

# Government College of Engineering, Aurangabad

An autonomous Institute of Government of Maharashtra

Department of Master of Computer Application

T.Y.M.C.A.

Proposed Curriculum Structure and Scheme of Evaluation

Effective from Academic Year 2015-16

## Semester - I

Course Code	Name of Subject	Teaching Scheme (Hours/Week)				Examination Scheme - Marks					
		L	T	P	Total Credits	Test	TA	ESE	Practical	TW	Total
<b>Theory Courses</b>											
MCA351	Mobile Computing	4	1	--	5	20	20	60	--	--	100
MCA352	Advanced Database Management Systems	3	1	--	4	20	20	60	--	--	100
MCA353	Big Data Analytics	3	1	--	4	20	20	60	--	--	100
MCA354 TO MCA358	Elective	4	-	--	4	20	20	60	--	--	100
<b>Laboratory Courses</b>											
MCA359	Lab: Mobile Computing	--	--	4	2	--	--	--	50	50	100
MCA360	Lab : Advanced Database Management Systems	--	--	2	1	--	--	--	25	25	50
MCA361	Lab: Big Data Analytics	--	--	2	1	--	--	--	25	25	50
MCA362 TO MCA366	Lab: Elective	--	--	2	1	--	--	--	25	25	50
MCA367	Lab: Software Project Development	--	--	4	2	--	--	--	50	50	100
<b>Total of Part I</b>		<b>14</b>	<b>3</b>	<b>14</b>	<b>24</b>	<b>80</b>	<b>80</b>	<b>240</b>	<b>175</b>	<b>175</b>	<b>750</b>

## Semester – II

Course Code	Name of Subject	Teaching Scheme (Hours/Week)				Examination Scheme - Marks					
		L	T	P	Total Credits	Test	TA	ESE	Practical	TW	Total
MCA368	Dissertation	--	--	24	24	--	--	--	100	100	200
<b>Total of Part II</b>		<b>--</b>	<b>--</b>	<b>24</b>	<b>24</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>100</b>	<b>100</b>	<b>200</b>

### Elective

MCA354 – Embedded System Design  
MCA355– Cloud Computing  
MCA356 - Distributed Operating System  
MCA357 – Image Processing  
MCA358 – Network Infrastructure Management

### Elective Lab -

MCA362 – Lab : Embedded System Design  
MCA363 - Lab : Cloud Computing  
MCA364 - Lab : Distributed Operating System  
MCA365 – Lab : Image Processing  
MCA366 – Lab : Network Infrastructure Management

**(L-Lectures,T-Tutorials,P-Practical,TA-Teacher Assessment,ESE-End Semester Examination)**

**Course Code : MCA351**  
**Course Title : Mobile Computing**

**Teaching Scheme :**

Lectures : 4 hrs/week

Tutorial: 1 hr/week

Total Credits : 5

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

1. Have a good understanding of Mobile Communication
2. Find solutions for the challenges faced in existing cellular systems
3. Differentiate between several cellular systems and analyze for better solution
4. Develop android applications for mobile systems
5. Design WML and WML Scripting for WAP Protocol
6. Interpret and analyze between several mobile protocols

**Course Contents :**

**1. Wireless and Mobile Network Architecture**

Principle of Cellular Communication, Overview 1G, 2G, 2.5G and 3G and 4G technologies. GSM Architecture and Mobility management, hand off management, Network signalling. Mobile Computing fundamental challenges, Mobile Devices –PDA and mobile OS.

**2.Mobile IP Protocol Architecture**

Mobile IP and IP v 6 and its application in mobile computing. Cellular Digital Packet Data CDPD, VOIP, GPRS Services, Carrier Sense Multiple Access With Collision Avoidance (CSMA/CA), Hidden Node Problem, Exposed Node Problem, Wireless Local Loop-WLL system, Security Issues in a Mobile IPv6 Network.

**3.Wireless Application Protocol (WAP)**

The Wireless Application Protocol application environment, wireless application protocol client software, hardware and websites, wireless application protocol gateways, implementing enterprise wireless application protocol strategy, Bluetooth, Hiper LAN.

**4.Wireless Markup Language**

An Introduction to Wireless Technologies, Markup Languages, An Introduction to XML, Fundamentals of WML, Writing and Formatting Text, Navigating Between Cards and Decks, Displaying Images, Tables, Using Variables, Acquiring User Input.

