

**DETAILED SYLLABUS  
FOR  
MASTER OF COMPUTER APPLICATIONS (MCA)  
LATERAL ENTRY (THIRD SEMESTER)  
(FOR BATCH 2017-2019)  
UNDER CBCS SYSTEM**



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## MCA & MCA (Lateral Entry) Scheme under CBCS

Semester	Core Courses(Compulsory)		Core Courses (Elective)		Open Electives
	4 Papers of 4 Credits	2 labs of 2 Credits	To Choose 1 Paper of 4 Credits		
I (Regular entry)	<ul style="list-style-type: none"> <li>Principles of Programming Languages</li> <li>Digital Computer Organization</li> <li>Database Management Systems</li> <li>Data Structures</li> </ul>	<ul style="list-style-type: none"> <li>C Programming Lab</li> <li>Office Automation Tools &amp; DBMS Lab</li> </ul>	<ul style="list-style-type: none"> <li>Multimedia Applications &amp; tools</li> <li>Management Theory &amp; Practices</li> </ul>	<ul style="list-style-type: none"> <li>Computers in Media Industry</li> <li>Advanced Excel</li> </ul>	
II	<ul style="list-style-type: none"> <li>Numerical Methods</li> <li>Object Oriented Programming with C++</li> <li>Web Development with HTML, DHTML, JavaScript &amp; CSS</li> <li>Networked Knowledge Society : Social &amp; Professional Issues</li> </ul>	<ul style="list-style-type: none"> <li>Object Oriented Programming Lab</li> <li>Web Programming Lab</li> </ul>	<ul style="list-style-type: none"> <li>Communicative English</li> </ul>	<ul style="list-style-type: none"> <li>Information System Management</li> <li>Principles of User Interface Design</li> <li>Oracle &amp; SQL Prog.</li> </ul>	
III (Lateral entry)	<ul style="list-style-type: none"> <li>Computer Networks</li> <li>Advanced DBMS</li> <li>Cloud Computing</li> <li>Operating Systems</li> </ul>	<ul style="list-style-type: none"> <li>Data Structure with C++ Lab</li> <li>Linux Programming lab</li> </ul>	<ul style="list-style-type: none"> <li>Information Security Foundations</li> <li>Data Warehousing &amp; Mining</li> <li>Cloud Architecture &amp; Infrastructure</li> <li>Discrete Mathematics &amp; Finite State Automata</li> </ul>	<ul style="list-style-type: none"> <li>Python Programming</li> <li>ERP &amp; CRM</li> <li>Object Oriented Analysis and Design</li> <li>Open Source Mathematical &amp; Scientific Tools</li> <li>Angular Java Script</li> </ul>	
IV	<ul style="list-style-type: none"> <li>Software Engineering</li> <li>Java Programming</li> <li>Design &amp; Analysis of Algorithms</li> <li>Theory of Computation</li> </ul>	<ul style="list-style-type: none"> <li>Professional Communication Skills lab</li> <li>Web Development lab</li> </ul>	<ul style="list-style-type: none"> <li>Network &amp; Cyber Security</li> <li>Big Data Analytics</li> <li>Cloud storage &amp; Application Development framework</li> <li>Server Administration</li> </ul>	<ul style="list-style-type: none"> <li>Soft Computing</li> <li>R Programming</li> <li>Software Testing and Quality Assurance</li> <li>Cyber Crime &amp; Laws</li> </ul>	
V	<ul style="list-style-type: none"> <li>Digital Initiatives, E-Commerce &amp; Internet of Things</li> <li>Computer Graphics</li> <li>Artificial Intelligence &amp; Machine learning</li> <li>Dot Net Programming</li> </ul>	<ul style="list-style-type: none"> <li>Mobile Application Development Lab</li> <li>IoT Labs</li> </ul>	<ul style="list-style-type: none"> <li>Security Standards Policies, Laws &amp; Management</li> <li>Big Data Analytics tools</li> <li>Cloud Planning, Management &amp; Security Compiler Design</li> </ul>	<ul style="list-style-type: none"> <li>Software Project Management</li> <li>Information Retrieval</li> <li>Parallel Computing</li> <li>MATLAB Programming</li> <li>Digital Forensic</li> </ul>	
VI (Dedicated Project)	<ul style="list-style-type: none"> <li>Project - Analysis &amp; Planning</li> <li>Project - Design &amp; Development</li> <li>Project - Testing &amp; Validation</li> <li>Project - Documentation</li> <li>Project Presentation &amp; Viva</li> </ul>				

