

**GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD**

(An Autonomous Institute of Government of Maharashtra)

**Department of M.C.A.**

Proposed Teaching and Evaluation Scheme for Choice Based Credit System -Third Year M.C.A.

Effective From A.Y. 2018-19

**SEMESTER-V**

<b>THEORY COURSES</b>												
Sr. No	Course Code	Subject	Scheme of Teaching (Hrs/Week)			Total Credits	Scheme of Evaluation (Marks)					
			L	T	P		Theory			Term Work	Practical /Viva-voce	Total
						Test	TA	ESE				
1	MC3001	Big Data Analytics	3	1		4	20	20	60	-	-	100
2	MC3002	Cyber Security and Cyber Law	3	1		4	20	20	60	-	-	100
3	MC3003	Information Retrieval and Management	3	0		3	20	20	60	-	-	100
4	MC3004	Software Project Management	3	0		3	20	20	60	-	-	100
5	MC3005 to MC3007	Elective- IV 1) Biometrics 2) ASP .Net and C# 3) Natural Language Processing	4	0		4	20	20	60	-	-	100
<b>LABORATORY COURSES</b>												
1	MC3008	Lab: Big Data Analytics	-	-	4	2	-	-	-	25	50	75
2	MC3009	Lab: Open Source Software Technology	-	-	2	1	-	-	-	25	25	50
3	MC3010	Lab: Software Project Development			4	2				25	50	75
4	MC3011 to MC3013	Lab: Elective-IV			2	1				25	25	50
		<b>TOTAL</b>	<b>16</b>	<b>2</b>	<b>12</b>	<b>24</b>	<b>100</b>	<b>100</b>	<b>300</b>	<b>100</b>	<b>150</b>	<b>750</b>

**SEMESTER-VI**

<b>THEORY COURSES</b>												
Sr. No	Course Code	Subject	Scheme of Teaching (Hrs/Week)			Total  Credits	Scheme of Evaluation (Marks)					
			L	T	P		Theory			Term Work	Practical Viva-voce	Total
							Test	TA	ESE			
1	MC3014	Dissertation			24	24				100	100	200
		<b>TOTAL</b>			<b>24</b>	<b>24</b>				<b>100</b>	<b>100</b>	<b>200</b>

**L-Lectures, T-Tutorials, P-Practical's, TA-Teacher Assessment, ESE-End-Semester Examination**

**List of Elective Subjects:**

<b>Semester V (Elective – IV)</b>	
<b>Theory courses</b>	<b>Laboratory courses</b>
MC3005- Biometrics	MC3011- Biometrics
MC3006- ASP .Net and C#	MC3012- ASP .Net and C#
MC3007- Natural Language Processing	MC3013- Natural Language Processing

## MC3001: Big Data Analytics

### Teaching Scheme

Lectures: 3 hrs/week

Tutorials: 1

Total Credits: 4

### Examination Scheme

Test: 20

Assignment: 20

End Semester: 60

### Course Educational Objectives:

- To provide students with the fundamentals and essentials of Big Data and Hadoop.
- Demonstrate various challenges in processing Big Data.
- Demonstrate various concepts of Big Data and Hadoop.
- Understand Hadoop MapReduce Framework.

### Course Outcomes Expected:

After completing this course, students will able to:

- Understand the concepts of Big data and challenges in processing Big Data
- Understand Hadoop architecture and eco-system.
- Gain conceptual understanding of Hadoop Distributed File System.
- Understand the concepts of map and reduce and functional programming
- Identify appropriate techniques and tools to solve actual Big Data problems.

### UNIT I: INTRODUCTION TO BIG DATA AND HADOOP

(6 hours)

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Info sphere Big Insights and Big Sheets.

### UNIT II: HDFS (Hadoop Distributed File System)

(6 hours)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

### UNIT III: Map Reduce

(6 hours)

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

### UNIT-IV HADOOP ECOSYSTEM AND YARN

(6 hours)

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

### UNIT-V HIVE AND HIVEQL, HBASE

(6 hours)

Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins &Subqueries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

### **Text Books**

- Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
- SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.