**5.Wireless Markup Language Script, Application of Mobile Computing**

An Introduction to WMLScript, WMLScript Control Structures, Events, Phone.com Extensions, Usability, ASP and Dynamic WAP Sites, XML and XSLT, Dynamic WML Generation with ASP and XSLT, Developing WAP Applications using Emulators.

**Text/Reference Books:**

1. Yi Bing Lin, "Wireless and Mobile Networks Architecture", John Wiley.
2. Wrox "The Beginning WML and WML Script", Wrox Publication
3. Tomasz Imielinski et.al, Mobile Computing, Kluwer Academic Press 1996.
4. Uwe Hansmann, Pervasive Computing Handbook. The Mobile World, IEE publication 2002
5. Jochen Burkhardt, et.al. Pervasive Computing, Technology and Architecture of Mobile Internet Applications, Addison Wesley, 2002

**Course Code : MCA352**

**Course Title : Advance Database Management System**

**Teaching Scheme :**

Lectures : 3 hrs/week

Tutorial : 1 hr/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

At the end of the course, the student will be able to

- 1) Understand basic concepts of distributed database
- 2) Understand Object Based Database Concepts
- 3) Understand Oracle System Architecture
- 4) Learn Oracle 10g
- 5) Understand Web to Database Connectivity

**Course Contents :**

**Unit 1 Introduction to Database Security**

Distributed Databases and Client-Server Architectures, Distributed Database Concepts, Data Fragmentation, Replication, Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, Query Processing in Distributed Databases, Overview of Concurrency Control and Recovery in Distributed Databases, An Overview of 3-Tier Client-Server Architecture, semi joins, query optimization, concurrency control and heterogeneity issues.

**Unit 2 Object based Databases**

Foundations of Database Transaction Processing : Need for Object oriented databases, object identity, Object structure, Type constructors (object identity and its implementation)  
Complex data types: Structured & unstructured, Structured types and Inheritance in SQL, Type Inheritance, Table Inheritance, Implementation of multivalued attributes & composite attributes, Persistent programming languages, client server object basis,

**Unit 3 Oracle System Architecture**

Oracle system architecture, process structures, database, initialization, control, data and redo log files,, Data file management, Server parameter file (SPFile), online table redefinition, dynamic SGA, Constraint enhancement, Backup and recovery features, Crash Coherence

**Unit 4 Object Relational Features of Oracle**

Refer Oracle 10 g Manual : OR features

Oracle Objects

Advantages of Objects

Key Features of the Object-Relational Model

1. Object Types
2. Objects
3. Object Methods
4. Type Inheritance
5. Type Evolution
6. Object Tables
7. Row Objects and Column Objects
8. Collection Types Varrays (for multivalued attributes), Nested Table (for many to many relationships)

9. Object Relationships: Unidirectional and Bidirectional
10. Create, Insert , Delete operations on: Varrays and Nested Tables
11. ADD : XML & Databases
12. A sample application using OR features :The practicals should be based on the ORDBMS features of Oracle

### **Unit 5 Web Database Connectivity**

Application Design and Development: User Interfaces and Tools , Web Interfaces to Databases , Web Fundamentals , Servlets and JSP , Building Large Web Applications, Execution model, JSP Scripting Elements: Expressions, Scriptlets, and Declarations, Implicit Objects, Connecting Oracle using JSP.

#### **Text/Reference Books:**

1. Database system concepts: H. Korth and A. Siberchatz, S. Sudarshan
2. Fundamentals of database systems: R. Elmasri, S. Navathe, Benjamin Cummings. .
3. The Complete Reference JSP 2.0 , TMH
4. Java Server Pages , Larne Pekowsky, Addison Wesley
5. Oracle 10 G manuals

**Course Code : MCA353**  
**Course Title : Big Data Analytics**

**Teaching Scheme :**

Lectures : 3 hrs/week

Tutorial: 1 hr/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

- 1) Understanding the concepts of Big data and challenges in processing Big Data
- 2) Gain conceptual understanding of Hadoop Distributed File System.
- 3) Awareness of the concepts of map and reduce and functional programming
- 4) Identify appropriate techniques and tools to solve actual Big Data problems.

