Scheme of Instructions& Syllabi

of

Master of Computer Applications

(Effective from Session 2018-19)

Faculty of Computer Applications

INVERTIS UNIVERSITY
Bareilly-243123 U.P.

M.C.A. (Master of Computer Applications)
Scheme of Instructions
(Effective from session 2018-19)
3rd YEAR

V Semester				**Teaching Scheme**			**Marks Distribution**		
Paper	**Code**	**Subject**	**Credit**	**L**	**T**	**P**	**ESM**	**MSM**	**Total**
Paper 1	MCA 501	PHP Programming	4	3	1	0	70	30	100
Paper 2	MCA 505	Grid and Cloud Computing	4	3	1	0	70	30	100
Paper 3	MCA 503	Artificial Intelligence	4	3	1	0	70	30	100
Paper 4		Elective-3	4	3	1	0	70	30	100
Paper 5		Elective-4	4	3	1	0	70	30	100
Paper 6**	MCA 598**	Aptitude Course – II	0	3	1	0	35	15	50
Lab 1	MCA 595	Mini Project	4	0	0	4	70	30	100
Lab 2	MCA 551	PHP Lab	2	0	0	4	35	15	50
Total			**24**	**18**	**6**	**4**	**420**	**180**	**600**

Elective – III	**Elective – IV**
I. MCA 511 Python	**I.** MCA 521 Digital Image Processing
II. MCA 512 Big Data and R-Programming	**II.** MCA 522 Artificial Neural Networks
III. MCA 513 MATLAB	**III.** MCA 523 Distributed System
IV. MCA 514 SQL Server	**IV.** MCA 524 Enterprise Resource Planning
V. MCA 515 Compiler Design	**V.** MCA 525 Software Testing Tools

VI Semester									
Paper	**Code**	**Subject**	**Credit**	**L**	**T**	**P**	**ESM**	**MSM**	**Total**
	MCA 691	Project Work	16	0	0	0	280	120	400
	MCA 692	Seminar/Colloquium	4	0	0	0	140	60	200
Total			**24**	**0**	**0**	**0**	**420**	**180**	**600**

***Qualifying paper for Non-mathematic Candidates.**
**** Qualifying paper for all candidates.**

L – Lecture
T – Tutorial
P – Practical
ESM – End Semester Marks
MSM – Max. Sessional Marks

MCA 501: Php Programming	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

1. To give knowledge about server site programming.
2. To introduce latest web development language.
3. To give knowledge about MySQL database management.
4. To explore the skills of programming in the file of online web project.

Detailed Syllabus

Unit-1

Introduction to PHP:- Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type , Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

Unit-2

Function:- What is a function, Define a function, Call by value and Call by reference, Recursive function, PHP GET and POST, Built-in Functions, User-Defined Functions, Functions with Parameters, Values and arguments in Function..

Unit-3

String and Array:-String - Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function , Array- Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and foreach(), Some useful Library function

Unit-4

Introduction to OOPS- Introduction, Objects, Declaring a class, The new keyword and constructor, Destructor, Access method and properties using $this variable, Public, private, protected properties and methods, Static properties and method, Class constant, Inheritance & code reusability, Polymorphism, Parent:: & self:: keyword, Instance of operator, Abstract method and class, Interface, Final

Unit-5

Exception Handling, file and Directories:-Understanding Exception and error, Try, catch, throw, Global Exception Handler, Defining Custom Exceptions, Understanding file& directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories.

Unit-6

Database Connectivity with MySql:-Introduction to RDBMS,Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Executing query, Framework.

Text and Reference Books

1. Lynn Beighley & Michael Morrison- Head First Php & MySQL.
2. Robin Nixon: Learning Php, MySQL, Java script and CSS: A step-by-step guide to creating dynamic websites.
3. Luke Welling & Laura Thompson: PHP & MYSQL web development

Course Outcomes:

After completing the course, students will be able to:

1. Understand various types of website development using php and mysql.
2. Analyze the latest language designing and optimize new technology.
3. Identify difference between traditional web development and php web development.
4. Understand level of web technology at corporate level.
5. Learning professional framework of php and mysql for project development.

MCA 505 Grid and Cloud Computing

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite:- MCA 204 Operating Systems, MCA 303 Data Communication & Computer Network.

Course Objectives:

1. To describe grid and cloud computing as an emerging technologies.
2. To understand the importance of grid and cloud computing along with various security issues.
3. To identify the differences between various types of computing techniques, Cloud deployment models and service models.
4. To understand the implementation of cloud security and mobile cloud computing concepts.
5. To analyze various virtualization and scheduling techniques.
6. To study the design approaches used by various cloud service providers.

