabric
C503.4	Understand about Use cases of Blockchain, Financial Service, healthcare, energy markets, media, Cyber Crime, e-Governance, Tax payments, land registry trcords and blockchain in IoT

MCA-19503 BLOCKCHAIN TECHNOLOGY (ELECTIVE-II)

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT – I

CRYPTOGRAPHY IN BLOCKCHAIN: Blockchain Definitions – Blockchain versus Databases – History – Motivation – Characteristics – Types – Overview - Hashing in Blockchain – Linking blocks in blockchain – Linking blocks using SHA256 – Block structure – Blockchain functionality – Creating Blockchain – Byzantine failure problem in blockchain – Digital signatures in blockchain – Blockchain wallets

UNIT – II

BLOCKCHAIN DESIGN PRINCIPLES: Networked Integrity – Distributed Power- Value as Incentive – Security – Privacy – Rights Preserved – Inclusion – Centralized Registries versus Distributed Ledgers – Public versus Private Ledgers – Transparency as a Strategic Risk – Transparency as a Strategic Asset - Zero Knowledge Proofs

UNIT – III

CONSENSUS ALGORITHMS: Proof of Work – Pure Stake Based Consensus – Proof of Stake - Leased Proof of Stake – Delegated Proof of Stake – Hybrid Form of PoS and PoW – Practical Byzantine Fault Tolerance – Ripple –Tendermint – Proof of Elapsed Time – Proof of Activity – Proof of Burn – Hyperledger Fabric.

UNIT – IV

BLOCKCHAIN OPTIMIZATIONS AND ENHANCEMENTS: Blockchain Optimizations – Transaction Exchange – Off-chain Transactions – Block size improvements – Blockchain enhancements – Sharding – Evolution of consensus algorithm – Proof of Stake – Proof of Activity – Byzantine Fault Tolerance Consensus Models – Proof of Elapsed Time – Cross-chain Protocol – Privacy Enhancement – Blockchain Security – Transaction Security Model – Decentralized Security Model – Attacks on Blockchain

Text Books:

1. Koshik Raj, “Foundations of Blockchain”, Packt Publishers, 2019.
2. S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, “Blockchain Technology: Cryptocurrency and Applications”, Oxford University Press, 2019.

Reference Books:

1. Josh Thompson, “Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming”, Create Space Independent Publishing Platform, 2017.
2. Andreas M. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, Oreilly Media, 1st Edition, 2014.
3. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. “Bitcoin and cryptocurrency technologies: a comprehensive introduction”, Princeton University Press, 2016.

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Course Code &Title: MCA-19503 FOUNDATIONS OF DATA SCIENCE (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Key concepts in data science, including tools, approaches, and application scenarios
To learn about Topics in data collection, sampling, quality assessment and repair
To learn about Topics in statistical analysis and machine learning
To learn about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Understand about Key concepts in data science, including tools, approaches, and application scenarios
C503.2	Understand about Topics in data collection, sampling, quality assessment and repair
C503.3	Understand about Topics in statistical analysis and machine learning
C503.4	Understand about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

MCA-19503 FOUNDATIONS OF DATA SCIENCE (ELECTIVE-II)

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

INTRODUCTION TO DATA SCIENCE: Data science process – roles, stages in data science project, setting expectations, Loading data into R – working with data from files, working with relational databases. Exploring data – Using summary statistics to spot problems, spotting problems using graphics and visualization. Managing data – cleaning and sampling for modelling and validation.

UNIT II

MODELING METHODS: Choosing and evaluating models – mapping problems to machine learning tasks, evaluating models, validating models – cluster analysis – Kmeans algorithm, Naïve Bayes, Memorization Methods – KDD and KDD Cup 2009, building single variable models, building models using multi variable, Linear and logistic regression, unsupervised methods – cluster analysis, association rules.

UNIT III

INTRODUCTION TO R Language: Reading and getting data into R, viewing named objects, Types of Data items, the structure of data items, examining data structure, working with history commands, saving your work in R.

PROBABILITY DISTRIBUTIONS in R - Binomial, Poisson, Normal distributions. Manipulating objects - data distribution.

UNIT IV

DELIVERING RESULTS: Documentation and deployment–producing effective presentations –Introduction to graphical analysis – plot() function – displaying multivariate data– matrix plots – multiple plots in one window - exporting graph – using graphics parameters in R Language.

Text Books

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications,2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press,2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley &Sons, Inc.,2012.

Reference Books

1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”,2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “PracticalData Science Cookbook”, Packt Publishing Ltd.,2014.
3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley,2011.
4. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071,2015.

Course Code &Title: MCA-19503 HUMAN COMPUTER INTERACTION (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about interaction design is and how it relates to human computer interaction and other fields. (MS -SOC B human computer interaction)
To learn about cognition is and why it is important for interaction design.
To learn about the social mechanisms that are used by people to communicate and collaborate.
To learn about Outlining the nature of user frustration and how to reduce it.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Able to understand about interaction design is and how it relates to human computer interaction and other fields. (MS -SOC B human computer interaction)
C503.2	Able to understand about cognition is and why it is important for interaction design.
C503.3	Able to understand about the social mechanisms that are used by people to communicate and collaborate.
C503.4	Able to understand about Outlining the nature of user frustration and how to reduce it.

MCA-19503 HUMAN COMPUTER INTERACTION (ELECTIVE-II)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories.

UNIT-II

Command and Natural Languages:Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

UNIT-III

Quality of Service:Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

UNIT-IV

Information Search:Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text Books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

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

Course Code &Title: MCA-19504 PYTHON PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce to the basics of Python Programming language
To discuss various functions and methods of Python Programming
To learn about Multithread Programming and GUI Programming
To study Web Programming and Database Programming

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the basics of Python Programming language
C504.2	Able to use various functions and methods of Python Programming
C504.3	Able to comprehend Multithread Programming and GUI Programming
C504.4	Able to understand Web Programming and Database Programming

MCA-19504 PYTHON PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules, Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Fil0es, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

UNIT – IV

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

TEXTBOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Mark Lutz ,"Learning Python", O Reily, 4thEdition, 2009

REFERENCES:

1. Tim Hall and J-P Stacey ,"Python 3 for Absolute Beginners" , 2009
2. Magnus Lie Hetland , "Beginning Python: From Novice to Professional", 2nd Edition, 2009

Course Code &Title: MCA-19504 PERL PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the syntax and semantics of the Perl language and their similarity and differences from other programming languages
To discuss various forms of data representation and structures supported by the Perl language
To learn about Files and File handles, Runtime Evaluation & Error Trapping
To study CGI Programming and Administration

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the basic syntax and semantics of the Perl language
C504.2	Able to understand various forms of data representation and structures supported by the Perl language
C504.3	Able to understand Files and Filehandles, Runtime Evaluation & Error Trapping
C504.4	Able to understand CGI Programming and Administration

MCA-19504 PERL PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction: What is Perl? ,Scripts vs. Programs, Comparison with Other Programming Languages: C/C++,PHP, Java/JSP, ASP, Hello World program and execution, Literals, **Manipulation of Data Structures:** Scalar Variables, Lists and Arrays, Hashes, Contexts.