**Course Contents :**

**Unit 1 Introduction to Big Data and Hadoop**

What is Big Data, What are Challenges in processing Big data? What is hadoop, Data Storage and Analysis, Comparison with Other Systems: RDBMS, Grid Computing, Volunteer Computing; A Brief History of Hadoop, Apache Hadoop and the HadoopEcosystem.

**Unit 2 HDFS: Hadoop Distributed File System**

Significance of HDFS in Hadoop, Features of HDFS, The Design of HDFS, HDFS Concepts: Blocks, Data replication, Namenodes and Datanodes; Accessing HDFS: CLI (Command line interface), Java based Approach.

**Unit 3 Map Reduce**

Map Reduce Architecture, How map reduce works:Job Submission, Job Initialization, Task Assignment, Task Execution, Progress and Status Updates, Job Completion. Failures, Job Scheduling.

**Unit 4 Pig**

Introduction to Apache Pig, Map-Reduce vs Pig, Pig Latin, Data Processing Operators.

**Hive:** Hive introduction, Architecture, Comparison with Traditional Databases, HiveQL, Tables.

**Unit 5 HBase**

HBase Concepts, HBase Versus RDBMS. **ZooKeeper:**The ZooKeeper Service. **Case Studies:**Hadoop and Hive at Facebook, Log Processing at Rackspace.

**Text Books/Reference Books :**

1. Tom White, "Hadoop: The Definitive Guide", Second Edition, O'Reilly Yahoo Press.
2. Robert D. Schneider, "Hadoop for Dummies", Wiley.
3. VigneshPrajapati, "Big Data Analytics with R and Hadoop", Packt Publishing.

**Course Code : MCA354**

**Course Title : Elective [Embedded System Design ]**

**Teaching Scheme :**

Lectures : 4 hrs/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

- 1.Awareness of processors and hardware units in embedded system.
- 2.Identifying different types timer and counting devices and different types of communication modes.
- 3.Gaining conceptual knowledge of 8051 microcontroller
- 4.Analyze Real Time Operating System

**Course Contents :**

**Unit 1 Introduction To Embedded Systems**

Definition and Classification: Overview of Processors and hardware units in an embedded system – Software embedded into the system, Processor and memory organization, Structural units in processor, Processor selection, Memory devices , DMA, and interfacing

**Unit 2 Devices and Buses for Device Network**

I/O Devices, Timer and counting devices, Serial communication, Synchronous and asynchronous communications, I<sup>2</sup>C, USB, CAN, Advanced I/O Serial High Speed Buses : ISA, PCI, PCI-X,

**8051** - Architecture,Pin Diagram,Addressing Modes,Memory Organisation,I/O Ports

**Unit 3 Programming Concepts and Embedded Programming In C, C++**

Programming in Assembly Language (ALP) vs. High Level Language: C Program Elements, Macros and functions, Pointers, Function calls in a cyclic order, Main function pointers, Function Queues and Interrupt Service Routines, Queues Pointers , Concepts of EMBEDDED PROGRAMMING in C++ , Objected Oriented Programming , Embedded Programming in C++, 'C' Program compilers , Cross compiler , Optimization of memory codes

**Unit 4 Real Time Operating Systems**

Operating system services, I/O subsystems, Network operating systems, Real-time and embedded system operating system,, Interrupt routines and interrupt handling in RTOS,Task scheduling models, Performance metric in scheduling models, OS security issues

**Unit 5 Hardware-Software Co-design in an Embedded System**

Embedded system project design and management, Design issues in system development process, Design cycle in development phase, Use of target system, Emulators and development boards, Software development and debugging tools, Integrated development environment, Case studies of embedded system development and programming with real time operating systems for industrial applications.

**Text Books/Reference Books**

1. Raj Kamal, Embedded Systems, Architecture, Programming and Design, TATA McGrawHill.
- 2.Steve Heath, Embedded Systems Design, Second Edition, 2003, Newness.
- 3.David E. Simon, An Embedded Software Primer, Pearson Education Asia.

**Course Code : MCA355**

**Course Title : Elective [Cloud Computing]**

**Teaching Scheme :**

Lectures : 4 hrs/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

1. Identify the appropriate cloud services for a given application.
2. Assess the comparative advantages and disadvantages of Virtualization technology.
3. Analyze authentication, confidentiality and privacy issues in cloud computing.
4. Awareness of security implications in cloud computing.
5. Discuss the importance of protocols and standards in management for cloud services.

