



**MK UNIVERSITY**

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Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265

Established by the Gujarat Govt. Recognized by UGC under Section 2(f) of UGC Act, 1956

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**SYLLABUS  
FOR  
MASTER OF COMPUTER  
APPLICATIONS (MCA)**

**[UNDER NEP-TWO YEARS / FOUR SEMESTER  
PROGRAM]**



## **COURSE OBJECTIVE**

- To empower students with basic skills of various technologies.
- To develop the ability to identify, analyze, formulate and develop computer applications.
- To enable the students to select modern computing tools and techniques and use them with dexterity.



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## MCA First Year

### Semester-I

Subject Code	Subject Name	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
		Credits/Hours							
MCA101	RDBMS with MySQL					60	40	0	100
MCA102	Python Programming					60	40	0	100
Elective (Choose Any Two)	MCA1031 Computer Organization and Architecture					60	40	0	100
	MCA1032 Operating System					60	40	0	100
	MCA1033 Computer Networks					60	40	0	100
	MCA1034 Linux Server Administration					60	40	0	100
	MCA1035 Multimedia System					60	40	0	100
Elective (Choose Any One)	MCA1041 Foundation of Cyber Security					60	40	0	100
	MCA1042 Statistical Methods for Data Science					60	40	0	100
	MCA1043 Office Automation					60	40	0	100
*	*Bridge Course-1 (As per AICTE Norms)								100
MCA105	Python Programming Lab					20	0	30	50
MCA106 (Choose Any One)	MCA1081 Foundation of Cyber Security Lab					20	0	30	50
	MCA1082 Statistical Methods for Data Science Lab					20	0	30	50
	MCA1083 Office Automation Lab					20	0	30	50
					<b>Total Credit =24</b>		<b>Total Marks =600</b>		

### Semester-II



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Subject Code	Subject Name	L	T	P	Load	Theory Marks	Internal Marks	Practical Marks	Total Marks
		Credits/Hours							
MCA201	DATA STRUCTURES AND ALGORITHMS	4	0	0	4	60	40	0	100
MCA202	AI AND MACHINE LEARNING	4	0	0	4	60	40	0	100
Elective (Choose Any Two)	MCA2031 ETHICAL HACKING	4	0	0	4	60	40	0	100
	MCA2032 INFORMATION AND NETWORK SECURITY	4	0	0	4	60	40	0	100
	MCA2033 PRINCIPLES OF DATA SCIENCE	4	0	0	4	60	40	0	100
	MCA2034 DATA MINING AND BUSINESS INTELLIGENCE	4	0	0	4	60	40	0	100
	MCA2035 PRINCIPLES OF MANAGEMENT	4	0	0	4	60	40	0	100
Elective (Choose Any One)	MCA2041 C# AND ASP.NET CORE	4	0	0	4	60	40	0	100
	MCA2042 FULL STACK WEB DEVELOPMENT (MERN STACK)	4	0	0	4	60	40	0	100
	MCA2043 WEB TECHNOLOGY	4	0	0	4	60	40	0	100
*MCA205	*BRIDGE COURSE-2 (AS PER AICTE NORMS )	4	0	0	4	60	40	0	100
MCA206	DATA STRUCTURES AND ALGORITHMS LAB	2	0	0	2	20	0	30	50
MCA207	MCA2071 C# AND ASP.NET CORE LAB	2	0	0	2	20	0	30	50
	MCA2072 FULL STACK WEB DEVELOPMENT (MERN STACK) LAB	2	0	0	2	20	0	30	50
	MCA2073 WEB TECHNOLOGY LAB	2	0	0	2	20	0	30	50
<b>Total Credit= 24</b>						<b>Total Marks=600</b>			

## MCA Second Year

### Semester-III

Subject Code	Subject Name	L	T	P	Load				
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		Credits/Hours				Theory Marks	Internal Marks	Practical Marks	Total Marks
MCA301	Software Engineering	4	0	0	4	60	40	0	100
MCA302	Java Programming	4	0	0	4	60	40	0	100
Elective (Choose Any Two)	MCA3031 Cyber Crime and Law	4	0	0	4	60	40	0	100
	MCA3032 Digital Marketing and Security	4	0	0	4	60	40	0	100
	MCA3033 Machine Learning for Data Science	4	0	0	4	60	40	0	100
	MCA3034 Social Network Analysis	4	0	0	4	60	40	0	100
	MCA3035 Theory of Computation	4	0	0	4	60	40	0	100
Elective (Choose Any One)	MCA3041 Digital Forensic	4	0	0	4	60	40	0	100
	MCA3042 Internet of Things	4	0	0	4	60	40	0	100
	MCA3043 Programing with R	4	0	0	4	60	40	0	100
MCA305	Java Programming Lab	0	0	2	2	0	20	30	50
MCA306 (Choose Any One)	MCA3061 Digital Forensic Lab	0	0	2	2	0	20	30	50
	MCA3062 Internet of Things Lab	0	0	2	2	0	20	30	50
	MCA3063 Programing with R LaB	0	0	2	2	0	20	30	50
<b>Total Credit= 24</b>						<b>Total Marks=600</b>			



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## Semester-IV

Subject Code	Subject Name	L	T	P	Load	Theory Marks	Internal Marks	Practical Marks	Total Marks
		Credits/Hours							
MCA401	Thesis/ Internship/Project	0	0	4	4	0	20	80	100
MCA402	Development and Operational Tools (DevOps)	4	0	4	4	60	40	0	100
Elective (Choose Any Two)	MCA4031 Server Hardening	4	0	4	4	60	40	0	100
	MCA4032 Cloud Computing	4	0	4	4	60	40	0	100
	MCA4033 Professional Communication Skills	4	0	4	4	60	40	0	100
	MCA4034 Big Data Analytics	4	0	4	4	60	40	0	100
	MCA4035 IT Audit	4	0	4	4	60	40	0	100
Elective (Choose Any One)	MCA4041 Blockchain Technology	4	0	4	4	60	40	0	100
	MCA4042 Mobile Application Development	4	0	4	4	60	40	0	100
	MCA4043 Data Visualization	4	0	4	4	60	40	0	100
MCA405	Development and Operational Tools (DevOps)	0	0	2	2	0	20	30	50
MCA406 (Choose Any One)	MCA4041 Blockchain Technology	0	0	2	2	0	20	30	50
	MCA4042 Mobile Application Development	0	0	2	2	0	20	30	50
	MCA4043 Data Visualization	0	0	2	2	0	20	30	50
<b>Total Credit= 24</b>								<b>Total Marks=600</b>	



## MCA101- RDBMS with MySQL

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA101	3/3	0	1/2	4/5	60	20	20	100

**Prerequisite:** Students are expected to know following topics before learning the syllabus. Theory classes may be organized if required. These topics are prerequisite not to be included for theory exam :- Significance of Databases, Database System Applications, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Distributed and Centralized DB, Database design ER Diagram, Relational Databases: Integrity Constraints, Functional Dependency, Multi-valued Dependency, Normalization.

### COURSE OBJECTIVES

- To create and manipulate a database using SQL.
- To know database administration basics and practice commands.
- To Understand File Organization and Indexing in Database.
- To Acquire the Knowledge of Query Evaluation to Monitor the Performance of the DBMS.
- To Impart Knowledge in Transaction Processing, Concurrency Control Techniques and Recovery Procedures.
- To Know Parallel, Distributed, Object relational and XML database basics.

### COURSE OUTCOME

- Understand and describe the basic concepts and terminology of Database Management System.
- Apply query language commands using MySQL.
- Understand internal storage mechanism, File Organization and Indexing in Database.
- Understand Concurrency, Transaction and recovery management concepts.
- Know Basic Concepts in parallel, distributed, object relational and XML database.

## UNIT-WISE SYLLABUS

### UNIT I

Database creation & using through MySQL, Query Language Introduction, DDL, DML and DCL Commands, Integrity Constraints, Query Structure, Basic Operations, SQL Data Types and Schemas, Set Operations, Null Values, Aggregate Functions, Sub queries, Modification of the Database, Join Expressions

### UNIT- II

Views, Transactions, Authorization, Trigger, Recursive Queries, Database Administration Basics, Running and Shutting Down, setting up Account, Users Role and privileges, MySQL Show Command, Backup and Restore.(all above are implemented in lab using My SQL)

### UNIT III

Overview of Physical Storage Media, RAID, Storage Access, File Organization, Organization of Records in Files, Data-Dictionary Storage, Indexing Basics, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Hashing, Multiple-Key Access, Query Optimization Basics.

### UNIT-IV

Transaction Concept, Transaction State, Concurrent Executions, Serializability, Recoverability, Concurrency Management, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based



Protocols, Recovery, Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery

## UNIT-V

Database system Architecture, Centralized and Client-Server Systems, Server System Architectures Parallel Systems, Distributed Systems Parallel Databases, I/O Parallelism, Design of Parallel Systems Distributed Databases, Heterogeneous and Homogeneous Databases, Distributed Data, Storage Object Relational Database, XML database.

## TEXT & REFERENCE BOOKS

- MySQL 8.0 Reference Manual Available online at <https://dev.mysql.com/doc/refman/8.0/en/>
- MySQL 8.0 Reference Manual in PDF format available online at <https://downloads.mysql.com/docs/refman-8.0-en.pdf>
- Learning MySQL by Hugh E. Williams, Seyed M.M. Tahaghoghi, O'Reilly, ISBN-978-596008642
- Beginning MySQL by Geoff Moes, Robert Sheldon Wrox Publications, ISBN –0764579509
- Creating your MySQL Database: Practical Design Tips and Techniques by Marc Delisle, PACKT Publications, ISBN-978-1904811305
- Mysql: The Complete Reference by Vaswani Vikram, Tata McGraw-Hill Education India, ISBN: 9780070586840, 9780070586840
- Murach'S Mysql by Murach Joel, PACKT Publishing, ISBN: 9789350237694, 9789350237694



## MCA102-Python Programming

Subiect Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA102	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- To Introduce Python Programming Language and its Features and Applications.
- To Learn Installing Python.
- To Practice Basic Language Features of Python.
  - To Implement Oops Concepts Using Python.
- To Work with Files in Python

### COURSE OUTCOMES

- Install and use Python on Various Platform.
- Understand and Explain the features of Python language
- Build package and modules in Python with object-oriented concept.
- Design and Develop Python applications for data analysis
- Write programs for Reading and Writing files in Python.

## UNIT-WISE SYLLABUS

### UNIT-I

Environment Setup of Python Application Area, Interactive Mode and Script Mode Data Types, Mutable and Immutable Variables, Expressions and Statements, Variables and Keywords, Operators and Operands, Expressions and Statements, Taking Input and Displaying Output.

Functions: Importing Modules, Invoking Built in Functions, Defining Functions, Invoking Functions, Scope, Passing Parameters, Scope of Variables, Returning Values, Recursion, 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, Traversing, Appending, Updating and Deleting Elements, Dictionary Functions and Methods, Tuples: Immutable Concept, Creating, Initializing and Accessing Elements, Tuple Assignment, Slices, Indexing, 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, Creating Instance Objects, Accessing Attributes and Methods, Constructor 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: Name error, Index error, Type error, I/O Error, Import error, Value error, Eoferror, Generator Function Using Yield

## TEXT & REFERENCE BOOKS

- Mark Lutz Learning Python, 5th Edition O'reilly Publication
- Fabrizio Romano Learning Python - Download Link – <https://www.packtpub.com/Packt/Free-Ebook/Learning-Python>
- Mark Lutz Learning Python (Fourth Edition) –Download Link [http://freebook.qiniudn.com/Learning%20python, %204th%20edition.pdf](http://freebook.qiniudn.com/Learning%20python,%204th%20edition.pdf)
- <https://docs.python.org/3/tutorial/index.html>

## LIST OF PRACTICAL

1. Program to demonstrate basic data type in python
2. A cashier has currency notes of denominations 10, 50, and 100.If the amount to be withdrawn isinput through the keyboard using input() function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer
3. Program to demonstrate list and tuple in python
4. Write a program in Python, A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
5. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate ofRs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work forfractional part of an hour.
6. Two numbers are entered through the keyboard, write a program to find the value of one numberraised to the power of another
7. Write a function that receives marks received by a student in 3 subjects and returns the averageand percentage of these marks. Call this function from main() and print the result in main
8. Write a program to read a file and display its contents
9. Write a program to demonstrate database connectivity in python



## MCA1031-Computer Organization and Architecture

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1031	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- To understand the basic blocks of digital logic.
- Understand basic operation of Combinational Circuits.
- Understand the Boolean algebra and map simplification.
- To examine the basics of assembly programming.
- To learn the memory addressing techniques and I/O organization.

### COURSE OUTCOMES

- Able to Apply Boolean algebra and map simplification to digital circuit design
- Able to Apply the flip-flop operation to design the timing and control circuit
- By using memory addressing techniques solve memory address problem
- Able to write assembly code for some basic problem.
- Understand the various types of memory and their functions.

### UNIT-WISE SYLLABUS

#### UNIT-I

Digital Logic Circuits : Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Product-of sums simplification, don't-care-conditions, Combinational Circuits, Half-Adder, Full –Adder, Sequential Circuits, Flip-Flops SR, & J K, Basis Computer Organization, Instruction codes, Stored program organization, Computer registers, Common Bus system, Computer Instructions, timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description

#### UNIT-II

Basis Computer Organization and Design :Design of Basis Computer, Control Logic Gates, Control of Registers and Memory, Design of Accumulator Logic, Control of AC Register, Adder and Logic Circuit, Multiple Bus Organization of Computer, Memory Addressing

#### UNIT-III

Programming the Basis Computer: Programming the Basis Computer, Machine Languages, Assembly Language, The Assembler, Program Loops, Programming Arithmetic and Logic Operations, Subroutines, subroutine Parameters and Data Linkage, Input output Programming, Character Manipulation, Program Interrupt

#### UNIT-IV

Micro programmed Control: Control Memory, Address Sequencing, Conditional Branching, Mapping of Instruction, Subroutines, Micro program Example, Design of Control Unit, Microgram Sequencer

#### UNIT-V

Input-Output & Memory Organization :Peripheral Devices, Input-Output Interface, Modes of Transfer, Priority Interrupt, Daisy-Chaining Priority, Parallel Priority Interrupt, Priority Encoder, Interrupt Cycle, Direct Memory Access (DMA), Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.



## TEXT & REFERENCE BOOKS

- Computer System Architecture Third Edition, by Mano M. Morris, Pearson Education India, ISBN: 9788131700709, 9788131700709
- Digital Design by Mano M. Morris, Pearson Education India, ISBN: 9789353062019, 9789353062019
- Digital Logic & Computer Design by Mano M. Morris, Pearson Education India, , ISBN: 9788177584097, 9788177584097
- Computer Organization and Architecture by Basu P N, Vikas Publishing House Pvt Ltd, ISBN: 9788125939917, 9788125939917
- Computer Organization & Architecture 10th Edition - Designing for Performance by Stallings William, Pearson, ISBN: 9789332570405, 9789332570405
- Computer Architecture and Organization by Hayes John, Tata McGraw-Hill Education India, ISBN: 9781259028564, 9781259028564
- Computer Organization by Hamacher V. Carl, McGraw-Hill Education - Europe, ISBN: 9781259005275, 9781259005275



## MCA1032-Operating System

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1932	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- 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 to Memory Management Techniques.
- To Understand the Structure and Organization of the File System.

### COURSE OUTCOMES

- Identify and describe the Services Provided by Operating Systems.
- Understand and Solve Problems Involving Process Control, Mutual Exclusion, Synchronization and Deadlock.
- Implement Processor Scheduling, Synchronization and Disk Allocation Algorithms
- Apply Various Approaches of Memory Management Techniques
- Analyze Various Operating System Approaches in Linux and Windows

### UNIT-WISE SYLLABUS

#### UNIT-I

Definitions, Components and Types of Operating System, Operating System Services, System Calls, System Programs, Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Threads Introduction

#### UNIT-II

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-III

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-IV

Disk Structure, Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protecting, I/O Subsystem Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem

#### UNIT-V

Case Studies: Linux System: History, Components, Kernel Modules, Process Management – Model, Identity, Context, Scheduling – Kernel Synchronization, Process Scheduling, Memory Management of Physical Memory Windows System: History, Design Principal, Components.

### TEXT & REFERENCE BOOKS

- Silberschatz, Galvin, Gagne-Operating System Concepts -Wiley Student Edition
- Milan Milenkovic-Operating System Concepts & Design-TMH Publication



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- Andrew S. Tanenbaum-Modern Operating System-PHI



## MCA1033 Computer Networks

Subtect Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1033	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- Build an understanding of the Fundamental Concepts of Computer Networking.
- Familiarize with the Taxonomy and Terminology of the Computer Networking Area.
- Introduce about various Networking Devices.
- Introduce about concept of Routing in networking.
- Preparing the Student for Entry Advanced Courses in Computer Networking.

### COURSE OUTCOME

- Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing, and Working of Networking Devices.
- Demonstrate the Significance, Purpose, and application of Networking Protocols and Standards.
- Describe, compare, and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM, and Various Switching Techniques.
- Explain the working of Layers and apply the various protocols of the OSI & TCP/IP model.
- Analyze the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies.
- Design the Network Diagram and Solve the Networking Problems of the Organizations with Consideration of Human and Environment.
- Install and Configure Networking Devices.

### UNIT-WISE SYLLABUS

#### UNIT-I

Introduction to Computer Networks, Types of Network - LAN, WAN, MAN, Internet, Network Topologies, Transmission Media, Communication Mode- Simplex, Half Duplex, Full Duplex Analog & Digital Signals, Base Band, Broad Band, Error Detection and Correction, OSI Model:- Functions of Each Layer, Services and Protocols, Inter-Networking Devices, Hub, Repeater, Bridge, Switch, Modem, Routers Gateways.

#### UNIT- II

Multiplexing Multiplexer FDM, TDM Statistical Multiplexing, Modulation AM, FM, PM, Switching Technique, Message Switching, Circuit Switching, Packet Switching, Virtual Circuit, IEEE Standards, 802.3, 802.4, 802.5. Fast Ethernet, FDDI Token Ring.

#### UNIT- III

Routing Algorithm:-Shortest Path Routing, Distance Vector Routing, Unicast Routing, Multicast Routing, Link State 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 IP Addressing, IP Addressing Classes, Internet Protocols – IP Packet, ARP, RARP, ICMP,

#### UNIT- IV

Various Protocol, HTTP, Telnet, FTP, SMTP, Mine, 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 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, Multi-Path Propagation, Path Loss, Slow Fading, Fast Fading, Frequency Reuse, Cell Splitting, Cell Sectoring.

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### TEXT & REFERENCE BOOKS

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- Andrew S.Tanenbaum -Computer Networks, Pearson Publishers
- Behrouza Forouzan- Data Communications and Networking -Global
- William a Shay - Understanding Data Communications and Networks -Course Technology Inc
- Prakash C. Gupta -Data Communications and Computer Networks, PHI
- William Stallings- Data and Computer Communications, Pearson Education India
- Larry L. Peterson and Bruce S. Davie, -Computer Networks – A Systems Approach, Morgan Kaufmann Publishers
- Thomas D. Nadeau & Ken Gray-Software Defined Networks, O'reilly Publishers
- <http://nptel.ac.in/video.php?subjectid=106105081>



## MCA1034 Linux Server Administration

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1034	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- Understand the fundamental concepts of Linux Server Administration
- Install and configure basic Linux services.
- Manage Users, Permissions, Folders, and Native Applications in Linux server.
- Manage the resources and security of a computer running Linux at a basic level
- Configure and manage simple networking services in Linux server.
- Creating and Maintaining E-Mail, FTP, and Web Servers.

### COURSE OUTCOMES

- Explain the fundamental concepts of Linux Server Administration
- Install, configure and manage basic Linux services.
- Manage Users and their permissions, applications and services in Linux server.
- Manage the resources and security of a Linux server.
- Configure and manage basic networking services in Linux server.
- Install and configure E-Mail, FTP, and Web Servers.

