Scheme of Instructions & Syllabi

of

Master of Computer Applications
Second Year

(Effective from session 2020-21)

Department of Computer Applications

INVERTIS UNIVERSITY
Bareilly-243123 U.P.

STUDY AND EVALUATION SCHEME
Master of Computer Applications
(Effective from session 2020-2021)

SEMESTER III, YEAR II

S.N.	Course Code	Subjects	L+T+P	Scheme		Total	Credit
				CA	EE		
THEORY							
1	MCA306	.NET Framework using C#	3+1+0	30	70	100	4
2	MCA307	Advanced Data Mining Techniques	3+1+0	30	70	100	4
3	MCA308	Cryptography and Cyber Security	3+1+0	30	70	100	4
4	MCA*	Elective 1	3+1+0	30	70	100	4
5	MCA*	Elective 2	3+1+0	30	70	100	4
6	MCA319	Industrial Training Viva **	0+0+0	0	0	25	1
PRACTICAL / PROJECTS							
7	MCA353	.NET Framework using C # Lab	0+0+4	15	35	50	2
8	MCA354	Elective 1 Lab	0+0+4	15	35	50	2
9	MCA355	Mini Project	0+0+4	10	15	25	1
TOTAL			**15 5 12**	**190**	**435**	**650**	**26**

Elective 1			**Elective 2**		
i	MCA309	Artificial Neural Network	i	MCA314	Digital Marketing
ii	MCA310	Android Programming	ii	MCA315	Theory of Computation
iii	MCA311	PHP	iii	MCA316	Distributed DBMS
iv	MCA312	Search Engine Optimization	iv	MCA317	Data Compression
v	MCA313	Oracle	v	MCA318	Social Network Analysis

STUDY AND EVALUATION SCHEME
Master of Computer Applications
(Effective from session 2020-2021)

SEMESTER IV, YEAR II

S.N.	Course Code	Subjects	L+T+P	Scheme		Total	Credit
				CA	EE		
THEORY							
1	MCA404	Machine Learning with Python	3+1+0	30	70	100	4
2	MCA405	Cloud Computing and Virtualization	3+1+0	30	70	100	4
3	MCA*	Elective	3+1+0	30	70	100	4
PRACTICAL / PROJECTS							
7	MCA453	Machine Learning with Python Lab	0+0+4	15	35	50	2
8	MCA454	Major Project	0+0+4	90	210	300	12
TOTAL			**9 3 8**	**195**	**455**	**650**	**26**

Electives					
i	MCA406	Internet of Things	I	MCA415	Big Data Analysis
ii	MCA407	MATLAB	Ii	MCA416	Compiler Design
iii	MCA408	Digital Image Processing	Iii	MCA417	Advanced Soft Computing
iv	MCA409	Block Chain Technology	Iv	MCA418	Software Quality Assurance & Testing
v	MCA410	Artificial Intelligence	V	MCA419	Advanced Mobile Computing

*** Students can choose Electives from Elective1 & Elective 2 lists.**

****After 2nd Semester, students will undergo 6 weeks summer training compulsorily in Public Sector undertakings or Private Sector, known as Industrial Training/Internship. 25 marks will be on viva of students on their Project experience in 3rd Semester.**

MCA306: .NET Framework using C#	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test – 12 Marks Teachers Assessment – 6 Marks Attendance – 12 Marks End Semester Exam – 70 Marks

Prerequisite: HTML and CSS.

Course Objectives:

1. Learn about MS.NET framework developed by Microsoft.
2. You will be able to using XML in C#.NET specifically ADO.NET and SQL server
3. Be able to understand use of C# basics, Objects and Types, Inheritance
4. To develop, implement and creating Applications with C#.
5. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
6. To understand and be able to explain Security in the .NET framework and Deployment in the .NET.
7. To develop Assemblies and Deployment in .NET, Mobile Application Development.

Detailed Syllabus:

Unit-1 **The .Net framework:** Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In-Time Compilation, Framework Base Classes. **Programming Language C#:** Declaring implicit and explicit variables, Unicode characters and strings, creating Object and Classes, The Main method specification.
Unit-2 **Object oriented programming with C#: I**nheritance, Method Overloading and method overriding, Polymorphism, Operator Overloading, Abstract Class, Inner Class, Interface. Delegates, Partial Classes, Exception Handling, Creating Name-Space, Input-Output and File Handling, Multithreading, **Windows Application:** Introduction of windows form, Linking Window Form, Creating Properties, window form controls, MDI form.
Unit-3 **Containers and its Event Handling:** Flow Layout Panel, Group Box, Panel, Split Container, Tab Control, Table Layout Panel. Navigation Control and Its Event Handling: Context Menu Strip, Tool Strip, Status Strip, Tool Strip Container. **Dialog Boxes and its Event Handling:** Message Dialog Boxes, Color Dialog, Folder Browser Dialog, Font Dialog, Open File Dialog, Save File Dialog, Data Grid View, Dataset.
Unit-4 **Introduction to ASP.NET with C#:**Introduction of web application, web site, A Review of Classic ASP , ASP.NET Web Applications, Rendering HTML with Server Controls. **Working with Web Forms Controls and C#**: Introduction to Web Forms Controls, Simple Input Controls, Hyperlinks, Button Controls and List Controls. Dropdown List Control, Overview of ASP.NET Validation Controls, Client-Side Validation, Server-Side Validation, File Upload controls, Wizard controls.Master Page, Ad Rotator Control, Login Controls, Session Management using Cookies, Session.