Detailed Syllabus

UNIT I

Recent trends in computing: Cluster Computing, Grid Computing, Utility Computing, Cloud Computing. Introduction to Grid Computing: Motivation, Definition of Grid Computing, Evolution of Grid, Scope in Grid Computing, Benefits of Grid Computing.

UNIT II

Grid Basics: Grid Architecture and its relationship to other distributed technologies, Grid Application Areas. Security Issues in Grids: Authentication Issues Trust and Privacy related Issues, Authorization Issues, Grid Security Framework, and GSI.

UNIT III

Basics Cloud Computing Overview, Characteristics; Applications; Benefits; Limitations; Challenges; Cloud Computing Service Models: Infrastructure as a Service; Platform as a Service; Software as a Service; Cloud Computing Deployment Models: Private Cloud; Public Cloud; Community Cloud; Hybrid Cloud, Major Cloud Service providers

UNIT IV

Cloud Storage and Security: Overview, Advantages, Storage as a Service, Security, Reliability, Advantages, Cloud Storage Providers. Accessing the Cloud: Web Applications and Web API's. Standards: Applications, Client, Infrastructure, Services.

UNIT V

Virtualization Technologies: Types of Virtualization, Benefits of Virtualization, Hypervisors. Scheduling in Cloud Overview of Scheduling problem, Different types of scheduling, Introduction to Mobile Cloud Computing.

UNIT VI

Developing Applications: Programming Paradigms – MapReduce, Hadoop Library from Apache, Cloud Computing Platform and Tool, Google App Engine, Amazon AWS. Cloud Software Environments - Eucalyptus, Open Nebula, OpenStack, Aneka.

Text and Reference Books

1- The Grid- Blueprint for a New Computing Infrastructure, Ian Foster, Carl Kesselman, 2nd Edition, Morgan Kaufmann Publications,2003.

2- Grid Computing: Making the Global Infrastructure a Reality, Francine Berman, Geoffrey Fox, Tony Hey, John Wiley & Sons,2003.

3- Cloud Computing: Principles and Paradigms, RajkumarBuyya and James Broberg, John Wiley & Sons, 2011.

4- Cloud Computing, A Practical Approach, Anthony T Velte, McGraw Hill, 2010.

Course Outcomes:

After completing the course, students will be able to:

1. Define Cloud Computing and memorize the different Cloud service and deployment models.
2. Describe importance of virtualization along with their technologies.
3. Use and Examine different cloud computing services.
4. Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.
5. Describe the key components of Amazon web Service.
6. Design & develop backup strategies for cloud data based on features.

MCA 503 Artificial Intelligence

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Artificial Intelligence is the sub-division of computer science and the main goal is to enable a smart device perform activities that are normally done by people, so before starting in the field of AI we should have knowledge about advanced mathematics(e.g. correlation algorithm) (Computer based optimization techniques MCA204), programming language(data structure MCA201, C MCA101) etc..

Course Objectives:

1. The main objective of AI to build intelligent machine which can perform and act like humans.
2. so the main objective of this course is to understand how these algorithms works and how to analyze the data to make a proper decision.
3. As we know AI is in used in all fields like healthcare industry, mobile world, Retail, Fraud detection etc. so demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
4. To initiate the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems in different fields.
5. To evaluate the different stages of development of the AI field from human like behavior to Intelligent Agents.

Detailed Syllabus

UNIT I

Introduction: Overview Of Artificial Intelligence- Problems Of AI, AI Technique. Problem Solving : Problems, Problem Space & Search: Defining The Problem As State Space Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

UNIT II

Search Techniques: Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies, Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms.

UNIT III

Knowledge representation: Knowledge Representation Issues, Representation and Mapping, Approaches To Knowledge Representation, Issues In Knowledge Representation, Knowledge manipulation, Knowledge acquisition.

UNIT IV

Using Predicate Logic: Representing Simple Fact In Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, Natural Deduction. Representing Knowledge Using Rules : Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

UNIT V

Probabilistic Reasoning: Representing Knowledge in An Uncertain Domain, The Semantics of Bayesian Networks, Dempster-Shafer Theory. Natural Language Processing : Introduction, Syntactic Processing, Semantic Analysis, Discourse & Pragmatic Processing.

UNIT VI

Expert System-Rule based system architecture, Non production system architecture, knowledge organization and validation, Existing Systems (DENDRAL, MYCIN).