**There are three Specialization offered from 3<sup>rd</sup> Semester onwards - Cloud Computing, Big data analytics and Network & Cyber Security. Based on the choice student can opt relative papers from Core Elective papers in 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> semesters.**

  
 8/5/12

**MARKING SCHEME FOR  
MASTERS IN COMPUTER APPLICATIONS [ MCA ]  
&  
MASTERS IN COMPUTER APPLICATIONS (LATERAL ENTRY) [ MCA(LE) ]**

**SEMESTER - I**

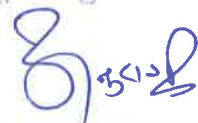
Subject Code	Subject Name	Scheme			Theory Paper	Practical Exams	Internal Evaluation	Total Marks
		L	T	P				
1MCACCC1	Principles of Programming Languages	3	0	1	80	-	20	100
1MCACCC2	Digital Computer Organization	4	0	0	80	-	20	100
1MCACCC3	Database Management Systems	3	0	1	80	-	20	100
1MCACCC4	Data Structures	3	0	1	80	-	20	100
1MCACCC5	C Programming Lab	1	0	1	-	40	10	50
1MCACCC6	Office Automation Tools & DBMS Lab	1	0	1	-	40	10	50
1MCACCE(A) <b>OR</b> 1MCACCE(B)	Multimedia Applications & Tools Management Theory & Practices	3 4	0 0	1 0	80 80	- -	20 20	100 100
1MCAOE1	Open Elective (Select a subject from any department's Open Elective course list)	2	1	0	40	-	10	50
		2	0	1	25	15	10	50
<b>GRAND TOTAL</b>								<b>650</b>

(\*CC - Core Compulsory Course, CE - Core Elective Course, OE-Open Elective Course, L-Lecture, T-Tutorial, P-Practical)

**SEMESTER - II**

Subject Code	Subject Name	Scheme			Theory Paper	Practical Exams	Internal Evaluation	Total Marks
		L	T	P				
2MCACCC1	Numerical Methods	4	0	0	80	-	20	100
2MCACCC2	Object Oriented Programming with C++	4	0	0	80	-	20	100
2MCACCC3	Web Development with HTML, DHTML, JavaScript & CSS	4	0	0	80	-	20	100
2MCACCC4	Networked Knowledge Society : Social & Professional Issues	4	0	0	80	-	20	100
2MCACCC5	Object Oriented Programming Lab	0	0	2	-	40	10	50
2MCACCC6	Web Programming Lab	0	0	2	-	40	10	50
2MCACCE(A)	Communicative English	4	0	0	80	-	20	100
2MCAOE1	Open Elective (Select a subject from any department's Open Elective course list)	2	1	0	40	0	10	50
		2	0	1	25	15	10	50
<b>GRAND TOTAL</b>								<b>650</b>

विश्वविद्यालय  
कम्प्यूटर अनुप्रयोग विभाग



**SEMESTER - III**

Subject Code	Subject Name	Scheme			Theory Paper	Practical Exams	Internal Evaluation	Total Marks
		L	T	P				
3MCACCC1	Computer Networks	4	0	0	80	-	20	100
3MCACCC2	Advanced Database Management Systems	3	0	1	50	30	20	100
3MCACCC3	Cloud Computing	3	0	1	80	-	20	100
3MCACCC4	Operating Systems	4	0	0	80	-	20	100
3MCACCC5	Data Structure with C++ Lab	1	0	1	-	40	10	50
3MCACCC6	Linux Programming lab	1	0	1	-	40	10	50
3MCACCE(A)	Information Security Foundations	4	0	0	80	-	20	100
3MCACCE(B)	Data Warehousing & Mining	4	0	0	80	-	20	100
3MCACCE(C)	Cloud Architecture & infrastructure	4	0	0	80	-	20	100
3MCACCE(D)	Discrete Mathematics & Finite State Automata	4	0	0	80	-	20	100
3MCAOE1	Open Elective (Select a subject from any department's Open Elective course list)	2	1	0	40	0	10	50
		2	0	1	25	15	10	50
<b>GRAND TOTAL</b>								<b>650</b>