UNIT II

Conditionals, Loops & Subroutines: Subroutines, Packages, Conditionals, Loops, **References:** Creating a Reference, Using References, Pass By Reference, Type globs, **Object-Oriented Programming:** Object-Oriented Concepts, OOP Primer: Statistics, Inheritance.

UNIT III

Files and Filehandles: Filehandles, File Input and Output Functions Directory Traversal Functions, File Test Operators, File Locking, **Regular Expressions:** Building a Pattern, Regular Expression Operators. **Runtime Evaluation & Error Trapping:** Warnings and Exceptions, Error-Related Functions, eval, Backticks and system (), Why Runtime Evaluation Should Be Restricted, Next Generation Exception Handling, Other Methods to Catch Programming Errors.

UNIT IV

CGI Programming: Static Content and Dynamic Content, CGI, CGI Program ,GET vs. POST, File Upload, Important HTTP Header Fields and Environment Variables, Server Side Includes, Security Issues, **Administration:** CPAN, Accessing the Module Database on the Web, Package Managers, Installing Modules using CPAN, Installing Modules -The Traditional Way.

TEXT BOOKS:

1. Perl 5 Tutorial First Edition, Chan Bernard Ki Hong, Prepared from LATEX source files, Web site: http://www.cbkihong.com
2. Learning Perl Making Easy Things Easy and Hard Things Possible, O'REILLY, 7th Edition, Randal L.Schwartz, Brain D'foy and Tom Phoenix,

REFERENCES:

1. Perl: The Complete Reference, Second Edition, Martin C. Brown
2. Beginning Perl, Curtis Poe, John Wiley & Sons 27-Sep-2012

Course Code &Title: MCA-19504 PHP PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce the fundamentals of PHP
To familiarize students with the process of PHP on the web
To learn to create databases in PHP
To study the functioning of FTP in PHP

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the fundamentals of PHP
C504.2	Able to understand the PHP programming works on Web
C504.3	Able to create databases in PHP
C504.4	Able to read databases and the functioning of FTP in PHP

MCA-19504 PHP PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

PHP FUNDAMENTALS: PHP – Exploring the PHP Environment – HTML Embedding, Comments – Variables, Data types – Operators – PHP String functions, Controls Structures, Arrays – Types – Multi dimension array – Array functions, Functions in PHP.

UNIT II

WEB PAGES WITH PHP: Embedding into HTML, User Input, Safe Handling user Input, PHP Form, form processing, Working with Form Data, GET, POST, REQUEST, Reading Data in web Pages, Performing Data validation, required data, number, text, Cookies and Session in PHP

UNIT III

WORKING WITH DATABASE: MySQL, Creating Database and Table, CURD, JOIN, Aggregate Queries, Connecting to MySQL with PHP, Accessing and Updating Database with PHP, SQL injections, Prepared Statements.

UNIT IV

ADVANCED CONCEPTS: File Handling -Create, Open, read, write to files, Working with FTP in PHP, PHP mail functions, Advanced mail functions, Building and Formatting dates and times, PHP filters.

TEXT BOOKS:

1. Steven Holzner, “PHP: The Complete Reference”, Tata McGraw Hill Education, 1st Edition,2007.

REFERENCES:

1. Luke Welling, Laura Thomson, “PHP and MySQL Web Development”, Pearson, 4th Edition.
2. Larry Ullman, “PHP and MySQL for Dynamic Web Sites”, Prentice Hall, 4th Edition.
3. George Schlossnagle,“Advanced PHP Programming”, First Edition, Sams Publishing.

Course Code &Title: MCA-19505 MACHINE LEARNING (ELECTIVE IV)
Semester & Year of study: V & 2021-2022
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce students to the basic concepts and techniques of Machine Learning
To discuss Decision Tree learning, Artificial Neural Networks
To learn about Bayesian learning, Instance-Based Learning
To study various Genetic Algorithms, Learning Sets of Rules

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand the basic concepts and techniques of Machine Learning
C505.2	Able to understand Decision Tree learning, Artificial Neural Networks
C505.3	Able to understand Bayesian learning, Instance-Based Learning
C505.4	Able to understand Genetic Algorithms, Learning Sets of Rules

MCA-19505 MACHINE LEARNING (ELECTIVE IV)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept earning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example learning to classify text, Bayesian belief networks The EM algorithm

Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

UNIT - IV

Genetic Algorithms – Motivation, Genetic Algorithms, an illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Text Books:

1. Machine Learning–Tom Mitchell, McGraw Hill Education; First edition(1July2017) **ISBN-10:**1259096955
2. Machine Learning: An Algorithmic Perspective, Second Edition, Stephen Marsl and, Taylor & Francis (CRC) 2014. ISBN-13: 978-1-4665-8333-7 (eBook -PDF)

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh, Cambridge University Press. 2009. ISBN-13978-0-511-59557-8
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &Sons Inc., 2001. ISBN:978-0-471-05669-0
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.ISBN-10:0-387-31073-8
4. Machine Learning by Peter Flach, Cambridge. 2012. ISBN978-1-107-09639-4

Course Code &Title: MCA-19505 EMBEDDED SYSTEMS(ELECTIVE IV)
Semester & Year of study: V & 2021-2022
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the basics of embedded systems its examples, the 8051 Microcontroller architecture and its instruction set.
To discuss various software architectures in embedded systems.
To learn about Advanced Controller and Processors,Advanced Microcontrollers ATOM processor - Architecture-Instruction set.
To study various embedded software development tools.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand the basic architecture of 8051 micro controller
C505.2	Able to understand various software architectures in embedded systems.
C505.3	Able to understand Advanced Controller and Processors, Advanced Microcontrollers ATOM processor - Architecture-Instruction set.
C505.4	Able to understand embedded software development tools.

MCA-19505 EMBEDDED SYSTEMS(ELECTIVE IV)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Introduction to Embedded System: Introduction to Embedded system - Microprocessor V/s Micro-controller - 8051 Microcontroller - General architecture - Instruction set and Assembly programs - Embedded C programs.

UNIT-II

Memory and Interface: Memory organization and interfacing - I/O devices and interfacing Counters and Timers - Serial data communication - Interrupts.
Interfacing Peripherals: Interfacing LCD Display – Keypad Interfacing – Generation of Gate signals for Converters and Inverters – Motor Control – Controlling AC appliances – Measurement of frequency – Standalone Data Acquisition System.