Unit-5

ADO.Net: Overview of ADO.NET, ADO. NET Classes,Connected and Disconnected Architecture and different operation with database.

Using the Data List and Repeater, Data grid Controls: Overview of List-Bound Controls , Creating a Repeater Control, Creating a Data List Control , Introduction to the Data Grid , , Using Advanced Data Grid Features.

Unit-6

Working with XML: Data handling using XML, Creating web Services, Net Assemblies features and Structure.

Configuring and Deploying ASP.NET Applications: Creating Setup of Web Application, Configuring IIS and the .NET Framework, Deploying ASP.NET Applications.

Suggested Readings:

1. Beginning Visual C# 2008, Wiley, Wrox Publication, 2nd Edition 2008
2. Programming with C#, E. Balagurusamy, TMH, 2nd Edition 1999
3. Microsoft .Net for Programmers, Fergal Grimes, SPI Edition,

Course Outcomes:

After completing the course, students will be able to:

1. Learn to develop applications using C# and VB.NET.
2. Learn to apply these languages to develop server-side applications which make use of ADO.NET, ASP.NET, and Web Services etc.
3. Understand use of C# basics, Objects and Types, Inheritance
4. Develop, implement and creating Applications with C#.
5. Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web.
6. Understand and be able to explain Security in the .NET framework and Deployment in the .NET.

MCA 307: Advanced Data Mining Techniques	
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: -

1. Familiarity with the data base management system
2. Knowledge of repository system.

Course Objectives:

1. Be familiar with mathematical foundations of data mining tools.
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. To explain the stages and process different data mining techniques. E. To learn mining and warehouse techniques through the use of different tools (e.g. ORACLE)

Detailed Syllabus

UNIT I (10 Hours) **Introduction:** Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining. **Data Pre-processing:** Needs, Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
UNIT II (10 Hours) **Introduction:** Data Warehouse and OLAP Technology for Data Mining, Data Warehouse Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. Data Mining Primitives, Data Mining Query Languages.
UNIT III (10 Hours) **Concepts Description:** Characterization and Comparison, Data Generalization and Summarization-Based Characterization. Analytical Characterization, Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.
UNIT IV (10 Hours) **Mining Association Rules in Databases:** Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis.
UNIT V (6 Hours) **Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back-propagation, Classification Based on Association Rule Mining, Other Classification Methods, Prediction, and Classifier Accuracy.

UNIT VI (10 Hours)

Cluster Analysis Introduction: Types of Data in Cluster Analysis, a Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Outlier Analysis. **Mining Complex Types of Data:** Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining-Spatial Databases, Multimedia Databases, Time-Series and Sequence Data, Text Databases, World Wide Web.

Text and Reference Books

1. Data Mining -Concepts and Techniques, Han, Kamber, Harcourt India, 2006.
2. Data Mining Introductory and advanced topics, Margaret H Dunham, Pearson, 2002.
3. Data Mining Techniques, Arjun K. Pujari, University Press, 2001.

Course Outcomes:

After completing the course, students will be able to:

1. The candidate will get knowledge of - Data preprocessing and data quality..
2.Modeling and design of data warehouses
3. Algorithms for data mining.
4. Be able to design data warehouses.
5. Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis

MCA 308 Cryptography and Cyber Security	
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: - MCA 101 Computer Concepts and C programming, MCA 303 Data Communication & Computer Network

Course Objectives:

1- To define cryptography, its use, areas where cryptography is needed.
2- To understand security concepts, ethics in Network Security, security threats, and the security services and mathematical foundation required for various cryptographic algorithms.
3- To develop code to implement a cryptographic algorithm or write an analysis report on any existing security product.
4- To analyze all key less and keyed algorithms to identify their strength and weaknesses and try to solve and remove the limitations or optimize the complexity of algorithm(s).
5- To test different available algorithms in terms of complexity, response time, key size, data size, security assurance, etc.
6- To design an algorithmic solution of a problem either by applying existing algorithms or a new one. Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.

Detailed Syllabus

UNIT I Introduction to Cryptography and Network Security: Security Goals, Attacks, Services and Mechanisms, Techniques, Traditional Symmetric Key Cipher.
UNIT II Modern Symmetric Key Ciphers: Fiestal Cipher, S-DES, DES, Double DES, Triple DES, AES, Block Cipher. Modes of Operation : ECB, CBC, CFB, OFB and CTR, KDC.
UNIT III (10 Hours) Introduction to Mathematics for Cryptography: Modular Arithmetic, The Euclidian Algorithm, Extended Euclid, Farmet's and Euler's Theorem, Chinese Remainder Theorem.
UNIT IV (10 Hours) Asymmetric Key Cryptography: RSA Algorithm, ECC, Key Management- Public Key Distribution, Sharing of secret key using A-symmetric Key Cryptosystem.
UNIT V (10 Hours) Message Authentication: MAC, SHA-512 and MD5. Digital Signature: DSS Key Management: Symmetric Key Distribution, Kerberos.
UNIT VI (10 Hours) Network Security: IPSec, SSL and TSL, PGP AND S/MIME, SET, System Security: Malicious Software, Firewalls and Intruders.
Text and Reference Books 1. Cryptography and Network Security, Behrouz A Frouzan, TMH, 1st Edition 2007. 2. Cryptography and Network Security, William Stalling, Pearson Education, 4th Edition, 2006. 3. Applied Cryptography, Bruce Schinner, Willy and Sons, 2nd Edition 1996.