### UNIT-WISE SYLLABUS

#### UNIT – I

Introduction, Understanding Linux Distributions, Installing Linux

**Using Essential Tools** - Logging in to Linux, Using the Seven Essential Linux Command Line Tools (ls, cp, mv, rm, mkdir, cd, pwd) Getting Help with man, Finding Which man Page to Use, Usinginfo, Using Other Systems for Getting Help

**Working with the Bash Shell** - Understanding the Shell and Other Core Linux Components, Using I/O Redirection and Piping, Working with history, Using Command Line Completion, Using Variables, Using Other Bash Features, Working with Bash Startup Files

**Essential File Management Tools** - Understanding the Linux File System Hierarchy, Listing Files with ls, Using Wildcards, Copying Files with cp, Working with Directories, Using Absolute and Relative Paths, Moving Files with mv, Removing Files with rm, Understanding Hard and Symbolic Links, Managing Hard and Symbolic Links, Finding Files with find, Using Advanced find Options, Archiving Files with tar, Managing File Compression

**Working with Text Files** - Understanding vi, Creating Text Files with vi, Browsing Text Files with more and less, Using head and tail to See File Start and End, Displaying File Contents with cat and tac, Working with grep, Understanding Regular Expressions, Using Regular Expressions with grep, Using Common Text Processing Utilities

**Connecting to a Server** - Understanding the Root User, Usingsu, Using sudo, Creating a Simple sudo Configuration, Working on Linux from Graphical Interface or Command Line, Using ssh to Connect to a Remote Server, Using ssh Keys

#### UNIT - II

**User and Group Management** - Understanding Users, Understanding File Ownership, Creating Users with useradd, Creating Groups with groupadd, Managing User and Group Properties, Configuring Defaults for New Users, Managing Password Properties, Understanding User and Group Configuration Files, Managing Current Sessions



**Permissions Management** - Understanding Basic Linux Permissions, Managing Basic Linux Permissions, Understanding Advanced Linux Permissions, Managing Advanced Linux Permissions, Managing umask

**Managing Partitions** - Understanding Disk Storage and Devices, Understanding MBR and GPT Partitions, Creating MBR Partitions, Creating MBR Extended and Logical Partitions, Managing GPT Partitions, Working with SSD, Adding a Swap Partition, Understanding Encrypted Partitions, Configuring Encrypted Partitions

**Managing File Systems and Mounts** - Understanding Linux File Systems, Creating File Systems, Mounting File Systems through /etc/fstab, Using File System Label and UUID, Managing Systemd Mounts, Managing Systemd Automounts

**Managing the Boot Procedure** - Understanding the Linux Boot Procedure, Shutting Down a System, Configuring the GRUB2 Boot Loader, Troubleshooting Boot Issues, Working with a Rescue Disk

## UNIT – III

**Managing Networking** - Understanding IPv4 Basics, Understanding IPv6 Basics, Applying run-time Network Configuration, Understanding Network Device Naming, Managing Host Names, Managing Host Name Resolution, Using Common Network Tools

**Managing Time** - Understanding Linux Time, Managing Linux Time, Understanding the NTP Protocol, Configuring Time Synchronization

**Working with Systemd** - Understanding Systemd, Managing Systemd Services, Modifying Service Configuration, Understanding Targets, Managing Targets

**Process Management** - Understanding Linux Processes and Jobs, Managing Interactive Shell Jobs, Monitoring Processes with top, Changing top Display Properties, Monitoring Process Properties with ps, Changing Process Priority, Managing Processes with kill

**Managing Software** - Installing Software from Source Packages, Understanding Software Packages, Managing Libraries, Understanding Repositories, Managing Packages with yum, Managing Packages with apt, Using rpm

**Scheduling Tasks** - Understanding Linux Task Scheduling, Scheduling Tasks with cron, Using systemd Timers, Using at to Schedule Tasks

**Reading Log Files** - Understanding Linux Logging, Working with journalctl, Understanding Rsyslog

## UNIT – IV

**An Introduction to Bash Shell Scripting** - Understanding Bash Shell Scripts, Essential Shell Script Components, Using Loops in Shell Scripts

**Managing Local Security** - Using ulimit to Configure Resource Limitations, Configuring PAM, Working with /etc/security, Managing Secure Mount Options

**Configuring a Firewall** - Understanding Linux Firewalling, Configuring a Firewall with firewalld, Configuring a Firewall with ufw, Understanding iptables Basics, Configuring a Firewall with iptables

**Managing SELinux and AppArmor** - Understanding the Need for Mandatory Access Control, SELinux versus AppArmor, Configuring AppArmor, Troubleshooting AppArmor, Configuring SELinux Mode, Working with SELinux Labels, Managing SELinux Booleans, Troubleshooting SELinux

**Managing SSH Services** - Configuring the SSH Service, Using SSH Public/Private Keys, Using scp to Copy Files, Managing File Synchronization with rsync, SSH Port Forwarding

**Managing Web Services** - Configuring a Web Service, Managing Web Service Log Files, Configuring Virtual Hosts, Restricting Access to a Web Page

**Configuring FTP Services** - Understanding FTP Solutions, Configuring a Basic FTP Server, Working with sftp

## UNIT - V

**Configuring a Basic DNS Server** - Understanding DNS, Configuring BIND, Configuring a Caching DNS Server



**Providing NFS and CIFS File Shares** - Understanding Linux File Sharing Solutions, Configuring a Basic NFS Server, Persistently Mounting NFS Shares, Configuring a Basic Samba Server, Mounting Samba Shares,

**Configuring a Database Server** - Understanding Linux Database Solutions, Installing MariaDB, Creating a Simple Database

**Configuring Basic Email Handling** - Understanding Email Handling, Configuring a Basic Postfix Server, Configuring Dovecot as an IMAP Server

**Configuring a Web Proxy** - Understanding Web Proxies, Configuring a Basic Squid Proxy, Restricting Access to the Squid Proxy

**Working with Virtual Machines** - Understanding Linux Virtualization Solutions, Creating a KVM Virtual Machines, Managing KVM Virtual Machines

## TEXT & REFERENCE BOOKS

- Christopher Negus Fedora and Red Hat Enterprise Linux Bible, Wiley India Ltd.
- Christopher Negus, Linux Bible, Wiley India Ltd
- Linux Administration, Kogent Learning Solutions Inc., ISBN 13- 9789350044209, ISBN 10- 935004420x, Wiley India
- Linux Administration A Beginner's Guide, Sixth Edition, Wale Soyinka, MC Graw Hill
- Linux: Powerful Server Administration by Jonathan Hobson, Oliver Pelz, and Uday R. Sawant, Packt Publishing
- Forouzan-Unix & Shell Programming, Cengage Publications

## LINUX SERVER ADMIN PRACTICAL LAB

### UNIT -I

Lab: Installing Linux

Lab: Using Essential Tools,

Lab: Working with the Bash Shell

Lab: Using Essential File Management Tools

Lab: Working with Text Files

Lab: Connecting to a Server

### UNIT -II

Lab: Managing Users

Lab: Managing Permissions

Lab: Managing Partitions

Lab: Managing File Systems

Lab: Managing the Boot Procedure

### UNIT -III

Lab: Managing Networking

Lab: Managing Time

Lab: Working with System d

Lab: Managing Processes

Lab: Managing Software

Lab: Scheduling Tasks

Lab: Working with Logging

### UNIT -IV

Lab: Writing Shell Scripts

Lab: Managing Security

Lab: Configuring a Firewall

Lab: Managing Mandatory Access Control



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Lab: Configuring SSH

Lab: Managing Web Services

Lab: Configuring FTP Services

## **UNIT - V**

Lab: Configuring DNS

Lab: Managing Remote File Shares

Lab: Configuring a Database Server

Lab: Configuring Email

Lab: Configuring a Proxy

Lab: Managing KVM Virtual Machines



## MCA1035 Multimedia System

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1035	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- To provide students with a basic understanding of multimedia systems and its components.
- To understand multimedia information representation and multimedia standards in the components of multimedia – Text, audio, image, video and animation.
- To gain knowledge about the standards tools and techniques used in development of multimedia components for productions
- To create simple multimedia applications and products for using standalone networked or web based computers.

### COURSE OUTCOMES

- Define multimedia and its components
- Acquire skill to create various multimedia components
- Create simple multimedia product that include all components
- Use standards software tools to develop multimedia components and integrate all components as per the requirement

## UNIT-WISE SYLLABUS

### UNIT-I

Introduction to Multimedia, Identifying Multimedia Elements Text, Images, Sound, Video and Animation, Multimedia Applications in Education, Entertainment. Advertising world & Media industry etc.

Text - Concepts of Plain & Formatted Text, RTF & HTML Texts, Using Common Text Preparation Tools, Conversion to and from of Various Text Formats, Using Standard Software, Object Linking and Embedding Concept, Fonts – Various types and uses.

### UNIT-II

Sound - Sound and its Attributes, Sound and its Effects in Multimedia, Representation of Analog Signals, A/D: Sampling and quantization, Frequency, Sound Depth, Channels and its Effects on Quality and Storage, Size Estimation of Space of a Sound File, Sound Card Standard – FM Synthesis Cards, Introduction to MP3, WMA, WAV, MIDI etc. Audio file formats, 3D Sounds, Recording and Editing Sound Using Sound Editors like Audacity, Sound Forge etc.

Graphics- Importance of Images/graphics in Multimedia, Vector and Raster Graphics, Regular Graphics Vs. Interlaced Graphics, Image Capturing Methods - Scanner, Digital Camera etc. Color Models-RGB, CYMK, HUE, Saturation, and Brightness, Various Attributes of Images Size, Color, Depth etc, Various Image File Format BMP, TIFF, GIF, PNG and JPEG Format Their Features and Limitations, Image Format Conversion, Various Effects on Images. Create Images Using Photoshop, CorelDrawor other Open Source software, Apply Various Effects, Using Layers, Channels and Masks in Images.

### UNIT-III

Video- frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm), Video Editing and Movie Making Tools, Converting Formats of Videos, Recording and Editing Videos Using Video Editing Software Like Adobe Premiere / Sony Vegas or Open Source software.



## UNIT-IV

Animation and its Basic – Principals of Animation and its use in Multimedia, Computer System Configuration and Peripherals Requirements, Software for Animation, Effects of Resolution, Pixel Depth, Image Size, on Quality and Storage, Types of Animation and Applications.

Introduction to Compression Technology - Concept of lossy and lossless compression, Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)

## UNIT-V

Multimedia Application Design - Content design, technical design, visual design, design metaphors, example studies, interactivity.

Authoring Tools for Multimedia – Introduction to Various Types of Multimedia Authoring systems, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors, CD/DVD Based and Web Based Tools, Features and Limitations, Creating Multimedia Package using All Components.

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## TEXT & REFERENCE BOOKS

- Tay Vaughan-Multimedia: Making It Work, Tata Mc-Graw Hill.
- Ramesh Bangia-Introduction to Multimedia- Laxmi Publications Pvt. Ltd.
- Satish Jain, Shashi Singh, Introduction To Multimedia - Based On Nielit O Level Syllabus For Mat-O2.R0 1st Edition, , BPB Publications, ISBN: 9788183335355, 8183335357



## MCA1041 Foundation of Cyber security

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1041	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- The Basics of Cyber Security Students begin by learning the fundamentals of cyber security, such as terminology, threat landscape, and key principles.
- Security of Networks and Infrastructure The curriculum delves into network security, covering topics such as firewalls, intrusion detection systems, and data encryption methods.
- Penetration Testing and Ethical Hacking Students learn ethical hacking techniques for identifying system vulnerabilities. Exercises in penetration testing teach them how to assess and strengthen system defenses.
- Response and Recovery to Incidents Knowing how to respond to and recover from a cyber attack is critical. Students are taught incident response strategies for mitigating damage and restoring normal operations.

### COURSE OUTCOMES

- Maintaining Business Continuity Digital infrastructure disruptions can halt operations and result in financial losses. Engineering firms can ensure the continued operation of critical systems in the face of cyber attacks by implementing robust cyber security measures.
- Maintaining User Trust Consumers and clients put their trust in businesses with their personal information. Breach of this trust can have far-reaching ramifications. Cyber security gives stakeholders confidence that their data is being handled responsibly and with the utmost care.

### UNIT-WISE SYLLABUS

#### UNIT-1

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, cyber espionage, Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Possible Types of Attacks.

#### UNIT-II

Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, Attacks on Symmetric Key Cryptography, Challenges and Limitations, Stream Ciphers, Block Cipher, Advantages, DES algorithm and AES algorithm.

#### UNIT-III

Computer-based Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Diffie-Hellman Key Exchange, Digital Signatures, Digital Signature Standard (DSS), Public-Key Cryptanalysis.

#### UNIT-V



Public Key Infrastructure: Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards, XML, PKI and Security. Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol, Secure Electronic Transaction, SSL versus SET, 3-D Secure Protocol, Electronic Money, E-mail Security, Wireless Application Protocol (WAP), Security in GSM.

## UNIT-V

Digital Signature, Overview of GPG, Digital Certificates, Introduction to Hash Function: Message Digest: MD5 and SHA-1, Attacks on Hash Functions, MD family, SHA family. DOS, DDOS attacks Intrusion detection System, Internet Banking and Confidential Email. Authentication Methods: Passwords, biometrics, Multi-factor authentication, Password Management. Threats and attacks, Intruders, Phishing, Virus, Malware, Trojan Horse, Worms, Spyware, Adware, Keylogger.

Reference Books:

### TEXT & REFERENCE BOOKS

1. Cryptography and Network Security: Principles and Practice-by William Stallings-Pearson Publication
2. Network Security Assessment-by Chris Mc Nab O'reilly Publication 3rd edition
3. Network Security: Private Communication in a Public World by Michael Speciner and Radia Perlman- -Pearson Publication
4. Network Security for Dummies, by Chey Cobb
5. Security in Computing –by Charles P Pfleeger-Pearson Publication.
6. Cryptography and Network Security – by Atul Kahate – TMH. 2.
7. Data Communications and Networking- by Behourz A Forouzan
8. Cyber Security Operations Handbook – by J.W. Rittiaghouse and William M.Hancock – Elseviers.



## MCA1042 Statistical Methods for Data Science

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1042	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- To develop the students ability to deal with quantitative & stactical data
- To enable the use of statistical methods & techniques wherever relevant.
- To have a proper understanding of various Statistical techniques for solving problems

### COURSE OUTCOMES

- Describe and discuss the key terminology, concepts tools and techniques used in Statistical analysis
- Critically evaluate the underlying assumptions of analysis tools
- Understand and critically discuss the issues surrounding sampling, estimation and regression
- Discuss critically the uses and limitations of statistical methods
- Solve a range of problems using the techniques covered

## UNIT-WISE SYLLABUS

### UNIT-I

Statistics and Data Analysis: Statistical Inference, Samples, Populations, and the Role of Probability, Sampling Procedures; Collection of Data, Measures of Location: The Sample Mean and Median, Measures of Variability, Discrete and Continuous Data, Statistical Modeling.

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule.

### UNIT-II

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Joint Probability Distributions.

Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

### UNIT-III

Some Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions, Chi-Squared Distribution, Beta Distribution, Lognormal Distribution.

### UNIT-IV

Fundamental Sampling Distributions and Data Descriptions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Distribution of  $S^2$ ,  $t$ -Distribution,  $F$ -Distribution.

One and Two-Sample Estimation Problems: Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Two Samples: Estimating the Difference between Two Means, Paired Observations, Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportions, Single Sample: Estimating the Variance, Two Samples: Estimating the Ratio of Two Variance.

### UNIT-V

Multiple Linear Regression and Certain Nonlinear Regression Models: Introduction, Estimating the Coefficients, Linear Regression Model Using Matrices, Properties of the Least Squares Estimators, Inferences in Multiple Linear Regression, Choice of a Fitted Model through Hypothesis Testing,



Categorical or Indicator Variables, Sequential Methods for Model Selection, Cross Validation, Other Criteria for Model Selection, Special Nonlinear Models for Non ideal Conditions.

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## **TEXT & REFERENCE BOOKS**

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- Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, Pearson Publishers.
- S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna publications.
- T.T. Soong, Fundamentals of Probability and Statistics For Engineers, John Wiley & Sons Ltd.
- Sheldon M Ross, Probability and Statistics for Engineers and Scientists, Academic Press.
- S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi



## MCA1043 Office Automation

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA1043	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- To familiarize student with Office Automation and Component of Office Automation.
- To make them comfortable to evaluate, select and use Office Software appropriate to specific task.
- To make them work on Open Software for Office Automation.
- To develop expertise in Word Processing, Spreadsheet, and Presentation Skills.

### COURSE OUTCOMES

- Outline Office Suit components with specific application.
- List Open Office Software.
- Apply Word Processing Tools including Document Formatting, Using Graphics, Working with Macro and Mail Merge.
- Apply Spread Sheet Tools including Worksheet formatting, Using Functions, Graphics and Charts.
- Create effective Presentation Using Animation and Transition.

## UNIT-WISE SYLLABUS

### UNIT-I

Starting Word Processor, The parts of a Word Processor Window, Menus & Commands, Toolbars & Buttons, Shortcut Menus, Creating a New Document, Different Page Views and Layouts, Applying various Text Enhancements, Formatting Text and Documents: Auto Format, Text Attributes, Paragraph and Page Formatting, Line Spacing, Margins, Borders and Shading, Tabs and Indents, Text Editing using various features, Bullets, Numbering, Working with Styles, Printing & various print options, Spell Check, Working with Headers and Footers, Tables: Creating a Simple Table,. Creating Presentations: Using Blank Presentation Option, Using Design Template, Adding Slides, Deleting a Slide, Importing Images from Outside, Transition and Build Effects, Deleting a Slide, Numbering a Slide, Saving Presentation, Closing Presentation, Printing Presentation.

### UNIT-II

Using Excel Shortcuts with Full List of Excel Shortcuts, Copy, Cut, Paste, Hide, Unhide, Delete and Link the Data in Rows, Columns and Sheets, Using Paste Special Options, Formatting Cells, Rows, Columns and Sheets, Protecting & Unprotecting Cells, Rows, Columns and Sheets with or without, Password, Page Layout, Themes, Background and Printer Properties, Inserting Pictures, Hyperlinks, Header/Footers, Shapes and Other Objects in Worksheets

### UNIT-III

Lookup and Reference Functions: VLOOKUP, HLOOKUP, INDEX, ADDRESS, MATCH, OFFSET, TRANSPOSE etc., Logical Function: IF/ELSE, AND, OR, NOT, TRUE, NESTED IF/ELSE etc., Date and Time Functions: DATE, DATEVALUE, DAY, DAY360, SECOND, MINUTES, HOURS, NOW, TODAY, MONTH, YEAR, YEARFRAC, TIME, WEEKDAY, WORKDAY etc., Information Functions: CELL, ERROR.TYPE, INFO, ISBLANK, ISERR, ISERROR, ISEVEN, ISLOGICAL, ISNA, ISNONTEXT, ISNUMBER, ISREF, ISTEXT, TYPE etc.

### UNIT-IV

Math and Trigonometry Functions: RAND, ROUND, CEILING, FLOOR, INT, LCM, MOD, EVEN, SUMIF, SUMIFS etc. Statistical Functions: AVEDEV, AVERAGE, AVERAGEA, AVERAGEIF, COUNT, COUNTA, COUNTBLANK, COUNTIF, FORECAST, MAX, MAXA, MIN, MINA, STDEVA



etc Text Functions: LEFT, RIGHT, TEXT, TRIM, MID, LOWER, UPPER, PROPER, REPLACE, REPT, FIND, SEARCH, SUBSTITUTE, TRIM, TRUNC, CONVERT, CONCATENATE, DOLLAR etc.

## UNIT-V

Using Conditional Formatting, Using Filters to Sort Data, Advance Filtering Options, Database Functions: DGET, DMAX, DMIN, DPRODUCT, DSTDEV, DSTDEVP, DSUM, DVAR, DVARP etc, Financial function PV, FV etc. Pivot Tables, Creating Pivot Tables, and Pivot charts, VBA Macro, Introduction to VBA Macro, Recording Macro & Understanding Code Behind.