Text and Reference Books

1. "Artificial Intelligence", Ritch& Knight, TMH, 2006.
2. "Introduction to Artificial Intelligence & Expert Systems", Patterson, PHI, 2007.
3. "*Artificial Intelligence: A Modern Approach"*, Russell, S., Norvig, P, Pearson Education, 2006.
4. "Introduction to A.I.", Charnick, Addision Wesley, 1999.

Course Outcomes:

After completing the course, students will be able to know:

1.	How to solve a particular problem by using different algorithms which is impossible for humans.
2.	How to make proper decisions by gathering information and analyzing them.
3.	How expert system works and perform tasks.
4.	How to convert a particular sentence into logical statement.
5.	Analyze the problem as a state space, graph, design heuristics and select amongst different search based techniques to solve them.
6.	Apply concept Natural Language processing to problems leading to understanding of cognitive computing.

MCA 511: Python	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

1. To give knowledge about python programming.
2. To introduce python development language.
3. To give knowledge about concept of python.
4. To explore the skills of web programming using python.

Detailed Syllabus

Unit-1

Introduction to Python: Importance of Python, Installing and working with Python in Windows, Linux and Mac, Using Python as calculator, Comments, How to define main function in Python
The concept of data types - Variables, Arithmetic Operators and Expressions.

Unit-2

Subscript Operator, Indexing, Slicing a string, Converting strings to numbers and vice versa, split function, **Control flow** - if statements, for and while loops, nested loops, Short-circuit (lazy evaluation), range() function, break and continue statements, pass statements.

Unit-3

Data Structures: **Lists** - Basic list operations, Replacing, inserting, removing an element; Searching and sorting a list, Methods of list objects, Using lists as Stacks and Queues, How efficient lists are when used as stack or queue, List and nested list Comprehensions Tuple, Sets, Difference between list and tuple, **Dictionary** - adding and removing keys, accessing and replacing values, traversing dictionaries

Unit-4

Python functions and modules - **OS** and **SYS** modules, Defining python functions, calling a function, function arguments, Lambda and map function, Importing python module, **Useful Python Packages** – Beautiful Soup, NumPy, iPython, tkinter, **Classes and OOP** - Class definition syntax, objects, class and instance variables, Inheritance and multiple inheritance, Polymorphism, Overloading, Overriding, Data Hiding.

Unit-5

Regular Expressions - re module, Searching a string (match and search), Finding a string (findall), Break string into substrings (split), Replace part of a string (sub), **Examples of Regex** - Return the first word of a given string, Extract all the words of a given string, Extract domain name from given e-mail id's, Extract date from given string, Return all the words of a string that starts with vowel, Split a string with multiple delimiters, Retrieve some information from HTML or XML file.

Unit-6

File Handling - Reading keyboard input, opening and closing file, Read, Write and Append mode, Create and Read a text file, Looping over a file object, Writing on a file, with statements, splitting lines in a text file, Renaming and Deleting files, **Exception Handling** - Exceptions, Why use exceptions, Raising an exception, try and except, try, except and else clause; try and finally

Text and Reference Books

1. Python Programming for the Absolute Beginner By Laila M. Dawson
2. Learn Python the Hard Way By Zed A.Shaw
3. Learning Python By Mark Putz Python Documentation (https://docs.python.org)

Course Outcomes:

After completing the course, students will be able to:

1. Understand various types of website development using python.
2. Analyze the latest language designing and optimize new technology.
3. Identify benefits of using python in the fiels of latest development in machine learning, web.
4. Understand data structure using python implementation.
5. Data mining and data analyzing.

MCA 512 Big Data and R Programming

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Database Management System, Data Mining and Warehousing.

Course Objectives:

1. To describe the concept of Big data and its features.
2. To understand the importance Big Data Analytics with various challenges.
3. To know about the architecture of Hadoop with its components.
4. To perform analysis on the data using R programming language.
5. To identify the role of cloud computing in Big Data.
6. To generate data and manipulating it using R.

Detailed Syllabus

UNIT I (6 Hours)
Introduction to Big Data Classification of Digital Data, Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Classification of Analytics, Top Challenges Facing Big Data, Responsibilities of data scientists, Big data applications in healthcare, medicine, advertising.

UNIT II (6 Hours)
Hadoop Architecture Hadoop Architecture, Hadoop Storage: HDFS, Hadoop MapReduce paradigm, Introduction to Hive, Introduction to Pig.

UNIT III (6 Hours)
Introduction to NoSQL & Hadoop Introduction to NoSQL Advantages of NoSQL, SQL versus No SQL, Introduction to Hadoop, Features of Hadoop, Hadoop Versions, Hadoop Versus SQL.