Course Outcomes:

After completing the course, students will be able to:

1. Identify some of the factors driving the need for network security.
2. Identify and classify particular examples of attacks.
3. Define the terms vulnerability, threat and attack.
4. Identify physical points of vulnerability in simple networks.
5. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.

MCA 309: 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.

MCA 310: Android Programming	
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: - Basics of Java language and PL/SQL

Course Objectives:

1. To gain knowledge of installing Android Studio
2. To learn designing of User Interface and Layouts for Android App.
3. To learn how to use intents to broadcast data within and between Applications.
4. To use Content providers
5. To introduce Android APIs
6. To design basic applications

Detailed Syllabus

UNIT I **JAVA Concepts (10 hrs):** Platform Independency, OOPs Concepts, Inheritance in detail, Exception handling, Packages & interfaces, JVM & .jar file extension, Multi threading (Thread class & Runnable Interface).**SQL:** DML & DDL Queries in brief.
UNIT II **Introduction to Android:** Introduction of Android, Setting up development environment, Installing the SDK, Creating Android Emulator, Android development Tool. **Fundamentals:** Basic Building blocks - Activities, Services, Broadcast Receivers & Content provider, UI Components - Views & notifications, Components for communication -Intents & Intent Filters, Android API levels (versions & version names)
UNIT III **Application Structure:** AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Draw-able Resources, Activities and Activity lifecycle, First sample Application.
UNIT IV **Emulator-Android Virtual Device:** Launching emulator**,** Editing emulator settings**,** Emulator shortcuts**,** Logcat usage**,** Introduction to DDMS. **Second App: (**switching between activities), Develop an app for demonstrating the communication between Intents.
UNIT V **Basic UI design:** Form widgets**,** Text Fields**,** Layouts**,** [dip, dp, sip, sp] versus px**,** Examples **Preferences:** Shared Preferences**,** Preferences from xml**,** Examples.
UNIT VI **Menu:** Option menu**,** Context menu**,** Sub menu**, M**enu from xml**, M**enu via code**,** Examples **UI design:** Time and Date**,** Images and media**,** Composite**,** Alert Dialogs & Toast**,** Popup**,** Examples

Text and Reference Books

1. Android Application Development (With Kitkat Support), Black Book, by Kogent Learning Solutions Inc. by Pradeep Kothari
2. *Android Application Development Cookbook: 93 Recipes for Building Winning Apps (WROX), by Wei-Meng Lee*
3. Professional Android 4 Application Development, by Reto Meier
4. Beginning Android 4 Application Development, Wei-Meng Lee
5. Android Application Development, by Lombardo John and Blake Meike

Course Outcomes:

After completing the course, students will be able to:

1. Understand basic knowledge of Java fundamental concepts and PL/SQL
2. Design and Implement User Interfaces and Layouts of Android App.
3. Use Intents for activity and broadcasting data in Android App.
4. Design and Implement Content Providers.
5. Evaluate performance of Application in terms of activity switching
6. Design menu driven applications

MCA 311: PHP	
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.

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.

MCA312: Search Engine Optimization	
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 introduction about HTML and Internet.

Course Objectives:

1. Define the Internet of Things.
2. To discussed keyword research, types of keyword Research, and their methodology.
3. Describe the essentials of good website designing and introduction of basic HTML tags.
4. Introduction to onsite optimization and their techniques.
5. Introduction to offsite optimization and their techniques.
6. Introduction to submission types and their significance.

Detailed Syllabus

Unit-1 Internet and Search Engine Basics, Internet Marketing and its importance, Types of Internet Marketing Methods, Search Engines and its working, Importance of Search Engines, SEO is an Art or Science, Google Search Engine Architecture, Search Engine Algorithms, Google Algorithm Updates, Page Rank Technology, Panda Update and its Importance.
Unit-2 Introduction to Keyword Research, Business Analysis, Types of Keywords, Keyword Research Methodology, Keywords Analysis Tools, Competition Analysis, Preparing a Keyword List for Project, Localized Keywords Research
Unit-3 Basics of Website Designing / Development, Essentials of good website designing, HTML Basics for SEO, basic tag- Title, Meta, Header, Image, link, anchor etc.., Usability and User Experience in Website, Importance of Domain Names and Value, Domain Selection
Unit-4 Introduction to onsite Optimization Website Structure and Navigation Menu Optimization, Filename Optimization, Title Tag Optimization, Meta Tags Optimization, Headers Optimization, Anchor Links Optimization, Footer Optimization, Creating an HTML and XML sitemaps
Unit-5 Introduction to Offsite Optimization, Local marketing of websites depending on locations, Promoting Subsequent pages of the website, Black Hat / White Hat / Grey Hat SEO, Linking Building Methodology, Types of Linking Methods, Free Links / Paid Links
Unit-6 Submission-Directory, Blog, Press Release, Article, Video, Forums, Forum Signatures and Commenting, Social Bookmarking, Tracking the Links and Page Rank

Text and Reference Books

1. Eric Enge, Stephan Spencer, Rand Fishkin, Jessie C Stricchiola, "The Art of SEO : Mastering Search Engine Optimization", O'Reilly Media, October, 2009
2. David Amerland, Google Semantic Search, Pearson
3. Jerri L. Ledford, "SEO: Search Engine Optimization Bible", 2nd Edition, Wiley India, April, 2009
4. John I Jerkovic, "SEO Warrior: Essential Techniques for Increasing Web Visibility", O'Reilly

Course Outcomes:

1. Understand to Search Engine and Search Engine Algorithms.
2. To understand Keyword Research, Keyword Research Methodology and Keywords Analysis Tools.
3. To understand the network protocol those are used for IoT Configuration.
4. Students will understand onsite optimization and their techniques.
5. Students will understand Offsite optimization and their techniques.
6. Students will able to optimize web pages and to rank web pages.