UNIT-III

Advanced Controller and Processors: Advanced Microcontrollers - PIC - ARM - ATOM processor - Architecture-Instruction set.

UNIT-IV

Designing and Development of Applications: Design methodologies and tools - designing hardware and software components - system analysis and architecture design - system integration – debugging - case studies

Text Books

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi., "The 8051 Microcontroller and Embedded systems", Second Edition, Pearson Education, 2008.
2. Lyla B.Das “Embedded systems an integrated approach”, Pearson Education, 2013.
3. Wayne wolf “Computers as components”, second edition, Elsevier, 2011.

References

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, “PIC Microcontroller an Embedded Systems using Assembly and C for PIC18”, Pearson Education, 2008.
2. Andrew N Sloss, D. Symes, C. Wright, ” Arm system developers guide”, Morgann Kauffman / Elsevier, 2006.
3. Peter Bary Patrick Crowley “Modern Embedded computing”, Elsevier, 2012.

Course Code &Title: MCA-19505 ROBOTICS (ELECTIVE IV)
Semester & Year of study: V & 2021-2022
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the basics of control systems and components
To discuss robot end effectors its Types, Tools as End Effectors, Gripper Selection and Design Forward and Inverse Kinematics.
To learn about machine vision, Sensor Characteristics, Image processing and Analysis, Robotic Applications
To study robot programming, Motion Commands, program Control and Subroutines. Programming methods and Branching

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand the basic of control systems and components
C505.2	Able to understand robot end effectors its Types, Tools as End Effectors, Gripper Selection and Design Forward and Inverse Kinematics
C505.3	Able to understand machine vision, Sensor Characteristics, Image processing and Analysis, Robotic Applications
C505.4	Able to understand robot programming, Motion Commands, program Control and Subroutines. Programming methods and Branching.

MCA-19505 ROBOTICS(ELECTIVE IV)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

CONTROL SYSTEMS AND COMPONENTS: Basic Control Systems Concepts and Models, Controllers, Control System Analysis,Classification, Components, Characteristics, Applications Robot Activation and Feedback Components, Power Transmission Systems, Robot Joint Control Design.

UNIT-II

ROBOT END EFFECTORS**:** Types, Mechanical Grippers and Other types, Tools as End Effectors, The Robot/End Effector Interface, Considerations in Gripper Selection and Design.Position Analysis, Robots as Mechanisms, Matrix Representation, Transformation Matrices, Forward and Inverse Kinematics.

UNIT-III

MACHINE VISION:Introduction,Sensor Characteristics, Description of Different Sensors. The Sensing and Digitizing function, Image processing and Analysis,Training and Vision Systems, Robotic Applications Characteristics of Actuating Systems, Actuating Devices and Control.

UNIT-IV

ROBOT PROGRAMMING: The Textual Robot languages, Generations of Robot programming languages, Robot language Structures, Constants, Variables, and other data Objects, Motion Commands, program Control and Subroutines. Programming methods, Robot program as a path in space, Motion Interpolation, WAIT, SGNAL, DELAY Commands, Branching.

TEXT BOOK:

1. Mikell P. Groover , Mitchell Weiss , Roger N. Nagel , Nicholas G. Odrey Industrial Robotics: Technology, Programming, and Applications , 1st edition, McGraw-Hill International Edition, 1986

2. Saeed B. Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001.

REFERENCE BOOK:

1. K.S.Fu, R.C Gonzalez, C.S.G.Lee , ROBOTICS , Control, Sensing , Vision and Intelligence , 1st edition, McGraw-Hill International Edition, 1987.

2. R.K.Mittal and I J Nagrath, Robotics and Control, TMH, 2003.

3. Computational Intelligence, Davis Poole, Alan Mackwath, Randy Coehel, Oxford University Press 1998.

Course Code &Title: MCA-19506 BIG DATA ANALYTICS LAB
Semester & Year of study: V & 2021-2022
Course Index: C506

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to implement data structures, generic types
Learn how to setup and install Hadoop
Learn how to implement file management tasks and programs in Hadoop

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C506.1	Able to implement data structures, generic types
C506.2	Able to setup and install Hadoop
C506.3	Able to implement file management tasks and programs in Hadoop

MCA-19506 BIG DATA ANALYTICS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

List of Experiments:

1. Write a Java Program to implement Linked Lists, Stacks and Queues.
2. Write Java Program that implements Generic Types which collects pair of elements of different types.
3. Write a Java Program that uses object serialization and deserialization.
4. Know about setting up and Installing Hadoop in its three operating modes and implement in Standalone.
5. Implement the following file management tasks in Hadoop: Adding, Retrieving and deleting files.

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

6. Write a Map-Reduce Program to find average of numbers.
7. Implement Matrix Multiplication with Hadoop Map Reduce
8. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

REFERENCES:

1. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
2. www.hadoop.apache.org
3. www.gist.github.com

MCA-19507 MINI PROJECT

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

- **Do Mini Project by using ELECTIVE - III**

SEMESTER VI (THIRD YEAR) CURRICULUM

code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA -19601	Project					-	16

ADIKAVI NANNAYA UNIVERSITY

UNIVERSITY COLLEGE OF ENGINEERING
RAJAMAHENDRAVARAM

Department of Computer Science and Engineering

MCA

Model Question Papers

II & III Year

Board of Studies
University College of Engineering

Semester III (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19301	Operations Research	75	25	100	4	-	4
MCA-19302	Design and Analysis of Algorithms	75	25	100	4	-	4
MCA-19303	Computer Networks	75	25	100	4	-	4
MCA-19304	Artificial Intelligence and Expert systems	75	25	100	4	-	4
MCA-19305	Database Management Systems	75	25	100	4	-	4
MCA-19306	Computer Networks Lab	50	50	100	-	3	2
MCA-19307	Database Management Systems Lab	50	50	100	-	3	2
	Total Credits						24

Adikavi Nannaya University, Rajahmundry
MCA III Semester
MCA-19301 Operations Research
Model Question Paper

Time : 3 Hours Max. Marks:75

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Explain simplex algorithm to find optimum solution for a given LPP **7M**

b) Use simplex method to solve the following LPP. **8M**

Maximize Z=5x1+4x2
Subject the constraints
4x1+5x2<=10
3x1+2x2<=9
8x1+3x2<=12, x1>=0, x2>=0

Or

c) Use two-phase simplex method to **15M**

Maximize Z=3x1+2x2
Subject to the constraints
2x1+x2<=2
3x1+4x2>=12
x1>=0, x2>=0.