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## TEXT & REFERENCE BOOKS

- 1- Microsoft Office Step by Step Beth Melton, Mark Dodge , Published with the authorization of Microsoft Corporation by: O'Reilly Media.
- 2- Office 2013 Bible: The Comprehensive Tutorial Resource Paperback – by Lisa A. Bucki (Author), John Walkenbach (Author), Michael Alexander.
- 3- Learning Microsoft Office 2013 by Ramesh Bangia, Khanna Publishers
- 4- [www.openoffice.org/documentation/manuals/.../0100GS3-GettingStartedOOo3.pdf](http://www.openoffice.org/documentation/manuals/.../0100GS3-GettingStartedOOo3.pdf)
- 5- Open Office for Dummies (<https://whc.es/OpenOffice%20org%20For%20Dummies.pdf>)
- 6- <https://www.libreoffice.org/get-help/documentation/>
- 7- Libre Office 5.1 Writer, Calc, Math Formula Book- Vol 1 by Lalit mali



**\*MCA105 (As per AICTE Norms)**  
**BRIDGE COURSE -1 (SEMESTER-1)**  
**Computer**

## UNIT-WISE SYLLABUS

### UNIT – I

Brief history of development of computers, Computer system concepts, Computer system characteristics, Capabilities and limitations, Types of computers Generations of computers, Basic components of a computer system - Control unit, ALU, Input / Output functions and characteristics, Memory - RAM, ROM, EPROM, PROM and other types of memory, Personal Computer (PCs) – evolution of PCs, Configurations of PCs- Pentium and Newer PCs specifications and main characteristics. Number System, Various Input / Output & Storage Units, Storage fundamentals - Primary V/s Secondary Data Storage, Data Retrieval methods - Sequential, Direct and Index Sequential

### UNIT – II

Software and its Need, Types of Software - System Software, Utility Program, software, Application software, System Software – Operating system, Programming languages - Machine, Assembly, High Level, 4GL, their merit and demerits, Assemblers, Compilers and Interpreter, Single Pass & Multiple Pass Compiler, Introduction to Operating System for PCs - DOS Windows, Linux, Macintosh. OS for mobile Devices - Symbian, Android, iMac etc. Application Software and its types - Word-processing, Spreadsheet, Presentation Graphics, Database Management Software - characteristics, Uses, examples and area of applications

### UNIT-III

Algorithms Need, & Development Process, Flow Chart, Types of Flow Chart. Programming Methodologies - Procedural Programming, Object-oriented Programming, Functional Programming, Logical Programming, Top-down & Bottom-up approaches of software development, Keywords, Constant & Variables, Data Types - Integer, Float, Single, Double etc., Type Conversion Scope of variables - Local & Global, Expression, Operators - Arithmetic, Logical, Relational, Conditional and Bit Wise Operators, Precedence and Associativity of Operators. Array - Single & Multi-dimension, Types of Statements - Iteration, Branching, Looping, Conditional. Example Functions - Library & User defined,

### UNIT- IV

Introduction to Databases, Flat File Vs Database, Significance of Databases, Uses, Types of Database Models - Hierarchical Data Model, Network Data Model, The Relational Data Model, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Conceptual Design, Mapping Relational Mode, Database System Applications, Business Requirements Databases and Data Modeling, Conceptual and Physical Data Models, Entities and Attributes - Unique Identifiers, Relationships Entity Relationship Modeling (ERDs), Relational Databases-Integrity Constraints, Data Definition Language (DDL), Data Manipulation Language (DML)

### UNIT-V

Data and Information – Types of information, requirements of information at different levels of management, qualities of information. Software Development Life Cycle (SDLC) - Defining the Problem, Designing, Coding, Testing and Debugging, Documentation, Deploying and Maintaining. Requirements determination – Requirements specifications –Feasibility analysis – final specifications – hardware and software study –system design – system implementation – system evaluation – system modification.



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Role of systems analyst – attributes of a systems analyst – tools used in system analysis. Information gathering strategies, Tools for prototype creation, data flow diagrams.



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## **SECOND SEMESTER**



## MCA201 Data Structures and Algorithms

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA201	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Learn Basic Data Structures such as, Linked Lists, Stacks and Queues, Tree and Graph.
- Learn Algorithm for Solving Problems Like Sorting, Searching, Insertion and Deletion of Data
- Understand the Complexity of Various Algorithms.
- Introduce Various Techniques for Representation of the Data in Memory.

### COURSE OUTCOMES

- Understand and Explain Basic Data Structures Such as, Linked Lists, Stacks and Queues, Tree and Graph.
- Select and Apply Appropriate Data Structures to define the particular Problem statement.
- Implement Operations Like Searching/Sorting, Insertion, and Deletion, Traversing on Various Data Structures.
- Determine and Analyze the Complexity of Given Algorithms

## UNIT-WISE SYLLABUS

### UNIT-I

Algorithm Analysis and Complexity, Data Structure- Definition, Types of Data Structures Recursion: Definition, Linear and Binary Recursion, Searching Techniques, Linear Search, Binary Search.

### UNIT- II

Sorting Techniques: Basic Concepts, Sorting Algorithms: Insertion (Insertion Sort), Selection (Heap Sort), Exchange (Bubble Sort, Quick Sort), Distribution (Radix Sort) and Merging (Merge Sort) Algorithms.

### UNIT- III

Stacks and Queues: Stacks: Basic Stack Operations, Representation of a Stack Using Arrays, Stack Applications: Reversing List, Factorial Calculation, Infix to Postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queue Operations, Representation of a Queue Using Array, Implementation of Queue Operations Using Stack. Circular Queues, Priority Queues. Applications of Queues- Round Robin Algorithm,

### UNIT- IV

Linked Lists: Introduction, Single Linked List, Representation of a Linked List in Memory, Operations on a Single Linked List, Circular Linked List, and Double Linked List, Advantages and Disadvantages of Linked List.

### UNIT- V

Trees: Terms Related to Tree, Binary Tree, Binary Tree Traversals, and Creation of Binary Tree from In-order, Pre-order and Post-Order Traversals, Threaded Binary Trees, Binary Search Tree, BST Operations: Insertion, Deletion.

Graphs: Basic Concepts, Representations of Graphs: Using Linked List and Adjacency Matrix, Graph Algorithms. Graph Traversals (BFS & DFS), Applications: Dijkstra's Shortest Path, Minimum Spanning Tree Using Prim's Algorithm, Warshall's Algorithm



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## TEXT & REFERENCE BOOKS

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- R. S. Salaria- Data Structures and Algorithm-Khanna Publishing
  - G. A. V. Pai, Data Structures and Algorithms- TMH
  - Debasis, Sarnanta- Classic Data Structures- PHI, 2009
  - E.Horowitz, SartajSahni and Susan Anderson, W. H. Freeman -Fundamentals of Data Structures in C
  - Schaum's Series- Introduction of Data Structure-Prentice Hall of India
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## LIST OF PRACTICAL

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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 expression 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 Dequeue 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.
19. Program to Implement Bubble Sort.
20. Program to Implement Quick Sort.



## MCA202 AI and Machine Learning

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA202	3/3	0	1/2	4/5	80	20	0	100

### COURSE OBJECTIVES

- To Understand the Concepts of Artificial Intelligence and Machine Learning such as supervised and unsupervised learning, knowledge representation, Possibility and probability theory and also get update about current and futuristic trends of AI problems and solutions.
- To Gain Knowledge of search space and search strategies, different algorithms of Supervised and Unsupervised Learning
- Understand the various architectures and activation functions, training and testing approach used in Artificial Neural Network and also acquire knowledge of expert systems.
- Understand the concepts of Fuzzy Logic, Genetic Algorithms, and apply them to solve the real-life problems.

### COURSE OUTCOMES

- Demonstrate Artificial Intelligence Techniques, Various Types of Production Systems, and Characteristics of Production Systems.
- Design and implement Neural Networks using layers, various activation functions and Various Algorithms to solve real life problems.
- Analyze fuzzy nature problem and Design, implement and test the Fuzzy Inference Systems for vague nature real life problem.
- Explain Genetic Algorithms theory, Design and validate the Genetic Algorithms based systems for search space driven problems.

## UNIT-WISE SYLLABUS

### UNIT-I

AI Introduction, The AI problems, AI technique, Characteristics of AI Applications, Current Trends in AI. Machine Learning: Machine Learning Overview, Design of a Learning system, Types of machine learning, Applications of machine learning, Variables and probabilities - Probability Theory, Probability distributions.

### UNIT-II

Problem Solving, General Problem Solving, Production Systems, Control Strategies Forward and Backward Chaining, Searching: Searching for Solutions, Uniformed Search Strategies – Breadth First Search, Depth First Search. Heuristic Search, Greedy Best First Search, Knowledge Representations Mapping & Issues

### UNIT-III

Soft Computing: Introduction to Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing. Basic Concepts of Neural Network, Human Brain- Biological Neural Network, Evolution of Artificial Neural Network, Structure and Function of a Single Neuron, Difference Between ANN and Human Brain, Characteristics and Applications of ANN, Learning Methods, Activation Function, Neural Network Architecture.



## UNIT-IV

Supervised Learning: Perceptron learning, - Single layer, multilayer, Back propagation network, Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks

## UNIT-V

Introduction to expert system and application of expert systems, case studies, MYCIN

Fuzzy Logic: Fuzzy Set Theory, Crisp Set, Fuzzy Set, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Product, Difference, Properties of Fuzzy set

Genetic Algorithm: Fundamentals, Basic Concepts, Working Principle, Encoding, Fitness Function, Reproduction, Crossover, Mutation

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## TEXT & REFERENCE BOOKS

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- Elaine Rich and Kevin Knight “Artificial Intelligence” - Tata McGraw Hill.
- Dan W. Patterson “Introduction to Artificial Intelligence and Expert Systems”, Prentice India.
- Nils J. Nilson “Principles of Artificial Intelligence”, Narosa Publishing House
- Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer
- Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press
- Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press
- Tom Mitchell, "Machine Learning", McGraw-Hill
- Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, Chapman and Hall/CRC Press
- S. Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications.



## MCA2031-Ethical Hacking

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2031	4/4	0	0	4/4	80	20	-	100

### Course Objectives

- Explore ethical hacking basics, Investigate reconnaissance: Information gathering for the ethical hacker, Explore scanning and enumeration, Explore hacking through the network: Sniffers and evasion
- Investigate how to attack a computer system, Explore low tech hacking techniques
- Investigate password hacking, Investigate database and other attacks

### Course Outcomes

- Perform session hijacking
- Gathering information required in order to attack target
- Investigate trojans and other attacks
- Investigate web-based hacking

## UNIT-WISE SYLLABUS

### UNIT-I

Ethical Hacking Overview, Hacking Life Cycle, Legal issues in Ethical Hacking, Hacking Terminology, Gathering Facts, CP/IP Concepts Review, Network and Computer Attacks,

### UNIT-II

Network Enumeration and Foot Printing- DNS Query, WHOIS Query, OS Finger Printing, Banner Grabbing, CERT-In Guidelines :CERT-In Guideline for Securing Wireless Access Points/Routers, Credit Card, Email, Web Server Security, Auditing and Logging, Securing Home Computers, SQL Server Security, Linux and Windows Server security, IDS - Intrusion Detection System, Anti Virus Policy

### UNIT-III

Programming for security professionals- web application vulnerabilities, buffer overflow attack, session hijacking, code injection attacks-cross site scripting attack, SQL injection attack. Required LAB Goals: basics of ethical hacking, gathering information required in order to attack target, finding critical bugs in servers.

### UNIT-IV

Password hacking, windows hacking, logging by pass, network hacking, and anonymity and email hacking. Web servers hacking, session hijacking, surveillance, desktop, server and OS vulnerabilities, required lab. Goals: methods of password encryption and decryption learn to remain anonymous over the internet.

### UNIT-V

Database attacks, hacking wireless networks, cryptography, network protection systems, Trojan and backdoor applications, legal resources, virtualization and ethical hacking. Required Lab Goals: ways to maintain access to a system using Trojan and backdoor, attacking database server and wireless networks.

## TEXT & REFERENCE BOOKS

1. Michael T. Simpson, Kent Backman, James Corley-Ethical Hacking and Network Defence.
2. Stuart McClure Joel Scambray, George Kurtz -Hacking Exposed—Network Security Secrets & Solutions,



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## MCA2032 Information and Network Security

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2032	4/4	0	0	4/4	80	20	-	100

### Course Objectives

- Define the concepts of Information security and their use.
- Describe the principles of symmetric and asymmetric cryptography.
- Understand the concepts of digital signature and digital certificates.
- List and explain various digital signature algorithms.
- Understand the concepts of hashing with algorithms

### Course Outcomes

- Understand and use the various key management and remote authentication mechanisms.
- Understand the concept transport layer security
- Understand and apply the various symmetric key algorithms.
- Understand and apply the various asymmetric key algorithms.
- Understand the concepts of hashing with algorithms and apply them.
- Understand and use the message authentication and its requirement.

## UNIT-WISE SYLLABUS

### UNIT-I

Introduction: Security Concepts:-Confidentiality, Integrity, and Availability , Threats, Risks, Sources of Threats, Attacks Classification, Cryptography, Objectives of Cryptography, Confusion vs. Diffusion, plain text, Cipher text Stream, Classical Cryptography, The Shift Cipher, The Substitution Cipher, The Vigenere Cipher, The Permutation Cipher, Stream Ciphers.

### UNIT- II

Block Ciphers, Block Cipher Principles, Feistel Networks, S-Boxes And P-Boxes, Block Cipher, Secret-Key Encryption, DES, Key Exchange: Diffie-Hellman, Public-Key Cryptography, Public-Key Encryption: RSA, Public-Key Infrastructure (PKI),

### UNIT- III

Digital Signature, Overview of GPG, Digital Certificates, X509 Certificates, SSL, HTTPS, and IPSEC, Open-SSL Cryptographic Introduction to Hash Function: Message Digest: MD5 and SHA-1, Attacks on Hash Functions, MD family, SHA family.

### UNIT- IV

Network Issues, Encryption using Non-Cryptographic Tools (VI, Zip), Authentication principles and methods, passwords, Two-factor authentication, Steganography, watermarks, firewalls and web security, malware – privacy, Semantic attack,

### UNIT- V

DOS, DDOS attacks Intrusion detection System, Internet Banking and Confidential Email. **Authentication Methods:** Passwords, biometrics, Multi-factor authentication, Password Management. Threats and attacks, Intruders, Phishing, Virus, Malware, Trojan Horse, Worms, Spyware, Adware, Key logger.

## TEXT & REFERENCE BOOKS

1. William Stallings, Cryptography and Network Security, PHI.
2. Calabrese, Info Security Intelligence-Cryptography Principles Appl- Cengage Learn.



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3. Krawetz- Introduction to Network Security, Cengage Learning.
4. Bruce Schneier, Applied Cryptography, John Wiley and Sons Mark Stamp,
5. Mark Stamp, Information Security: Principles and Practice, John Wiley and Sons



## MCA2033 Principles of Data Science

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2033	4/4	0	0	4/4	80	20	-	100

### UNIT-WISE SYLLABUS

#### Unit – I

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

#### Unit – II

Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

#### Unit – III

Exploratory Data Analytics Descriptive Statistics – Mean Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map Correlation Statistics – ANOVA.

#### Unit – IV

Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

#### Unit – V

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

### TEXT & REFERENCE BOOKS

1. Doing Data Science, BY Cathy O’Neil and Rachel Schutt O’Reilly, 2015.
2. Practical Statistics for Data Scientists, by Peter Bruce, Andrew Bruce and Peter Gedeck, Paperback 2020
3. Introduction to Data Science: Practical Approach with R and Python by B. Uma Maheswari and R. Sujatha, Willey Publication-2021
4. The Art of Data Science by Roger D. Peng and Elizabeth Matsui
5. Data Science and Big data Analytics By David Dietrich, Barry Heller, Beibei Yang, ,EMC 2013

### LIST OF PRACTICAL

1. READING AND WRITING DIFFERENT TYPES OF DATASETS using Python a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location. b. Reading Excel data sheets in Python. c. Reading XML dataset in Python.
2. VISUALIZATIONS: a. Find the data distributions using box and scatter plot. b. Find the outliers using plot. c. Plot the histogram, bar chart and pie chart on sample data 3. EXPLORATORY DATA ANALYSIS (EDA): Perform EDA on the Credit Card Fraud Detection Dataset (open source dataset) for analyzing the data.
4. LINEAR REGRESSION MODEL FOR PREDICTION: Apply Regression Model techniques to predict the future data values on the open source available datasets.
5. LOGISTIC REGRESSION MODEL: Import the Red-Wine dataset from the UCI Machine Learning Repository with three wine qualities. Apply logistic regression model for multi-class classification of the wine categories.



6. MODEL EVALUATION USING RESIDUAL PLOT: Plotting Accuracy and Error Metrics against the number of iterations for model performance evaluation.
7. EVALUATING UNDER-FITTING AND OVER-FITTING: Plotting Learning curves for model evaluation for Under-fitting and Over-fitting.



## MCA2034 Data Mining and Business Intelligence

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2034	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES

- Introduce the Basic Concepts of Data Base, Data Warehouse and Data Mining
- Understand the Concept of Knowledge Discovery, Understand the process of deriving Information from data with Different Perspectives , Understand and apply Preprocessing Methods on Raw Data
- Discover Interesting and Useful Patterns and associations, Analyze Supervised and Unsupervised Models , Understand Business Intelligence Life Cycle and Techniques Used in It

### COURSE OUTCOMES

- Demonstrate an Understanding and knowledge of the Data Warehousing, Data Mining and Business Intelligence, Explain the Data Analysis and Knowledge Delivery Stages.
- Organize and Prepare the Data Needed for Data Mining Using Pre Preprocessing Techniques
- Implement the Appropriate Data Mining Methods Like Association, Classification, Clustering
- Apply Data Mining Methods to Solve Practical Problems

### UNIT-WISE SYLLABUS

#### 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, Business Intelligence Introduction, Cycle of a Business Intelligence Analysis Data Preprocessing: Need, Data Cleaning, Integration & Transformation

#### UNIT-II

Data Warehouse Process & Architecture, OLAP and OLTP Definitions, Difference Between OLAP and OLTP, Dimensional Analysis, Multidimensional Data Mode, Data Cubes, Drill-Down and Roll-Up – Slice and Dice or Rotation, Operations, Types of OLAP, ROLAP Vs. MOLAP, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations

Relation between BI and DW, the Business Intelligence User Types, Standard Reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, Dimensional Analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards

#### UNIT-III

Association Rule Mining, Single-Dimensional Boolean Association Rules Apriori 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

Emerging Technologies - Machine Learning, Big Data: Introduction, Importance, Four Vs Data Mining for Business Applications Like Fraud Detection, Market Segmentation, Retail Industry, Telecommunications Industry, Banking & Finance and CRM etc., Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining Concepts.



## TEXT & REFERENCE BOOKS

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- Jiawei Han, Micheline Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers
- Arun K Pujari, "Data Mining Concepts and Techniques", University Press
- G.K.Gupta, "Data Mining with Case Studies", PHI



## MCA2035 Principles of Management

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2035	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them fundamental knowledge of Management theories and take cognizance of the importance of management principles.
- Acquire the knowledge of different Planning, strategies, decision making and forecasting techniques and implement them to solve organizational problems.
- To help the students to learn budgetary control, inventory control and quality control Theory with the help of case study.

### COURSE OUTCOMES

- Explain the fundamental knowledge of Management theories and practice them to investigate and solve the organizational.
- Design, Develop and Implement Plans and Strategies, and take decisions to solve organizational problems.
- Demonstrate the management skills through effective communication, presentation, leadership skills and motivate team members for obtaining targets of organization and individual team member.
- Explain and apply budgetary control, inventory control and quality control Theory with the help of case study.

### UNIT-WISE SYLLABUS

#### UNIT-I

Management practices- Meaning and Functions, Development of Management Thought, F.W. Taylor and Herry Fayol's Theories of Management, Qualities of an Efficient Management, Management Principles of Modern Times (Empowerment, Kaizen, Quality Circles, and Total Quality Management.