MCA 313: Oracle	
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: - Database Management Systems

Course Objectives:

1. Understand DBMS architecture
2. Understand Transaction control language.
3. Understand Updating and deleting data through views.
4. Oracle Overview and Architecture.
5. Maintaining and monitoring redo log files.
6. Managing Users and Security.

Detailed Syllabus:

UNIT I Introduction: DBMS architecture and data independence, DBA roles and responsibilities. SQL *PLUS Overview: SQL plus Fundamentals, producing more readable outputs, Accepting values at runtime, Using iSQL *Plus.
UNIT II Modifying Data: Introduction to DML Statements, Truncating a table, Transaction control language. Managing Constraints: Creating constraints, dropping constraints, enabling and disabling constraints, deferring constraints checks.
UNIT III Managing Views: Creating and modifying views, Using views, Inserting, Updating and deleting data through views. User Access and Security: Creating and modifying use accounts, creating and using roles, granting and revoking privileges, managing user groups with profiles.
UNIT IV Oracle Overview and Architecture: An overview of logical an physical storage structures, Oracle memory structures, Oracle background processes, connecting to oracle instance, processing SQL command. Managing Oracle: starting up the oracle instance, managing sessions, and shutting down the oracle instance, instances messages and instance alerts.
UNIT V Control and Redo Log Files: Managing the control files, Maintaining and monitoring redo log files. Managing tables, indexes and constraints: Storing data (create, alter, analyzing, and querying table information), Managing indexes, Managing constraints.
UNIT VI Managing Users and Security: Profiles, managing users, managing privileges, managing roles, querying role information. Introduction to Network Administration: Network design considerations, network responsibilities for the DBA, network configuration, Overview of oracle Net features, Oracle Net Stack Architecture.

Text and Reference Books

1. C.J. Date, Database Systems, Addison Wesley, 2000
2. Chip Dawes, Biju Thomas, Introduction to Oracle 9i SQL, BPB, 2002
3. Bob Bryla, Biju Thomas, Oracle 9i DBA Fundamental I, BPB, 2002
4. Doug Stums, Matthew Weshan, Oracle 9i DBA Fundamental I, BPB, 2002
5. Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

Course Outcomes:

1.Acquire knowledge of handling large volume of data.
2.Acquire skills to deal with Real life database implementation.
3.Response off faster queries and serve as many users as possible concurrently.
4.Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
5.Fit with any Database project in industry after completion of degree.

MCA314 Digital Marketing	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test – 12 Marks Teachers Assessment – 6 Marks Attendance – 12 Marks End Semester Exam – 70 Marks

Prerequisite: Knowledge of Social Media Platforms.

Course Objectives:

1. To understand the importance of Digital Marketing.
2. To study various types of Digital Marketing.
3. To know the significance of Digital and Internet Marketing.
4. To understand the recent trends in digital advertising and SEO.
5. To create a campaign on any social media platform.

Detailed Syllabus:

Unit-1 **Introduction to Digital Marketing**: Evolution of Digital Marketing from traditional to modern era,Role of Internet;Current trends, Info-graphics, implications forbusiness & society; Emergence of digital marketing as a tool;Drivers of the new marketing environment; Digital marketingstrategy; P.O.E.M. framework, Digitalmarketing plan, Digital marketing models.
Unit-2 **Internet Marketing and Digital MarketingMix**:Internet Marketing, opportunities and challenges; Digitalmarketing framework; Digital Marketing mix. Introduction to Content Marketing, Email Marketing, Web analytics, Conversion Rate Optimization, Sales Funnels and Affiliate Marketing.
Unit-3 **Social Media Marketing**: Role of Influencer Marketing,Tools & Plan–Introduction to social media platforms, penetration &characteristics; Building a successful social media marketingstrategy.Facebook Marketing, LinkedIn Marketing, Twitter Marketing, Instagram Marketing: Introduction and framing content strategy, Advertising.
Unit-4 **Mobile Marketing**: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics.
Unit-5 **Introduction to SEO and SEM**: Trends in Digital Advertising– - Introduction and need for SEO, How to use internet & search engines; search engine and its working pattern,On-page and off-page optimization, SEO Tactics, Introduction to SEM.
Unit-6

Web Analytics: Google Analytics & Google Ad Words; data collection for web analytics. Online Reputation Management.

Application: A group of two students (Maximum) has to work on creating an advertising campaign through any form of digital marketing viz: Mobile Marketing, Twitter Marketing, Facebook Marketing, LinkedInMarketing, Instagram or Snapchat Marketing. The student/s should work on creating the campaign, running the campaign, presenting the results of the campaign in terms of Lead Generation and / or sales and / or web analytics.