2. a) Explain dual simplex Algorithm **8M**

b) Use dual simplex method to solve the following LPP. **7M**

Maximize Z=2x1+3x2
Subject to the constraints
2x1-x2-x3>=3
x1-x2+x3>=2, x1,x2,x3>=0

Or

c)Solve the following transportation problem whose unit cost matrix, supply and demand are given below. **15M**

	D1	D2	D3	D4	D5	Supply
1	7	7	10	5	11	45
2	4	3	8	6	13	90
3	9	8	6	7	5	95
4	12	13	10	6	3	75
5	5	4	5	6	12	105
Demand	20	80	50	75	85	

3. a) A project is composed of eleven activities, the time estimates for which are given below **15M**

Activity	Optimistic Time (Days)	Pessimistic Time (Days)	Most Likely Time (Days)
1-3	**10**	**60**	**20**
1-4	**5**	**15**	**10**
2-5	**50**	**110**	**65**
2-6	**30**	**50**	**40**
3-6	**50**	**90**	**55**
3-7	**1**	**9**	**5**
4-7	**40**	**68**	**48**
5-8	**5**	**15**	**10**
6-8	**20**	**52**	**27**
7-8	**30**	**20**	**40**

i. Draw the network diagram for the project
ii. Calculate slacks for each mode.
iii. Determined the critical path
iv. What is the probability of completing the project in 125 days?

Or

b) Find the optimum integer solution to the following linear programming Problem **15M**

Maximize Z=5x1+8x2
Subject to x1+2x2<=8
4x1+x2<=10
x1, x2>=0 and integers.

4. a) Solve the game where pay off matrix is given below, using dominance **15M**

	Player B			
	I	**II**	**III**	**IV**
I	18	4	6	4
II	6	2	13	7
III	11	5	17	3
IV	7	6	12	2

Or

b) Explain static and dynamic EOQ models. **15M**

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.

a. Vogel's approximation.
b. When do you get degeneracy in transportation problem?
c. What is the difference between regular simplex method and dual simplex method.
d. Write mathematical formulation of assignment problem
e. What are the advantages of networks?
f. Explain recursive nature of dynamic programming.
g. Minimax principle
h. Rules for detecting saddle point.

Adikavi Nannaya University, Rajahmundry
MCA III Semester
MCA-19302 Design and Analysis of Algorithms
Model Question Paper

Time : 3 Hours Max. Marks : 75

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Define Algorithm. Explain fundamentals of Algorithmic problem solving.

(OR)

b) Define space and time complexity. Explain different types of Asymptotic notations.

2. a) Explain divide and conquer solution for quick sort. Illustrate with examples.

(OR)

b) Explain DFS and BFS search using decrease and conquer technique with examples .

3. a) Explain Floyd's algorithm for all-pairs shortest path problem with an example. (OR)

b) Explain Greedy method .Discuss Krushkal's algorithm for minimum spanning tree.

4. a) Explain NP-Complete and NP-Hard problems.

(OR)

b)Explain n-queen problem using backtracking technique.

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a). Analysis of recursive algorithm.

b) Strassen's matrix multiplication.

c) Binary search algorithm.

d) Horner's rule.

e) Horspool's algorithm.

f) Dijkstra's algorithm.

g) Decision tree.

h) Hamiltonian circuit problem.

Adikavi Nannaya University, Rajahmundry
MCA III Semester
MCA-19303 Computer Networks
Model Question Paper

Time : 3 Hours Max. Marks :75

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a)With a neat block diagram explain the TCP/IP reference model. List out the limitations of the model. [15]

(OR)

(b) What are the functions of the physical layer?
(c) Give the physical description, characteristics, and uses of all the guide transmission media. [5+10]

2 (a) Explain Sliding Window Protocol
(b) Differentiate Error detection and Correction Codes [8+7]

(OR)

(c) Explain Link State Routing Protocol
(d) What are the methods of congestion control in datagram subnets [10+5]

3 (a) what is TCP protocol? How is connection management done by TCP?
(b) Explain how TCP controls congestion [8+7]

(OR)

(c) Explain SMTP and MIME [15]

4(a) Compare the different network devices [15]

(OR)

(b) Write brief notes on Mobile Adhoc Networks and Sensor networks [15]

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.

(a) ATM Reference Model

(b) Explain Frequency Division Multiplexing

(c) Give the format of IPv4 header

(d) IPv4 Address Classes

(e)What are the various timers used by TCP and what are their purposes?

(f) Difference between TCP and UDP

(g) Short Notes on Firewalls

(h) Wireless Access Points

Adikavi Nannaya University, Rajahmundry
MCA III Semester
MCA-19304 Artificial Intelligence and Expert Systems
Model Question Paper

Time : 3 Hours Max. Marks : 75

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Describe any one informed search strategy and uninformed search strategy.
   (OR)
   b) Explain four basic kinds of agents that underlie almost all intelligent systems.
2. a) Explain how optimal strategies lead to optimal decisions in games.
   (OR)
   b) Describe resolution and unification
3. a) Explain different approaches to uncertain reasoning. (OR)
   b) Describe multi attribute utility functions
4. a) Explain the stages in the development of an expert system.
   (OR)
   b)Briefly explain the concept of neural networks.

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.

a) Define AI. What is Turing Test?

b) Specify the basic components of a problem.

c) Write a short notes on CSP.

d) Give the BNF of sentences in propositional logic.

e) Axioms of probability.

f) Axioms of utility theory.

g) Applications of expert systems

h) Frames

Adikavi Nannaya University, Rajahmundry

MCA III Semester

MCA-19305 DATABASE MANAGEMENT SYSTEMS

Model Question Paper

Time : 3 Hours Max. Marks: 75

SECTION – A (4x15=60 Marks)

Answer ALL Questions

1. a) Write a brief note on advantages and applications of DBMS **[8M]**

b) Briefly explain about Three-Schema Architecture with neat diagram **[7M]**

Or

c.) Briefly discuss about Database System Environment with neat diagram **[15M]**

2. a) Explain in detail about various key constraints used in database system with examples **[10M]**

b) Explain about Relational Algebra Set Operations with examples **[5M]**

Or

c) Explain in detail about Tuple and Domain Relational Calculus with examples **[15M]**

3. a) What is Normalization? Briefly explain the types of normal forms with an example **[15M]**

Or

b) Explain how a dynamic multi level indexes can be created using B Trees and B+ Trees with example. **[15M]**

4. a) What is Serializability? Briefly explain the different types of Serializability **[15M]**

Or

b) Briefly explain the following Concurrency Control Techniques

i) Two Phase Locking Protocol **[8M]**

ii) Validation Concurrency Control **[7M]**

SECTION – B (5x3=15 Marks)

Answer any FIVE Questions

5. **a)** Define DBMS, Schema, Instance. What is weak entity? Explain with example

b) What is Data Independence? Specify the classification

b) Give a brief note on Insert, Delete, and Update Queries in SQL with examples

c) What is View in SQL? Create a view and perform DML operations on it

d) What is Functional Dependency? Classify.

e) Give a brief note on Buffering Blocks

f) What is Transaction? Discuss Characteristics of Transaction

g) Give a brief note on Shadow Paging technique.