**SEMESTER - IV**

Subject Code	Subject Name	Scheme			Theory Paper	Practical Exams	Internal Evaluation	Total Marks
		L	T	P				
4MCACCC1	Software Engineering	4	0	0	80	-	20	100
4MCACCC2	Java Programming	3	0	1	50	30	20	100
4MCACCC3	Design & Analysis of Algorithms	4	0	0	80	-	20	100
4MCACCC4	Theory of Computation	4	0	0	80	-	20	100
4MCACCC5	Professional Communication Skills lab	1	0	1	-	40	10	50
4MCACCC6	Web Development lab	1	0	1	-	40	10	50
4MCACCE(A)	Network & Cyber Security	3	0	1	80	-	20	100
4MCACCE(B)	Big Data Analytics	3	0	1	80	-	20	100
4MCACCE(C)	Cloud storage & Application Development framework	3	0	1	80	-	20	100
4MCACCE(D)	Server Administration	3	0	1	50	30	20	100
4MCAOE1	Open Elective (Select a subject from any department's Open Elective course list)	2	1	0	40	0	10	50
		2	0	1	25	15	10	50
<b>GRAND TOTAL</b>								<b>650</b>

## SEMESTER - III

### 3MCACCC1 - COMPUTER NETWORKS

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#### Course Objectives:

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- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

#### UNIT-I

Introduction to Computer Networks, Types of Network - LAN, WAN, MAN, Internet, Network Topologies, Transmission media and systems, Analog & Digital Signals, Communication Mode- Simplex, Half Duplex, Full Duplex, Error detection and correction, Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer, Structure of Switch / Router, Inter-Networking Devices, Bridge, Routers Gateways, Repeater,

#### UNIT-II

Multiplexing and signaling techniques, Base Band, Broad Band, Multiplexer FDM, TDM Statistical multiplexing., Modulation AM, FM, PM, Switching Technique, Message Switching, Circuit Switching, Packet Switching, Virtual Circuit, MAC and LAN Protocols: Multiple access communication, Random Access – ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE Standards, 802.3, 802.4, 802.5. Peer-To-Peer Protocols: Protocols, Service Models and end-to-end requirements, ARQ, Sliding window, RTP, PPP protocols, Fast Ethernet, FDDI Token Ring, Wireless LAN,

#### UNIT-III

Routing Algorithms, Distance Vector Routing, Shortest Path Routing, Internet Routing Protocols, Unicast Routing, Multicast routing, Broadcast Routing, Congestion Control, Traffic Shaping. TCP/IP: Introduction, History of TCP/IP, Architecture, Layers of TCP/IP, Comparison Between OSI and TCP/IP Models, Transmission Control Protocol, User Datagram Protocol, Internet Protocol, IPv4 Addressing, IP address classes, Internet Protocols – IP packet, ARP, RARP, ICMP,

#### UNIT-IV

Various Protocol, HTTP, TELNET, FTP, SMTP, MIME, UDP, URL (Uniform Resource Locator), ISDN Channel, ISDN Services, Base Band ISDN, Broadband ISDN. Network Security: Network Security Issues, Firewalls – Need and Features of Firewalls, Types of

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Firewall Technology- Network Level and Application Level, IP Packets Filter Screening Routers, Limitations of Firewalls.

**UNIT-V**

Introduction to Wireless Network, Fundamentals of cellular systems, mobile ad-hoc and sensor networks, wireless PAN/LAN/MAN Mobile radio propagation, multi-path propagation, path loss, slow fading, fast fading, Cellular concept, frequency reuse, cell splitting, cell sectoring, Multiple radio access protocols, CSMA, CSMA/CD, CSMA/CA

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*TEXT BOOKS*

- Computer Networks (4th Edition) [Kindle Edition] Andrew S. Tanenbaum
- Data Communications and Networking (SIE) Paperback – 20 May 2006 by Behrouz A. Forouzan
- 3.Understanding Data Communication of Networking by William A Shay

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*REFERENCE BOOKS*

- Communication and Network by Lewis Machenzie
- Data Communication by Prakash C Gpta
- Data And Computer Communication: by William Stallings

## **3MCACCC2 - ADVANCED DATABASE MANAGEMENT SYSTEM**

### **UNIT - I**

Overview of relational Database design, Universal Relation, Anomalies in a Database, Atomic Domain and 1NF, Functional Dependency Theory, Decomposition Using Functional Dependency, Algorithm For Decomposition, Decomposition Using Multivalued Dependency More Normal Forms, Database Design Process

### **UNIT-II**

Overview of physical storage media, RAID, Indexing Concepts, ordered indexed, B+ tree index, bitmap Indexing, multiplex key index, hashing concepts, Hashing - static and dynamic, Query Processing , Measures of Query cost , Query processing for select, Sort Join operations. Basics of Query optimization, Transformation of Relational expression, Estimating Statistics of Expression, Choice of evaluation plan

### **UNIT-III**

Transaction Concepts, Features of database transaction, Concurrency control in database, Lock base, Time stamp base, validation base Protocols, Database recovery system, Database authentication & security.