UNIT-IV (8 Hours)
Types of Analytics & Techniques Open source technology for Big Data Analytics – cloud and Big Data – Mobile Business Intelligence and Big Data.

UNIT V (8 Hours)
Predictive Analysis Predictive Analytics, Supervised, Unsupervised learning, Clustering Techniques.

UNIT VI (6 Hours)
Basics of R, Working of R - Creating, listing and deleting the objects in memory - The on-line help Data with R Objects, R data Frames and Matrices, Reading data in a file, Saving data, Generating data, Manipulating data using R

Text and Reference Books

1. 1 An Introduction to Statistical Learning: With Applications in R: Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani.
2. BIG Data and Analytics, Sima Acharya, Subhashini Chhellappan, Willey
3. VigneshPrajapati, "Big Data Analytics with R and Hadoop", Packet Publishing 2013.
4. The Culture of Big Data, Mike Barlow, by Oreilly
5. Big Data Analytics; Frank J. Ohlhorst, by Wiley

Course Outcomes:

After completing the course, students will be able to:

1. Understand the role and importance of Big Data and Big Data Analytics.
2. Understand the architecture of Hadoop.
3. Know the role of Pig and Hive.
4. Understand the concept of various types of Analysis.
5. Work on the provided data using R programming.

MCA513: MATLAB	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Basic Mathematics, Elementary knowledge of computer programming and basic understanding of matrices, linear algebra, calculus, trigonometric functions and geometry.

Course Objectives:

Familiarization of the syntax, semantics, data-types and library functions of numerical computing languages such as MATLAB and/or SCILAB, and application of such languages for implementation/simulation and visualization of basic mathematical functions relevant to electronics applications.

Detailed Syllabus

UNIT I (6 Hours)
Basics of MATLAB: Starting MATLAB, matrices, variables, and the colon operator, linspace, plotting vectors.

UNIT II (10 Hours)
Matrices: Typing matrices, concatenating matrices, useful matrix generators, subscripting, end as a subscript, deleting rows or columns, matrix arithmetic, transpose.

UNIT III (10 Hours)
MATLAB Programming: Logical expressions, for loops, while loops, conditional programming, scripts, function m scripts, return statements, recursive programming.

UNIT IV (10 Hours)
Basic Graphics: Plotting many lines, adding plots, plotting matrices, clearing the figure window, subplots.
Graphics of Functions of Two Variables: Basic plots, color maps, color bar.

UNIT V (10 Hours)
Text Strings and cell arrays: String matrices, comparing strings, string manipulations, converting numbers to strings, using strings as commands, introduction and use of cell arrays.

UNIT VI (10 Hours)
Multidimensional Arrays: Generating Multidimensional Grids, Operations with Multidimen-sional Arrays.Digital Image Processing using MATLAB: Reading and writing gray scale image, Conversion of gray scale image to binary image, finding the number of density, perimeter, branch, area points of the image.

Text and Reference Books

1. Basics of MATLAB and beyond, Andrew knight, CRC Press LLC, 2000.
2. A Guide to MATLAB for Beginners and Experienced Users, Brian R. Hunt, Ronald L. Lipsman, Cambridge University, 2005.
3. Digital Image Processing using METLAB, Rafel, Richard & Steven, Pearson, 2007.

Course Outcomes:

On successful completion of the course, the students should be able to

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.

MCA514: SQL Server	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Pre-Requisites: Basic computer literacy including ability to create and manipulate files and install software.

Course Objectives:

1. Learn structured query language (SQL) to an intermediate/advanced level.
2. Be able to write data retrieval queries and evaluate the result set
3. Be able to write SQL statements that edit existing data
4. Be able to write SQL statements that create database objects.
5. Understand the structure and design of relational databases.
6. Understand the importance and major issues of database security and the maintenance of Data integrity.

Detailed Syllabus

Unit-1

SQL Server Overview: What Is SQL Server, SQL Server Integration, SQL Server Databases, SQL Server Security, Working with SQL Server. Planning to Install SQL Server, Hardware Installation Considerations, SQL Server 2000/2005 Editions, Software Installation Considerations, Methods of Installing SQL Server, Verifying the Installation, Configuring SQL Server Enterprise Manager, Troubleshooting.

