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