Suggested Readings:

1.Seema Gupta, Digital Marketing,Mc-Graw Hill, 1st Edition - 2017
2. Ian Dodson, The Art of Digital Marketing, Wiley Latest Edition
3.Puneet Singh Bhatia, Fundamentals of Digital Marketing,Pearson 1st Edition – 2017
4.Vandana Ahuja, Digital Marketing, Oxford University Press Latest Edition
5. Philip Kotler Marketing 4.0: – Moving from Traditional to Digital Wiley 2017

Course Outcomes:

After completing the course, students will be able to:

1. Understand the concept of Digital Marketing
2. Develop insight on Current Trends – Digital and Social Statistics (Infographics)
3. Provide an introduction to Digital Marketing Platforms like Facebook, Twitter, YouTube, etc.
4. Understand the basics of Search Engine Optimization (SEO) and Mobile Marketing.
5. Know various strategies involved in Marketing products and Services Digitally.

MCA 315: Theory of Computation	
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: Sets, Relations, Trees, Graphs, Boolean Algebra etc.

Course Objectives:

1. Introduce concepts in automata theory and theory of computation.
2. Identify different formal language classes and their relationships.
3. Design grammars and recognizers for different formal languages.
4. Prove or disprove theorems in automata theory using its properties.
5. Determine the decidability and intractability of computational problems.

Detailed Syllabus

UNIT I Mathematical preliminaries: sets, relations, functions, graphs, trees, string and their properties, principle of induction, proof by contradiction.
UNIT II **Theory of automata:** Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata.
UNIT III **Regular sets and regular grammars:** Regular expression (RE) , Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.
UNIT IV **Context free grammar (CFG) and Context Free Languages (CFL):** Definition, Examples, Derivation , Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.
UNIT V **Push down automata (PDA):** Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.
UNIT VI **Turing machines (TM):** Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Un-decidability, Un-decidable problems about TMs.

Text and Reference Books:

1. Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”, Pearson Education, 2010.
2. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science : Automata, Languages and Computation”, PHI,2007.

Course Outcomes:

After completing the course, students will be able to:

1. Acquire a fundamental understanding of the core concepts in automata theory and formal languages.
2. An ability to design grammars and automata (recognizers) for different language classes.
3. An ability to identify formal language classes and prove language membership properties.
4. An ability to prove and disprove theorems establishing key properties of formal languages and automata.
5. Acquire a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and intractability.

MCA316: Distributed Database Management Systems	
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: - Database management system

Course Objectives:

The objectives of this course are

1. Enhanced the knowledge in the area of Distributed Database system.
2. Comprehend the Distributed query processing.
3. The subject explores the ideas of Transaction management and concurrency control.
4. Know the parallel database system architecture.
5. Become conscious about current trends.

Detailed Syllabus:

UNIT I Introduction: Distributed Data processing, Distributed Database Systems (DDBMSs), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS, Relational Database concepts, Normalization, Integrity rules, Relational Data Languages, Relational DBMS.
UNIT II Distributed DBMS Architecture: DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture.Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control.
UNIT III Overview of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing.
UNIT IV Introduction to Transaction Management: Definition of Transaction, Properties of transaction, typesof transaction.Distributed Concurrency Control: Serializability theory, Taxonomy of concurrency control mechanisms, locking based concurrency control algorithms.
UNIT V Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture.Database Interoperability: Database Integration, Query processing.
UNIT VI Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, Object query processing. Transaction management.

Text and Reference Books

1. Principles of Distributed Database Systems, M.TamerOzsu, Patrick Valduriez, 2nd Edition, 1999.
2. Distributed Databases principles and systems, Stefano Ceri, Giuseppe Pelagatti, TMH, 2008.

Course Outcomes:

After completing the course, students will be able to:

1. Aware of fundamentals of Distributed Database systems.
2. Use the different techniques of Distributed query processing
3. Set the rules over management of transaction and concurrency control.
4. Familiar with parallel database system architecture.
5. Apprehend Machine Learning Algorithms.

MCA317: Data Compression	
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: -

1. Computer Fundamentals
2. Principles of computer programming
3. Basic mathematical knowledge
4. Operating Systems

Course Objectives:

The objective of this course is to:

1. Gain a fundamental understanding of data compression methods for text, images, and videos.
2. Understand the concept of lossy and lossless compression.
3. Understand Huffman coding and Arithmetic coding.
4. Illustrate the concepts of various algorithms for text, images and video compression.
5. Understand how to select the best algorithm/ approach for compression given a situation.
6. Understand vector quantization.

Detailed Syllabus:

UNIT I (10 Hours) **Compression Techniques:** Lossless compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, **Models:** Physical models, Probability models, Markov models, composite source model, **Coding:** uniquely decodable codes, Prefix codes.
UNIT II (10 Hours) **The Huffman coding algorithm:** Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, **Applications of Hoffman coding:** Lossless image compression, Text compression, Audio Compression.
UNIT III (10 Hours) **Arithmetic Coding:** Introduction, Coding a Sequence, Generating a Tag, Deciphering the Tag, Generating a Binary Code, Uniqueness and Efficiency of the Arithmetic Code, Algorithm Implementation, Integer Implementation, Comparison of Huffman and Arithmetic Coding, Adaptive Arithmetic Coding
UNIT IV(12 Hours) Bi-level image compression-The JBIG standard, JBIG2, Image compression. **Dictionary Techniques:** Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary, The LZ77 Approach, The LZ78 Approach, **Applications**: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Moveto-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markov Compression.