#### UNIT-II

Planning-Plan, policies, strategies and programs, steps in planning & decision making, forecasting, qualities of an effective planner, relevant case study

#### UNIT-III

Organizing-Organizational Design, Organizational Structure, Centralization & Decentralization, Delegation, Gantt chart and PERT/CPM, Relevant Case Study

#### UNIT-IV

Directing-Motivation and teambuilding, theories of motivation, factors affecting motivation. Leadership, leadership styles, theories of leadership, qualities of an effective leader, effective communication and presentation skills, relevant case studies

#### UNIT-V

Controlling Meaning and basic principles, types of controls, budget and budgetary control, inventory control and quality control relevant case studies.

### TEXT & REFERENCE BOOKS

- Joseph L. Massie, Essentials of Management, Prentice Hall of India
- Biswajeet Patanayak, Human Resource Management, Prentice Hall of India
- Gomes-Mejia, Balkin & Hardy, Managing Human Resource, Prentice Hall of India
- Lesslie W. Rue Llyod Byurs, Management, Tata McGraw Hill
- Joseph M. Putti, Harold Koontz, Essentials of Management, An Asian Perspective, Tata McGraw Hill



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- David Boddy, Management: An Introduction, ,Pearson
- Laurie J. Mullins with Gill Christy, Management & Organisational Behaviour, Pearson



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## MCA2041 C# and ASP.NET Core

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2941	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Identify the basics of .NET framework, architecture and user programs.
- Do GUI programming using ASP.NET
- Examine the challenges involved in .NET framework programming
- Do event driven programming projects
- Database Usages in Website Creation
- Develop Websites with use of ASP..NET.

### COURSE OUTCOME

- Understand and explore various features of ASP.NET framework
- Analyze, design and develop the GUI based applications software using ASP.NET.
- Design, develop and implement complete software projects using ASP.NET with consideration of environment in team spirit.
- Analyze the requirement, design and develop dynamic and static websites and web applications using .NET technology.
- Integrate and apply different components including database, with proper choice of languages mapping

## UNIT-WISE SYLLABUS

### Unit-I: C# Language Fundamentals

Overview of .NET and C#, Data Types, Variables, Operators, Control Structures: if-else, switch, loops, Methods & Parameters, Object-Oriented Programming (Classes, Objects, Inheritance, Polymorphism), Interfaces & Abstract Classes, Exception Handling, Generics, Collections, Delegates, Events, Introduction to LINQ

### Unit-II: ASP.NET Core Basics

Introduction to ASP.NET Core and Project Structure, Program.cs, Startup.cs & Minimal Hosting Model, Middleware and Request Pipeline, Dependency Injection (DI), Configuration and Options Pattern, Logging in ASP.NET Core, MVC Pattern (Model, View, Controller), Razor Views, Layouts, Tag Helpers

### Unit-III: Data Access & Web APIs

Entity Framework Core (EF Core), Code-First & Database-First approaches, LINQ with EF Core, Repository & Unit of Work Pattern, REST APIs with Controllers, Routing (Conventional & Attribute-based), Model Binding & Validation, API Versioning & Swagger Documentation

### Unit-IV: Security & Advanced Features

Authentication & Authorization (Identity, Roles, Policies), JWT Authentication for APIs, External Logins (Google, Facebook, Microsoft, etc.), HTTPS & Certificates, CSRF & CORS protection, Filters (Action, Exception, Authorization), File Uploads & Downloads, Session Management & Caching (In-memory, Distributed, Response), Real-time Communication with SignalR, Background Tasks with Hosted Services



## Unit-V: Deployment, Testing & Modern Architectures

Unit Testing & Integration Testing, Debugging & Diagnostics Tools, Deployment on IIS, Kestrel, Nginx, Apache, Docker & Containerization with ASP.NET Core, Cloud Deployment (Azure, AWS, GCP), Performance Tuning & Profiling, Microservices with ASP.NET Core, Minimal APIs & gRPC, API Gateways (Ocelot, YARP), Distributed Caching (Redis) & Message Queues (RabbitMQ, Azure Service Bus, Kafka)

### TEXT & REFERENCE BOOKS

1. C# 10 and .NET 6 – Modern Cross-Platform Development  
Author: Mark J. Price, Packt Publishing
2. Pro ASP.NET Core 6  
Author: Adam Freeman, Apress
3. ASP.NET Core in Action (2nd Edition)  
Author: Andrew Lock, Manning Publications
4. Programming C# 8.0: Build Cloud, Web, and Desktop Applications  
Author: Ian Griffiths, O'Reilly Media
5. Entity Framework Core in Action  
Author: Jon P. Smith, Manning Publications
6. Professional C# and .NET (2021 Edition)  
Author: Christian Nagel, Wrox

### PRACTICALS LIST

7. Write a C# program to implement a calculator using switch-case.
8. Create a program to demonstrate classes, objects, and inheritance.
9. Implement exception handling in C# with multiple catch blocks.
10. Write a program using delegates and events.
11. Use LINQ to filter and sort a list of students by marks.
12. Create a simple ASP.NET Core MVC project and display “Hello World” on the browser.
13. Implement a Razor view with layout and partial views.
14. Demonstrate dependency injection by injecting a service into a controller.
15. Create middleware to log user requests.
16. Add configuration values in `appsettings.json` and fetch them in a controller.
17. Create a database using EF Core Code-First approach and insert sample records.
18. Build a simple REST API for managing products (CRUD operations).
19. Implement model validation in an ASP.NET Core API.
20. Use Swagger to test your API endpoints.
21. Perform LINQ queries with EF Core to retrieve filtered data.
22. Implement user registration and login with ASP.NET Core Identity.
23. Add JWT authentication for a Web API.
24. Upload and download files in an ASP.NET Core application.
25. Implement session-based authentication and caching.
26. Create a real-time chat application using SignalR.
27. Write unit tests for a controller using xUnit / NUnit.
28. Deploy an ASP.NET Core application on IIS.
29. Dockerize an ASP.NET Core web app and run it in a container.



30. Deploy an ASP.NET Core API to Azure App Service.
31. Build a minimal API with .NET 6 and test it using Postman.



## MCA2042 Full Stack Web Development (MERN Stack)

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2042	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Implement single-page applications, Build React js Forms
- Understanding of full stack web development (Frontend and backend)
- Understand the use of Components, Hooks etc.
- Understand the concept and implementation of Dependency Injection
- Master React expressions, components

### COURSE OUTCOMES

- Build real client apps with React js on your own
- Troubleshoot common compile-time and run-time errors
- Write clean and maintainable code like a professional
- Apply best practices when building React js apps

## UNIT-WISE SYLLABUS

### UNIT- I

Brief Introduction of HTML5 and CSS3. Bootstrap- introduction, versions, installation, CDN, implementation. Bootstrap components, forms, utility classes, grid system, padding and margin.

Responsive web page

Version control system -introduction of Git, create and manage local repository, branches, commit and rollback. Introduction of GitHub- create and manage remote repository,

### UNIT - II

JavaScript Introduction, The Basics of JS – what is ECMA script, variables, operators, conditional statements, looping, arrays, functions and JavaScript objects. DOM, events

Advanced JavaScript-, arrow functions, callback functions, Arrays methods (ForEach(), map(),filter), modules, classes. Exceptional handing-try and catch block Ajax- XMLHttpRequest, fetchApi, axios , promise, async and await. JSON.

Typescript introduction: JavaScript vs typescript, advantages of typescript.

### UNIT – III

introduction of React – JSX, features, advantages, node js, installation and node package manager (NPM), environment and IDE, create and run react applications, Single page applications, lifecycle methods, project structure,

React Components-class based and functional components, render view, props, handling list, event handling. React bootstraps, call, installing and using third party packages and libraries. Routing, build and deploy react applications on the server.

React Hooks -introduction, requirements, useState, useRef, useEffect, useContext, custom hooks.

React Redux, reactive form hooks.

### UNIT – IV

Introduction of node.js, node js vs core javascript, modules, installing and managing packages, nodemon, create a web server, express js, CORS configuration, .env file, dotenv, create a REST Api and endpoints, routing, request methods (Post, Get, Put, Delete) .

Postman- introduction and uses, api testing, api client and other api testing tools.

Error handling, try catch block.

Deployment: Understanding how to deploy Node.js applications to production environments.PM2

### UNIT – V

Microservices: Designing and implementing microservices architectures using Node.js.

MySQL- introduction, uses, create database and tables. SQL queries (select, delete, insert, update) .



Database Integration with node js - installing packages, connectivity, performed CRUD operations, connection pool.

Authentication and Authorization- jwt token

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## **TEXT & REFERENCE BOOKS**

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- "The Road to React" by Robin Wieruch:
- Beginning Node.js, Express & MongoDB Development: by Greg Lim
- Mastering Node.js Web Development: by Sandro Pasquali and Federico Kereki
- Web Development with Node and Express: Leveraging the JavaScript Stack: by Ethan Brown



## MCA2043 Web Technology

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA2043	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Learn to Design and Develop a Web Page
- Design and Develop a Web Site Using Text, Images, Links, Lists, and Tables for Navigation and Layout.
- Style Your Page Using CSS, Internal Style Sheets, and External Style Sheets.
- Learn to use JavaScript & XML in Web Design.
- Learn How to use Database in Web Design.

### COURSE OUTCOME

- Describe the Concepts of WWW Including Browser and HTTP Protocol.
- List the Various HTML Tags and use them to develop the user-friendly web Pages.
- Define the CSS Types and use them to provide the Styles to the web pages at Various Levels.
- Develop the Modern Web Pages Using the HTML and CSS Features with Different Layouts as per Need of Applications.
- Use the JavaScript to Develop the Dynamic Web Pages.
- Use Server-Side Scripting with PHP to Generate the Web Pages Dynamically Using the Database Connectivity.
- Develop the Modern Web Applications Using the Client and Server-Side Technologies and the Web Design Fundamentals.

## UNIT-WISE SYLLABUS

### UNIT-I

Introduction to Web, Web Designing and Website Planning: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web Browser and Web Servers, Website Hosting-Free vs. Paid, Linux Vs. Windows Hosting, Concepts & use of Database & Mail Servers Associated with Web Sites, Features of Web 2.0 Concepts of Effective Web Design, Web Design Issues Including Browser, Bandwidth and Cache, Display Resolution, Look and Feel of the Website, Page Layout and Linking, User Centric Design, Sitemap, Planning and Publishing Website, Designing Effective Navigation, Website Hosting Issues, FTP.

### UNIT-II

Web Development with HTML: Basics of HTML, Formatting and Fonts, Commenting Code, Color, Hyperlink, Lists, Tables, Images, Forms, Meta Tags, Character Entities, Frames and Frame Sets, Browser Architecture and Web Site Structure, use of HTML Code Editor & WYSIWYG Editor.

Cascading Style Sheets (CSS): Style Sheets: Need, Introduction, Basic Syntax and Structure, Using CSS- Background Images, Colors and Properties, Manipulating Texts, Using Fonts, Borders and Boxes, Margins, Padding Lists, Positioning Using CSS, CSS2, Overview and Features of CSS3

### UNIT-III

Technologies for Web Applications JavaScript& XML: JavaScript: Client Side Scripting with JavaScript, Variables, Functions, Conditions, Loops and Repetition, Pop Up Boxes, JavaScript Objects, the Dom and



Web Browser Environments, Manipulation Using Dom, Forms and Validations, DHTML: Combining HTML, CSS and JavaScript, Events and Buttons.

XML: Introduction of XML, Validation of XML Documents, Ways to use XML, XML for Data Files, HTML vs.XML, Embedding XML into HTML Documents, Converting XML to HTML for Display, Displaying XML Using CSS and XSL, Rewriting HTML as XML, Relationship Between HTML, SGML and XML, Web Personalization, Semantic Web, Semantic Web Services. Transforming XML Using XSL and XSLT

## UNIT-IV

Web Design with PHP: Introduction and Basic Syntax of PHP, Decision and Looping with Examples, PHP and HTML, Arrays, Functions, Browser Control and Detection, String, Form Processing, Files, Cookies and Sessions, Object Oriented Programming with PHP

## UNIT-V

Introduction to Database Driven Websites with PHP, PHP and MYSQL, Basic Commands with PHP Examples, Connection to Server, Creating Database, Selecting a Database, Listing Database, Listing Table Names, Creating a Table, Inserting Data, Altering Tables, Queries, Deleting Database, Deleting Data and Tables

## TEXT & REFERENCE BOOKS

- Roger S.Pressman, David Lowe, “Web Engineering”, Tata McGraw Hill Publication, 2007
- Achyut S Godbole and AtulKahate, “Web Technologies”, Tata McGraw Hill
- Gopalan N P, Akilandeswari “Web Technology: a Developer S Perspective”, PHI
- Chris Bates Web Programming: Building Internet Applications Wiley
- Refter, Fawset- Beginning XML, Wiley India
- C. Xavier, “Web Technology &Design”, Tata McGraw Hill.
- Ivan Bay Ross, “HTML, DHTML, JavaScript, Perl CGI”, BPB.
- Web Technologies, Black Book, Dreamtech Press
- HTML 5, Black Book, Dreamtech Press
- Joel Sklar-Web Design, ,Cengage Learning
- Harwani-Developing Web Applications in PHP and Ajax, Mcgrawhill

## List of Open Source Software/Learning Website

- Server Software Xampp/Wamp/Lamp
- [www.apachefriends.org](http://www.apachefriends.org)
- [www.w3.org](http://www.w3.org)
- [www.w3schools.com](http://www.w3schools.com)
- [www.php.net](http://www.php.net)
- [www.mysql.com](http://www.mysql.com)
- [www.phpmyadmin.net](http://www.phpmyadmin.net)



## LIST OF PRACTICAL

1. Write an HTML page with JavaScript that takes a number from one text field in the range 0-999 and display it in other text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.
2. Develop static pages (using only HTML) of an online Book store.

The pages should resemble: [www.amazon.com](http://www.amazon.com). The website should consist the following pages.

- Home page
  - Registration and user Login
  - User profile page
  - Books catalog
  - Shopping cart
  - Payment by credit card Order Conformation
3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, lines and words in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
  4. Write an HTML page that contains a selection box with a list of 5 countries. In this page when the user selects a country, its capital should be printed next to the list, and add CSS to customize the properties of the font of the capital.
  5. Create an XML document that contains 10 users information. Write a script which takes user id as input and returns the user details by taking the user information from XML document.
  6. Implement a user validation web application, where user submits the login name and password to server. These are checked against the data already available in database and if the data matches a successful login page is returned otherwise a failure message is shown to the user.
  7. A simple calculator web application that takes 2 numbers and an operator (+, -, \*, /, %) from an HTML page and returns the result page with the operation performed on the operands.
  8. A web application shows a start time at the right top corner of the page and takes a name as input and provides the logout button at bottom. On clicking logout button it should show a logout page with thank you message with the duration of Usage.
  9. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with “hello, and You are not authorized to visit this site” otherwise it should send “You are welcome to this site” message.
  10. Write a web application in which the user is first served a login page which takes users name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions if name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match then serves password mismatch page. If name not found in database, serves a registration page where users full name is asked and on submitting the full name, it stores the login name, password and full name in the database.
  11. A web application that lists all cookies stored in the browser on clicking “list cookies” button, add cookies if necessary



**\*MCA205(As per AICTE Norms )**  
**BRIDGE COURSE-2 (SEMESTER-2)**  
**MATHEMATICS**

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**UNIT-WISE SYLLABUS**

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**UNIT 1: Set theory**

Set Definition: power set, universal set, union and intersection of sets, difference of sets, complement of a set, ordered pairs, Cartesian product of sets, number of elements in the Cartesian product of two finite sets. Equality of sets, transitivity of set inclusion, universal set, complement of a Set, Subsets Proper and Improper Subsets, Union of Sets, properties of Union. Operation, intersection of sets, disjoint sets, properties of intersection operation, relative complement of a set, DeMorgan's Laws, Distributive Laws of Union and Intersection. Definition of Relation: Pictorial Diagrams, Co-domain and Range of a relation.

**UNIT 2 : Function and Rational**

Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain & range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions. Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.

**UNIT 3 : Determinant and Matrix**

Concept of determinants, determinant of square matrix of order two, determinants of order three, minors and cofactors , properties of determinants, solving linear equations using determinants. Introduction to matrix, types of matrix, multiplication of matrices , transpose of matrix , cofactor , adjoint of matrix , inverse of matrix .

**UNIT 4: Numbers and Basic algebra**

Numbers: Natural numbers, prime numbers, integers numbers, irrational numbers; real numbers , the number line, complex number, Algebra-notation algebraic laws associate law, commutative law, distributive law, solving the roots of a quadratic equation.

**UNIT 5: Statistics and Probability Theory**

Meaning of probability, random experiment an outcome, sample space, sample point, types of sample space, types of events, and probability of an event, total and conditional probability. Mean, median and mode of grouped data, standard deviation.

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**TEXT & REFERENCE BOOKS**

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1. BASICS OF MATHEMATICS BY DR. R.D. SHARMA
2. REMEDIAL MATHEMATICS BY DR. D.C. AGARWAL
3. MATHEMATICS BY R S AGGARWAL



**MK UNIVERSITY**

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Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265

Established by the Gujarat Govt. Recognized by UGC under Section 2(f) of UGC Act, 1956

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**THIRD SEMESTER**



## MCA301 Software Engineering

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA301	4/4	0	0	4/4	80	20	0	100

### COURSE OBJECTIVES

- Understand, Learn and Apply the Theoretical and Practical Knowledge of Software Development Such as Software Development Paradigms, Process, Models, Tools and Techniques.
- Understand and Learn the Process of Software Requirements Identification, Analysis, Review, and also Learn Recording Requirements in the IEEE Format of the SRS Document.
- Understand the Various Types and Levels of Software Testing and Basic Approaches of Test Case Designing.
- Gain the Knowledge of the Various Models of Software Quality, Estimation, Quality Assurance and Control.

### COURSE OUTCOMES

- Identify, Analyze, Review and Validate the Requirement of Software Components and System, and Also Prepare Software Requirement Specification (SRS) Document Using Relevant Standards, Tools and Methodologies.
- Manage a Software Project by Applying Project Management Concepts Such as Planning, Scheduling and Risk Management for Developing Qualitative and Economic Software.
- Work Effectively in Various Profiles of Software Developing Team Such as Software Analyst, Architecture, Programmer, Tester, Quality Assurance and Control officer, Project Manager and Leaders.
- Communicate and Coordinate Competently by Listening, Speaking, Reading and Writing Software Documents
- Apply Coding Standards & Guidelines, and Quality Norms in Coding of Software Systems to Satisfy the Requirements and Quality.
- Design Test Cases and Optimize the Test Suite for UNIT, Integration and System-Level Testing using various Techniques and Tools for Adequately Testing the Software Components and Systems.

### UNIT-WISE SYLLABUS

#### UNIT-I

Software: Software Characteristics, Components, and Applications, Software Engineering Layered Technology, Software Development Life Cycle, Software Process Models- Linear Sequential Model, Prototype & RAD Model, Incremental and Evolutionary Process Models. Introduction of Agile Software Development, CBSD (Component Based Software Development) Aspect Oriented Paradigm (AOP) and Green Software Development, Process and Product Metrics.

#### UNIT-II

Analysis Concept and Principles: Requirement Analysis, Analysis Principles, Requirement Elicitation, Information Gathering Techniques, Requirements Specification, Requirements Verification and Validation, Requirements Management. Requirements Modeling: Scenarios, Information and Analysis Classes, Flow and Behavioral Modeling, Documenting Software Requirement Specification (SRS) Characteristics of



SRS, Format of SRS, Software Project Planning: Objectives, Decomposition Techniques, and Empirical Estimation Models. Project Metrics: Software Measurement–Size Oriented, Function Oriented Metrics.

## UNIT-III

Design Concepts and Principles: Design Process, Design Concepts, Design Principles, Effective Modular Design, Human Computer Interface Design, Interface Design Guidelines. System Design: Design Models for Architecture, Component, Data and User Interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom-Up Design Approaches; Design Specification. Coding: Top-Down and Bottom-Up Structure Programming, Information Hiding, Programming Style and Internal Documentation Verification.