Unit-2

Data Storage Management: Introduction to Data Structures, Creating Databases, Managing Databases , Placing Database Files and Logs, Optimizing the Database Using Hardware-based RAID, Optimizing the Database Using File groups, Optimizing the Database Using File groups with Hardware-based RAID, Capacity Planning, Performance Considerations, Creating A Database, Managing File groups, Viewing Metadata

Unit-3

Managing Security/Security Management: Windows Security Management for SQL Server, Windows Authentication Mode, Implementing an Authentication Mode, Assigning Logins to Users and Roles, Assigning Permissions to Users and Roles, Managing Security within SQL Server, Managing Application Security, Managing SQL Server Security in the Enterprise

Unit-4

Performing Administrative Tasks: Configuration Tasks, Routine SQL Server Administrative Tasks, Automating Routine Maintenance Tasks, Creating Alerts, Troubleshooting SQL Server Automation, Automating Multi-Server Jobs. Backing Up Databases, Preventing Data Loss, Setting and Changing a Database Recovery Model, SQL Server Backup, When to Back Up Databases, Performing Backups, Types of Backup Methods, Planning a Backup Strategy, Performance Considerations

Unit-5

Restoring Databases: SQL Server Recovery Process, Preparing to Restore a Database, Restoring Backups, Restoring Databases from Different Backup Types, Restoring Damaged System Databases, Monitoring/Tuning SQL Server, Why to Monitor SQL Server, Performance Monitoring and Tuning, Tools for Monitoring SQL Server, Common Monitoring and Tuning Tasks, T-SQL Tuning, SQL Tuning, Diagnosing Storage and System Problems, Diagnosing Session and O/S Issues

Unit-6

Managing Data with DTS Utility/High Availability: Introduction to Transferring Data, Tools for Importing and Exporting Data in SQL Server, Introduction to DTS, Transforming Data with DTS, Introduction to Availability, Increasing Availability Using Failover Clustering, Standby Servers and Log Shipping, Introducing Replication, Introduction to SQL Server Replication, SQL Server Replication Agents, SQL Server Replication Types, Physical Replication Models, Creating a Replication Topology

Text and Reference Books

Suggested Readings:

1. MS SQL Server Study Guide for DBA: by Zakir Hossain Microsoft SQL Server 2008 Administrator's Pocket Consultant, 2nd Edition,Microsoft Press.
2. Complete Reference, Jeffrey R Shapiro, McGraw-Hill Companies, 2005
3. SQL Server 7 Essential Reference, Sharon Dooley, Sams, 2000.

Course Outcomes:

After completing the course, students will be able to:

1. Students will familiar for SQL architecture, client/server relation, and database types.
2. Students will create table and modifying data using SQL quires, Views, and Stored Procedures
3. To understand the Managing Security/Security Management issues and Managing Application Security
4. Students will Performing Administrative Tasks related Automating Routine Maintenance Tasks and Backing Up Databases
5. Students will understand how to Restoring Databases, SQL Server Recovery Process
6. To understand the managing data with DTS Utility/High availability backup and restoration of databases and SQL Server Replication

MCA515: Compiler Design

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Theory of Formal Language (Automata), Basic Concepts of C Language, Discrete Mathematics.

Course Objectives:

1. To learn the process of translating a modern high-level language to executable code.
2. To learn about Automata Theory of basic Concepts.
3. To develop concepts of parsing.
4. To Analyze concept of Chomsky, Syntax tree..
5. To learn run time enviournment concepts, run time concepts.
6. To understand concepts of code optimization techniques.

Detailed Syllabus

UNIT I

Introduction to Compiler: Compilers, Analysis of the source program, The phases of the compiler, Major data structures in a Compiler, Issues in a Compiler Structure, Bootstrapping and Porting.

UNIT II

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA, Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to Compiler Construction- lexical analysis, Construction of lexical analyses using LEX tool, Phases of Compilation and A simple One-Pass Compiler.

UNIT III

Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity, Application CFG in compilation-Preprocessing steps in Parsing, LL(1) parsing, Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

UNIT IV

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements, Context Sensitive features – Chomsky hierarchy of languages and recognizers, Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT V

Run-time Environments: Memory organization during program execution, Fully static run-time environment, Stack-based run-time environments, Dynamic memory, Parameter passing mechanism, Run-time environment for Tiny language.

UNIT VI

Code Generation: Intermediate code and data structures for code generation, Basic code generation techniques, Code generation of Control statements and Logical expressions, Code generation of Procedure and Function calls, Code generation for a tiny language, A survey of code optimization techniques..

Text and Reference Books:

1. "Compiler Principles, Techniques and Tools", Aho, Sethi, Ullman, Pearson Education,2007.
2. "Introduction to Automata Theory, Languages and Computation" ,Hopcroft, RajeevMotwani and Ullman, Addition Wesley, 2006.
3. "Compiler Construction – Principle and Practice", Kenneth C. Louden, Thomson 2007.
4. "Introduction to Theory of computation", Sipser, Thomson, 2009.