**Course Contents :**

**UNIT 1 Introduction to Cloud Computing**

Defining Cloud computing, Characteristics, Components, deployment model, service model, Applications, Benefits of cloud computing, Limitations of cloud computing. Grid Computing, Grid vs Cloud Computing.

**UNIT 2 Cloud architecture, Services and Applications**

Exploring cloud computing stack – Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Defining Infrastructure as a Service (IaaS), Defining Software as a Service (SaaS), Defining Platform as a Service (PaaS), Defining Identity as a Service (IDaaS), Defining Compliance as a Service (CaaS).

**UNIT 3 Cloud Infrastructure and Virtualization**

Hardware and Infrastructure – Clients, Security, Network and Services., use of Virtualization technology, Load Balancing and Virtualization, virtualization benefits, Hypervisors, porting application, Defining cloud capacity by defining baselines and Metrics.

**UNIT 4 Exploring cloud services**

Software as a Service – Overview, advantages, limits, virtualization benefits, examples. Platform as a Service – overview, advantages and functionalities, PaaS application frameworks – Drupal, Long Jump. Case study – Google Apps and Web Services.

**UNIT 5 Cloud Administration and Security Management**

Management responsibilities, lifecycle management, cloud management products, Cloud management standards. Cloud security, data security,

Identity and presence protocol standards, Availability management in SaaS, IaaS, PaaS, Access Control, Security Vulnerability, Patch and Configuration Management, Security as a Service of cloud, Future of Security in Cloud computing.

**Text Books :**

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley India Edition.
2. Anthony Velte, Toby Velte, Robert Elsenpeter, “Cloud Computing – A Practical Approach”, Tata McGraw-Hill Edition.

**Reference Books –**

1. John W. Rittinghouse, James F. Ransome, “cloud computing: implementation management and security” CRC Press.
2. GautamShroff, “Enterprise Cloud Computing: Technology, Architecture, Applications”, Cambridge University Press.
3. Christian Baun, Marcel Kunze, Jens Nimis, Stefan Tai, “Cloud Computing: Web-Based Dynamic IT Services”, Springer.



**Course Code : MCA356**

**Course Title : Elective [Distributed Operating System ]**

**Teaching Scheme :**

Lectures : 4 hrs/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

- 1) Knowledge to the fundamentals of message passing system
- 2) Awareness of the concepts of Remote Procedural Calls
- 3) Exposure to the general architecture of Distributed Shared Memory System and its pros and cons
- 4) Learn features of naming system

**Course Contents**

**Unit 1 Fundamentals & Message Passing**

Basic concept of distributed computing, Evolution of Distributed computing, Distributed computing system models, Issues in designing Distributed operating systems. Features of good message passing system, issues in IPC by message Passing, Synchronization, Buffering, Multi datagram messages, Encoding and decoding of message data, Process Addressing, Failure handling, Group Communication.

**Unit 2 Remote procedure calls**

Introduction to RPC, The RPC model, Transparency of RPC, Implementing of RPC mechanism, Stub Generation, RPC Messages, Marshaling Arguments and results, server management, Parameter Passing Semantics, Call Semantics, Communication protocols for RPC, Client Server Binding, Exception Handling, Security RPC in Heterogeneous Environments, Light Weight RPC, Optimizations for better performance.

**Unit 3 Distributed Shared Memory & Synchronization**

Introduction, General architecture of DSM system, Design and implementation issues of DSM, Granularity, Structure of shared memory space, Consistency models, Replacement strategy, Thrashing, Heterogeneous DSM, Advantages of DSM. Need of synchronization, Clock synchronization, Event ordering, Mutual Exclusion, Deadlock, Election Algorithms.

**Unit 4 Resource Management & Process Management**

Desirable Features of Global scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach. Introduction, Process migration, Threads in Distributed systems. Distributed File System, Desirable features of Distributed file system, File models, File Accessing models, file sharing semantics, File caching schemes, File replication, Fault tolerance, Atomic transactions

**Unit 5 Naming & Security**

Features of Naming system, Fundamental terminology and concepts, System oriented names, Object locating mechanisms, human oriented names, Name caches, Naming

and security, Potential attacks to computer systems, cryptography, Authentication, access control, Digital signatures.