UNIT V (6 Hours) Mathematical Preliminaries for Lossy Coding, Distortion criteria, Models, The Quantization Problem, Uniform Quantizer, Adaptive Quantization, Forward Adaptive Quantization, Backward Adaptive Quantization, Nonuniform Quantization
UNIT VI (4 Hours) Vector Quantization, Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured VectorQuantizers.
Text and Reference Books 1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers 2. Elements of Data Compression,Drozdek, Cengage Learning 3. Introduction to Data Compression, Second Edition, KhalidSayood,The Morgan aufmannSeries 4.Data Compression: The Complete Reference 4th Edition byDavid Salomon, Springer 5.Text Compression 1st Edition by Timothy C. Bell Prentice Hall

Course Outcomes:

On completion of this course, the students will be able to:

1. Understand and apply various coding techniques for data compression.
2. Differentiate between lossy and lossless compression.
3. Program, Analyze Huffman coding: Loss less image compression, Text compression, Audio Compression.
4. Demonstrate conceptually various popular algorithms used for text, image and video compression.
5. Compare the algorithms used for text, image and video compression.
6. Illustrate the concept of vector quantization and its advantage.

MCA 318: Social Network Analysis	
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

Prerequisites: Graph theory, programming skills, artificial intelligence

Course Objectives:

1. This course covers data analysis on social networks, focusing on ways to handle large-scale networks efficiently.
2. It provides the main theoretical results in social network mining

Detailed Syllabus:

Unit-1 **Introduction to Social Network Mining:** Introduction to social network mining. Illustration of various social network mining tasks with real-world examples. Data characteristics unique to these settings and potential biases due to them.
Unit-2 **Graph Models and Node Metrics:** Social Networks as Graphs, Random graph models/ graph generators (Erd¨os-R´enyi, power law, preferential attachment, small world, stochastic block models, kronecker graphs), degree distributions. Models of evolving networks, Node based metrics, ranking algorithms (Pagerank), Gephi graph visualization and exploration software
Unit-3 **Social-Network Graph Analysis:** Social network exploration/ processing: graph kernels, graph classification, clustering of social-network graphs, centrality measures, community detection and mining, degeneracy (outlier detection and centrality), partitioning of graphs, finding overlapping communities, similarity between graph nodes, counting triangles in graphs, neighborhood properties of graphs
Unit-4 **Information Diffusion in Social Networks**: Strategic network formation: game theoretic models for network creation/ user behavior in social networks, Information diffusion in graphs: Cascading behavior, spreading, epidemics, heterogeneous social network mining, influence maximization, outbreak detection.
Unit-5 **Event Detection** Classification of Text Streams, Event Detection and Tracking: Bag of Words, Temporal, location, ontology-based algorithms. Evolution Analysis in Text Streams, Sentiment analysis.
Unit-6 **Social Influence Analysis** Influence measures, Social Similarity - Measuring Influence, Influencing actions and interactions. Influence maximization.

Text and Reference Books

1. M.E.J. Newman: Networks: An Introduction, OUP, 2012
2. Network Data Analytics, Ed. Charu C.Aggarwal, Springer, 2011
3. David Easley and Jon Kleinberg, Networks, crowds, and markets, Cambridge University Press, 2010.
4. Jure Leskovec, Anand Rajaraman and Jeffrey David Ullman, Mining of massive datasets, Cambridge University Press, 2014.

Course Outcomes:

After completing the course, students will be able to:

1.	Understand the basic concepts of social networks
2.	Understand the fundamental concepts in analyzing the large-scale data that are derived from social networks
3.	Implement mining algorithms for social networks
4.	Perform mining on large social networks and illustrate the results.

MCA404 Machine Learning with 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

Prerequisite: -

1. Familiarity with the C and C++ programming language.

Course Objectives:

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python
4. To develop the ability to write database applications in Python
5. To introduce students to the basic concepts and techniques of Machine Learning.
6. To become familiar with regression methods, classification methods, clustering methods

Detailed Syllabus

UNIT I (8 Hours)

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 II (8 Hours)

String manipulations - 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 III (10 Hours)

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 IV (10 Hours)

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 V (10 Hours)

Overview of machine learning, related areas, applications, software tools. Supervised Learning: classification and regression.UnsupervisedLearning.Reinforcement Learning. Parametric regression: linear regression, polynomial regression, logistic regression, locally weighted regression, numerical optimization, gradient descent, kernel methods.

UNIT VI (10 Hours)

DECISION TREE LEARNING - Decision tree learning algorithm-Inductive bias- Issues in Decision tree learning;Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms;Bayesian Learning: Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm;

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 Learning Python By Mark PutzPython Documentation (https://docs.python.org
3. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
4. EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
5. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
6. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

Course Outcomes:

After completing the course, students will be able to:

1. Explain basic principles of Python programming language
2. Implement object-oriented concepts
3. Implement database and GUI applications.
4. Gain knowledge about basic concepts of Machine Learning.
5. Identify machine learning techniques suitable for a given problem
6. Solve the problems using various machine learning techniques

MCA 405: Cloud Computing and Virtualization	
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: - Operating Systems, Computer Networking.