Course Outcomes:

After completing the course, students will be able to:

1. Understand concepts of Phase of Compiler.
2. Understand the concept of Automata Theory.
3. Understand the Concept of Parsing and YACC compiler.
4. Understand the concept Run time enviournment and tiny Language Concepts.
5. Understand the concepts of code generation.
6. Understand the connectivity of syntax tree and Chomsky hierarchical tree.

MCA 521 Digital Image Processing

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite:- Basic Logical operations, Computer Graphics.

Course Objectives:

1. To describe and explain basic principles of digital image processing.
2. To study basic image operations.
3. To understand the algorithms that perform basic image processing (e.g. noise removal and image enhancement).
4. To design and implement algorithms for advanced image analysis (e.g. image morphing, image segmentation).
5. To expose students to current applications in the field of DIP.

Detailed Syllabus

UNIT I (6 Hours) Elements of Visual Perception, Image Sensing and Acquisition, Steps of DIP and its Applications, Components of Image Processing system, Image sampling and Quantization.

UNIT II (10 Hours) Image Enhancement in Spatial Domain: Basic Gray Level Transformation, Histogram Processing, Spatial Filtering, Smooth Spatial Filtering: Smoothing Linear Filters, Order-Statistics filters. Enhancement using arithmetic/Logic Operations: Image subtraction, Image Averaging, Use of Second Derivatives for Enhancement-The Laplacian.

UNIT III (10 Hours) Image Enhancement in Frequency Domain: one dimensional Fourier frequency domain and its inverse, Two dimensional Fourier frequency domain and its inverse, Basic properties of frequency domain, Smoothing Frequency-Domain Filters- Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian LowpassFilters, Sharpening Frequency Domain Filters- Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters, Unsharp Masking, High-Boost Filtering.

UNIT IV (10 Hours) Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models- Spatial and Frequency Properties of Noise, Important Noise Probability Density Functions, Periodic Noise, Restoration in the Presence of Noise- Mean Filters, Order-Statistics Filters, Linear, Position-Invariant Degradations, Estimating the Degradation Function- Estimation by Image Observation, Estimation by Experimentation, Estimation by Modeling Inverse Filter, Minimum Mean Square Error (Wiener) Filter, Geometric Mean Filter.

UNIT V (10 Hours) Morphological Image Processing: Basic Concepts from Set Theory, Logic Operations Involving Binary Images, Dilation and Erosion, Opening and Closing, Hit or Miss Transformation, Morphological Algorithms- Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning, Extensions to Gray-Scale Images- Dilation, Erosion, Opening and Closing.

UNIT VI (10 Hours) Image Segmentation: Detection of Discontinuities- Point Detection, Line Detection, Edge Detection, Edge Linking and Boundary Detection- Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques, Thresholding- Foundation, Basic Global Thresholding, Basic Adaptive Threshold, Region-Based Segmentation- Basic Formulation, Region Growing, Region Splitting and Merging.

Text and Reference Books

1. Fundamentals of Digital Image Processing, Anil K. Jain, Pearson, IIIrd, 2004.
2. Digital Image Processing, Rafel C. Gonzalez & Richard E. Woods, PHI, 10th, 2005.
3. Digital Image Processing using MATLAB, Rafel, Richard & Steven, Pearson, IInd, 2007.
4. Digital Image Processing, JayaramanS,VeerakumarT,Esakkirajan S, TMH, Ist, 2009.

Course Outcomes:

After completing the course, students will be able to:

1. Understand general terminology of digital image processing.
2. Examine various types of images, intensity transformations and spatial filtering.
3. Develop Fourier transform for image processing in frequency domain.
4. Evaluate the methodologies for image segmentation, restoration etc.
5. Implement image process and analysis algorithms.
6. Apply image processing algorithms in practical applications.

MCA 522: Artificial Neural Networks	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Machine Learning

Course Objectives:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective
3. To give design methodologies for artificial neural networks
4. To provide knowledge for network tunning and overfitting avoidance
5. To offer neural network implementations.
6. To demonstrate neural network applications on real-world tasks

Detailed Syllabus

Unit-1

Overview of biological neurons: Structure of biological neurons relevant to ANNs. Fundamental concepts of Artificial Neural Networks: Models of ANNs; Feed-forward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner –lake all learning rule, etc.

Unit-2

Single layer Perception Classifier: Classification model, Features & Decision regions; training & classification using discrete perceptron algorithm, single layer continuous perceptron networks for linearly separable classifications.