### **REFERENCES**

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012. 6 IT2015 SRM(E&T)
4. VigneshPrajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
6. <http://www.bigdatauniversity.com/>
7. JyLiebowitz, “Big Data and Business analytics”,CRC press, 2013

## MC3002: Cyber Security and Cyber Law

### Teaching Scheme

Lectures: 3 hrs/week  
Tutorials: 1  
Total Credits: 4

### Examination Scheme

Test: 20  
Assignment: 20  
End Semester: 60

- 1. Introduction To Cyber Security, Public Key Cryptography And RSA [8]**  
Need for security, security attacks, security services, model for network security. Principles of public-key cryptosystems, the RSA algorithm, key management, Diffie-Hallman key exchange.
- 2. E-mail Security, IP Security And Web Search [8]**  
Pretty Good Privacy, S/MIME, IP security architecture, web security considerations, SSL and TTL
- 3. CyberLaw [8]**  
IT Act 2000(Detail): Objectives,provisions,offenses,
- 4. Cyber Crime And Investigation [8]**  
Cyber crimes: crimes against the computer,crimes using a computer, Investigation Issues: cyber Forensics.
- 5. Professional Ethics [8]**  
Property rights in Computer Software, Computers and Privacy, Crime, Abuse,And Hacker Ethics, Responsibility and Liability Solving Ethical Dilemmas, Discovering an Ethical Dilemma, Copyright Ethics overseas. Ethics Codes and Policies- The need for Codes and Policies, An Email Privacy, An Internet UsePolicy.

### Text/Reference Books:

1. Cryptography and network security- principles and applications – William Stallings – Third edition –Pearson education
2. Network Security – Complete reference  
Roberta bragg, Mark Rhodes, Keith Strassberg – Tata Mcgraw Hill
3. Cryptography and network security – AtulKahate – Tata Mcgraw Hill
4. Network security – Chaile Kaufman, Radia Perlman Mike speciner Pearson education
5. Dr.R.K.tiwariP.k.Sastri,K.v. Ravikumar “ Computer crime and Compure Forensics” First Edition 2002,Select publishers.
6. Computer Ethics and professional responsibility – Terrell Ward Bynum, Simon Rogerson

## MC3003: Information Retrieval and Management

### Teaching Scheme

Lectures: 3 hrs/week  
Tutorials: -  
Total Credits: 3

### Examination Scheme

Test: 20  
Assignment: 20  
End Semester: 60

### Educational Objectives:

- To review informational retrieval system.
- To illustrate retrieval metric and query expansion.
- To describe query languages and properties.
- To discuss concepts of web crawling and web retrieval.
- To introduce taxonomy and ontology concepts

### Course Outcomes Expected:

After completing the course, students will be able to:

**CO1:** Illustrate the different query properties K2

**CO2:** Compare different search engine ranking techniques. K2

**CO3:** Analyze the different retrieval metrics for retrieval evaluation. K3

**CO4:** Construct a search engine. K4

**CO5:** Describe different ontology and taxonomy architectures and processes. K2

**1. Introduction to Information Retrieval :** Motivation, Information Retrieval vs Data Retrieval, Models of Information Retrieval : Boolean Model, Vector Space Model, Probabilistic Model, Alternative Models

**2. Retrieval Evaluation:** Recall and Precision, Alternative Measures, Reference Collections and Evaluation of IR systems. Query Languages for IR : Keywords, Boolean Queries, Context Queries, Natural Language Queries, Structural Queries

**3. Text Indexing, Preprocessing and File Organization:** Stopwords, stemming, thesauri, File (Text) organization (invert, suff), Text statistics (properties), Text compression, Text Searching, Knuth-Morris-Pratt, Boyer-Moore family, Suffix automaton, Phrases and Proximity, Document Clustering.

**4. Multimedia Information Retrieval:** Similarity Queries, Feature-based Indexing and Searching, Spatial Access Methods, Searching in Multidimensional Spaces, Parallel and Distributed IR, Architectures MIMD and SIMD, Collection Partitioning, Source Selection

**5. Meta-Ranking:** Integrated vs Isolated Methods, Interleaving, Voting. Web Search, History of Web, Indexing, Spidering/Crawling, Link Analysis (HITS, PageRank)

## MC3004: Software Project Management

### Teaching Scheme

Lectures: 3 hrs/week  
Tutorials: -  
Total Credits: 3

### Examination Scheme

Test: 20  
Assignment: 20  
End Semester: 60

1. Introduction & Software Project Planning – Fundamentals, project management cycle, management spectrum, SPM framework, software project planning, types of project plan, software project estimation 08 Hrs
2. Project organization, scheduling and management issues- project life cycle and product life cycle, controlling activities, project planning,- choice of process model, project scheduling, resource allocation, Role changing technology 08 Hrs
3. Project management and control- Dimensions of project monitoring and control, Earned value analysis (EVA), EVA indications 08 Hrs
4. Technical communications – fundamentals of technical communications – oral and written, software project documentation, preparing oral presentations and supporting materials, out-sourcing 08 Hrs
5. Software quality assurance and testing- types of testing, levels of testing, test strategies, program correctness, program verification and validation, software quality, SQA activity 08Hrs