Semester IV (Second Year Curriculum)

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA -19401	Information Security and Cryptography	75	25	100	4	-	4
MCA- 19402	Cloud Computing	75	25	100	4	-	4
MCA-19403	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-19404	Object Oriented Software Engineering	75	25	100	4	-	4
MCA-19405	Elective-I 1.Distributed Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-19406	Data Mining Concepts and Techniques Lab	50	50	100	-	3	2
MCA-19407	Object Oriented Software Engineering Lab	50	50	100	-	3	2
	Total Credits						24

Adikavi Nannaya University : Rajahmundry
MCA IV Semester
MCA-19401 Information Security and Cryptography
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Explain Principles of Security **7M**
b) Discuss Substitution and Transportation techniques? **8M**
Or
c) What is Modulo Arithmetic and discuss its properties? **8M**
d) What is Totient Function and explain how to calculate Totient Function with an example **7M**

2. a) Show that DES decryption is the inverse of DES encryption? **8M**
b) Discuss different block cipher modes of operation? **7M**
Or
c) Explain RSA algorithm with an example? **8M**
d) Explain how to generate digital signatures? **7M**

3. a) What is authentication and discuss different authentication mechanisms? **7M**
b) Explain SHA1? **8M**
Or
c) What is Virus? And discuss different types of Viruses? **5M**
d) Write short notes on Intruders and Trusted Systems? **10M**

4. a) Briefly explain SSL protocol? **7M**
b) Explain SET in detail? **8M**
Or
c) Explain about IP Security architecture? **8M**
d) What is Firewall and discuss different types of Firewalls? **7M**

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.
2 Explain any five Security attacks?
3 What is Key and what are different types of keys?
4 Briefly discuss Differential cryptanalysis?
5 Define Prime number and explain relatively prime numbers with an example?
6 Differentiate between Symmetric and Asymmetric key cryptography?
7 What are the requirements of Hash Functions?
8 Explain SHTTP?
9 Briefly discuss Virtual Private Network?

Adikavi Nannaya University : Rajahmundry
MCA IV Semester
MCA-19402 Cloud Computing
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. **a)** Explain Cloud computing delivery models and Services. **(8M)**

b) Discuss Communication Protocols and Process Coordination in Distributed Systems. **(7M)**

Or

c) Briefly explain Cloud Computing at Microsoft Azure. **(8M)**

d) Explain Responsibility sharing between user and cloud service provider. **(7M)**

2. **a)** What is the need of virtualization? Explain Full virtualization and Para virtualization. **(7M)**

b) Discuss Virtual Machine Monitors and Virtual Machines. **(7M)**

Or

c) Explain Start-Time Fair Queuing Scheduling Algorithm for Computing Clouds. **(15M)**

3. **a)** Explain Network File System (NFS), Andrew File System (AFS) and Sprite Network
4. File System (SFS) of Distributive File Systems. **(8M)**

b) Discuss Google File System. **(7M)**

Or

c) Explain the Security of Virtualization **(8M)**

d) Discuss the Xoar: Breaking the monolithic design of the TCB. **(7M)**

4. **a)** How do we connect clients to cloud instances through Firewalls? **(8M)**

b) Explain the Security rules for application and transport layer protocols in EC2. **(7M)**

Or

c) How to install Hadoop on Eclipse on a Windows system **(8M)**

d) Explain the Case Study: Xen, a VMM based on para virtualization **(7M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Challenges for Cloud Computing

b) The Zoo Keeper

c) Mechanisms for Resource Management

d) Two-Level Resource Allocation Architecture

e) Locks and Chubby.

f) VM Security

g) Cloud-based simulation of a distributed trust algorithm.

h) The GrepTheWeb Application.

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA -19403 Data Mining Concepts and Techniques
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. **a)** Explain with a neat diagram the three-tier architecture of a Data Warehouse **7M**
   b) Explain the OLAP operations in a Multidimensional data. **8M**

   Or

   c) Why do we pre-process data? Explain different techniques in data cleaning, integration and transformation **15M**

2. **a)** Data Mining should be applicable to any kind of data repositories, including data streams. What are the different kinds of data on which mining can be applied? **10M**
   b) Mention different issues in Data Mining. **5M**

   Or

   c) Explain in detail how the data is measured differently in statistical descriptions **8M**
   d) Where can data mining be applied? Explain different domains of applications **7M**

3. **a)** Explain FP-Growth Algorithm with an example. **8M**
   b) Explain AOI Algorithm. **7M**

   Or

   c) Explain Apriori property and explain the algorithm associated with it **8M**
   d) How to generate Closed and Max patterns **7M**

4. **a)** What is the difference between classification and Prediction? How a decision tree is constructed **10M**
   b) Explain Support Vector Machines concept **5M**

   Or

   c) Explain Bayesian Classification Methods. How Classification by back propagation is obtained **7M**
   d) Explain k-means Clustering and compare that with k-medoids algorithm **8M**

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. **Write a Short note on**
   a) DBSCAN Algorithm
   b) Tree Pruning
   c) Concept Description.
   d) Frequent Item sets using vertical data format
   e) Multilevel Association Rules
   f) Data Visualization
   g) Similarity and Dissimilarity of data
   h) Data Cube Technology

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA-19404 Object Oriented Software Engineering
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) What is software engineering? Explain software engineering activities **15M**

Or

b) What is requirement engineering? Explain requirements engineering activities **15M**

2. a) Discuss how usability principles play a significant role in user interface design **15M**

Or

b) Explain static and dynamic elements of UML. **15M**

3. a) What is software architecture? Explain architectural patterns with examples. **15M**

Or

b) What is the role of patterns in software engineering? Explain any four patterns **15M**

4. a) Explain the types of defects that occur in the cases of ordinary algorithms, numerical algorithms and timing and co-ordination **15M**

Or

b) Explain RUP **15M**

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. Write a Short note on

a) Software quality
b) Reusability in software engineering.
c) Purpose of use case diagram.
d) Specialization and generalization.
e) Design principles.
f) Information about a pattern.
g) Black box testing.
h) Spiral model

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA-19405 Elective-I: 1. Distributed Systems
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. **a)** What are Distributed Systems? Give some examples. Explain the advantages and limitations of distributed systems. **15M**

Or

b) Explain the various issues to be addressed while designing a distributed system **15M**

2. **a)** Explain and compare the mutual exclusion algorithms **15M**

Or

b) What are physical and logical clocks? Explain the various clock synchronization a1gorirthms. **15M**

3. **a)** Compare the different system models **7M**
b) What are threads? Explain the design issues for thread packages **8M**

Or

c) Explain the different processor allocation algorithms **15M**

4. **a)** Explain Strict Consistency, Sequential Consistency and Causal Consistency with appropriate examples. **15M**

Or

b) Explain cache consistency protocols for bus based multiprocessors with shared memory **8M**
c) How can sequential consistency be achieved in replicated pages in page based distributed shared memory? **7M**

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. **Write a Short note on**
   a) Differentiate tightly coupled and loosely coupled hardware.
   b) What are the essential properties of transactions?
   c) Explain Ring Election Algorithm.
   d) Explain RPC semantics in the presence of any two types failures
   e) Write briefly about file service interface.
   f) What are faults? Explain the types of component faults and processor faults
   g) Compare the various shared memory systems.
   h) Explain PRAM consistency.