## UNIT-IV

Software Testing: White and Black Box Testing, Levels of Testing, Unit, Integration, System Testing, Functional Testing, Structural Testing, Test Plan, Software Testing Strategies, Verification & Validation, Incremental & Non-Incremental Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, White Box and Black Box Test Case Design Techniques, Debugging Techniques. Software Quality, Quality Models, Quality Control and Quality Assurance, ISO.

## UNIT-V

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning., Project Life Cycle and Effort Estimation: Software Process and Process Models – Choice of Process models. Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II

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## TEXT & REFERENCE BOOKS

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- Roger S. Pressman, Software Engineering-a Practitioner’s Approach, McGraw Hill International Edition,
- K. K. Aggarwal, Yogesh Singh, Software Engineering,
- Ian Sommerville, Software Engineering, Addison-Wesley Publishing Company,
- James F. Peter, Software Engineering - an Engineering Approach, John Wiley,
- Fairley Richard Software Engineering Concepts, Tata McGraw Hill
- Scrum Ken Schawber, Mike Beedle-Agile Software Development with Publisher: Pearson.
- Lisa Crispin, Janet Gregory Agile Testing: A Practical Guide for Testers and Agile Teams Publisher: Addison Wesley.
- Kenneth S. Rubin, Essential Scrum: A Practical guide to the most popular agile process
- Robert C. Martin, Agile Software Development, Principles, Patterns and Practices, Publisher: Prentice Hall



## MCA302 Java Programming

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA302	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Introduce and Learn the Usage of the Java SDK Environment to Create, Debug and Run Java Programs.
- Understand Fundamentals of Java Programming Such as Character Set, Variables, Data Types, and Control Structures, Array, Class and Methods.
- Understand the Concepts of (OOPs) and Learn Implementation in Java Defining Classes, Invoking Methods, Using Class Libraries.
- Introduce Strings, Vectors, Interfaces, Packages and Threads Handling in Java.
- Gain the Knowledge of Java Applets, AWT, Swings, Servlet.
- Understand the GUI Application, Web Applications, N-Tier Architecture.
- Develop the Understanding of the Basic Knowledge of File Handling, Database Connectivity, Java Servlets and Web Application.

### COURSE OUTCOMES

- Explain and Apply the Object-Oriented Concepts for Solving Real Problem.
- Use the Java SDK Environment to Create, Debug and Run Simple Java Programs.
- Apply Java Technology to Develop the Small Applications, Utilities, and Web Applications.
- Apply Events Management and Layout Managers Using AWT, Swing, JDBC and Servlet for Developing the Software for Various Problems.

## UNIT-WISE SYLLABUS

### UNIT-I

Basics of Java: History and Basics of Java, Java Environment, JDK Tools, Java Virtual Machine, Java Program Structure, Java Language- Tokens, Keywords, Constants, Variables, and Data Types. Operators and Expressions, Statements - Decision Making, Branching and Looping, Labeled Loops Statement, Jump Statements: Break, Continue, and Return, Command Line Argument. One and Two Dimension Arrays, String Array, String and String Buffer Classes, Vectors, Wrapper Classes.

### UNIT-II

OOP's concepts - Classes, Objects, Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Static Members, Nesting of Methods, Inheritance and Polymorphism: Basics Types, Extending a Class, Using Super, Method Overloading, Method Overriding, Final Variables and Methods, Final Classes, Finalize Method, Abstract Methods and Classes, Visibility Control.

### UNIT-III

Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, and Packages: System Packages, Naming Conventions, Creating Packages, accessing a Package, Using Package, adding a Class to a Package, Hiding Classes. Exception Handling: Introduction to Exception Handling, Try-Catch, Finally, Throws,



Multi-Threading & Concurrency: Life Cycle of a Thread, Thread Class, Runnable Interface, thread priority, thread synchronization, inter thread communications

### UNIT-IV

Java collection framework-List (Array List, Linked List), Set (Hash Set, Tree Set, Linked Hash Set), Map (Hash Map, Tree Map, Linked Hash Map)

I/O Stream: Introduction of I/O Stream, Types of Streams, Stream Class Hierarchy, Using File Class, Byte Streams Vs Character Streams, Text file Vs Binary File, Standard I/O Streams, and Random-Access File, Serialization.

Database Programming Using JDBC: Introduction to JDBC, JDBC Drivers, Types of JDBC Drivers, Connecting with Database.

### UNIT-V

J2EE: Introduction of J2EE, Web Application Basics, Architecture and Challenges of Web Application, web server installation and configuration.

Java Server Pages (JSP)-architecture, life cycle, request and response object, form handling, client state management, redirection

Servlet, Servlet Life Cycle, Developing and Deploying Servlets.jsp vs servlets

### TEXT & REFERENCE BOOKS

- E. Balagurusamy, "Programming with Java, a Primer", TMH, ISBN-13: 978-0-07-061713-1, ISBN-10: 0-07-061713-9.
- Patrick Naughton and Herbert Schildt, "Java: the Complete Reference", TMH Publication, ISBN 0-07-463769-X.
- Yashavant Kanetkar, "Let us Java", BPB Publications.
- Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", BPB Publications
- Cay Horstmann, "Big Java", Wiley Publication
- Peter Norton, "Java Programming", Tech media Publications.
- Joseph Weber, "Using Java 1.2", PHI, ISBN -81-203-1558-8.

### LIST OF PRACTICAL

1. Write a Program in Java to Calculate the Simple Interest.
2. Write a Program in Java to Calculate Sum of Two Numbers Input from Command Line Argument.
3. Write a Program in Java to Calculate Area of Circle Using Scanner Class.
4. Write a Program in Java to Calculate Square Root of a Number.
5. Write a Program in Java to Display Name, Age, Calendar and Salary of a Person Input from the Keyboard.
6. Write a Program in Java to Display Grading of Student When His Percentage is Input from Keyboard.
7. Write a Program in Java to Display Odd Number from 1 to 100.
8. Write a Program in Java to Display the Following Patterns using Functions.

(a)	(b)	(c)	(d)
1	1	1	1
2 2	2 2	1 2	2 3
3 3 3	3 3 3	1 2 3	4 5 6



4 4 4 4 5 5 5 5 5	4 4 4 4 5 5 5 5 5	1 2 3 4 1 2 3 4 5	7 8 9 10 11 12 13 14
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9. Write a Program in Java to Calculate the Factorial of a Number.
10. Write a Program in Java to Determine Whether a Number Input from Keyboard is Prime Number Or Not.
11. Write a Program in Java to Display the Prime Numbers from 1 to 500 Using Function.
12. Write a Program in Java to Show Accessing Class Members and use a Dot(.).
13. Write a Program in Java to Show Multilevel Inheritance.
14. Write a Program in Java to Show Single Inheritance.
15. Write a Program in Java to Concatenate Two Strings Without Using Library Function.
16. Write a Program in Java to Make First Alphabet Capital of Each Word in a String.
17. Write a Program in Java to Get the Last Index of Any Given Character in a String.
18. Write a Program in Java to Reverse Words of a String.
19. Write a Program in Java to Find Occurrences of Each Character in a String.
20. Java Program to Get String and Count Number of Words in Provided String.
21. Write a Program in Java to Check Given String is Palindrome String Or Not in Java.
22. Write a Program in Java to Reverse Each Word of Given String.
23. Write a Program in Java to Get Sub String from a Given String.
24. Java Program to Convert String to Lowercase and Uppercase.
25. Create a Java Applet and Show the use of Drawstring () Function.
26. Create a Java Applet to Show How to use Various Methods of Applet Class and Graphics Class in a Java Applet.
27. Write a Program in Java to Show the use of Interface.
28. Create a Java GUI Application Using Labels and Text fields.
29. Create a Java GUI Application Using Radio buttons.
30. Create a Java GUI Application Using Checkboxes.
31. Create a Java GUI Application Using Combo boxes.
32. Create a Java GUI Application Using List boxes.
33. Create Two Html Pages with Links to Navigate from One Page to Other Page.
34. Write a Servlet to Display Current Date and Time of Server on Client : Date Servlet
35. Write a Servlet to Display Natural Numbers from 1 to 100 :Numberservlet
36. Create a JSP to Display Natural Numbers from 1 to 50 :Number.Jsp and Write Down the Process of Running It Step by Step.
37. Create a JSP to Display Current Date and Time of Server onClient :Date.JSP and Write Down the Process of Running it Step by Step.

## GROUP ASSIGNMENT

1. Scientific Calculator Utility
2. Chat Application
3. Time Table System
4. Student Attendance System
5. Steganography & Data Encryption System Java
6. Student Information System
7. Survey Tool System
8. Text Editor Like Notepad/Wordpad
9. Game / Puzzle Like Luddo Game
10. Game / Puzzle Like Snake Game
11. Paint Application



## MCA3031 Cyber Crime and Law

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3031	4/4	0	0	4/4	80	20	-	100

### OBJECTIVES

- To understand digital marketing concepts, tools, and platforms.
- To learn secure practices for promoting products/services online.
- To study SEO, SEM, social media marketing along with data protection methods.
- To understand consumer behavior while ensuring privacy and security.
- To develop skills for creating secure and effective online campaigns.

### OUTCOMES

- Ability to design and implement secure digital marketing strategies.
- Skills in using SEO, analytics, and paid ads while protecting user data.
- Knowledge of cyber threats and preventive measures in online marketing.
- Capability to comply with cyber laws and ethical guidelines.
- Practical experience in managing campaigns with security measures in place.

### UNIT-WISE SYLLABUS

#### UNIT-I

**Introduction of Cyber Security:** Issues and Challenges of Cyber Security, Architecture of Cyberspace, Internet and Society, Need of cyber law, Regulation of Cyberspace, Key Regulatory issues in India, Regulation via Software, Regulation via Hardware, Application of Common Law Principles for Internet Regulation, Human Rights in Cyberspace, Freedom of Expression, Privacy, Anonymity, Harassment and defamation, Economic Rights, IPR, Protecting Human Dignity in the Digital Age,

#### UNIT- II

**Legal Perspectives of Cybercrimes and Cyber security:** The Indian IT Act and its Amendments, Challenges to Indian Law and Cybercrime, Consequences of IT Act, Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Cybercrime and Punishment, Data Privacy, Data Security, Big Data Security: issues and challenges, General Data Protection Regulations (GDPR), Personal Data Protection, Data Protection Principles, Contract Act, Trademark Act, Copyright, Patents

#### UNIT- III

**Cybercrime Targeting Computer Systems:** Data Diddling, Attacks, Spy Ware, Logic Bombs, Email Scam and Phishing, Theft, Obscene Content, Cyber bullying, Cyber grooming, Online job fraud, Online sextortion, Vishing, Sexting, Smashing, Sim Swap scam, Debit/Credit card fraud, Impersonation and identity theft, Data breach, Denial of services /distributed dos, Crypto jacking(crypto Currency), Online Drug Trafficking.

#### UNIT- IV

**Cybercrime Against Persons:** Child Pornography/ Child Sexually Abusive Material (CSAM), Cyber Stalking and its type, Phishing and Its Type, Ethics and its Important, Legal Developments, Cyber Security In Society, Online Cyber Crime Reporting,

#### UNIT- V



**Cybercrime Targeting Countries:** Cyber Terrorism, International Response to Cybercrime, Digital Evidence and Computer Forensics, Regulation and Jurisdiction for global Cyber security, Copy Right-Source of Risks, Pirates, Internet Infringement, Fair Use, Postings, Criminal Liability, Malware Analysis: -Spamming, SMS ware, Malware, Adware, Ransom ware, Virus, Worms & Trojans

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## TEXT & REFERENCE BOOKS

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1. Kumar K -Cyber Laws: Intellectual Property & E Commerce, Security, Dominant Publisher
2. Information Security Policy & Implementation Issues, NIIT, PHI
3. Marine R.C.- Cyber Crime Impact in the New Millennium, Auther Press
4. Sunit Belapure and Nina Godbole, Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives, Wiley India Pvt. Ltd, 2011.
5. Cyber Law: Indian and International Perspectives on Key Topics By Anirudh Rastogi
6. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.



## MCA3032 Digital Marketing and Security

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3032	4/4	0	0	4/4	80	20	-	100

### UNIT-WISE SYLLABUS

#### UNIT - I

**Digital Marketing** - Introduction, Key terms and concepts, understanding marketing strategy, The building blocks of marketing strategy, Crafting a digital marketing strategy, Case study: Nike digital strategy

**Market Research** - Introduction, importance of market research, Key terms & concepts in market research, online research methodologies, justifying the cost of research, Tools of the trade, Advantages and challenges, Case Study: Rocking the Daisies – 2011 & 2012

**Content Marketing Strategy** - Introduction, Defining Content marketing, Key terms and concepts, Strategic building blocks, Content creation, Content channel distribution, Tools of the trade, Advantages and challenges, Case study : Coca-Cola Company

#### UNIT - II

**User Experience Design** - Introduction, Key terms and concepts, Understanding UX design, Core principles of UX design, Mobile UX, Step in UX design, Tools of the trade, Case study: Rail Europe

**Web Development and Design** - Introduction, Key terms and concepts, Web design, Web development, Mobile development, Steps in building a website, Case study – The Boston Globe

**Writing for Digital** - Introduction, Key terms and concepts, Writing for your audience, Types of web copy, HTML for formatting, SEO copywriting, Best practices for online copywriting, Tools of the trade, Case study: Encyclopedia, Britannica Online

#### UNIT - III

**Customer Relationship Management** - Introduction, Key terms and concepts, A CRM model, Understanding customers, CRM and data, The benefits of CRM, Social CRM, Steps in implementing a CRM strategy, Tools of the trade, Case study: Fuji Xerox

**Search Engine Optimization (SEO)** - Introduction, Key terms and concepts, Understanding SEO, Search engine friendly website structure, SEO and key phrases, Link popularity, User insights, What not to do, Tools of the trade, Benefits and challenges, Case study: Viewpoints.com and the Panda update

**Search Advertising** - Introduction, Key terms and concepts, Advertising in search, The elements of a search ad, Targeting options, Bidding and ranking for search ads, Tracking, Planning and setting up a search advertising campaign, Tools of the trade, Advantages and challenges, Case study – ‘Sister Act’ on Broadway

#### UNIT - IV

**Online Advertising** - Introduction, Key terms and concepts, Online advertising objectives, The key differentiator, Types of display adverts, Payment models for display advertising, Getting your ads online, Targeting and optimizing, Tracking, Steps in online advertising, The future of online advertising, Advantages and challenges, Case study: Toyota Prius



**Affiliate Marketing** - Introduction, Key terms and concepts, The building blocks of affiliate marketing, Setting up a campaign, Tools of the trade, Advantages and challenges, Case study.

**Video Marketing** - Introduction, Key terms and concepts, Video content strategy, Video production step by step, Video promotion, Tools of the trade, Advantages and challenges, Case study – Woolworths: ‘Cook like a Master Chef’ for Master Chef South Africa

## UNIT - V

**Social Media Channels** - Introduction, Key terms and concepts, Social media channels, Social networking, Content creation, Bookmarking and aggregating, Location and social media, Tracking social media campaigns, Social media marketing: Rules of engagement, Tools of the trade, Advantages and challenges, Case study – Col’Cacchio #Price Slice

**Social Media Strategy** - Introduction, Key terms and concepts, Using social media to solve business challenges, Step-by-step guide to creating a social media strategy, Documents and processes, Social media risks and challenges, Case study – Super Bowl Social Media Command Center

**Email Marketing** - Introduction, Key terms and concepts, Email strategy and planning, Step-by-step process, Tools of the trade, Advantages and challenges, Case study – Zando

**Mobile Marketing** - Introduction, Key terms and concepts, Mobile commerce, Integrating mobile into online marketing, Augmented reality, Mobile analytics, Advantages and challenges, Case study – Carling Black Label’s “Be the Coach”

## TEXT & REFERENCE BOOKS

- eMarketing : The Essential Guide to Marketing in a digital world, 5th Edition, Rob Stokes and the Minds of Quirk, Available online at [https://www.redandyellow.co.za/content/uploads/woocommerce\\_uploads/2017/10/emarketing\\_textbook\\_download.pdf](https://www.redandyellow.co.za/content/uploads/woocommerce_uploads/2017/10/emarketing_textbook_download.pdf)
- Ryan Deiss, Russ Henneberry- “Digital Marketing for Dummies”, John Wiley & Sons.
- Ahuja Vandana- “Digital Marketing”, Oxford University Press.
- Ira Kaufman, Chris Horton- “Digital Marketing: Integrating Strategy and Tactics with Values, A Guidebook for Executives, Managers, and Students”, Routledge,
- Matt Chiera- “Digital Marketers Sound Off: Tips, Tactics, Tools, and Predictions from 101 Digital Marketing Specialists”, Matt Chiera,
- Puneet Bhatia- “Fundamentals of Digital Marketing”, Pearson India
- Dan Zarrella- “The Social Media Marketing Book”, O’Reilly Media.
- Krista Neher- “Visual Social Media Marketing: Harnessing Images, Instagram, Infographics and Pinterest to Grow Your Business Online”, Boot Camp Digital.
- Damian Ryan, Understanding Digital Marketing Strategies for Engaging the Digital Generation



## MCA3033 -Machine Learning for Data Science

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3033	4/4	0	0	4/4	80	20	-	100

### Course Objectives

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

### Course Outcomes

- Appreciate the importance of visualization in the data analytics solution
- Apply structured thinking to unstructured problems
- Understand a very broad collection of machine learning algorithms and problems
- Develop an appreciation for what is involved in learning from data.rs, Distance based classification and clustering algorithms

## UNIT-WISE SYLLABUS

### UNIT-I

Introduction to Machine Learning, Gathering Business Knowledge, Data Exploration, The Dataset and the Data Dictionary, Importing Data in Python, Univariate analysis and EDD, Outlier Treatment in Python, Missing Value Imputation in Python, Seasonality in Data, Variable transformation and deletion in Python, Dummy variable creation in Python, Correlation Analysis in Python

### UNIT-II

Introduction to data science and its applications, Data Engineering and Preprocessing, Model Evaluation, and Hyperparameter Tuning, Supervised Learning – Regression, Supervised Learning, Most popular libraries for Machine Learning in Python

### UNIT-III

Classification SVM, KNN & Naive Bayes, Ensemble Methods and Boosting, Unsupervised Learning – Clustering, Unsupervised Learning – Dimensionality Reduction, Training and testing Machine learning Model in Python, Creating Confusion Matrix in Python, Evaluating performance of models, Evaluating model performance in Python Predicting probabilities, assigning classes,

### UNIT-IV

Function and Derivatives, Gradient Descent, Stochastic Gradient Descents, Convex Optimization, Formulation and Optimality Conditions, ADAM Optimizer, Reinforcement Learning,

### UNIT-V

Introduction to DEEP LEARNING, Artificial Neural Networks, Convolution Neural Networks – Transfer Learning, RNN – Recurrent Neural Networks, Generative Models and GANs



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## TEXT & REFERENCE BOOKS

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1. Machine Learning using Python, By Manaranjan Pradhan, U Dinesh Kumar willey Publication
2. Machine Learning in Data Science Using Python by Dr. R. Nageswara Rao ,dream Tech Publications
3. Data Science From Scratch: First Principles with Python, by Joel Grus, O'Reilly, Publications
4. Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly, Publications by Aurélien Géron
5. Data Analytics using Python by Bharti Motwani willey Publication
6. Practical Deep Reinforcement Learning with Python: Concise Implementation of Algorithms, Simplified Maths, and Effective Use of TensorFlow and PyTorch , by Ivan Gridin BPB Publications

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## LIST OF PRACTICAL

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1. Split training and testing datasets in Python
2. Hyper parameter tuning methods in Scikit-learn
3. Train K-nearest neighbors, Decision tree, linear regression, Logistic regression, K-means clustering and gradient descent model and perform result analysis



## MCA3034 Social Network Analysis

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3034	4/4	0	0	4/4	80	20	-	100

### Objectives

- To understand the concepts and importance of social networks.
- To learn methods for representing and visualizing networks.
- To study metrics like centrality, clustering, and network density.
- To analyze patterns, influence, and communities in networks.
- To develop skills for applying SNA in real-world domains (e.g., marketing, security).