Unit-3

Multi-layer Feed forward Networks: linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, generalized delta learning rule, Error back-propagation training, learning factors, Examples. Single layer feedback Networks: Basic Concepts, Hopfield networks, Training & Examples.

Unit-4

Associative memories: Linear Association, Basic Concepts of recurrent Auto associative memory: retrieval algorithm, storage algorithm; Bi-directional associative memory, Architecture, Association encoding & decoding, Stability.

Unit-5

Fuzzy Logic and Genetic Algorithms: Fuzzy set theory, Crisp set, Crisp relations, Fuzzy relations, Fuzzy systems – crisp logic, Predicate logic, Fuzzy logic, Rule based system, Defuzzification methods. Genetic Algorithms- Basic concept, working principle, flow chart of genetic algorithms.

Unit-6

Applications of Neural Network: Approach to solve hard problems- Travelling Salesman problem, Time Series prediction, Speech Recognition, Autonomous Vehicle Navigation, Handwritten Digit Recognition, Image compression, Visual processing networks.

Text and Reference Books

1. "Introduction to artificial neural systems", Jacek M. Zurada, 1994, Jaico Publ. House.
2. "Neural Networks- A comprehensive foundation", Simon Haykin, Pearson Education Asia, II edition, 2002
3. "Neural Networks", Kosko, 1992, PHI.
4. "Neural Network fundamentals with Graph Algorithms & Applications", P. Liang and N.K. Bose, TMH, 2003.
5. "Neural Networks, Fuzzy Logic and Genetic Algorithms", S. Rajasekaran and G. A. V. Pai, PHI, 2003.

Course Outcomes:

After completing the course, students will be able to:

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

MCA523: MATLAB	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Unit Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Basic knowledge of soft computing and mathematics.

Course Objectives:

1. To familiarize with MATLAB concepts.
2. To introduce the concepts of matrix.
3. To know programming methods in MATLAB.
4. To know the application of MATLAB in graphics.
5. To use strings in MATLAB.
6. To know application of MATLAB in digital image processing.

Detailed Syllabus

UNIT I

Basics of MATLAB: Starting MATLAB, matrices, variables, and the colon operator, linspace, plotting vectors.

UNIT II

Matrices: Typing matrices, concatenating matrices, useful matrix generators, subscripting, end as a subscript, deleting rows or columns, matrix arithmetic, transpose.

UNIT III

MATLAB Programming: Logical expressions, for loops, while loops, conditional programming, scripts, function m scripts, return statements, recursive programming.

UNIT IV

Basic Graphics: Plotting many lines, adding plots, plotting matrices, clearing the figure window, subplots.Graphics of Functions of Two Variables: Basic plots, color maps, color bar.

UNIT V

Text Strings and cell arrays: String matrices, comparing strings, string manipulations, converting numbers to strings, using strings as commands, introduction and use of cell arrays.

UNIT VI

Multidimensional Arrays: Generating Multidimensional Grids, Operations with Multidimen-sional Arrays.Digital Image Processing using MATLAB: Reading and writing gray scale image, Conversion of gray scale image to binary image, finding the number of density, perimeter, branch, area points of the image.

Text and Reference Books

1. Basics of MATLAB and beyond, Andrew knight, CRC Press LLC, 2000.
2. A Guide to MATLAB for Beginners and Experienced Users, Brian R. Hunt, Ronald L. Lipsman,Cambridge University, 2005.
3. Digital Image Processing using METLAB, Rafel, Richard & Steven, Pearson, 2007.

Course Outcomes:

After completing the course, students will be able to:

1. Perform simulation for the verification of mathematical functions
2. Analyze features of the MATLAB to enable their applications in the higher learning
3. Implement simple mathematical functions/equations in numerical computing environment.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Use MATLAB effectively to analyze and visualize data
6. work with grey scale images.

MCA524: Enterprise Resource Planning

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - Basic Knowledge of Project Management Skills

Course Objectives:

1. Understand the functionality of Supply chain and management techniques.
2. Understand business process models that assist with implementation of ERP.
3. Analyze the implementation of ERP and MPGPRO.
4. Design different types of ERP Interfaces.
5. Architect the system control, presentation, database Interfaces.

Detailed Syllabus

Unit-1

Introduction: ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, System Architecture of ERP.

Unit-2

Overview of an enterprise: Why ERP is required and how can it help in development and deployment of information system in an enterprise?

Case1: Manufacturing Industry.

Unit-3

ERP Functional Modules: Introduction, Client Server Multi tire Architecture of ERP,Standard Modules, Extended ERP, Integration of ERP with SCM and CRM Applications, Concept of e-ERP, Web Architecture of e-ERP.

