# Proposed Curriculum Structure and Scheme of Evaluation

**Effective from Academic Year 2015-16**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of Subject</th>
<th>Teaching Scheme (Hours/Week)</th>
<th>Examination Scheme - Marks</th>
<th>Total Credits</th>
<th>Test</th>
<th>TA</th>
<th>ESE</th>
<th>Pract</th>
<th>TW</th>
<th>Total</th>
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<tbody>
<tr>
<td>MCA351</td>
<td>Mobile Computing</td>
<td>4 1 --</td>
<td>20 20 60 -- --</td>
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<td>20</td>
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<td>Advanced Database Management</td>
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<td>MCA353</td>
<td>Big Data Analytics</td>
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<td>20 20 60 -- --</td>
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<tr>
<td>MCA354</td>
<td>Elective</td>
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<tr>
<th>Laboratory Courses</th>
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<tr>
<td>MCA359 Lab: Mobile Computing</td>
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<tr>
<td>MCA360 Lab: Advanced Database Management</td>
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<td>MCA361 Lab: Big Data Analytics</td>
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<td>MCA362 Lab: Elective</td>
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<tr>
<td>MCA367 Lab: Software Project Development</td>
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| Total of Part I | 14 3 14 24 80 80 240 175 175 750 |

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<tbody>
<tr>
<td>MCA368</td>
<td>Dissertation</td>
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| Total of Part II | -- -- 24 24 -- -- -- 100 100 200 |

**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

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(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 IPv 6 and its application in mobile computing. Cellular Digital Packet Data
   CDPD,VOIP,GPRS Services, Carrier Sense Multiple Acess 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:
2. Wrox “The Beginning WML and WML Script”, Wrox Publication
   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 databases
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

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

Text/Reference Books:
1. Database system concepts: H. Korth and A. Siberchatz, S. Sudarshan
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 :
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, I²C, 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
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

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

UNIT 5 Cloud Administration and Security Management
Management responsibilities, lifecycle management, cloud management products, Cloud management standards. Cloud security, data security,

**Text Books :**


**Reference Books –**

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

Unit 4 Resource Management & Process Management

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  

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  

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  
Text Books/Reference Books
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 Subnetting, Complex Subnet & Super subnetting, 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-Proxy -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.


Unit 5 Introduction to Network Management Tools

Text Book:
1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

Reference Books:
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.
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.
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 : MCA36
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.
5. Understanding Software as a Service: Sales Force
7. Installing Openstack cloud: Creating sand box environment using Virtual Box.
8. Installing and Administarting 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.
   \[
   \begin{align*}
   k_1 &= \begin{pmatrix}
   0 & 1 & 2 & 1 & 1 \\
   6 & 6 & 6 & 5 & 7
   \end{pmatrix} \\
   k_2 &= \begin{pmatrix}
   4 & 5 & 6 & 5 & 5 \\
   1 & 1 & 1 & 0 & 2
   \end{pmatrix} \\
   k_3 &= \begin{pmatrix}
   8 & 9 & 10 & 9 & 9 \\
   6 & 6 & 6 & 5 & 7
   \end{pmatrix}
   \end{align*}
   \]
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

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