**Text Books/Reference Books :**

1. Distributed Operating systems Concept and Design By Pradeep K. Sinha Prentice-Hall
2. Distributed systems: Principles and paradigms By Andrew Tanenbaum, Marteen Ven steen Prentice – Hall.

**Course Code : MCA357**

**Course Title : Elective [Image Processing]**

**Teaching Scheme :**

Lectures : 4 hrs/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

- 1) Understanding the basics of Digital Image Processing
- 2) Exposure to Image Enhancement Techniques
- 3) Knowledge To various Image Compression Techniques
- 4) Awareness of various Color Image Processing Models

**Course Contents**

**Unit 1 Digital Image**

Steps of Digital Image Processing Systems-Elements of Visual Perception - Connectivity and Relations between Pixels. Simple Operations- Arithmetic, Logical, Geometric Operations. Mathematical Preliminaries - 2D Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

**Unit 2 Image Enhancement**

Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods, enhancement in the frequency domain. Image Segmentation: Edge Detection - Line Detection - Curve Detection - Edge Linking And Boundary Extraction, Boundary Representation, Region Representation And Segmentation, Morphology-Dilation, Erosion, Opening And Closing. Hit And Miss Algorithms Feature Analysis

**Unit 3 Image Compression**

Redundancy And Compression Models -Loss Less And Lossy. Loss Less- Variable-Length, Huffman, Arithmetic Coding - Bit-Plane Coding, Loss Less Predictive Coding, Lossy Transform (DCT) Based Coding, JPEG Standard - Sub Band Coding.

**Unit 4 Object Recognition**

Patterns and patterns classes, recognition based on decision-theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching

**Unit 5 Color Image**

Processing Fundamentals, RGB Models, HSI Models, Relationship Between Different Models. Multispectral Image, Color Image Processing.

**Text Books/Reference Books**

- 1.Digital Image Processing, Rafeal C. Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.
- 2.Digital Image Procesing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education ,2009. Pvt Ltd, NewDelhi.
- 3.Fundamentals of Digital image Processing, Anil Jain.K, Prentice Hall of India, 1989.

**Course Code : MCA358**

**Course Title : Elective [ Network Infrastructure Management]**

**Teaching Scheme :**

Lectures : 4 hrs/week

Total Credits : 4

**Examination Scheme :**

Test: 20 Marks

Assignment: 20 Marks

End Sem. Exam: 60 Marks

**Course Outcomes Expected :**

- 1) To get acquainted with the concepts of networking.
- 2) To understand the concepts of routing and switching.
- 3) To get acquainted with configuration of router and switch, network monitoring tools.

**Course Contents :**

**Unit 1 Networking Concepts**

**IP Addressing:** IP Addressing Classes, Subnet Masks and Sub netting, Complex Subnet & Super netting, Determining Broadcast & Network Address.

**Configuring a Router & Switch:** Starting up with a Router and Switch, Booting a Router and setup mode, The Command-line Interface, Passwords and Line Console Commands, Interface Configuration setting, Building a Network, Configuring a Router and Switch.

**Managing CISCO in an Internetwork:** Backing up and restoring start up configuration and IOS, Booting IOS, Cisco Discovery Protocol, Ping and Trace, Understanding configuration register.

**Unit 2 Routing & Switching Concepts**

**Routing:** Routing Basics, Managing static and Dynamic Routes, Configuring static IP Routing, Configuring Dynamic IP routing using RIP, IGRP, Managing and configuring OSPF & EIGRP, Avoiding Routing loops using split horizon, route poisoning.

**Switching:** Working concept of Switch, Spanning Tree Protocol (STP), LAN Switch Types, Virtual LANs, VLAN membership, VLAN Configuration and VTP, Assigning Ports.

**Unit 3 Network Storage Concepts**

**SAN:** Architecture of SAN, SAN Hardware devices, SAN Software components, Configuration options for SAN, Applying SAN solution.

**NAS:** Storage on network, NAS Hardware devices, NAS software components, NAS Connectivity options, Applying NAS solution, Integrating SAN and NAS.

**Unit 4 Network Management Concepts**

Network Management Architecture-Proxies -SNMP related standards.

**Structure of Management Information Base:** Object syntax, limitation of MIB objects, Standard MIB's - MIB-II – system, interfaces, at, ip, icmp, tcp, udp, egp, dot3.