### TEXT / REFERENCE BOOKS:

1. Bob Hughes, Mikecoterrell, “Software Project Management”, Tata McGraw Hill, Third Edition, 2004
2. Rajiv Chopra, “Software Project management- A practical approach”, S.K.Kataria and sons, Second, 2009
3. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001
4. Royce, “Software Project Management”, Pearson Education, 1999 5. Jalote, “Software Project Management in Practice”, Pearson Education, 2002

## MC3005: Biometrics

### Teaching Scheme

Lectures: 3 hrs/week

Tutorials: -

Total Credits: 4

### Examination Scheme

Test: 20

Assignment: 20

End Semester: 60

### Course Objectives:

- Understand the responsibilities of project manager and how to handle these.
- Be familiar with the different methods and techniques used for project management.
- Students will have good knowledge of the issues and challenges faced while doing the Software project Management.
- Be able to understand why majority of the software projects fails and how that failure probability can be reduced effectively.
- Will be able to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.

1. Introduction; Biometrics overview –What is biometrics? Biometric traits, design and performance evaluation; Biometric research

2. Fingerprint, Face and Iris overview; case study: India Aadhaar project  
Other emerging biometric modalities and technologies survey: Hand, vein, ear, periocular, voice, gait, keystroke, video, multi-modal

3. Iris Recognition –The eye and iris; iris image acquisition, enhancement, processing, feature extraction

4. Face Recognition – image acquisition, modalities, processing, features  
PCA, LDA, 3D, Infrared, data fusion

5. Fingerprint Recognition – image acquisition, processing, minutiae, matching, and evaluation  
Other emerging biometric modalities and technologies survey: Hand, vein, ear, periocular, voice, gait, keystroke, video, multi-modal

Biometric template security, Privacy and cancelable biometrics

### Text Books:

1. Davide Maltoni, Dario Maio, Anil K Jain, Salil Prabhakar, “Handbook of Fingerprint Recognition”, Second Edition, Springer, 2009.
2. Anil K. Jain, “Encyclopedia of Biometrics”, Springer, 2009.

## MC3006: ASP .NET & C#

### Teaching Scheme

Lectures: 4hrs/week  
Tutorials: 0  
Total Credits: 4

### Examination Scheme

Test: 20  
Assignment: 20  
End Semester: 60

**1.Getting Started with .NET:** Introduction to .NET Framework and Visual Studio.NET, Kind of Applications that can be developed using Visual Studio.NET, Website v/s Web Application, Creating a new sample Web Project with Visual Studio

**Creating Presentation Layer:** Creating Front-End with the HTML & CSS, Grid Layout v/s Liquid Layout, using Cascaded Style Sheets

**2.Introduction to C#:** Working with Variables, Data Types, Data Type Conversion, Operators and Expressions, Creating Classes and Objects in C#, Using Namespaces, Arrays, Exception Handling in C#, Navigating amongst Web Pages, Event Handling

**Important Files and Folders in Web Application:** All System Folders, Web.Config, Global.asax, Building sites with Master Pages, Using User Controls

**3.Building ASP.NET Pages:** Standard Controls, Validation Controls,

**State Management:** ASP.NETPageLife Cycle, Session Management, Managing Query String, View State in C#

**4.Working with Data:** ADO.NET Architecture, Connected & Disconnected Architectures, SQL Connection, SQL Command & important Classes for operating database related operations (CRUD), Using Datasets& Data Adapters