### **UNIT - IV**

PARALLEL AND DISTRIBUTED DATABASES — Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Data Partitioning, Parallelizing Sequential Operator Evaluation Code, Parallelizing Individual Operations - Bulk Loading and Scanning, Sorting, Joins, Parallel Query Optimization, Introduction to Distributed Databases - Types of Distributed Databases, Distributed DBMS Architectures - Client-Server Systems, Collaborating Server Systems, Middleware Systems, Storing Data in a Distributed DBMS - Fragmentation, Replication

Distributed Catalog Management - Naming Objects, Catalog Structure, Distributed Data Independence, Distributed Query Processing - Nonjoin Queries in a Distributed DBMS, Joins in a Distributed DBMS, Cost-Based Query Optimization , Updating Distributed Data - Synchronous Replication, Asynchronous Replication, Distributed Transactions, Distributed Concurrency Control, Distributed Deadlock, Distributed Recovery, Normal Execution and Commit Protocols, Restart after a Failure, Two-Phase Commit Revisited, Three-Phase Commit

### **UNIT - V**

OBJECT-DATABASE SYSTEMS — Introduction, New Data Types, Manipulating the New Data, Structured Data Types, Collection Types, Operations on Structured Data — Operations on Rows, Operations on Arrays, Operations on Other Collection Types, Queries Over Nested Collections, Encapsulation and ADTs — 23.4.1 Defining Methods,

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Inheritance — Defining Types with Inheritance, Binding Methods, Collection Hierarchies, Objects, aIDs, and Reference Types — Notions of Equality, Dereferencing Reference Types, URLs and OIDs in SQL, Database Design for an ORDBMS—Collection Types and ADTs, Object Identity—Extending the ER Model, Using Nested Collections , ORDBMS Implementation Challenges, Storage and Access Methods, Query Processing, Query Optimization, OODBMS, The ODMG Data Model and ODL, OQL, Comparing RDBMS, OODBMS, and ORDBMS, RDBMS versus ORDBMS, OODBMS versus ORDBMS: Similarities, OODBMS versus ORDBMS: Differences

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*TEXT BOOKS:*

- Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 7<sup>th</sup> Edition, McGraw Hill .
- Ramakrishnan and Gherke, "Database Management Systems", TMH.
- Rajesh Narang "Database management System" PHI.

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*REFERENCE BOOKS:*

- R. Elmarsri and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
- Singh S.K., "Database System Concepts, design and application", Pearson Education
- Bipin Desai, "An Introduction to database Systems", Galgotia Publications.



### **3MCACCC3 - CLOUD COMPUTING**

#### **UNIT-I**

Introduction to Cloud Computing, History of Cloud Computing, Importance of Cloud Computing in the current Era, Characteristics of Cloud Computing, Pros & Cons of Cloud Computing, Nature of Cloud Computing, Technologies in Cloud Computing, Migration issues to Cloud., Types of Cloud- Public & Private Clouds, Difference & Factors of Public V/s Private Clouds, Cloud Infrastructure, Trends in Computing Paradigm, Cloud service models, Cloud Deployment Models, Cloud Computing and Services - Pros & Cons

#### **UNIT-II**

Cloud Computing Technology - Cloud Lifecycle models, Role of Cloud Modelling & Architecture-Cloud Computing Models, Necessary Characteristic, Service models, Deployment models, Reference models for cloud computing, Cloud Industry standards, Cloud Architecture - Cloud computing Logical architecture, Developing Holistic Cloud computing reference models, Cloud system architecture, cloud deployment models, Cloud Modelling and Design - Cloud computing basic principles, Model for federated cloud computing, Cloud ecosystem model, Cloud governance

#### **UNIT-III**

Virtualization - Virtualization foundations, Virtualization architecture and software, Virtualization clustering, Virtualization application, pitfalls of Virtualization, Grid Cloud and Virtualization - Virtualization in Grid, Virtualization in Cloud, Virtualization and cloud security, Virtualization and Cloud Computing - Anatomy of Cloud infrastructure, Virtual infrastructure, CPU Virtualization, Network and Storage Virtualization

#### **UNIT-IV**

Data Storage and Cloud Computing - Introduction to enterprise Data storage-DAS, SAN, NAS, Data storage management - Tools, processes and challenges, File systems - FAT, NTFS, Cloud File systems, Cloud data stores- Distributed data stores, Types of data stores, Using Grid for Data stores, Cloud storage - Overview, Data management for cloud storage, data intensive technologies for cloud computing, Distributed Data storage - Amazon Dynamo, CouchDB, ThruDB etc, Application utilizing Cloud storage - Online file storage, Online Photo editing services etc.