Adikavi Nannaya University : Rajahmundry
MCA IV Semester
MCA-19405 Elective-I: 2. Internet Of Things
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. **a)** What is the IoT? Explain Design guidelines for IoT **(15M)**

Or

b) Explain in detail application of Internet of Things in Smart Cities **(15M)**

2. **a)** Explain M2M. Distinguish between IoT and M2M **(8M)**

b) Explain SDN and NFV for IoT **(7M)**

Or

c) Explain IoT System Management with NETCONF-YANG **(8M)**

d) Explain limitations of SNMP **(7M)**

3. **a)** Explain Design Methodology for IoT **(15M)**

Or

b) Explain Logical Design of IoT suing Python. Explain various python packages used for IoT **(15M)**

4. **a)** What is Raspberry Pi. Explain Raspberry Pi Board and various interfaces in Raspberry pi. **(15M)**

Or

b) What is Cloud? Explain various Cloud Storage Models using in IoT **(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Explain Wireless Sensor Networks

b) Explain IoT in Environment

c) Explain Need for IoT Systems Management

d) Explain NETOPEER

e) Explain various data types used in Python

f) Explain basic building blocks of IoT Device

g) Explain Amazon Web Services for IoT

h) Explain Django Architecture.

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA-19405 Elective-I: 3. Image Processing
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. **a)** Explain the elements of Digital Image Processing System with a neat diagram **(15M)**

Or

b)Explain terms: Neighbours of a Pixel **,** Adjacency, Connectivity, Regions, and Boundaries **,** Distance measures **,** Image Operations on a Pixel Basis **(15M)**

2. **a)** Define and explain low pass filters and high pass filters in brief **(7M)**
b) Define and edge. Explain various edge enhancement filters **(8M)**

Or

c) Discuss histogram techniques for Image enhancement: Histogram specification (Matching.**,** Histogram Equalization , Local enhancement. **(15M)**

3. **a)** Explain Lossy compression and Lossy predictive coding **(15M)**

Or

b) Explain the Morphological Algorithms: Boundary Extraction, Region Filling **(15M)**

4. **a)** Distinguish Global Processing via the Hough Transform and via the Graph-Theoretic Techniques. **(15M)**

Or

b) What is Thresholding? Explain about Global Thresholding **(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) How do you acquire an image? Explain in detail
b) What is Image Sampling and Quantization?
c) Compare one dimension and two dimension DFT
d) Distinguish between spatial domain techniques and frequency domain techniques of Image enhancement
e) Explain about the Dilation and Erosion
f) Draw the relevant diagram for source encoder and source decoder
g) Explain the Detection of Discontinuities: Point Detection, Line Detection, Edge Detection
h) Explain about Region-Based Segmentation

Semester V (Third Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-19501	Big Data Analytics	75	25	100	4	-	4
MCA-19502	Cyber Security and Forensics	75	25	100	4	-	4
MCA-19503	Elective II 1. Blockchain Technology 2. Foundations of Data Science 3. Human-Computer Interaction	75	25	100	4	-	4
MCA-19504	Elective-III 1.Python Programming 2.Perl Programming 3.PHP programming	75	25	100	4	-	4
MCA-19505	Elective-IV 1.Machine Learning 2.Embedded Systems 3.Robotics	75	25	100	4	-	4
MCA-19506	Big Data Analytics Lab	50	50	100	-	3	2
MCA-19507	Mini Project	50	50	100	-	3	2
	Total Credits						24

Adikavi Nannaya University : Rajahmundry
MCA V Semester
MCA-19501 Big Data Analytics
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

d) **a)** Define Big Data. What are the characteristics of Big Data. Explain each character with suitable real time applications **(15M)**

Or

b) Compare data in a Warehouse and Data in Hadoop. Discuss similarities and dissimilarities **(15M)**

2. **a)** Explain Map Reduce concept and all building blocks of Hadoop **(15M)**

Or

b) Explain the concepts of HDFS. Also explain how command line interface in Java works in HDFS **(15M)**

c) **a)** Write Matrix multiplication program with Map Reduce concept. How to construct Basic template of a Map Reduce Program **(15M)**

Or

b) Write word count program with Map Reduce concept. Explain Bloom Filters **(15M)**

4. **a)** Explain Friends-of-Friends Algorithm in finding friends in a Social Network. **(15M)**

Or

b) Explain PageRank Algorithm. **(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Explain the concept of wrapper classes in Java

b) Explain Serializability

c) Compare sql databases and Hadoop

d) What is Hadoop Archives. Explain

e) Explain anatomy of a MapReduce Program

f) What are chaining Map Reduce jobs

g) What is Streaming In Hadoop

h) Explain Shortest Path Algorithm.

Adikavi Nannaya University : Rajahmundry

MCA V Semester

MCA-19502 Cyber Security & Forensics

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

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SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. **a)** Distinguish computer forensics and other related disciplines? **(8M)**
b) Explain how to establishing company policies? **(7M)**
Or
c) Explain an overview of a computer crime? **(8M)**
d) Explain how to analysing your digital evidence? **(7M)**

2. **a)** Discuss different Storage Formats for Digital Evidence? **(7M)**
b) Explain how to identify the nature of the case? **(8M)**
Or
c) Explain seizing digital evidence at the scene? **(15M)**

3. **a)** Explain how to Exploring Microsoft File Structures? **(15M)**
Or
b) Discuss different Computer Forensics Software Tools? **(15M)**

4. **a)** Addressing Data-Hiding Techniques? **(8M)**
b) What are the Specialized E-mail Forensics Tools? **(7M)**
Or
c) What are Acquisition Procedures for Cell Phones and Mobile Devices? **(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**
a) What is computer forensics?
b) Briefly explain how to develop computer forensics resources?
c) Explain E-mail abuse investigations.
d) What are proprietary formats?
e) Briefly discuss Windows validation methods?
f) Explain processing and handling digital evidence?
g) What are the different disk partitions?
h) Explain Mobile Device Forensics.