**Working with Data Controls:** Grid View, Repeater Control

**5.AJAX:** Ajax Architecture, Script Manager, Update Panel, Ajax Control Toolkit

**Web Services:** Creating and Consuming Web Services

**Deploying ASP.NET Websites:** Installing and configuring website using IIS

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### Text/Reference Books

1. The Complete Reference ASP.NET
2. The Complete Reference C#

## MC3007: Natural Language Processing

### Teaching Scheme

Lectures: 4hrs/week

Tutorials: 0

Total Credits: 4

### Examination Scheme

Test: 20

Assignment: 20

End Semester: 60

<b>UNIT 1</b>	Motivation for studying NLP; Natural Language Processing as the forcing function of AI; Classical approaches to NLP with knowledge bases and linguistic rules; Data Driven and Machine Learning Approaches to NLP; Efficient, Robust and Scalable NLP	[6]
<b>UNIT 2</b>	Classical NLP: Linguistics Fundamentals: Syntax and Parsing: Meaning:	[6]
<b>UNIT 3</b>	Empirical or Statistical NLP: Probabilistic Methods on Introductory Graphical Models for NLP: Shallow Parsing: Probabilistic Parsing	[6]
<b>UNIT 4</b>	Applications: Machine Translation, Information Retrieval, Question Answering, Summarization, Information Extraction	[6]
<b>UNIT 5</b>	Biology and Sociology of NLP: Neurolinguistics, Child Language Acquisition	[6]
<p><b>TEXT BOOKS:</b></p> <ol style="list-style-type: none"><li>1. Jurafsky, Daniel, and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics, PrenticeHall, 2000.</li><li>2. Christopher D. Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing. Cambridge, MIT Press, 1999.</li></ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"><li>1. James Allen, Natural Language Understanding, Benjamin/Cummings, 2ed, 1995.</li><li>2. Eugene Charniak, Statistical Language Learning, MIT Press, 1996.</li><li>3. Martin Atkinson, David Britain, Harald Clahsen, Andrew Redford, Linguistics, Cambridge University Press, 1999.</li><li>4. P. Lieberman, Toward an evolutionary biology of language, Harvard university Press, 2006.</li></ol>		

## MC3008-Lab : Big Data Analytics

### Teaching Scheme

Practicals: 4hrs/week

### Examination Scheme

Practical Exam.: 50 Marks

Term Work :25 Marks

### List of Experiments:

1. Introduction to Hadoop ecosystem and Installation of Hadoop.
2. To understand the overall programming architecture using Map Reduce API
3. Store the basic information about students such as roll no, name, date of birth , and address of student using various collection types such as List, Set and Map
4. Basic CRUD operations in MongoDB
5. Retrieve various types of documents from students collection
6. To find documents from Students collection
7. Develop Map Reduce Work Application
8. Creating the HDFS tables and loading them in Hive and learn joining of tables in Hive

## MC3009-Lab : Open Source Software Technology

### Teaching Scheme

Practicals : 2hrs/week

### Examination Scheme

Practical Exam.: 25 Marks

Term Work :25 Marks

**Prerequisite: NIL**

### Course Educational Objectives:

- Demonstrate different open source technology like Linux, PHP & MySQL with different packages.
- Illustrate & implement Linux commands for programming.
- Create & execute programs of PHP with MySQL/ MariaDB connection
- Create & Implement programs of Python programming using MySQL / MariaDB connection

### Course Outcomes Expected:

After completion of this course students will be able to:

CO1: Explore different open source technology like Linux, PHP & MySQL with different packages.

CO2: Implement Linux commands for programming.

CO3: Execute programs of PHP with MySQL/MariaDB server connection

CO4: Execute programs of Python with Mysql /Maria DB connection

The term work shall consist of following practical/assignments/mini-project/visit\* based on following Theory

### UNIT-1 Open Source and Linux

Open Source Definition, The distribution terms of open source software, open source technology importance Free and open Source Software (FOSS), LAMP(Linux, Apache, MySQL, PHP, Python, and Perl) Benefits , Perspective of Open Source software Linux and Open Source, Linux Usage Basics: Logging into the system, changing users and editing text files.Running Commands and Getting Help.Browsing the File system, Users, Groups and Permissions.

### UNIT-2 Apache and PHP

Introduction to Web server. Installing Apache on Linux: httpd service.

PHP : Testing Installation. Basics of PHP scripts, Variables, Datatypes,Operators and Expressions, Constants , Flow control functions, If statement, Loops, Arrays, Strings,Dates and Times, Forms

### UNIT-3 MySQL/MariaDB Server and Application

MySQL Server: Configuring MySQL Server, working with MySQL Databases, MySQL Tables, SQL Standards-INSERT, SELECT, UPDATE, REPLACE, DELETE. Date and Time functions in MySQL.

PHP-MySQL Application Development: Connecting to MySQL with PHP, Inserting data with PHP, Retrieving data with PHP. Developing PHP scripts for dyanamic web page like Feedback form, online admission form online test.