#### **UNIT-V**

Cloud Computing Services -Cloud computing elements, Cloud Do's and Don'ts, Legal implications, Overview of Amazon Web services, Understanding Services and Applications by types - Web based services, Web services, Infrastructure services, On-demand Computing, Web Application Framework, Cloud Services - Cloud types and services, SaaS, PaaS, IaaS, Other cloud services- STaaS, DaaS, INaaS, Cloud computing at work - Cloud services development tools, Management/ Administrative Services,

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Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat

**TEXT BOOKS:**

- A. Srinivasan, J.Suresh, Cloud Computing – A Practical approach for learning and implementation, Pearson India, [ISBN-978131776513]
- GautamShroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
- Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach [ISBN: 0071626948]
- Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

## **3MCACCC4 - OPERATING SYSTEMS**

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### **Course Objectives**

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- To understand the services provided by operating system
- To understand the working and organization of process and its scheduling and synchronization.
- To understand the concept of deadlock.
- To understand different approaches of memory management techniques.
- To understand the structure and organization of the file system.

### **UNIT- I**

Definitions, Components and types of Operating system, Operating System Services, System Calls, System Programs, System Structure, System Design and Implementation, System Generations. I/O subsystem Overview, I/O hardware, Application I/O interface, Kernel I/O Subsystem.

### **UNIT-II**

Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Threads Introduction

### **UNIT-III**

The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock.

### **UNIT-IV**

Storage management Logical Versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Thrashing, Demand Segmentation.

### **UNIT-V**

Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protecting, File system in Linux & Windows NT

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### **Course Outcome**

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By the end of the course Students should be able to

- Describe the various services and types of operating systems
- Describe algorithms like CPU scheduling, synchronization problems etc.

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- Describe physical and virtual memory concepts and techniques.
- Describe file system, security, and integrity

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*TEXT & REFERENCE BOOKS:*

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- Operating system concepts by Silberschatz, Galvin, Gagne, Wiley Student Edition
- Operating system concepts & design by Milan Milenkovic, TMH publication

### **3MCACCC5 - DATA STRUCTURE WITH C++ LAB**

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#### *Data Structure Lab :*

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List of Practical using C++ : (At least 10 Practical)

1. Program to maintain a Linked List.
2. Program to add a new node to the ascending order Linked List.
3. Program to maintain a Doubly Linked List.
4. Program to implement Stack as an Array.
5. Program to implement Stack as a Linked List.
6. Program to convert an A.E. from Infix form to Postfix form.
7. Program to evaluate an Expression entered in Postfix form.
8. Program to Implement Non-Recursive function for Factorial of a Number.
9. Program to Implement Recursive function for Factorial of a Number.
10. Program to implement a Queue as an Array.
11. Program to implement a Queue as a Linked List.
12. Program to implement a Circular Queue as an Array.
13. Program to implement a Circular Queue as a Linked List.
14. Program to implement a Deque using an Array.
15. Program to implement Linear Search in an unsorted Array.
16. Program to implement Binary Search in a sorted Array.
17. Program to implement Selection Sort.
18. Program to implement Insertion Sort (The program should report the number of comparisons).
19. Program to implement Bubble Sort.
20. Program to implement Quick Sort.

### **3MCACCC6 - LINUX PROGRAMMING LAB**

List of Practical Using Linux (At least 10 practical)

1. Basic Linux Commands, Locating files and Directories, Using the man Command
2. Creating, Viewing, and Editing Text Files:, Redirecting Output to file,
3. Editing Text files from the shell prompt, Editing files with Vim,
4. Editing Text Files with a Graphical Editor,
5. Command with vim
6. Access to files with Linux File system Permissions:, Linux File System Permissions, Managing File system permissions from the command line,
7. Controlling New File Permissions and ownership
8. Archiving and Copying Files, Managing Compressed tar Archives and zip,
9. Backing Up and Restoring Files From a tar Archive,
10. Copying Files between Systems Securely.
11. Writing Bash Scripts:, Bash Shell Scripting Basics, Writing Bash Scripts (at least 10 bash script for common task)
12. Web server installation and configure
13. Using Mysql Databases - MySQLDB Commands, Managing Database Users and Access Rights,
14. Creating and Restoring MySQLDB Backups,
15. Configuring MySQLDB Databases