**Simple Network Management Protocol V1:** Basic concepts, Protocol specification of SNMP, Practical issues of SNMP, Introduction to Remote Network Monitoring (RMON)- control of remote monitors, Introduction to SNMP v2 and SNMP v3.

## **Unit 5 Introduction to Network Management Tools**

What is network management? Why it is used? Levels where it is used? : Logging Error and event log captures, Event Correlation, Event Automation, configuration Management, Fault Management, Accounting Management, Performance Management and Security Management, Introduction to network management tools.

### **Text Book:**

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. Network Management: Principles and Practices by Mani Subramaniam, Addison Wesley-1999
3. Storage Network: The Complete Reference, Tata McGraw Hills
4. Concepts & Theories of Server Load Balancing by Tony Bourke, O'reilly Media Inc., 2001.

### **Reference Books:**

1. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
2. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
3. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010
4. The holy grail of network storage management By Jon William Toigo, Prentice Hall; 1 edition (November 6, 2003)

**Course Code : MCA359**  
**Course Title : Lab : Mobile Computing**

**Teaching Scheme :**  
Practical : 4 hrs/week  
Total Credits : 2

**Examination Scheme :**  
Practical Exam : 50 Marks  
Term Work : 50 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted.

**Suggestive List of Programs –**

Part A

- 1) Write a program to format a text.
- 2) Write a program to display data in tabular format.
- 3) Write a program for user input and navigation between cards.
- 4) Write a program to handle different events.
- 5) Write a program to convert currency.
- 6) Write a program to perform validation using WML script.
- 7) Write a program using phone.com.
- 8) Write a program to connect ASP and WML.

Part B : Android Programming

- 1) Installing and developing environment with Eclipse and creating Hello World Application
- 2) Using Standard Controls like Textbox, Button, Image etc to develop a form
- 3) Using Event Listeners and Intents to navigate amongst activities.
- 4) Using styles and themes for UI Designing
- 5) Creating Menu Controls in Android
- 6) Creating Various Dialog boxes

Practical Examination will consist of Performance and Viva-voice Examination

The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA360**

**Course Title : Lab : Advanced Database Management Systems**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted.

**Suggestive List of Programs –**

- 1) Installation of oracle server and client in the lab.
- 2) Perform practically DDL, DCL and DML SQL commands.
- 3) Write SQL queries using
  - Joins
  - Subqueries
- 3) Create/Insert/Delete Varrays and nested tables
- 4) A sample application using OR features: The practical should be based on the ORDBMS features of Oracle
- 5) Perform practically backup and recovery procedures.
- 6) Create simple Java server page and perform validations.
- 7) Connect JSP and Java Beans. Take any live example to perform operation.
- 8) Using JDBC connect Oracle database

Practical Examination will consist of Performance and Viva-voice Examination. The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.



**Course Code : MCA361**  
**Course Title : Lab : Big Data Analytics**

**Teaching Scheme :**  
Practical : 2 hrs/week  
Total Credits : 1

**Examination Scheme :**  
Practical Exam : 25 Marks  
Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted.

**Suggestive List of Programs –**

1. Installing Hadoop.
2. Running MapReduce Jobs.
  - a. Compile java File
  - b. Create a Jar File
  - c. Run MapReduce Job
3. Writing a MapReduce Program
  - a. Implement a Unit Tests for the WordCount code.
4. Creating a Hadoop cluster using virtual machines.
5. Managing Hadoop clusters.
  - a. Managing jobs.
  - b. Managing scheduler.
6. Installing and running pig.
7. Installing and running Hive.
8. Installing HBase, HBase Shell.
9. Manipulating data with HBase.
10. Installing and Running ZooKeeper.
11. Importing data with Sqoop.
12. Integration of Apache Hive and HBase.