### Outcomes

- Ability to model and represent networks using graphs.
- Skills to calculate and interpret network measures (degree, betweenness, etc.).
- Understanding of community detection and influence spread in networks.
- Capability to use SNA tools for visualization and analysis.
- Application of SNA techniques to solve practical problems in business, research, or security.

## UNIT-WISE SYLLABUS

### UNIT I

Introduction to social network, Introduction to Python/Colab ,Introduction to Network X, Network Measures Introduction to social network analysis, Descriptive network analysis, Network structure, Introduction, uses, examples and types of social networks, Social and economic networks, Opportunities and challenges in social networks,

### UNIT II

Nodes, Edges, Relationship, Graphs, Samples and Boundaries, Formal methods, Adjacency Matrix for undirected and directed networked graphs and using matrices to represent social relations, Random graphs, Properties of random graphs, Percolations, Branching processes, Growing spanning tree in random graphs. Node centralities and ranking on network, Network communities, Affiliation networks Network Growth Models, Link Analysis, Social structure in social networks, Properties of social networks, algorithmic and economic aspects of social networks.

### UNIT III

Information and influence propagation on networks, Network visualization, Graph Visualization Tools, Community Detection, Understanding the social graph API. Level in Social Networks: Ego networks, partial networks, complete or global networks, social networks methods including binary or valued, directed or undirected.

### UNIT IV

Metrics in social network analysis (Betweenness, Centrality, Equivalence relation, Centralization, Clustering coefficient and Structural cohesion).Link Prediction, Cascade Behavior and Network Effects, Anomaly Detection, Social media mining, SNA in real world: FB/VK and Twitter analysis

### UNIT-V

Introduction to Deep Learning; Graph Representation Learning , Coding on Graph Representation Learning, Structural equivalence, Automorphic equivalence and Regular equivalence Applications and Case Studies



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## TEXT & REFERENCE BOOKS

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1. Social Network Analysis, Tanmoy Chakraborty, Wiley, 2021
2. Network Science, Albert-Lazzlo Barabasi
3. Social Network Analysis: Methods and Applications, Stanley Wasserman, Katherine Faus

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## LIST OF PRACTICAL

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**Mining Twitter:** Fundamental Twitter Terminology, creating a Twitter API Connection, Exploring Trending Topics, searching for Tweets, extracting Tweets entities, analyzing Tweets and Tweet entities with frequency analysis, computing the lexical diversity of Tweets, Examining patterns in Retweets, Visualizing frequency data with histograms.

**Mining Facebook:** Understanding the social graph API, Understanding the open graph protocol, Analyzing social graph connections

**Mining LinkedIn:** Making LinkedIn API requests, Downloading LinkedIn connections as a CSV file, Clustering, normalizing data for analysis, measuring similarity, and clustering algorithms.

**Mining Web pages:** Scraping, Parsing and Crawling the Web, Discovering semantics by decoding syntax, Entity-Centric analysis: A paradigm shift, Quality of analytics for processing human language data.

**Mining the Semantically Marked-Up Web:** Microformats: Easy-to-implement Metadata, Semantics markup to semantic Web: A brief interlude, The semantic Web: An evolutionary revolution.



## MCA3035 Theory of Computation

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3035	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES

- Learn and Understand FSA, DFA, N DFA, Turing Machine, Regular Expression, Push Down Automaton.
- Learn and Understand Properties of Languages, Grammars and Automata.
- Gain knowledge of Computing and Mathematics to Solve Problems.

### COURSE OUTCOMES

- Demonstrates Models, Turing Machine, Regular Expression, Push Down Automaton.
- Model, Compare and analyze different Computational Models.
- Apply and Prove properties of Languages, Grammars and Automata.
- Apply Knowledge of Computing and Mathematics to Solve Problem
- Apply Mathematical Foundations, Algorithmic Principles and Computer Science Theory to the Modeling

## UNIT-WISE SYLLABUS

### UNIT-I

Introduction to Theory of Computation: Basic Computational Constructs: Finite State Systems, Non Deterministic Finite Automata (N DFA), Deterministic Finite Automata (DFA), Equivalence of DFA and N DFA, Finite Automata with E-Moves, Limitations of FSM, Minimization of Finite Automata, Moore and Mealy Machines, Equivalence of Moore and Mealy Machines.

### UNIT- II

Regular Sets, Closure Properties of Regular Sets, Pumping Lemma, Applications of Pumping Lemma. Regular Expression, Laws for Regular Expression, Equivalence of Finite Automata and Regular Expression, Introduction to Regular Grammar.

### UNIT- III

Introduction to Context Free and Context Sensitive Grammar, Ambiguity, Parse Tree Representation of Derivations, Simplification of Context Free Grammar, Normal Forms (Chomsky Normal Form (CNF) and Griebach Normal Form (GNF)).

### UNIT- IV

Definition, Deterministic Push Down Automaton (DPDA), Non-Equivalence of PDA & DPDA, Equivalence of CFG and PDA, Pumping Lemma for CFL's, Closure Properties of CFL, Non-CFL.

### UNIT- V

Turing Machine(TM): Introduction, Types of Turing Machine, Universal Turing Machine and Other Modifications, Construction of Tm for Simple Problems, Turing Machine as Enumerators, Relation Between Languages of Classes, Computational Complexity Theory. Computable Functions: Partial, Total, Constant Functions, Primitive Recursive Function, Regular Function, Recursive Functions.



## TEXT & REFERENCE BOOKS

- John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. Introduction to Automation Theory, Languages & Computation
- Mishra & Chandrasekaran-Theory of Computer Science (Automata, Languages and Computation PHI ISBN-81-203-1271-6
- Lewis & Papadimitriou Elements of the Theory of Computation, PHI ISBN 81-203-1016-0
- John C. Martin -Introduction to Languages and Theory of Computation ISBN- 0-07-463722-3
- Bernard M. Moret Pearson -Theory of Computation ISBN-81-7808-550
- Raymond Green law& H. James Hoover (Harcourt) - Fundamentals of Theory of Computation ISBN: 81-7867-036-4



## MCA3041 Digital Forensic

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3041	3/3	0	1/2	4/5	60	20	20	100

### OBJECTIVES

- To understand the principles and processes of digital forensics.
- To learn methods for identifying, collecting, and preserving digital evidence.
- To study forensic tools and techniques for data recovery and analysis.
- To understand legal, ethical, and procedural aspects of digital investigations.
- To develop skills for reporting and presenting forensic findings in court.

### OUTCOMES

- Ability to perform proper evidence collection without tampering.
- Skills to analyze digital devices, files, and network logs for investigation.
- Knowledge of forensic tools for data recovery and analysis.
- Capability to prepare legally acceptable forensic reports.
- Practical experience in conducting end-to-end digital investigations.

## UNIT-WISE SYLLABUS

### UNIT- I

**Log Analysis:** Linux and Windows: What are Logs, where they are Stored, How to Interpret the Logs.

Required LAB

Goals: Understanding Methods of Logging: Rsyslog, Syslog and Interpreting Logs in Order to Identify Problems.

### UNIT- II

**Introduction to Digital Forensics:** Computer Forensics, Mobile Device Forensics, Network Forensics, Forensics Data analysis and Web Forensics. Evidence -Sources of Digital Evidence, Digital Forensics Models: DFRWS Model, Abstract Digital Forensic Model, Integrated Digital Investigation Model; Enhance Digital Investigation Model, Digital Forensics Investigation, And Evidence Gathering Techniques. Required LAB, Cyber Crime Investigation through Data Mining Techniques – Introduction, Data Mining, Data Mining for Digital Forensics, Classification of Crime Data, Frame Work for Web Forensics,

**Ontology:** Motivation for Text Mining, Text Characteristics, Information Retrieval, Information Extraction, Text Mining Process Required LAB. Goals: Forensics includes digging up hidden data, and track left by the attacker.

### UNIT- III

**Inverted Index Live Forensics:** Incident on windows, Linux, and apple computers, basic registry analysis, MRUs and history file analysis.

**Network Forensics:** Network Analyzer basic, packet capturing, scan ports, upstream tools and TCP dump, Wire shark, Wireless sniffing, Log and SIEM searches Required LAB, Goals: scanning network for weakness, capturing the data going through the network.



## UNIT- IV

**Examination and Analysis Techniques:** Search Techniques, Manual Browsing. Disk Forensics – File Systems, Encryptions Issues, SSD Challenges, Slack space, partitions Lab: DD and its many options, strings, Scalpel, Sleuth kit. File System Forensics – Malware Analysis, Magic Numbers, Digital Steganography, Browser Forensics, ands and OST files.

**Social media Forensic:** Email forensics: Browser tools, SQL Query, Securing WiFi, Securing DVR, Disk Encryption, (GNUPG), and Required LAB Goals: Retrieving the Lost or Corrupt Data, Securely Deleting Data in Order to prevent it from Recovery.

## UNIT- V

**Android Forensics:** Introduction, Acquiring Physical Image of an Android Device, connecting a Device via Data Cable, Imaging the memory card, USB debugging, Preparing the Hero for rooting, Creating ADD image of memory, examination of memory, Analysis with the Cellebrite, using Apps.

Required LAB,Goals: Gaining the Root Access in Android Phone, Collecting Information from Android.

## TEXT & REFERENCE BOOKS

1. Eoghan Casey-Handbook of Digital Forensics and Investigation,
2. Windows Registry Forensics: Advanced Digital Forensic Analysis of the windows registry.
3. John Sammons-The Basics of Digital Forensics:
4. Computer Forensics: Cybercriminals, Laws, and Evidence by Marie-Helen Maras ,Publisher: Jones & Bartlett Learning
5. Incident Response & Computer Forensics by Jason T. Luttgens, Matthew Pepe, Kevin Mandia Publisher: McGraw-Hill Education

## LIST OF PRACTICAL

1. Explore and exploit the various computer forensic tools for evidence collection and analysis used in Network Forensic, Database analysis, File analysis, Registry analysis, Email analysis, OS analysis, Disk and data capture.
2. Identify, and collect, prioritize, analyze and reporting on evidence found on computers, laptops and storage media in support of investigations and legal proceedings.
3. Decrypt the Data file collected in evidence of cyber crime
4. Collect email evidence, arranging the evidence, and searching the emails Perform Email Analysis for both web and application based mail clients. Detect and report obscene image attachments in email by using skin-tone analysis
5. Collect and analyze browser information, including browser history, cookies, proxy settings, web forms, bookmarks, cache, add-ons, saved passwords, etc.
6. Extract and creates an output directory for fetching information about credit card, Internet domains, emails, MAC addresses, IP addresses, Images and videos, URL's, telephone numbers, searches performed, etc.
7. Collect digital evidence from mobile phones and cloud services used on phones (Android, Sony, Blackberry and iPhone.)



8. Bypass Android screen lock, get location history, extract data from cloud storages, analyze call and data records, search data keywords, recover deleted data and export data to various file formats
9. Monitor, capture, store and analyze of network activities or events in order to discover the source of security attacks, intrusions or other problem incidents, i.e. worms, virus or malware attacks, abnormal network traffic and security breaches.
10. To recover the electronic evidence from mobile phones, smart phones, SIM cards, PDAs, GPS devices, tablets and game consoles and Analyze evidence of mobile crimes/incidents and report on the basis of evidence in legal cases
11. Extract and analysis the metadata of digital acquired photographic images to validate their authenticity by recovering the metadata of the image file to ascertain its history.
12. Collect and analyze, and evaluate the sound and video recordings for authenticity, originality, tampering, and maliciousness of them.
13. Collect and correlate information about the running processes, memory drives, registry, file system metadata, event logs, web history and network activity. Perform memory and host analysis for traces of infection, or any malicious activity.
14. Search the binary image of embedded files in .exe code.
15. Perform memory analysis for MAC OS for finding kernel extensions, gathering kernel information, task listing, detecting hooks, network listing, dumping a file from memory, presenting boot information and lot of other details.
16. Determine the presence of rootkits on a system for analyzing malware infection and reasons for network compromise
17. Recover the evidence from the RAM of a running computer, also called live acquisition.
18. Create the image of the hard disk for ensuring the integrity of the data using hashing and do the investigation.
19. Perform the windows registry analysis for following:
  - Create a case and load and search the registry using filters, or timestamps.
  - Data collection: Collect target registry files for enumeration and analysis.
  - Recovery: Recover registry for deleted keys.
  - Analysis:
    - Windows analysis: Owner, Installation data, etc.
    - Storage analysis: Accounts present, run commands, browser history analysis (URLs).
    - Network connection analysis: network drive connections, etc.
    - Application analysis: List of auto runs, application usage history, etc.
    - SW and HW management: Software and hardware installations, storage devices connections.
  - Reporting: Create result reports in CSV formats.
20. Write a report of an analysis of digital evidence for a case Using an existing report template
21. Calculate the Hash of Multiple Files and Passwords.
22. Create and modify users on active directory
23. create a back door and hijack system
24. Analyze and Filter, TCP and UDP packets.
25. Apply analysis techniques to open SAM, SYSTEM and SECURITY files
26. Demonstrate the technique for locating a variety of file types Using common digital forensics tools



## MCA3042-Internet of Things

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3042	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- To impart necessary and practical knowledge of components of Internet of Things
- To introduce the latest microcontrollers with application development, product design and prototyping.
- Learn and Understand Various Protocols used in Wireless Sensor Network.
- Develop skills required to build real-life IoT based projects

### COURSE OUTCOMES

- Understand the Concepts of Internet of Things and the Application Areas of IoT
- Understand IOT's hardware and software components
- Interface I/O devices, sensors & communication modules
- Remotely monitor data and control devices
- Develop real life IoT based projects

## UNIT – WISE SYLLABUS

### UNIT-I

Introduction to IoT, Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

### UNIT-II

Elements of IoT, Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.

Software Components- Programming API's (using Python/Node.js/Arduino) for communication Protocols- MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

### UNIT-III

IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

### UNIT-IV

IoT case studies and mini projects based on Home Automation, Industrial automation, Transportation etc.

### UNIT-V

IoT case studies and mini projects based on Agriculture, Healthcare, logistics etc.

## TEXT & REFERENCE BOOKS

- Vijay Madiseti, Arshdeep Bahga, İnternet of Things, “A Hands on Approach”, University Press



- Dr. SRN Reddy, RachitThukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
- Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
- Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
- Adrian McEwen, “Designing the Internet of Things”, Wiley
- Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill
- Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media

## LIST OF PRACTICAL

- Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
- To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
- To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
- To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
- To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
- To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
- To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to Smartphone using Bluetooth.
- To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when ‘1’/‘0’ is received from Smartphone using Bluetooth.
- Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud.
- Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
- To install MySQL database on Raspberry Pi and perform basic SQL queries.
- Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
- Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
- Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
- Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.



## MCA3043 Programing with R

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA3043	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES:

- Provide the knowledge of Basic R Programming Language to Students.
- Prepare Students for Role of Professional Data Analyst.
- Learn about Concepts of R Programming like Control Structures, Functions, and Arrays.
- This course will teach students, How to develop workflows going from raw data to graphics and statistical analysis, Using the Programming Language and Statistical Environment R.
- Over the Course of the Semester, Students will learn the Skills to Write Scripts to automate data formatting and analysis, making their studies replicable.
- Student will be able Apply Programming Knowledge to Develop R Programs Based on Simulation.

### COURSE OUTCOMES:

- Learn and apply the features of R Programming Tool to Carry out Statistical Analysis of data
- Write, Compile and Execute the Programs Written in R Programming Language
- Implement Intelligent Algorithms in R to Solve Statistical and Decision Making Problems

### COURSE OUTCOME:

1. Understand the basics in R programming in terms of constructs, control statements, string functions
2. Understand the use of R for Big Data analytics
3. Learn to apply R programming for Text processing
4. Able to appreciate and apply the R programming from a statistical perspective

### UNIT -WISE SYLLABUS

#### UNIT - I

OVERVIEW— Evolution of R, Features of R

ENVIRONMENT SETUP— Try it Option Online, Local Environment Setup

BASIC SYNTAX—R Command Prompt, R Script File, Comments

DATA TYPES—Vectors, Lists, Matrices, Arrays, Factors, Data Frames

VARIABLES—Variable Assignment, Data Type of a Variable, Finding Variables, Deleting Variables

OPERATORS—Types of Operators, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Miscellaneous Operators

DECISION MAKING—If Statement, If- Else Statement, The if, else if, else Statement, Switch Statement

LOOPS—Repeat Loop, While Loop, For Loop, Loop Control Statements, Break Statement, Next Statement

#### UNIT - II

FUNCTION—Function Definition, Function Components, Built- In Function User-defined Function, Calling a Function, Lazy Evaluation of Function

STRINGS—Rules Applied in String Construction, String Manipulation



VECTORS—Vector Creation, Accessing Vector Elements, Vector Manipulation

LISTS—Creating a List, Naming List Elements, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting List to Vector

MATRICES—Accessing Elements of a Matrix, Matrix Computations

ARRAYS—Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculations across Array Elements,

FACTORS—Factors in Data Frame, Changing the Order of Levels, Generating Factor Levels

DATA FRAMES—Extract Data from Data Frame, Expand Data Frame

## UNIT - III

PACKAGES – Introductions, Uses, Install R Package

DATA RESHAPING, —Joining Columns and Rows in a Data Frame, Merging Data Frames, Melting and Casting, Melt the Data, Cast the Molten Data

CSV FILES—Getting and Setting the Working Directory, Input as CSV File, Reading a CSV File, Analyzing the CSV File, Writing into a CSV File

EXCEL FILE—Install xlsx Package, Verify and Load the "xlsx" Package, Input as xlsx File, Reading the Excel File, 21. BINARY FILES, Writing the Binary File, Reading the Binary File, XML FILES, Input Data, Reading XML File, Details of the First Node, and XML to Data Frame

JSON FILE—Install rjson Package, Input Data, Read the JSON File, Convert JSON to a Data Frame

WEB DATA

DATABASES—RMySQL Package, Connecting R to MySql, Querying the Tables, Query with Filter Clause, Updating Rows in the Tables, Inserting Data into the Tables, Creating Tables in MySql, Dropping Tables in MySql

## UNIT - IV

PIE CHARTS—Pie Chart Title and Colors, Slice Percentages and Chart Legend, 3D Pie Chart,

BAR CHARTS—Bar Chart Labels, Title and Colors, Group Bar Chart and Stacked Bar Chart

BOXPLOTS—Creating the Box plot, Box plot with Notch,

HISTOGRAMS—Range of X and Y values

LINE GRAPHS—Line Chart Title, Color and Labels, Multiple Lines in a Line Chart

SCATTERPLOTS—Creating the Scatter plot, Scatter plot Matrices

## UNIT - V

MEAN, MEDIAN & MODE—Mean, Applying Trim Option, Applying NA Option, Median, Mode

LINEAR REGRESSION—Steps to Establish a Regression lm() Function predict() Function

MULTIPLE REGRESSION—lm() Function Example

LOGISTIC REGRESSION—Create Regression Model

NORMAL DISTRIBUTION—dnorm () pnorm()qnorm()rnorm()

BINOMIAL DISTRIBUTION—dbinom() pbinom() qbinom() rbinom()

Poisson Regression, Analysis of Covariance

TIME SERIES ANALYSIS—Different Time Intervals, Multiple Time Series

Nonlinear Least Square, Decision Tree Install R Package

RANDOM FOREST—Install R Package, Survival Analysis, Chi Square Test



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## TEXT & REFERENCE BOOKS

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- The Art of R Programming: A Tour of Statistical Software Design, by Norman Matloff, No Starch Press, 2011
- R for Everyone: Advanced Analytics and Graphics by Jared P. Lander, Addison-Wesley Data & Analytics Series, 2013.
- Beginning R – The Statistical Programming Language, by Mark Gardener, Wiley, 2013
- Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R, by Robert Knell, Amazon Digital South Asia Services Inc, 2013
- W. N. Venables, D. M. Smith, an introduction to R, r-core team, 2015
- Alain F. Zuur, Elena n. Ieno, and Erik Meesters. A beginner's guide to R. Use R. Springer, 2009. ISBN: 978-0-387-93836-3.
- Roger D. Peng R Programming for Data Science, <https://leanpub.com/rprogramming>
- John Verzani, chapman -Using R for introductory statistics, ,ISBN- 1584884509
- <https://www.r-project.org/doc/bib/r-books.html>

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## LIST OF PRACTICAL

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1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n.
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort.
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition, subtraction and Multiplication.