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-1 **Recent trends in computing**: Introduction to Grid Computing: Motivation, Definition of Grid Computing, Evolution of Grid, Examples and Usages, Research Possibilities, Benefits of Grid Computing. Cluster Computing, Grid Computing, Utility Computing, Cloud Computing. Introduction to Grid Computing
Unit-2 **Cloud Computing Fundamentals**: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim. .
Unit-3 **Cloud Computing Service Models:** Infrastructure as a Service; Platform as a Service; Software as a Service. **Accessing the Cloud:** Web Applications, Web API's, and Web Browsers.
Unit-4 **Cloud Storage and Security:** Overview, Advantages, Storage as a Service, Security, Reliability, Advantages, Cautions, Theft, Cloud Storage Providers. **Standards:** Applications, Client, Infrastructure, Services.

Unit-5

Virtualization Technologies: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT-6

Security in the Cloud: Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

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, Rajkumar Buyya and James Broberg, John Wiley & Sons, 2011.

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

Course Outcomes:

Students will 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.

MCA406 : Internet of Things	
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: Network Fundamental and Basic Introduction about Python.

Course Objectives:

7. Define the Internet of Things.
8. To discussed different type of design of IoT.
9. Describe the important computer network and there uses.
10. Introduction to challenges in Design, Development and Security.
11. Introduction to nature wise requirement of different type IoT Application.
12. Introduction to development IoT application in Python.

Detailed Syllabus

Unit-1 **Introduction to IoT-** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical**,** design of IoT, Functional blocks of IoT, Communication models & APIs
Unit-2 **IoT & M2M-** Machine to Machine, Difference between IoT and M2M, Software, define Network
Unit-3 **Network & Communication aspects-** Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination
Unit-4 **Challenges in IoT-** Design challenges, Development challenges, Security challenges, Other challenges
Unit-5 **Domain specific applications of IoT-** Home automation, Industry applications, Surveillance applications, Other IoT applications
Unit-6 **Developing IoTs** - Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python
Text and Reference Books 1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach” 2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice

Course Outcomes:

1. Understand to IoTs and their design concepts.
2. To understand M2M and IoT and their *differences*.
3. To understand the network protocol those are used for IoT Configuration.

4. Students will create, design documents for IoTs with understanding of security issues.
5. Students will understand *different* types of application of IoTs.
6. Students will able to develop IoTs application using Python.

MCA407: 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.

MCA 408 Digital Image Processing	
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 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 Introduction to digital image processing, applications, steps of digital image processing, Components of Image Processing system, Image sampling and Quantization.
UNIT II **Image Enhancement in Spatial Domain:** Meaning of spatial domain, image negatives, log transformation, power law transformation, Introduction to histogram Processing, histogram equalization, histogram specification, Enhancement using logical AND and logical OR operator, Image subtraction, Image Averaging.
UNIT III **Image Enhancement in Frequency Domain:** meaning of frequency domain, one dimensional Fourier frequency domain and its inverse, Two dimensional Fourier frequency domain and its inverse, filtering in frequency domain, Smoothing Frequency-Domain Filters- Ideal Low pass Filters, Butterworth Low pass Filters, Gaussian Low pass Filters, Sharpening Frequency Domain Filters- Ideal High pass Filters, Butterworth High pass Filters, Gaussian High pass Filters.
UNIT IV **Image Restoration:** Introduction to image restoration. Model of the Image Degradation/Restoration Process, Restoration in the Presence of Noise- arithmetic mean filter, geometric mean filter, harmonic mean filter, contra harmonic mean filter, Minimum Mean Square Error (Wiener) Filter, Geometric Mean Filter.
UNIT V **Morphological Image Processing:** Basic Concepts from Set Theory, Logic Operations Involving Binary Images, Dilation and Erosion, Opening and Closing, Hit or Miss Transformation, Extensions to Gray-Scale Images- Dilation, Erosion, Opening and Closing.
UNIT VI **Image Segmentation:** Detection of Discontinuities- Point Detection, Line Detection, Edge Detection, 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, Jayaraman S,Veerakumar T,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 409 Blockchain Technology	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test – 12 Marks Teachers Assessment – 6 Marks Attendance – 12 Marks End Semester Exam – 70 Marks

Prerequisite: Advanced Computer Networks, Cryptography and Network Security.

Course Objectives:

1. To aware studentswith blockchain technology.
2. To understand the foundational constructs, benefits and opportunities of blockchain technology.
3. To understand the applications of blockchain technology.
4. To evaluate the risks and challenges in implementing blockchain technology.
5. To understand the concept of cryptocurrency.
6. To know about the Hyperledger Fabric.

Detailed Syllabus:

Unit-1 **Introduction to Blockchain:** History of centralized services,trusted third party for transactions, understand the difference between centralized, decentralized and distributed peer to peer networks,why Block chain?, Types of Blockchain. **History of Bitcoins:** How and when Blockchain and Bitcoin started. Milestone on the development of bitcoin, Problem area of Bitcoin, relation to Bitcoin, requirement of block chain in a business environment, sharing economy, requirements deep dive, Internet of value.
Unit-2 **Consensus**: Mechanism, Types of Consensus Mechanism, Consensus in Blockchain. Decentralization: Disintermediation and Contest Driven Decentralization, Routes to Decentralization, Full Ecosystem Decentralization, Smart Contracts, Decentralized Organizations, Platforms for Decentralization.
Unit-3 **Blockchain Applications and USE case**: Business drivers of blockchain, Digital currency and finance (including ICOs and alternative funding), Identity, Supply Chain, Healthcare, Ownership and property rights Governance and compliance.
Unit-4 **Blockchain Challenges and Constraints:** Blockchain risks, Technological challenges, standards Scalability issues, Security and privacy, Legal and regulatory problems, Social and cultural constraints.
Unit-5 **Ethereum:** Ethereum network, EVM, Transaction fee, Mist, Ether, gas, Solidity - Smart contracts,

Truffle, Web3, Design and issue Cryptocurrency, Mining, DApps, DAO.