#### **UNIT-4 Python programming with MYSQL/MariaDB connection and application.**

Understanding prerequisites for Python, Getting started with Hello World, Selecting code with conditionals loops, datatypes, variables, arithmetic expressions, string, arrays & functions, access MySQL databases from Python, decimal datatypes, Creating retrieving updating and deleting records.

#### **TEXT AND REFERENCE BOOKS**

1. Red Hat Linux Bible by Christopher Negus. Wiley Publishing  
ISBN: 0-7645-4333-4
2. PHP, MySQL and Apache by Julie C Meloni. Pearson Education  
ISBN: 81-297-0443-9
3. The Complete Reference Linux by Peterson . Tata McGRAW HILL  
ISBN:0-07-044489-7
4. Programming in Python 3, Second Edition, Mark Summerfield
5. Python Cookbook, Third Edition, David Beazley and Brian K. Jones, Shroff Publishers & Distributors Pvt. Ltd., ISBN : 978-93-5110-140-6
6. Learning Python FIFTH EDITION Mark Lutz
7. Programming Python (English) 4Th Edition Mark Lutz
8. Testing Python, David Sale, Wiley India (P) Ltd., ISBN : 978-81-265-5277-1
9. PHP Cookbook, 3rd Edition Solutions & Examples for PHP Programmers By David Sklar,  
Adam Trachtenberg Publisher: O'Reilly Media Final Release Date: June 2014 ISBN:978-1-4493-6375-8  
| ISBN 10:1-4493-6375-X

#### **Internet Resources:**

1. <http://opensource.org/>
2. <http://www-128.ibm.com/developerworks/opensource/newto/>
3. <http://www.sun.com/software/opensource/>
4. <http://www.linux.org/lessons/beginner/>
5. <http://www.linux.org/lessons/interm/index.html>
6. <http://www.php.net/tut.php>
7. <http://www.howopensource.com/2011/07/foss-lab-manual>
8. <http://www.csetube.in7th-lab..html>

## MC3010-Lab : Software Project Development

### Teaching Scheme

Practicals : 4 hrs/week

### Examination Scheme

Practical Exam.: 50 Marks

Term Work .:25 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).

## **MC3011-Lab : Biometrics**

### **Teaching Scheme**

Practicals : 2hrs/week

### **Examination Scheme**

Practical Exam.: 25 Marks

Term Work .:25 Marks

1. Fingerprint Image preprocessing
2. Image enhancement, binarization, segmentation
3. Minutiae detection for fingerprint image
4. Fingerprint recognition
5. Face image preprocessing
6. Computing eigenface
7. Face recognition with nearest neighbor method
8. Face recognition with neural network

## **MC3012-Lab : ASP .NET & C#**

### **Teaching Scheme**

Practicals : 2hrs/week

### **Examination Scheme**

Practical Exam.: 25 Marks

Term Work .:25 Marks

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### **Suggestive List of Programs**

1. To Study the ASP.Net Framework
2. To Study & Create Presentation Layer using HTML & CSS
3. To Study & Create Master Page, User Control etc
4. To Study & Use Standard Controls in ASP.NET
5. To Study & Use Validation Controls in ASP.NET
6. To Study, Create and Connect with Database using ASP.NET & SQL Server
7. To Study & Implement Web Services
8. To Study & Implement AJAX in ASP.NET
9. To Study & Deploy Project on IIS
10. Mini Project

## **MC3013-Lab : Natural Language Processing**

### **Teaching Scheme**

Practicals : 2hrs/week

### **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

The objective of Natural Language Processing lab is to introduce the students with the basics of NLP which will empower them for developing advanced NLP tools and solving practical problems in the field.

- 1. Word Analysis**
- 2. Word Generation**
- 3. Morphology**
- 4. N-Grams**
- 5. N-Grams Smoothing**
- 6. POS Tagging: Hidden Markov Model**
- 7. POS Tagging: Viterbi Decoding**
- 8. Building POS Tagger**
- 9. Chunking**
- 10. Building Chunker**

References :

1. Jurafsky and Martin: "Speech and Language Processing", Prentice Hall, 2000.
2. Akshar Bharati, Rajeev Sangal and Vineet Chaitanya: "Natural Language Processing: A Paninian Perspective", Prentice-Hall of India, New Delhi, 1995

## MC3014: Dissertation

### Teaching Scheme

Practicals : 24hrs/week

### Examination Scheme

Practical Exam: 100 Marks

Term Work :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).