## MCA401-THESIS/ INTERNSHIP/PROJECT

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA401	0	0	4/8	4/8	-	20	80	100

### Guidelines for MCA Project

The Master of Computer Applications (MCA) programme is designed with the objective to prepare the students to take up positions in it industries as programmer, systems designers, software engineers, etc. The curricula are designed to provide students comprehensive knowledge covering the skills and core areas of computer science in theory and practical's. With the same objective six months major project is part of curricula in last semester of MCA. In the major project students are supposed to develop quality software solutions by applying theoretical and practical knowledge of various courses learnt.

### Objectives

The objective of the project is to help the student develop the ability to apply theoretical and practical tools / techniques to solve real life problems related to industry, academic institutions and research laboratories. After completion of this project work, the student should be able to describe the Systems Development Life Cycle (SDLC) related to their project:

- Evaluate systems requirements.
- Evaluate a problem definition.
- Collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and operational feasibility for the project.
- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries/ decision trees/ decision table.
- Create and evaluate graphical tools as systems flow charts, entity-relationship (er) diagrams and state transition diagrams.
- Preparation of Software Requirement Specifications (SRS)and hardware specifications.



- Plan the systems design phase of the SDLC.
- Identification of Functional & Non-functional design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.
- Design and evaluate user interfaces.
- Perform coding for the project.
- Prepare documentation of project
- Perform various testing techniques/strategies.
- Be able to generate various reports in project.
- Able to deploy the project on machine/lab/real time environment
- Identification of the maintenance procedures.
- To decide the future scope and further enhancement of the system.
- Plan for appendices (if any) to be placed in support with the project report documentation.

## Types of Project

The majority of the students are expected to work on real-life project preferably in some industry/ research and development laboratories / educational institution / Software Company. However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of her/his supervisor and if approved, the student commences working on it.

### Project Synopsis Format

The project proposal should be prepared in consultation with supervisor. Approval of the project proposal is mandatory to continue and submit the project work. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken.

The project proposal should contain complete details in the following form:

- Title of the project
- Name of the supervisor (external supervisor(company)from / internal supervisor (teacher of the MCA ))
- Introduction and objectives of the project
- Analysis (DFDs, ER diagrams, class diagrams, time line etc. As per the project requirements).
- A complete structure which includes:
  - Name of modules and their description
  - Database / data structures description
  - Process logic of each module( flow chart)



- Reports generation. (repor format)
- Tools / platform, hardware and software requirement specifications
- Organization/ company details with profile of supervisor (if project is carried out outside the department)

## Project Work Guidelines

The project work should normally include software development.

Not more than one student is permitted to work on a project.

The project may be done in the university campus/concern study institute or in an approved sponsoring organization in view of the proposed topic.

A candidate is required to present the progress of the project work during the semester as per the schedule.

## Project Report Preparation

Good quality white A4 size paper should be used for printing and duplication. Care should be taken to avoid smudging pages while duplicating the copies.

Page Size – A4 (21 cm x 29.7 cm) – Orientation – Portrait

Page Margins -Left Margin-3.0cm, Right Margin- 2.0 cm, Top Margin 2.54 cm, Bottom Margin 2.54 cm, Line Spacing – single, Font Name -Times New Roman/Bookman Old Style

Font Size – 12 for normal text, 14 for headings, 16 for chapter heading,

Page Numbers - all text pages as well as program source code listing should be numbered at the bottom of the pages.

Software Used - MS-Word or Open Office or any other Open Source software.

The project report should contain the following:

1. Front page – PINK color with Black text.
2. Certificate from the supervisor with her/his signature and date.
3. Certificate from company/industry in their letter head (if project is carried out outside the department)
4. Certificate of originality/ self-certificate
5. The project report documentation should include the following topics (as per the project requirements).
6. Acknowledgements
7. Table of contents / index with page numbering
8. Introduction / objectives of the project
9. System analysis
10. Feasibility study
11. Software and hardware requirement specifications
12. System design
13. Coding
14. Validation checks



15. Testing (testing techniques and testing strategies used along with the test data and the errors listed for each test case).
16. Reports, tables figures should be properly numbered/labeled
17. Screen shots of projects
18. Implementation and maintenance
19. Conclusion
20. Future scope and further enhancement of the project
21. Bibliography/ references
22. Appendices (if required)

A properly labeled and signed CD which contains the soft-copy of all the program's source code and executables, databases, reports, screenshots and documentation in MS Word / Libre & PDF format should be kept in a thick envelope and must be pasted inside of the back cover of the project report.

Two copies of the original project report in bound form are to be submitted. Each group is required to prepare individual copy of project report in CD and submit along with his/her project report in MS Word / Libre as well as PDF. The same must contain the report, results, screenshots, errors, databases, source codes (wherever it is not feasible explicit approval from the supervisor must be obtained).

### Project Evaluation

Internal evaluation is done on the basis of following

- Project analysis & planning
- Project design & development
- Project testing & validation
- Project documentation
- Project presentation & viva

To fulfill the above three presentation must be carried out phase wise in the whole semester for internal assessment of the project.

The standard formats of the title cover of the project reports and other standard certificates are given ahead. All students are advised to use these formats to present their reports.



# MK UNIVERSITY

Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265  
Established by the Gujarat Govt. Recognized by UGC under Section 2(f) of UGC Act, 1956

PROJECT REPORT ON

“.....TITLE OF THE PROJECT .....”

Submitted in partial fulfilment of the requirements for the award of the degree  
Master of Computer Applications (MCA)

SESSION :20 - 20



Project Guide:

Internal Guide:

Submitted By:  
Name of Student  
Enrollment No.  
Roll No.

Submitted to

Department of Computer Science and Applications

MK UNIVERSITY PATAN, GUJARAT



## PROJECT CERTIFICATE

This is to certify that the project report entitled \_\_\_\_\_ submitted to MK University, Patan, in partial fulfillment of the requirement for the award of the degree of Master of Computer Applications(MCA), is original work carried out by myself Mr/ Ms \_\_\_\_\_ with enrolment no. \_\_\_\_\_ under the Supervision of Prof./Dr./Mr./Ms.\_\_\_\_\_. The matter embodied in this project is genuine work done by myself and has not been submitted whether to this University or to any other University / Institute for the fulfillment of the requirement of any course of study.

Date:

Name & Signature of the Student  
Contact Details (Email, Phone & Address)

Verified by the Supervisor  
Name & Signature of the Supervisor/s  
Date: .....



## ACKNOWLEDGEMENT

This Major Project is the result of contribution of many minds. I would like to acknowledge and thank my project guide..... (Faculty Name) for his/her valuable support and guidance. He/she guided me through the process from conception and till the completion of this project. I would also like to thanks my class teacher/institute director .....and my all my faculties..... I thank to lab staff members.....and other non-teaching members.

I am very thankful for the open-handed support extended by many people. While no list would be complete, it is my pleasure to acknowledge the assistance of my friends who provided encouragement, knowledge and constructive suggestions.

Signature of Student  
(Name of student)  
(Roll No -----)  
(Enrollment No -----)



## SELF-CERTIFICATE

This is to certify that the Major Project report entitled “-----  
-----” is done by me, and it is authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Master of Computer Application(MCA) under the guidance of.....(Faculty name ) and ( Faculty name ). The matter and software embodied in this project have not been submitted earlier for the award of any degree or diploma to the best of my knowledge and belief.

Signature of Student  
(Name of student)  
(Roll No -----)  
(Enrollment No -----)



## CERTIFICATE FROM PROJECT GUIDE

This is certify that this Major Project entitled " \_\_\_\_\_ " Submitted in partial fulfillment of the requirements for the award of the degree of Master of Computer Application (MCA) in session (years 20\_\_ to 20\_\_) to the MK University, Patan, Gujarat, done by \_\_\_\_\_(student name) is an authentic work carried out by his/ them at "... ..... "(department name) (-----Place) under my guidance. The matter and software embodied in this project work has not been submitted earlier for the award of any degree or diploma to the best of my knowledge and belief.

Signature:

Name of the Guide:

Designation:



## MCA402 Development and Operational Tools (DevOps)

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA402	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Understand the principles of continuous development and deployment.
- Understand and use AWS Services.
- Concepts of version control and using Git for version control
- Understand and use the container Technology
- Using DevOps tools like Git, Docker etc. in various aspects of DevOps delivery model.

### COURSE OUTCOME

- Explain the principles of continuous development and deployment of software.
- Using AWS Services
- Using Git for version control
- Use container Technology in Software development
- Using DevOps tools like Git, Docker etc in various aspects of DevOps delivery model.

## UNIT-WISE SYLLABUS

### UNIT-I

What is DevOps?, Why is DevOps is Needed?, How is DevOps different from traditional IT?, Why is DevOps used?, DevOps Lifecycle, DevOps Work Flow, DevOps Vs Agile, DevOps Principles, Roles, Responsibilities, and Skills of a DevOps Engineer, Various DevOps Tools

Amazon Web Services - Cloud Computing, Advantages, Types of Cloud Computing, Amazon Web Services Cloud Platform Overview, Features of Elastic Compute Cloud (EC2), AWS Services, AWS Management Console, AWS Command Line Interface, Region, availability Zone and edge location, Amazon EC2 root device volume, Creating and Launching EC2 windows and Linux Instances, Connecting to Linux and Windows Instances, Managing Security Group, Identity access Management (IAM), Create IAM users and Group, Assign policy to IAM users and Groups, Configure IAM roles to access AWS resources

### UNIT - II

Version Control with Git - About Version Control, Local Version Control Systems, Centralized Version Control Systems, Distributed Version Control Systems, What is Git?, A Short History of Git, difference between Git and any other VCS, The Three States of Git - modified, staged, and committed, Why Git for your organization, Install and Using Git, Common commands in Git, Working with Remote Repositories

### UNIT - III

Container Technology - Introduction to Containers?, Benefits of Containerization, How Do Containers Work?, Virtual Machines vs Containers, brief intro to Container Terminology, Overview of Container Architecture, Installing Container engine tool, Creating Containerized Services, Provisioning Containerized Services



## UNIT - IV

Managing Containers - What is Container management, Benefits of Container management, Container management strategy, Pull Docker images from Docker hub, Managing the Life Cycle of Containers, Attaching Persistent Storage to Containers, Accessing containers, Managing Container Images - Accessing Registries (public and Private), Manipulating Container Images

## UNIT - V

Creating Custom Container Images - Designing Custom Container Images, Building Custom Container Images with Docker file

Configuration Management with Ansible - Introduction to Ansible, Ansible Installation, Configuring Ansible Roles, Write Playbooks, working with playbooks, manage ansible variables, Executing adhoc command, Ansible Variables.

## TEXT & REFERENCE BOOKS

- Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
- Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014
- Hands-On Azure Devops: Cidc Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for DevOps and Microsoft Azure (English Edition) Paperback - 1 January 2020
- by Mitesh Soni
- Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
- David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.
- Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
- <https://www.jenkins.io/user-handbook.pdf>
- <https://maven.apache.org/guides/getting-started/>

## LIST OF PRACTICAL

- Create AWS Account
- Launch Linux and Windows Instances
- Connecting to Linux and Windows Instances
- Create IAM users and Groups
- Manage IAM Policy and Roles
- Create github account
- Create public and private repository
- Working with github repository
- Installation of Docker / Podman / Rocket
- Creating Containerized Services (Database and webserver instances)
- Maria DB / My Sql / Nginx / Httpd
- Persisting a MYSQL Database



- Managing a MYSQL Container
- Managing Images (tags)
- Creating Custom Container Images
- Install ansible on control node
- Execute adhoc command
- Working with playbooks
- Manage ansible variables



## MCA4031 SERVER HARDENING

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4031	4/4	0	0	4/4	80	20	-	100

### UNIT-WISE SYLLABUS

#### UNIT-I

Software & Hardware available to enhance the network security: Software solutions include firewalls (both hardware and software), antivirus/anti-malware software, intrusion detection and prevention systems, and network security monitoring tools, Vulnerability Scanners, Endpoint Security, Cloud Security, and Web Security. Hardware solutions include firewalls, network access control (NAC) devices, and VPN hardware. Goals: complete network Security, Prevent unauthorized access to network with stateful and deep packet inspection for network, application and user identity-based security.

#### UNIT-II

**Centralized authentication:** Centralized authentication, IPA server, and LDAP: create, delete, modify users and specify permission for users from a centralized server. Goals: server that provides centralized authentication, authorization and account information by storing data about user, groups, hosts and other objects necessary to manage the security aspects of a network of computers.

#### UNIT-III

**CVE** (Common Vulnerability and Exposure) **OWASP:** Online platform/database for known vulnerabilities, gaining knowledge about the vulnerability, using the existing exploit, modifying the exploits as per needs. Goals: To know about organization that operates research to identify and catalog vulnerabilities in Software or firmware into a Free “Dictionary” for organizations to improve their security.

#### UNIT-IV

**Advance ACL, PAM:** ACL Rules, how ACL rules work, how to apply, and authentication schemes using PAM, working with API. Goals: help us to provide dynamic authentication support for applications and services in a Linux system.

#### UNIT-V

**Data recovery:** Data recovery after Ransom ware, HDD Crash, Android Data Recovery: Data Recovery using software's Goals: how to recover data in different scenario i.e. after a ransom wares attack, data wipe etc.

### TEXT & REFERENCE BOOKS

1. Michael Sikorski, Andrew Honig-“Practical Malware Analysis: The Hands On Guide to Dissecting Malicious Software” publisher William Pollock
2. Donald A. Tevault-Mastering Linux Security and Hardening: Secure your Linux server and protect it from intruders, malware attacks, and other external threats



## LIST OF PRACTICAL

1. Implement the complete network security through unauthorized access and deep inspection of packets for network and applications on the basis of user identity-based security.
2. Store and manage data about user, groups, hosts and other objects necessary for providing the optimal the security computers of network using centralized authentication and authorization
3. Detect, catalog into a Free “Dictionary” , prioritize, mitigate and manage vulnerabilities in Software or firmware of organizations to improving their security.
4. Implement the dynamic authentication support for applications and services in a Linux system.
5. Recover data in different scenario i.e. After a RANSOMWARE/SMSWARE/ADWARE attack, data wipe etc.
6. Implementation of DVWA kit for Secure coding and testing
7. Mitigation from SQL Injections and other attacks.



## MCA4032 CLOUD COMPUTING

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4032	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES

- To get Introduced to various Computing Paradigms
- To Learn Fundamentals of Cloud Computing and managements.
- To Know Various Cloud Computing Technologies
- To Understand and implement Virtualization
- To study Technological Drivers for Cloud Computing
- To learn Data Storage in Cloud
- To Learn Elements and Services in Cloud Computing
- To Learn and implement Application Platform for Cloud Applications.
- To understand Various Cloud Services.
- To Know and implement Tools of Cloud Computing

### COURSE OUTCOMES

- Describe the Key concepts, Advantages, Limitations and Applications of Cloud Computing
- Explain the various Models and services of Cloud.
- Understand and Describe the Core Issues and challenges of cloud computing Such as Security, Privacy, and Interoperability.
- Select and Apply Suitable Technologies, Tools and Applications in the Cloud Computing Driven Systems
- Design and develop the efficient solutions of the Cloud Computing problems and issues with consideration of environment and sustainable development.
- Analyze the interface requirement for deploying the Applications in Cloud

## UNIT-WISE SYLLABUS

### UNIT – I

Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano-computing, Network Computing.

Cloud Computing Fundamentals: Motivation, Need, Definition, Principles, Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services, Cloud Computing Architecture- User/Client Layer, Network Layer, Cloud Management Layer, Hardware Resource Layer, Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access Networking.

### UNIT – II

Cloud Computing Management: Cloud Applications, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud,



Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Introduction to Open Source Tools for IaaS, Paas& SaaS.

## UNIT – III

Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multicore Technology: Multicore Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0:Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education, Web 3.0:Components, Semantic Web, Web Services, Characteristics, Convergence of Cloud and Web 4.0, Connecting Information: Face-book, Agile Software Models: Agile SDLC for Cloud Computing, Features of Cloud SDLC, Agile Software Development Process, Advantages of Agile, Cloud Application Development Platforms: Windows Azure, Google App Engine, Force com, IBM Cloud Computing API

## UNIT – IV

Virtualization: Full Virtualization, Para virtualization, Hardware-Assisted Virtualization, Hypervisor, OS Virtualization, Server Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Application Virtualization, Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application Virtualization, Hypervisors, Types of Hypervisors, Security Issues and Recommendations, From Virtualization to Cloud Computing, VMware, Microsoft Hyper-V, Open Virtualization (Ovirt) overview

## UNIT – V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue Service, Microsoft Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM Smart Cloud, Security in Cloud Computing, Cloud General Challenges.

## TEXT & REFERENCE BOOKS

- Essentials of CLOUD COMPUTING, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2 ]
- Raj Kumar Buyya, James Broberg, and RezeiMGoscinski- Cloud Computing: Principles and Paradigms-Wiley.
- Srinivasan, J.Suresh, -Cloud Computing – A Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
- Toby Velte, Anthony Velte, Robert Elsenpeter- Cloud Computing, A Practical Approach - McGraw Hill, ISBN: 0071626948
- Greg Schulz -Cloud and Virtual Data Storage Networking, Auerbach Publications, ISBN: 978-1439851739.
- Marty Poniatowski- Foundations of Green IT, ISBN: 978-0137043750.
- Learning Spring Application Development, Ravi Kant Soni, Packt Publishing.
- Michael Miller, Cloud Computing.
- Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for Dummies.
- BorkoFurht, Armando Escalante, Handbook of Cloud Computing, Springer, 2010.



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## LIST OF PRACTICAL

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Suggested Practical for development of applications for following tasks/tools:

- Install Virtual Machine
- Create Virtual Machine
- Manage Virtual Machine Images
- Installing and Configuring Ovirt
- Creating Managing Datacenters and Clusters
- Adding Physical Hosts (Configure Hypervisors)
- Managing User Accounts and Roles
- Managing Red Hat Virtualization Storage
- Deploying and Managing Virtual Machines
- Managing Virtual Machine Images
- Automating Virtual Machine Deployment



## MCA4033 PROFESSIONAL COMMUNICATION SKILLS

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4033	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES:

- Improve Verbal and Non-Verbal Communication Style
- Enhance Interpersonal Skills.
- Communicate Clearly and With Impact
- Develop Oral and Written Language Skills
- Develop Reading, Listening, Speaking Skills,

### COURSE OUTCOME:

- Explain and use Basic Concept of Communication.
- Demonstrate the Phonetic Capability in Communication.
- Indulge the Soft and Ethical Skills in Their Personality
- Participate in Group Discussion, Mock Interview, Group Presentation etc.
- Explain and use Leadership Skills, Time Management Skills, Public Speaking Skills, and Situation Handling Skills to Solve the Societal Problem.

## UNIT -WISE SYLLABUS

### UNIT - I

Elements of Communication: the Importance and Scope of Communication Through English at the Present Time, the Process and Factors of Communication: Sender, Receiver, Channel, Code, Topic, Message, Context, Feedback, 'Noise', Filters and Barriers. Purpose of Communication, Verbal and Non Verbal Communications.

### UNIT - II

Sounds of English: Vowels, Diphthongs, Consonants, Consonant Clusters, the International Phonetic Alphabet (IPA) ; Phonemic Transcription, Problem Sounds, Stress and Intonation

### UNIT - III

Developing Reading and Writing Skills: the Importance of Developing Reading and Skills, Benefits of Effective Reading, the Importance of Writing Skills, the Differences Between Speech and Writing, the Qualities of Effective Writing: Art of Condensation, Writing Effective Sentences, Developing Logical Paragraphs, Précis, Essay, Drafting, Editing.

### UNIT - IV

Soft Skills Practice and Ethical Skills: Personality Development, Participating in Group Discussion and Job Interviews, Time Management Presentation Skills, Leadership Skills, Public Speaking, Extempore, Expressing Oneself in Various Situations, the Illusion of Communications, Danger of Half Baked Ideas, the Art of Explanation.