Practical Examination will consist of Performance and Viva-voice Examination The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA362**

**Course Title : Lab : Elective [ Embedded System Design ]**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted

**Suggestive List of Programs –**

1. Study of Embedded System hardware board, its configurations and programming features
2. Study of Real Time Operating System and programming methodology
3. Develop, test and execute C language program for LCD interfacing using embedded development system board
4. Develop, test and execute C language program for 4x4 keyboard interfacing using embedded development system board
5. Develop, test and execute C language program for timers and event counter application using embedded system board
6. Develop, test and execute C language program using embedded development system board to implement simple digital calculator using keyboard and LCD interface
7. Develop, test and execute C language program for I/O applications

Practical Examination will consist of Performance and Viva-voice Examination

The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA363**

**Course Title : Lab : Elective [ Cloud Computing ]**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted

Practical Examination will consist of Performance and Viva-voice Examination

The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Suggestive List of Programs –**

1. Installing Ubuntu (server edition) using virtual box, and study virtualization.
2. Setting up and using an instance on public IaaS cloud, using Amazon AWS.
3. Exploring GitHub to learn features such as
  - a. How to create repositories on GitHub.
  - b. How source code can be uploaded/downloaded from repositories.
  - c. Making code commits in repositories.
  - d. GitHub issue tracking features.
4. Writing Sample Applications on Cloud using Google App Engine.
5. Understanding Software as a Service: Sales Force
6. Understanding Private Clouds: OpenStack, Eucalyptus.
7. Installing Openstack cloud: Creating sand box environment using Virtual Box.
8. Installing and Administrating OpenStack Compute packages.
9. Installing Openstack Identity and storage services.
10. Installing Openstack Image services.

Practical Examination will consist of Performance and Viva-voice Examination The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA364**

**Course Title : Lab : Elective [Distributed Operating System]**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted

**Suggestive List of Programs –**

- 1) Write a program to implement IPC by message passing..
- 2) Write a program to implement RPC mechanism.
- 3) Write a program to implement replacement strategy in DSM.
- 4) Write a program to implement an election algorithm.
- 5) Write a program to implement resource management by load balancing approach.
- 6) Write a program to implement resource management by load sharing approach.
- 7) Write a program for file sharing semantics.
- 8) Write a program for encryption and decryption of data.

Practical Examination will consist of Performance and Viva-voice Examination

The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA365**

**Course Title : Lab : Elective [ Image Processing ]**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

**Prerequisite :** Programming Language

**Suggestive List of Programs –**

- 1) Implement histogram smoothing; determine how much smoothing is necessary to suppress turning points in the histogram due to what you consider to be noise, or small scale image-effects.
- 2) Develop programs for the following geometric transforms:
  - a) Rotation
  - b) Change of scale
  - c) Skewing
  - d) Affine transform calculated from three pairs of corresponding points
  - e) Bilinear transform calculated from four pairs of corresponding points
- 3) Use a mathematical calculation software package (i.e. Matlab, Mathematica, Maple) to determine transformation coefficients for the affine and bilinear transforms.
- 4) Develop program for determining magnitude and direction edge image pairs using the following compass edge detectors:
  - a) Prewitt
  - b) Sobel
  - c) Robinson
  - d) Kirsch

To show that your edge detection gives correct results, use a circle image to test your program.

- 5) Develop a program for border detection using edge relaxation.
- 6) Write a function for region identification in 4-neighborhood connectivity.
- 7) Let a minimum distance classifier be used to recognize two-dimensional patterns from three classes K1, K2, K3. The training set consists of five patterns from each class: Determine (sketch) the discrimination functions in the two dimensional feature space.

$$K1 = \left\{ \begin{pmatrix} 0 \\ 6 \end{pmatrix}, \begin{pmatrix} 1 \\ 6 \end{pmatrix}, \begin{pmatrix} 2 \\ 6 \end{pmatrix}, \begin{pmatrix} 1 \\ 5 \end{pmatrix}, \begin{pmatrix} 1 \\ 7 \end{pmatrix} \right\}$$

$$K2 = \left\{ \begin{pmatrix} 4 \\ 1 \end{pmatrix}, \begin{pmatrix} 5 \\ 1 \end{pmatrix}, \begin{pmatrix} 6 \\ 1 \end{pmatrix}, \begin{pmatrix} 5 \\ 0 \end{pmatrix}, \begin{pmatrix} 5 \\ 2 \end{pmatrix} \right\}$$

$$K3 = \left\{ \begin{pmatrix} 8 \\ 6 \end{pmatrix}, \begin{pmatrix} 9 \\ 6 \end{pmatrix}, \begin{pmatrix} 10 \\ 6 \end{pmatrix}, \begin{pmatrix} 9 \\ 5 \end{pmatrix}, \begin{pmatrix} 9 \\ 7 \end{pmatrix} \right\}$$

- 8) Write a program for binary dilation and erosion.
- 9) Develop a program for high-pass, low-pass and band-pass image filtering.