Adikavi Nannaya University : Rajahmundry

MCA V Semester

MCA-19503 Elective-II:1. Block chain Technology

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)

Answer ALL Questions

1.	**a)** Explain linking blocks using SHA-256 Algorithm.	**(8M)**
	b) Explain digital signatures in blockchain?	**(7M)**
	Or	
	c) Explain blockchain types with examples?	**(8M)**
	d) Explain blockchain functionalities with examples?	**(7M)**
2.	**a)**Explain blockchain design principles with examples?	**(15M)**
	Or	
	b) Explain security and privacy in blockchain with examples?	**(15M)**
3.	**a)** Explain pure state based consensus with examples?	**(15M)**
	Or	
	b) Explain any three consensus algorithms with examples?	**(15M)**
4.	**a)** Explain blockchain optimization techniques with examples?	**(15M)**
	Or	
	b) Explain blockchain enhancement techniques with examples?	**(15M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Differentiate between blockchain and databases.
b) Explain hashing on Block chain.
c) Explain distributed ledgers on Blockchain.
d) Explain public and private ledgers on blockchain.
e) Explain delegated proof of state in blockchain.
f) Explain hyperledger on Blockchain.
g) Explain Attacks on Blockchain.
h) Explain evolution of consensus algorithm.

Adikavi Nannaya University : Rajahmundry
MCA V Semester
MCA-19503 Elective-II:2. Foundation of Data Science
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. **a)** Explain concepts of relational database in data science with examples. **(15M)**

Or

b) Explain the concept of managing data in data science with examples. **(15M)**

2. **a)** Explain modeling methods in data science with examples? **(15M)**

Or

b) Explain linear and logistic regression in data science with examples? **(15M)**

3. **a)** Explain R language operations with examples? **(15M)**

Or

b) Explain probability distribution in R language with examples? **(15M)**

4. **a)** Explain the concept of documentation and deployment in data science with examples? **(15M)**

Or

b) Explain the graphical analysis in data science with examples? **(15M)**

Section-B (5 X 3 =15 Marks)

5. Write a Short Note on any FIVE of the following

a. Explain stages in data science with examples.
b. Explain spotting problems in data science
c. Explain machine learning tasks on modeling.
d. Explain k-means algorithms.
e. Explain types of data items in R Language
f. Explain Normal distribution in Data Science
g. Explain Graphics parameters in R language.
h. Explain Matrix plots in delivering data science.

Adikavi Nannaya University : Rajahmundry

MCA V Semester

MCA-19503 Elective-II:3. Human Computer Interaction

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) What is Heuristic Evaluation? Why is it used? Outline the steps involved for expert review. [8M]
   b) Discuss the guidelines for Ethnographic observation. [7M]

(or)

   c) Explain the importance of response time display rate in menu designing. [8M]
   d) Compare and contrast between the Linear menus and Tree structured menus with examples. [7M]

2. a) Discuss the challenges and issues in adopting Speech recognition technology. [8M]
   b) Explain the various display technologies applicable for small and large displays. [7M]

(or)

   c) Discuss the factors that influence the acceptable response time. [8M]
   d) Explain the importance and impact of using colors in the design of error and warning messages [7M]

3. a) Explain the advantages of online documentation and also discuss the important Features that can help accessing the online documentation in a better way. [8M]
   b) Discuss the designer concerns and user-desired qualities for shaping the content of documentation. [7M]

(or)

   c) What do you mean by Multimedia document? Discuss various challenges involved in searching a multimedia document. [8M]
   d) Discuss the process of data type by task taxonomy for information visualization[7M]

4. a) Explain how organizational design supports usability. [8M]
   b) Discuss the concerns and potential barriers for Social impact statement of early design review. [7M]

(or)

   c) Explain various structures of menus with neat diagrams. [8M]
   d) What are small display units? What are its special characteristics? Discuss various factors that are to be considered in designing menus for small display units. [7M]

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a) Discuss the interface design goals for academicians, industrial researches and common people.
   a) b) What are the different types of display devices?
   b) Describe the features of mobile device displays.
   c) Why is quality of service important in the context of HCI?
   d) Differentiate between paper manuals and displays.
   e) What is the reference model for visualizations? Why is this model important for visualization?
   f) g) Write about the various factors that plays a significant role in influencing users expectations with respect to system response time.
   g) Discuss the importance of audio menus for small display units.

Adikavi Nannaya University : Rajahmundry
MCA V Semester
MCA-19504 Elective-III:2. PERL Programming
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Explain manipulation of data structures in PERL programming with examples [15M]

(or)

b) Define PERL, explain comparisons with other programming languages with examples[15M]

2. a)Explain control structures in PERL programming with examples . [15M]

(or)

b) Explain Object Oriented concept in PERL programming with examples [15M]

3. a) Explain file handling function in PERL programming with examples [15M]

(or)

b) Explain runtime evaluation and error trapping in perl programming with an example [15M]

4. a) Explain security issues in PERL programming with an example [15M]

(or)

b) Explain Administration functionalities in PERL programming with an example [15M]

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a) Differentiate scripts and programs in PERL programming.
b) Explain scalar variables in PERL
c) Explain parameter passing techniques in PERL.
d) Explain inheritance concept in PERL
e) Explain input and output functions of perl
f) Explain operators in perl programming.
g) Differentiate GET vs POST in perl.
h) Discuss CPAN in perl programming.

Adikavi Nannaya University : Rajahmundry

MCA V Semester

MCA-19504 Elective-III:3. PHP Programming

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) Explain control structures in PHP programming with example [15M]

(or)

b) Explain types of Arrays in PHP programming with examples [15M]

2. a) Explain web pages in PHP programming with examples [15M]

(or)

b) Explain types of form data in PHP programming with examples [15M]

3. a) Explain accessing and updating in PHP programming with examples [15M]

(or)

b) Explain database concept in PHP programming with an example[15M]

4. a) Explain file handling functions in PHP programming with an example [15M]

(or)

b) Explain PHP mail functions with an example [15M]

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5. a) Explain data types in PHP.
b) Explain function in PHP
c) Explain reading data in Web pages
d) Explain data validation in PHP
e) Explain SQL injection in database in PHP
f) Explain MySQL in PHP Database.
g) Explain PHP mail functions.
h) Explain PHP filters with examples.