### UNIT - V



Self Presentation: Dress Code, Business Card, Handshake, Telephone Etiquette, Email Etiquette, Dining Etiquette, office Etiquette, International Business Etiquette, Approaches to Professional Writing, Writing a C. V, Resume, Applications, Reports, Business and Social Letters, Notices, Circulars and Memos.

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## TEXT & REFERENCE BOOKS

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- Practical English Usage, Michael Swan, Oxford
- English for Effective Communication, Sanjay Kumar and Pushplata, Oxford
- B. K. Das et al-An Introduction to Professional English and Soft Skills -Cambridge University Press.
- Bovee et al Business Communication Today - ( Pearson)
- Meenakshi Raman and Prakash Singh-Business Communication - -(Oxford)
- Brian Clegg - Crash Course in Personal Development - Kogan Page
- Adele B. Lynn Activities for Developing Emotional Intelligence -(HRD Press)
- Edward De Bono -Lateral Thinking -Penguin



## MCA4034 BIG DATA ANALYTICS

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4034	4/4	0	0	4/4	80	20	-	100

### COURSE OBJECTIVES:

- Familiarize the students with most important information technologies used in manipulating, storing, and analyzing big data.
- This course gives students all around learning of the big data framework using Hadoop and spark, including yarn, HDFS and Map Reduce
- It provides an overview of approaches facilitating data analytics on huge datasets.

### COURSE OUTCOME:

- Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
- Demonstrate an ability to use Hadoop framework to efficiently store retrieve and process Big Data for Analytics.
- Implement several Data Intensive tasks using the Map Reduce Paradigm

## UNIT-WISE SYLLABUS

### UNIT - I

Big Data- Introduction, Characteristics, Types, Elements, Traditional vs. Big Data Business Approach, Big Data Analytics, Advantages, Applications, Distributed & Parallel Computing for Big Data, Components in Big Data Architecture, Virtualization Approaches.

Statistics and Probability: Sampling Techniques - Data Classification, Tabulation, Frequency and Graphic Representation, Measures of Central Value - Mean Mode, Median, Random Variable and Probability Theory.

**UNIT – II :** Hadoop- Introduction, Features, Advantages, Versions, Key Considerations of Hadoop, RDBMS Vs Hadoop, Hadoop Eco-system, HDFS - Architecture, Features, Commands, Processing Data with Hadoop, Hadoop Yarn.

### UNIT – III

Map Reduce Framework, Features, Uses, Working on Map Reduce, Map Reduce Input and Output Operations, Exploring Map and Reduce Functions, Map Reduce Optimization Technique, HBASE Introduction, Architecture, HBASE in Hadoop Applications.

### UNIT - IV

Processing Data with Map Reduce, Task Execution & Environment – Installation of Eclipse, Hadoop, Java Development Kit and Linux Ubuntu OS, Map Reduce Program Steps to Obtain Word Count, Functionality of Input Format- Input split, Record reader, File input format, Output Process of File output format – Output format, Record writer, Role of Combiner, Partitioned, Debugging Map Reduce.

### UNIT –V

Introduction Big Data Analytics and types -Descriptive Analytics, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics, Cyber Analytics. Big Data Applications: Social Media Analytics, Healthcare Analytics, Financial Analytics, Urban Planning-commerce and Supply Chain Management.

## TEXT & REFERENCE BOOKS

- Rob Kitchin The Data Revolution: Big Data Open Data Data Infrastructures and theirConsequences SAGE Publications Ltd
- Croll and B. YoskovitzLean Analytics: Use Data to Build a Better Startup Faster o'reilly
- Mayer-Schönberger and K. CukierBig Data: A Revolution That Will Transform How We Live Work and Think



# MK UNIVERSITY

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**Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265**

**Established by the Gujarat Govt. Recognized by UGC under Section 2(f) of UGC Act, 1956**

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- E. Siegel-Predictive Analytics: The Power to Predict Who Will Click Buy Lie or Die
- Bernard Marr-Big Data in Practice Wiley publication.



## MCA4035- IT AUDIT

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4035	3/3	0	1/2	4/5	60	20	20	100

### UNIT-WISE SYLLABUS

#### UNIT-I

IT Governance: This includes frameworks like COBIT and COSO, which provide guidelines for managing IT resources and ensuring alignment with business objectives. Risk Management: Identifying, assessing, and mitigating risks related to IT systems and data. Internal Controls: Understanding and evaluating the effectiveness of controls within IT systems. IT Security: Examining security measures, such as access controls, data encryption, and incident response plans.

#### UNIT-II

IT Audit Process: Audit Planning: Developing an audit plan, including scope, objectives, and timelines. Fieldwork: Collecting and analyzing evidence, including data collection, testing controls, and interviewing personnel. Audit Reporting: Preparing and presenting audit findings, including recommendations for improvements.

#### UNIT-III

Specific Audit Areas: IT Infrastructure: Auditing hardware, software, and network infrastructure. Application Systems: Evaluating the design, development, and implementation of applications, includes application controls. Data Security: Assessing data privacy, confidentiality, and integrity, including data encryption and access controls. E-commerce Security: Auditing online transaction security and compliance with relevant regulations. Data Analytics: Using data analytics to identify vulnerabilities and risks within IT systems.

#### UNIT-IV

Emerging Technologies: Cloud Computing: Understanding the security and compliance implications of cloud computing. Big Data: Auditing big data platforms and applications. Artificial Intelligence (AI): Evaluating the security and ethical implications of AI systems.

#### UNIT-V

Legal and Regulatory Compliance: Information Technology Act: Understanding relevant legal frameworks and regulations. Data Privacy Regulations: Compliance with regulations like GDPR and CCPA

### TEXT & REFERENCE BOOKS

1. Information Technology Control and Audit, 4th Edition [Paperback] by Sandra Senft, Frederick Gallegos, Aleksandrs Davis
2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by: Peter Weill & Jeanne W. Ross
3. COBIT 2019 Framework: Introduction and Methodology, Publisher: ISACA
4. IT Auditing: Using Controls to Protect Information Assets by Authors: Chris Davis, Mike Schiller, Kevin Wheeler
5. Auditing IT Infrastructures for Compliance (2nd Edition) By Martin Weiss, Michael G. Solomon
6. Data Analytics for Internal Auditors by Richard Cascarino



## MCA4041 BLOCKCHAIN TECHNOLOGY

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4041	3/3	0	1/2	4/5	60	20	20	100

### OBJECTIVE

- To provide conceptual understanding of how block chain technology
- To provide conceptual understanding of how block chain technology can be used to innovate and improve business processes.
- To acquire skills to develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
- To develop & integrate ideas from various domains and implement them using block chain technology in different perspectives

### OUTCOMES

- Understand block chain technology.
- Develop block chain based solutions and write smart contract using hyper ledger Fabric and Ethereum frameworks.
- Build and deploy block chain application for on premise and cloud based architecture.
- Integrate ideas from various domains and implement them using block chain technology in different perspectives

## UNIT-WISE SYLLABUS

### UNIT I

Distributed computing introduction, Electronic Cash System introduction, The shortcomings of current, transaction systems, Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs. Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain

### UNIT II

Cryptography- encryption and decryption model, services-Confidentiality, Integrity, Authentication, Non-repudiation and Accountability, Symmetric cryptography, Asymmetric cryptography, Cryptographic Hash Function, Properties of a hash function, SHA-256, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic crypto currency.

### UNIT III

Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hash cash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

### UNIT IV

Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain-



Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems. Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain

## UNIT V

Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda

## TEXT & REFERENCE BOOKS

- Mastering Blockchain by Imran Bashir, Packt Publishing Ltd. ISBN 978-1-78883-904-4
- Mastering Bitcoin by Andreas M. Antonopoulos, O'Reilly Media, Inc. ,
- Blockchain For Dummies, IBM Limited Edition by Manav Gupta, John Wiley & Sons, Inc. ,ISBN: 978-1-119-37123-6 (pbk); ISBN: 978-1-119-37139-7 (ebk)
- BLOCKCHAIN E-BOOK by Cybrosys Limited Edition
- Melanie Swan, “Block Chain: Blueprint for a New Economy”, O'Reilly, 2015
- Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chainTechnology and Leveraging Block Chain Programming”
- Daniel Drescher, “Block Chain Basics”, Apress; 1<sup>st</sup>edition, 2017
- Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.
- Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing
- Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build Smart Contracts for Ethereum and Block Chain”, Packt Publishing
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, Venkatraman Ramakrishna, “Hands-On Block Chain with Hyperledger: Building Decentralized
- Applications with Hyperledger Fabric and Composer”, Import, 2018

## LIST OF PRACTICAL

1. Install and understand Docker container, Node.js, Java and Hyper ledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on Cloud to run.

<https://github.com/hyperledger/>

<https://docs.docker.com/get-started/>

<https://console.ng.bluemix.net/docs/services/blockchain/index.html>

[https://console.bluemix.net/docs/containers/container\\_index.html#container\\_index](https://console.bluemix.net/docs/containers/container_index.html#container_index)

2. Create and deploy a block chain network using Hyper ledger Fabric SDK for Java

Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your block chain network

(<https://developer.ibm.com/patterns/create-and-deploy-blockchain-network-using-fabric-sdk-java/>)



3. Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules (<https://developer.ibm.com/patterns/interacting-with-a-blockchain-network/>)
4. Deploy an asset-transfer app using block chain. Learn app development within a Hyper ledger Fabric network  
[\(https://developer.ibm.com/patterns/deploy-an-asset-transfer-app-using-blockchain/\)](https://developer.ibm.com/patterns/deploy-an-asset-transfer-app-using-blockchain/)
5. Use block chain to track fitness club rewards  
Build a web app that uses Hyper ledger Fabric to track and trace member rewards  
[\(https://developer.ibm.com/patterns/fitness-club-rewards-points-iot-and-retail-integration/\)](https://developer.ibm.com/patterns/fitness-club-rewards-points-iot-and-retail-integration/)
6. Car auction network: A Hello World example with hyper ledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyper ledger Fabric to invoke chain code while storing results and data in the starter plan  
[\(https://developer.ibm.com/patterns/car-auction-network-hyperledger-fabric-node-sdk-starter-plan/\)](https://developer.ibm.com/patterns/car-auction-network-hyperledger-fabric-node-sdk-starter-plan/)
7. Develop an IoT asset tracking app using Block chain. Use an IoT asset tracking device to improve a supply chain by using Block chain, IoT devices, and Node-RED  
[\(https://developer.ibm.com/patterns/develop-an-iot-asset-tracking-app-using-block chain/\)](https://developer.ibm.com/patterns/develop-an-iot-asset-tracking-app-using-block-chain/)
8. Secure art using block chain digital certificates. Node.js-based auction application can help democratize the art market(<https://developer.ibm.com/patterns/securing-art-using-blockchain-digital-certificates/>)
9. Mini projects such as :
  - Block chain for telecom roaming, fraud, and overage management. See how communication service providers use block chain to enhance their value chains.  
<https://developer.ibm.com/patterns/blockchain-for-telecom-roaming-fraud-and-overagemanagement/>
  - Use IoT dashboards to analyze data sent from a Block chain network. Build an IoT app and IoT dashboards with Watson IoT Platform and Node-RED to analyze IoT data sent from a Block chain network  
<https://developer.ibm.com/patterns/iot-dashboards-analyze-data-blockchain-network/>
  - Create an Android app with Block chain integration. Build a Block chain enabled health and fitness app with Android and Kubernetes  
<https://developer.ibm.com/patterns/create-an-android-app-with-blockchain-integration/>
  - Create a global finance block chain application with IBM Block chain Platform Extension for VS Code. Develop a Node.js smart contract and web app for a Global Finance with block chain use case  
<https://developer.ibm.com/patterns/global-financing-use-case-for-blockchain/>
  - Develop a voting application using Hyper ledger and Ethereum. Build a decentralized app that combines Ethereum's Web3 and Solidity smart contracts with Hyper ledger's hosting Fabric and Chain code EVM



<https://developer.ibm.com/patterns/voting-app-hyperledger-ethereum/>

- Create a block chain app for loyalty points with Hyper ledger Fabric Ethereum Virtual Machine. Deploy Fabric locally with EVM and create a proxy for interacting with a smart contract through a Node. js web app

<https://developer.ibm.com/patterns/loyalty-points-fabric-evm/>



## MCA4042 Mobile Application Development

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4042	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To work with SQLite Database and content providers.
- To integrate multimedia, camera and Location based services & REST full web Services in Android Application.
- To explore publishing process of Android Application

### COURSE OUTCOMES

- Describe Android platform, Architecture and features.
- Design User Interface and develop activity for Android App.
- Use Intent, Broadcast receivers and Internet services in Android App.
- Design and implement Database Application and Content providers.
- Use multimedia, camera and Location based services in Android App.
- Discuss various stages in Android App publishing.

## UNIT-WISE SYLLABUS

### UNIT - I

Various mobile platforms, introduction to android, history and versions of android, android API, android architecture, android runtime, dalvik virtual machine, features of android, introduction and installation of eclipse and ADT plugin and/or introduction and installation of android studio, requirements and installation of android SDK, SDK manager, emulator, avd, android virtual device manager, google play account, installing android app from google play, APK file.

### UNIT - II

Setting up Development Environment, Installing Packages using SDK Manager, Android Project Structure, Creating Hello Android App, Deploy it on USB-connected Android device, Setting up an Emulator, Android Tool Repository, Manifest File, DDMS, File Explorer, Installing and Running Android - Hello App, Activity Life Cycle and its methods, Logcat, Components of an Android App – Activity, Service, Broadcast Receiver, Content Provider

### UNIT - III

Layout – Linear Layout, Relative Layout, Scroll View Layout, Table Layout, Frame Layout, UI Resources – Layout Resources, UI Elements, Views – Text view, Edit Text, Button, Check Box, Radio Button, Image Button, Spinner, Navigating between Activities – Intent, Exchanging Data between Activities, Action Bar, Event Handling, Listeners, Notifying the User –Toast.

### UNIT - IV



Using Threads, Image View, Exception Handling, Multimedia - Playing Audio using an Intent, Playing Video using an Intent, Playing Audio using Media Player, Playing Video using Video View, Fragment, Fragment Life Cycle.

## **UNIT - V**

SQLite database, creation of database and tables, CRUD operations – create, retrieve, update and delete operations, Cursor, list view,

Introduction – REST full web Services, JSON, Google Play Services, location services, publishing apps.

## **TEXT & REFERENCE BOOKS**

- Michael Burton, Donn Felker, "Android Application Development for Dummies", Dummies, ISBN : 9788126538775
- Pradeep Kothari, " Android Application Development (with Kitkat Support)", Kogent Learning Solutions Inc., Black Book, DreamTech Press, ISBN : 9789351194095
- W. Frank Ableson, Robi Sen, Et. Al., " Android in Action", Manning, ISBN : 9789350042915
- Charlie Collins, Michael Galpin, Et. Al., " Android in Practice", Manning, ISBN : 9789350042397
- Anubhav Pradhan, Anil V Deshpande, "Composing Mobile App, Learn | Explore | Apply using Android", Wiley, ISBN : 9788126546602
- James C. Sheusi, " Android Application Development For Java Programmers", Cengage Learning, 2013.
- Wallace Jackson, "Android Apps for Absolute Beginners", Apress, ISBN : 9788132211372
- <http://www.developer.android.com>

## **PRACTICAL LIST ON MOBILE APPLICATION DEVELOPMENT**

1. Installing Android Environment
2. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the emulator. Also display “Hello World” in the middle of the screen in the Android Phone.
3. Create an application with login module. (Check username and password).
4. Create spinner with strings taken from resource folder (res >>> value folder) and on changing the spinner value, Image will change.
5. Create a menu with 5 options and selected option should appear in text box.
6. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
7. Create an application with three option buttons, on selecting a button color of the screen will change.
8. Create and Login application as above. On successful login, pop up the message.
9. Create an application to Create, Insert, update, Delete and retrieve operation on the database.
10. Create a Simple Application using Android Resources.
11. Create a Simple Application using Layouts.
12. Create a Simple Application using Intents.



# MK UNIVERSITY

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**Campus: Deesa -Highway, Opp. Hngu, Matarvadi Part, Gujrat-384265**

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13. Create a Simple Application using user interfaces.
14. Create a Simple Application for playing Audio and Video files.



## MCA4043- DATA VISUALIZATION

Subject Code	L	T	P	Credit	Theory	Internal	Practical	Total Marks
MCA4043	3/3	0	1/2	4/5	60	20	20	100

### COURSE OBJECTIVES

- Acquire and develop the skills for both design and critique visualizations through Conducting Exploratory and Explanatory analysis of data using visualization.
- Understand the importance data visualization, type of data and its impacts on data visualization.
- Understand and learn the principles of perception for Crafting visual presentations of data for effective communication and evaluation of visual design alternatives.

### COURSE OUTCOMES

- Prepare data for visualization and analysis.
- Demonstrate and apply Exploratory and Explanatory analysis skills for data visualization and evaluation of visual alternatives.
- Explain the importance data visualization, type of data and its impacts on data visualization.
- Demonstrate the color palettes, principles of perception and cognition and apply them for crafting visual presentations of data for effective communication and evaluation of visual design alternatives.

## UNIT-WISE SYLLABUS

### UNIT I

Introduction to data visualization, The data visualization process, Importance of data visualization, Model of communication systems, Types of Communication Problems- technical, semantic and effectiveness, Data types, relationships, and visualization formats, Basic principles for data visualization - Principles of Communicating Data- Know your goal, use the right data, select suitable visualizations, design for aesthetics, choose an effective medium and channel, check the results, Data storytelling for social and market communication, Trends in market research and data visualization dashboards.

### UNIT II

Power BI - Introduction, Features, Power BI Products, Power BI Architecture, Download and Installation of Power BI, Using Desktop Workspace, Power BI User Interface, Workspace, Toolbar, Menu, Visuals, Dashboards, Fields Pane, Data Types, File Types.

### UNIT III

Data connection with data sources like Text File and Microsoft Excel, Power BI Calculations – Calculated Columns, Measures, Quick Measures using DAX (Data Analysis Expressions), Power BI Expressions – Field, Operator, Constant, Parameter, and Comment, DAX Operators – General operators, Arithmetic operators, Relational operators, and Logical operators, DAX Functions – Number functions, Text functions, Date functions, Logical functions, and Aggregate functions, Data transformation using Power Query Editor – Merging, Appending, Splitting, Filtering, and Cleaning data, Power BI Filters – Basic Filters and types: Visual-level, Page-level, Report-level filters.

### UNIT IV

Visual displays of information – simple text, tables, graphs, points, lines, bars, area Power BI charts & visuals – bar chart, line chart, pie chart, column chart, bubble chart, area chart, donut chart, scatterplot, tree map, waterfall chart, gauge, matrix, cards, slicers ,Creating interactive dashboards – designing reports using visuals, configuring drill through and tooltips



## UNIT V

Clutter, gestalt principles of visual perception – proximity, similarity, enclosure, closure, continuity, and connection types of visual clutter – lack of visual order, alignment, white space and non-strategic use of contrast, pre-attentive attributes design principles for effective data communication – use of layout, color, contrast, and minimalism in power bi best practices for designing user-centric, accessible power bi reports

## TEXT & REFERENCE BOOKS

- Microsoft Power BI for Dummies ,by Jack A. Hyman , Wiley
- Visualize It!: A Comprehensive Guide to Data Visualization by Netquest Available online at <https://www.netquest.com/en/download-ebook-data-visualization>
- Data Visualization Techniques Angie Ficek Available online at <https://www.cehd.umn.edu/OLPD/MESI/spring/2015/Ficek-DataVis.pdf>
- Ben Jones, Communicating Data with Tableau O'Reilly Media, Inc. Publication, ISBN: 978-1-449-37202-6
- Claus O. Wilke, Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, O'Reilly Media, Inc. Publication, ISBN - 9781492031086
- Cole Nussbaumer-knaflic, Storytelling with Data, John Wiley Publication, ISBN 9781119002062 (ePub)
- Interactive Data Visualization - Foundations, Techniques, and Applications by Matthew Ward, Georges Grinstein, Daniel Keim, CRC Press, Taylor & Francis Group