## **3MCACCE(A) - INFORMATION SECURITY FOUNDATIONS**

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### **Course Objectives**

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This introductory course is aimed at

- Basic understanding about system security.
  - Provides a broad spectrum of security topics and is based on real-life examples to create system security interest in the students.
  - A balanced mix of technical and managerial issues
  - Terminology and concepts related to network and system level security.
  - Understand the salient facets of information security basics and the basics of risk management.
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### **Course Outcome**

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- At the end of the course, the students have firm understanding on:
  - Basic Security Threat and Vulnerability in computer systems.
  - Terminology and concepts related to network and system level security.
  - Basics of networking including Internet Protocol, routing, Domain Name Service, and network devices.
  - Basic cryptography, security management, and network security techniques.
  - Look at policies as a tool to effectively change an organization's culture towards a better secure environment.
  - In the end, the students put it all together in the form of a case study for designing and auditing a security system at conceptual level.
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### **UNIT I**

Business Needs and Security Awareness- Information Technology Concept and Application, Security Awareness, Information Security: Overview, Legal and Ethical Issues

### **UNIT II**

Security Threat and Vulnerability- Introduction to Security threats and Vulnerability, Computer as a target, as a mean of resource or as a mean of attack, Malware (Viruses, Worms, Trojan horses), Hacking: Issues and Techniques, Security Counter Measures

### **UNIT III**

Networking Concepts and Attacks -Introduction to Data Communication and Transmission Media, Secure Network Connectivity, Firewalls, Encryption, Overview of networking technologies (Topologies), Network Management and Protocol, Network Attacks, Using some secure protocols

### **UNIT IV**

Operating System Concepts - Introduction to Operating System, Operating System Security: An Overview (Authentication, Access controls, Security models, Updates,

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Patches, Integrity checks, Antivirus software), Operating System Hardening and Controls, ADC/SAMBA (File servers)

**UNIT V**

Securing your Computer - Securing Desktop/Laptop Concerns, Securing Files and Folders with Password (Power on Password, Login Password), User Restricted Data, Sharing of Files and Secure Downloading from Internet, Security Threats due to Software Piracy.

Securing Data - Securing, Backup and Restore Strategies for Data, Concepts of PC auditing, Snapshot Utility , Defragmentation.

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*Text Books*

- Behrouze A Forouzan, Cryptography and Network Security, McGraw Hill Publishers
- William Stalling, Cryptography and Network Security: Principles and practices, 4th ed, Prentice Hall Publishers



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## 3MCACCE(B) - DATA WAREHOUSING AND MINING

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### Course Objectives

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- To introduce the basic concepts of Data Base, Data Warehouse and Data Mining
  - To understand the concept of knowledge discovery
  - To understand information from different perspectives
  - To understand preprocessing methods on raw data
  - Discover interesting patterns, analyze supervised and unsupervised models
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### Course Outcomes:

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By the end of the course Students should be able to

- Process raw data to make it suitable for various data mining algorithms.
- Discover and measure interesting patterns from different kinds of databases.
- Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

### UNIT-I

Data ware housing Definition, usage and trends, DBMS vs. data warehouse, Data marts, Metadata, Data mining definition & application, DBMS vs. data mining, KDD versus data mining, data mining techniques, Data Preprocessing: need, data cleaning, integration & Transformation

### UNIT-II

Multidimensional data mode, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations. Data warehouse process & architecture, OLTP vs. OLAP, types of OLAP, ROLAP vs. MOLAP, 3 – Tier data warehouse architecture.

### UNIT-III

Association Rule Mining, Single-Dimensional Boolean Association Rules Apoiri algorithm, FP growth, Multi-Level Association Rules from Transaction Databases

### UNIT-IV

Classification and Prediction, Concepts of Decision Tree Induction and Bayesian Classification,

Cluster Analysis, Categorization of methods, Partitioning methods, K-Means algorithm, Outlier Analysis, Hierarchical Methods

### UNIT-V

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining concepts

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## **3MCACCE(C) - CLOUD ARCHITECTURE & INFRASTRUCTURE**

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### **Course Objectives**

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- To introduce the Virtualized Data Center Architecture and their components
  - To understand Information Storage Security & Design in cloud environment
  - To understand Storage Network Design
  - To understand concepts related to Optimized Storage in cloud environment
  - To understand Information Availability Design
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### **Course Outcomes:**

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By the end of the course Students should be able to

- Understand Virtualized Data Center Architecture and their components
- Understand Information Storage Security & Design in cloud environment
- Understand Storage Network Design
- Understand concepts related to Optimized Storage in cloud environment
- Understand Information Availability Design.