- 10) Write a program to read an image and remove noise from the image.
- 11) Write a program to enhance an image.
- 12) Write a program to applying high pass filter for an image.
- 13) Write a program to enhance an object in the image with segmentation method.
- 14) Write a program to apply morphological operations.
- 15) Write a program to compress an image with lossy compression method.
- 16) Write a program to compress an image with lossless compression method.
- 17) Write a program for object recognition.
- 18) Write a program to classify given patterns with neural network.
- 19) Write a program to analyze supervised and unsupervised learning with neural network.

The list is indicative only. Scope of the subject should not be limited to the same.  
Practical Examination will consist of Performance and Viva-voice Examination  
The assessment will be based on the following –

1. Performance in the practical examination
2. Record of programs submitted by the candidate
3. Setting goals higher than expected from problem statement
4. Innovation & Creativity
5. Team building skills
6. Technical writing skills

Practical Examination will consist of Performance and Viva-voice Examination

The assessment will be based on the following –

- 1 Performance in the practical examination
2. Record of programs submitted by the candidate.

**Course Code : MCA366**

**Course Title : Lab: Elective [ Network Infrastructure Management ]**

**Teaching Scheme :**

Practical : 2 hrs/week

Total Credits : 1

**Examination Scheme :**

Practical Exam : 25 Marks

Term Work : 25 Marks

Minimum of 8 Programs should be completed which will be based on the subject and record for the same shall be submitted

### **Suggested List of Experiments**

- 1) Router Configuration – Basic Commands.
- 2) Configuration of Static, Dynamic & Default Route.
- 3) Implementation of RIP V1 & V2.
- 4) Implementation of EIGRP.
- 5) Implementation of OSPF.
- 6) Switch Configuration - Basic Commands.
- 7) Switch Configuration, Switch Port Security, VLAN Configuration.
- 8) Capturing and analyzing the packets by using network monitoring tools.
- 9) Create Network by using Load Balancer.
- 10) Create Enterprise Network by using router, switches.

Practical Examination will consist of Performance and Viva-voice Examination  
The assessment will be based on the following –

- 1) Performance in the practical examination
- 2) Record of programs submitted by the candidate.

**Course Code : MCA367**

**Course Title : Software Project Development**

**Teaching Scheme :**

Practical : 4 hrs/week

Total Credits : 2

**Examination Scheme :**

Practical Exam : 50 Marks

Term Work : 50 Marks

**Course Educational Objectives :**

To emphasize on software industry practices to acquire the knowledge about software development. Take up a software development project of your choice and systematically carry-out all the phases of Software Development Life Cycle (SDLC). Do the necessary documentation at each stage. Use your own choice of case tools.

Steps:

1) Finalization of Project

Form groups of (2-4) students (with one of them as a leader)

Brainstorm and list minimum 3 suitable project ideas

Present these to the class and guide and other teachers

Finalize one of the projects from the list

Write project definition for it

2) Development of software

Requirement Analysis

Project Scheduling and cost estimation

System Design

Software Development

Testing

Software review in front of class and teachers

**Term Work:**

The assessments of the term work should be done by two internal examiners, one of which will be the guide and the other will be HOD or senior staff member of the concerned branch of the institute.

**Practical Examination :**

Practical Examination will consist of a presentation along with the demonstration of the project. The said examination will be conducted by a panel of two examiners (one internal guide and one external examiner).



**Course Code : MCA368**  
**Course Title : Dissertation**

**Teaching Scheme :**  
Total Credits : 24

**Examination Scheme :**  
Term Work : 100 Marks  
Practical Exam : 100 Marks

The dissertation will consist of the work on the topic selected for the project .The project must be done individually. Project should be sponsored project.

The candidate is expected to select the project, do the requirements analysis, carry out the necessary design procedure and complete the implementation.

The candidate will submit dissertation in triplicate to head of the institution

**Term Work:**

The assessments of the term work should be done by two internal examiners, one of which will be the guide and the other will be HOD or senior staff member of the concerned branch of the institute.

**Practical Examination :**

Practical Examination will consist of a presentation along with the demonstration of the project. The said examination will be conducted by a panel of two examiners (one internal guide and one external examiner).