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MCA V Semester

MCA-19505 Elective-IV:1. Machine Learning

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)

Answer ALL Questions

1. **a)** What is Machine learning? Explain different perspectives and issues in machine learning (8M)

b) What are the concepts of learning as search? (7M)

Or

c) Explain find – S algorithm with the given example. Give its application. (10M)

Explain	SKY	AIR Temp.	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rain	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

d) Explain basic decision tree algorithm **(5M)**

2. **a)** Explain basic decision tree algorithm **(10M)**

b) Explain how hypothesis space search is carried in decision tree learning **(5M)**

Or

c) Explain Back propagation algorithm. Mention its limitations **(7M)**

d) Discuss a general approach for deriving confidence intervals **(8M)**

3. **a)** Discuss maximum likelihood hypothesis for predicting probabilities in Bayesian learning **(7M)**

b) Explain Gibs algorithm **(8M)**

Or

c) Explain k- Nearest Neighbour Learning with example **(8M)**

d) Write a short note on Locally Weighted Regression, Case-Based Reasoning **(7M)**

4. **a)** Explain Hypothesis space search in genetic algorithms **(8M)**

b) How Genetic Algorithm can be parallelized? **(7M)**

Or

c) Write short notes on the following:

i.Learning First Order Rules **ii.** Sequential Covering Algorithms **(8M)**

d) Write above Genetic Programming Models of Evolution and Learning **(7M)**

Section-B (5 X 3 =15 Marks)

5. **Write a Short Note on any FIVE of the following**

a) Explain designing a learning system

b) Write a short note on candidate elimination algorithm

c) Explain the Issues in decision tree learning

d) Explain about Multilayer networks

e) Briefly explain about Bayes theorem

f) Briefly write about Lazy and Eager Learning

g) What is Inverted Deduction? Explain

h) Explain what Genetic Programming is with example

Adikavi Nannaya University : Rajahmundry
MCA V Semester
MCA-19505 Elective-IV:2. Embedded Systems
Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1. a) Draw and explain the typical Embedded system architecture? [8M]
   b) Illustrate an application-specific Embedded system with suitable example? [7M]
   (or)
   c) What are the various serial communication devices used in an Embedded Hardware? Explain any one of them? [8M]
   d) Discuss about Real time clock with respect to an Embedded Hardware? [7M]
2. a) Explain any one of Embedded firmware design approaches in detail? [8M]
   b) Tabulate the concepts of compiler and cross compiler relevant to an Embedded Firmware? [7M]
   (or)
   c) Discuss about Multiprocessing and Multitasking techniques used in RTOS? [8M]
   d) Briefly explain (i) Task scheduling (ii) Hardware software trade-offs [7M]
3. a) Draw and explain the integrated embedded system development environment. [8M]
   b) Write notes on Embedded software development-process? [7M]
   (or)
   c) Write short notes on the following [15M]
   i) Translation Tools
   ii) Debugging Tools
4. a) What is Digital Signal Processor? Explain the role of DSP in embedded system design. [8M]
   b) Explain the different characteristics of embedded systems in detail? [7M]
   (or)
   c) Explain the role of Watchdog timer in embedded system [8M]
   d) Compare the operation of ZigBee and Wi-Fi networks [7M]

Section-B (5 X 3 =15 Marks)

5.Write a Short Note on any FIVE of the following

a) What is operational quality attribute?
b) What is the operation of transistor based relay driver circuit ?
c) What is the difference between C and Embedded C ?
d) What is process life cycle?
e) What are the advantages of simulator base debugging?
f) What is a target system? How does the target system differ from the final embedded system?
g) What is meant by Embedded firmware?
h) What are Timer and counting devices?

Adikavi Nannaya University : Rajahmundry

MCA V Semester

MCA-19505 Elective-IV: 3. Robotics

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION-A (4 X 15 = 60 M)

Answer ALL Questions

1. a) Define the term 'Robot'. Explain different Robot types. [8M]
   b) What is meant by a manipulator having redundant degrees of freedom and write its advantages? [7M]

(or)

   c) Distinguish between servo and non-servo grippers. [8M]
   d) What are the design considerations in the robot end effector for holding the object? [7M]

2. a) Discuss the features of SCARA and cylindrical robot and also find the D-H matrix for cylindrical robot. [15M]

(or)

   c) What is Jacobian work envelope? Explain in brief. [8M]
   d) Find the manipulator Jacobian matrix J(q) of the five axis spherical co- ordinate robot. [7M]

3. a) Explain the different types of Robot languages. [8M]
   b) Discuss the software elements of robot and different teaching methods of robot. [7M]

(or)

   c) Explain the applications of Robot in spot and continuous arc welding. [8M]
   d) In which type of production, robots are preferred for loading and unloading function? Explain. [7M]

4. a) Name and discuss the four basic arm configurations that are used in robotic manipulators. [8M]
   b) Discuss advantages and disadvantages of using robot in industry. [7M]

(or)

   c) Discuss direct and inverse kinematics [8M]
   d) Differentiate path planning and trajectory planning [7M]

Section-B (5 X 3 =15 Marks)

5.Write a Short Note on any FIVE of the following

a) What are the various applications of Robots in manufacturing industries?
b) What is the function of gripper?
c) What is inverse kinematics problem?
d) What is meant by range and proximity sensor?
e) Discuss robot trajectory planning.
f) Discuss the applications of Tactile sensors.
g) what is dynamic modeling?
h) what are advantages of offline programming?

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MCA V Semester

MCA-19504 Elective-III:1. Python Programming

Model Question Paper

Time: 3 Hours **Max. Marks: 75**

SECTION – A (4X15=60 Marks)
Answer ALL Questions

1. a) What are different applications of Python? Give examples. (7M)
   b) Write a Python program to convert height in feet and inches to cm.
   [1 feet = 12 inch and 1 inch= 2.54 cm]
   (Sample input: 2 feet 7 inch Sample output: 78.74 cm) (8M)
   (or)
   c) List and explain different arithmetic operators supported by Python. Discuss about their precedence and associativity. (7M)
   d) Write a Python program to print all prime numbers less than 256. (8M)
2. a) Write a Python program that interchanges the first and last characters of a given string. (7M)
   b) Give a comparison between lists, tuples, dictionaries and sets (8M)
   (or)
   c) What type of parameter passing is used in Python? Justify your answer with sample programs. (8M)
   d) Write a Python function that prints all factors of a given number. (7M)
3. a) Write a Python program that overloads + operator, to add two objects of a class. (8M)
   b) How to create, raise and handle user defined exceptions in Python. (7M)
   (or)
   c) What are regular expressions? How to find whether an email id entered by user is valid or not using Python ‘re’ module. (7M)
   d) Write a Python program that creates a GUI with a textbox, Ok button and Quit button. On clicking Ok, the text entered in textbox is to be printed in Python shell; on clicking Quit, the program should terminate. **(8M)**
4. a) Explain creatin classes in Python with examples (8M)
   b) Define and Differentiate Error and exception . (7M)
   (or)
   c) Why testing is required ? explain in detail (7M)
   d) Explain the following i)Calendar module ii) Synchronizing threads (8M)

SECTION – B (5X3=15 Marks)
Answer any FIVE Questions

5.

a) What happens if a semicolon (;) is placed at the end of a Python statement?
b) What are membership operators? Give examples for usage.
c) What is a dictionary in Python?
d) Can a Python function return multiple values? If yes, how it works?
e) How to make a Python class member variable hidden from outside the class?
f) Write Python program to calculate your age in days. (days between Today and Date of Birth)
g)How to access dictionaries in python?
h) Explain about self variable in python?