### **UNIT I**

Virtualized Data Center Architecture - Cloud infrastructures; public, private, hybrid. Service provider interfaces; Saas, Paas, Iaas.VDC environments; concept, planning and design, business continuity and disaster recovery principles.

### **UNIT II**

Information Storage Security & Design - Storage strategy and governance; security and regulations. Designing secure solutions; the considerations and implementations involved. Securing storage in virtualized and cloud environments. Monitoring and management; security auditing and SIEM.

### **UNIT III**

Storage Network Design - Architecture of storage, analysis and planning. Storage network design considerations; NAS and FC SANs, hybrid storage networking technologies (iSCSI, FCIP, FCoE), design for storage virtualization in cloud computing, host system design considerations.

### **UNIT IV**

Cloud Optimized Storage - Global storage management locations, scalability, operational efficiency. Global storage distribution; terabytes to petabytes and greater. Policy based information management; metadata attitudes; file systems or object storage.

## UNIT V

Information Availability Design - Designing backup/recovery solutions to guarantee data availability in a virtualized environment. Design a replication solution, local remote and advanced. Investigate Replication in NAS and SAN environments. Data archiving solutions; analyzing compliance and archiving design considerations.

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### TEXT BOOKS:

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- Greg Schulz 2011, Cloud and Virtual Data Storage Networking, Auerbach Publications [ISBN: 978-1439851739]
- Marty Poniatowski, Foundations of Green IT [ISBN: 978-0137043750]
- EMC, Information Storage and Management [ISBN: 978-0470294215]
- Volker Herminghaus, Albrecht Scriba,, Storage Management in Data Centers [ISBN: 9783540850229]
- Klaus Schmidt, High Availability and Disaster Recovery [ISBN: 978-3540244608]

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## 3MCACCE(D) - DISCRETE MATHEMATICS AND FINITE AUTOMATA

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### Course Objectives:

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- Introduce students to Some fundamental mathematical concepts and terminology;
- Students able to use and analyze recursive definitions;
- Students able to understand different types of discrete structures;
- Students able to understand techniques for constructing mathematical proofs, illustrated by discrete mathematics examples.
- Students able to construct finite state machines and the equivalent regular expressions
- Express a logic sentence in terms of predicates, quantifiers, and logical connectives
- Apply the operations of sets and use Venn diagrams to solve applied problems;
- Solve problems using the principle of inclusion-exclusion.

### UNIT I

Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Cartesian Product, Relations, Representation of relations, Types of relation, Equivalence relations and partitions, Partial ordering relations and lattices, Function and its types, Composition of function and relations

### UNIT II

Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eulerian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Graph Coloring, Trees, Spanning trees, Binary trees and its traversals.

### UNIT III

Propositional logic: Basic operations: AND( $\wedge$ ), OR( $\vee$ ), NOT( $\sim$ ), Truth value of a compound statement, propositions, tautologies, contradictions, Validity of Arguments, Boolean Algebra Group theory: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Cosets, Lagrange's theorem.

### UNIT IV

Recursion and Recurrence Relation : linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence

relation using generating functions. Techniques of Counting: Permutations with and without repetition, Combination.

### **UNIT V**

Formal Languages, Phrase structured grammar and their classification, Chomsky hierarchy, closure properties of families of languages, regular grammar, properties of regular sets, finite automata NFA, DFA, FSM with output Determinism and Non determinism, FA minimization and related theorems.

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#### *TEXT BOOK:*

- Elements of Discrete Mathematics C.L Liu, 1985, McGraw Hill

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#### *REFERENCE BOOKS:*

- Discrete Mathematics by Johnson Bough R., 5th Edition, PEA, 2001..
- Concrete Mathematics: A Foundation for Computer Science, Ronald Graham, Donald Knuth and Oren Patashik, 1989, Addison-Wesley.
- Mathematical Structures for Computer Science, Judith L. Gersting, 1993, Computer Science Press. 4. Applied Discrete Structures for Computer Science, Doerr and Levasseur, (Chicago: 1985,SRA
- Discrete Mathematics by A. Chtewynd and P. Diggle (Modular Mathematics series), 1995, Edward Arnold, London.