Unit-4

ERP Implementation: Standard Methodology, As is Study, Requirement Engineering and Business Process Reengineering, Reverse Engineering, Batch data conversion from legacy system, Technology set up and testing, Issues/Risks, Impacts, Solution/ Mitigation.

Case2: Why does ERP implementation fail in more than 50% cases?

Unit-5

ERP software (any standard ERP package): Structure, concepts of Data Acquisition, Data Organization, Data Conversion/Reporting, ERP Basis and Maintenance, Programming Interface.

Core Modules: Financials, Materials, Manufacturing/Conversions, Sales and Distribution, Human Resources.

Unit-6

ERP Software Services and Opportunities: Step by step implementation, Document management Systems, Document Linking, Process change and document change & control, ERP Database, Online services/ Helpdesk, Control and security, Managing Communications and Training for ERP, Employment opportunities.

Text and Reference Books

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill,2007,1st Edition
2. Rahul V. Altekar "Enterprise wide Resource Planning", Tata McGraw Hill, 2004,1st Edition
3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, 2003, 2nd Edition,
4. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology,2001,1st Edition

Course Outcomes:

After completing the course, students will be able to:

1. Demonstrate a good understanding of basic issues in Enterprise Systems.
2. Explain the scope of common Enterprise Systems (e.g., MM, SCM, CRM, HRM, procurement).
3. Explain the challenges associated with implementing enterprise systems and their impacts on organizations.
4. Describe the selection, acquisition and implementation of enterprise systems.
5. Use one of the popular ERP packages to support business operations and decision-making.
6. Communicate and assess an organization's readiness for enterprise system implementation with a professional approach in written form.
7. Demonstrate an ability to work independently and in a group.

MCA525: Software Testing Tools	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - programming languages, software engineering.

Course Objectives:

The objectives of this course are

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To highlight the strategies for software testing and understand the various types of black box and white box testing methods.
3. To discuss various software testing issues and solutions in unit testing, integration, regression, and system testing
4. To identify the issues in testing management and understand test planning.
5. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Detailed Syllabus:

UNIT I (6 Hours) Software Quality Assurance: Software crisis, Birth of software engineering, Why Software engineering, Criteria for the success of a software project, phases in SDLC, Software Quality Assurance, Quality Management Systems.
UNIT II (10 Hours) Software Testing Process: Verification and Validation, Cost of Quality, Why Testing is difficult, Levels of testing-Unit Testing, Module Testing, Integration and System Testing, Acceptance Testing, Testing Approaches: Top-down versus Bottom-up, Functional versus Structural testing, Mutation testing, Regression Testing, Types of Testing, Manual Testing and its Limitations.
UNIT III (10 Hours) Software Testing Tools: Need for Automated Testing Tools, Taxonomy of testing tools, Functional/Regression Testing Tools, Performance Testing tools, Testing Management Tools, Source Code Testing Tools, How to select a Testing Tool?
UNIT IV (12 Hours) Win Runner: Overview, Testing an application using Win Runner, Test Script Language(TSL), GUI MAP file, Synchronization of Test cases, Data driven testing, Checking GUI objects.
UNIT V (12 Hours) SQA Robot: overview, testing an application, Synchronization of Test procedures, creating checkpoints. Test Director: overview, testing management process, managing the testing process using Test Director.

UNIT VI (6 Hours)
Source Code Testing Utilities in Unix and Linux Environnement: GNU tools, Timings of programs, Profiler, Code optimization, Productivity tools, Portability Testing Tool, Configuration Management Tools, Coding Guidelines and Standards.

Text and Reference Books

1. "Effective Software Testing", Elfriede Dustin, Pearson Education, IV edition.
2. "Software Testing Concepts and Tools", N. R. Pusuluri, Dreamtech press, 2008.
3. "Automated Software Testing", Jeff Rashka, John Paul and E. Dustin, Pearson
4. Education, 2008.
5. "Effective Methods For Software Testing", W. E. Perry, Wiley-India, III edition.

Course Outcomes:
After completing the course, students will be able to:

1. Have an ability to apply software testing knowledge and engineering methods. Have an ability to design and conduct a software test process for a software testing project.
2. Have an ability to understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods
3. Have an ability to design and conduct various types and levels of software testing for a software project.
4. Have basic understanding, knowledge of contemporary issues in software testing and test planning. Have an ability to use various communication methods and ethical skills to communicate with their teammates to conduct their practice-oriented software testing projects.
5. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.