## **CSAOEPG(F) - PYTHON PROGRAMMING**

### **UNIT - I**

Getting Started: Introduction to Python , Application area, interactive mode and script mode.

Data types- Number (Integer- boolean, decimal,octal, hexadecimal; Floating point; Complex),none, Sequence (String,Tuples, List) Sets,.Mapping.

Mutable and Immutable Variables

Variables, Expressions and Statements: Values, Variables and Keywords;Operators and Operands in Python, Expressions and Statements ; Taking input (using raw\_input() and input() and displaying output(print statement); (single and multiple line) .

Functions: Importing Modules, invoking built in functions, functions from math module ,functions from random module . Function from datetime module , functions from remodule composition.

Defining functions, invoking functions, scope , passing parameters , scope of variables, void functions and functions returning values, recursion.

Conditional and looping construct ,use of compound expression in conditional and looping construct.

### **UNIT - II**

Strings: String operators, Comparing strings using relational operators; String functions & methods, Regular Expressions and Pattern Matching.

Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements, composition, lists as arguments , List operations, List functions and methods.

Dictionaries: Concept of key:value pair, creating, initializing and accessing the elements in a dictionary, traversing, appending, updating and deleting elements. Dictionary functions and methods.

Tuples: Immutable concept, creating, initializing and accessing elements in a tuple, Tuple assignment, Tuple slices, Tuple indexing, Tuple Functions.

### **UNIT - III**

Concept of Object Oriented Programming: Data Hiding, Data Encapsulation, Class and Object, Polymorphism, inheritance, advantages of Object Oriented Programming over earlier programming methodologies,

Classes: Defining classes (attributes, methods), creating instance objects, accessing attributes and methods, using built in class attributes (dict, doc, name, module, bases), Constructor( \_

\_init() , del() and str() ) methods in a class, private attributes (limited support),

importance of "self" (acts as a pointer to current calling object) operator overloading with methods.

#### **UNIT - IV**

Inheritance: Concept of base class and derived class: Single, multilevel and multiple inheritance- Overriding methods, using super() in derived class to invoke init() or overridden methods of parent class.

Data File - Need for non bold for data file, types of data file-text and binary, opening and closing files- open() , close() , access modes (output, input, default), file object, access\_modes, reading and writing a file Read(), readline(), readlines(), write(), writelines file positions (seek(), tell()), renaming and deleting a file.,flush();

#### **UNIT - V**

Implementation of basic file operations on text and binary file in Python: Creating/writing data into file, reading and displaying data from file, searching for particular data from a file, insertion and deletion of data from an already existing file, modification of data in file.

Error and Exceptions - NameError, IndexError, TypeError, I/O Error, ImportError, ValueError, EOFError. Generator function using Yield.

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#### *Recommended Reading*

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- Learning Python, 5th Edition 5th Edition by Mark Lutz O'REILLY Publication
- Learning Python by Fabrizio Romano Download link - <https://www.packtpub.com/packt/free-ebook/learning-python>
- Learning Python by Mark Lutz (Fourth Edition) – Download Link <http://freebook.qiniudn.com/Learning%20Python,%204th%20Edition.pdf>
- <https://docs.python.org/3/tutorial/index.html>

## **CSAOEPG(J) - ANGULAR JAVASCRIPT**

### **UNIT - I**

Introduction to AngularJS, JavaScript Client-Side Frameworks, Features of AngularJS .Architectural concepts, Setting up the framework, Organizing the code, Introducing Data Binding, Simple Data Binding,

### **UNIT - II**

Creating modules, Controllers, Scope, Two-way data binding Modules, Understanding AngularJS Forms, Form validation

### **UNIT - III**

Creating Reusable Components with Directives - What is a directive? , Using AngularJS built-in directives, Creating our own directives

### **UNIT - IV**

Data Handling, Expressions, Filters, Basic usage with expressions, currency, date, filter, creating filters,

### **UNIT - V**

Dependency Injection and Services, Creating services, Using AngularJS built-in services, Factory & Provider

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### **Text & Reference Book**

- AngularJS Essentials- Rodrigo Branas, Packt Publishing Ltd Open Source
- AngularJS:Novice To Ninja - Sandeep Panda, Sitepoint Pty. Ltd, Download link <http://www.longevity.co.uk/media/1008/angularjs-novice-to-ninja.pdf>