Unit-6

Introduction to Hyperledger Fabric: What is Hyperledger, Why Hyperledger, Where can Hyperledger be used, Hyperledger Architecture, Membership, Blockchain, Transaction, Chaincode, Hyperledger Fabric, Features of Hyperledger, prerequisiteof Fabric installation

Suggested Readings:

1. A. Narayanan, J. Bonneau, E. Felten, A. Miller & S. Gold feder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.
2. B. Singhal & G. Dhameja Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions, Apress 2018.
3. D. Mohanty, Blockchain - From Concept to Execution, BPB Publications, 2018.
4. Imran Bashir, Mastering Blockchain, 2nd Edition, Packt Publishing, 2018.

Course Outcomes:

After completing the course, students will be able to:

1.Understand what and why of Blockchain.
2. Explore the major components of Blockchain.
3.Understand various challenges and constraints of Blockchain.
4.Learn about Bitcoin, Cryptocurrency and Ethereum.
5.Identify a use case for a Blockchain application.
6. Learn about Hyper ledger Fabric model and its Architecture.

MCA 410: Artificial Intelligence	
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: - CSH101 C Programming, CSH201 Discrete Mathematics.

Course Objectives:

1. To understand how these algorithms works so the main objective of this course is and how to analyse the data to make a proper decision.
2. To know the application areas and building blocks of AI as presented in terms of intelligent agents.
3. 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.
4. To evaluate the different stages of development of the AI field from human like behavior to Intelligent Agents.
5. To build intelligent machine which can perform and act like humans.

Detailed Syllabus

Unit-1 **Introduction:** Overview of Artificial Intelligence- Problems of AI, AI and related fields. **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-2 **Search Techniques:** Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Comparing Uniform Search Strategies, Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search.
Unit-3 **Knowledge representation:** Knowledge Representation Issues, Representation and Mapping, Approaches to Knowledge Representation, Issues in Knowledge Representation, Knowledge manipulation, Knowledge acquisition.
Unit-4 **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-5 **Natural Language Processing:** Introduction, Syntactic Processing, Semantic Analysis, Discourse & Pragmatic Processing.
Unit-6 **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:

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 415 Big Data Analysis	
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: - 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.

MCA416: Compiler Design	
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: - 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 417: Advanced Soft Computing	
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: Mathematics, Algorithm, Programming skills.

Course Objectives:

3. Explain basic concepts, principles, algorithms, and performance metrics of soft computing;
4. Analyze computing requirements of a computing problem to be solved using soft computing algorithm.

Detailed Syllabus :

Unit-1 Fuzzy Set Theory: Introduction to Neuro–Fuzzy and Soft Computing, Fuzzy Sets – Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules – Extension Principle and Fuzzy Relations, Fuzzy IF-THEN Rules, Fuzzy Reasoning – Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.
Unit-2 Optimization: Derivative-based Optimization, Descent Methods – The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization.
Unit-3 Genetic Algorithm: Simple Genetic Algorithms, Simulated Annealing, Gradient Free Optimization, Crossover and mutation, Genetic algorithms in search and optimization, Random Search, Downhill Simplex Search.
Unit-4 Neural Networks: Introduction, Architecture, Back Propagation and Feed Forward Networks, Supervised Learning Neural Networks, Perceptrons, Adline, BackpropagationMutilayerPerceptrons, Radical Basis Function Networks, Unsupervised Learning Neural Networks, Competitive Learning Networks, Kohonen Self-Organizing Networks, Learning Vector Quantization, Hebbian Learning.
Unit-5 Neuro Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference Systems, Architecture, Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN, Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum.
Unit-6 Applications: Pattern Recognitions, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing
Text and Reference Books 1. Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun and E.Mizutani, PHI - Pearson Education, 2004. 2. Fuzzy Logic with Engineering Applications", Timothy J.Ross, McGraw-Hill, 1997. **3.** Genetic Algorithms: Search, Optimization and Machine Learning", Davis E. Goldberg, Addison Wesley, N.Y., 1989.

Course Outcomes:

After completing the course, students will be able to:

1. Illustrate Fuzzy logic and its applications.
2. Artificial neural networks and its applications.
3. Solving single-objective optimization problems using GAs.
4. Solving multi-objective optimization problems using Evolutionary algorithms (MOEAs).
5. Applications of Soft computing to solve problems in varieties of application domains.
6. Fuzzy logic and its applications.

MCA418: Software Quality Assurance &Testing	
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) WinRunner: Overview, Testing an application using WinRunner, TestScript 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.TestDirector: overview, testing management process, managing the testing process using TestDirector.
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.

MCA 419: Advanced Mobile Computing	
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: Mobile communication and Computer Network, INTERNET, Router

Course Objectives:

13. To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing.
14. Describe and designing of GSM architecture and HLR/VRL .So that it can be able to solve the mobile connective problems
15. To design successful mobile and pervasive computing applications and services.
16. To analyze the strengths and limitations of the tools and devices for development of pervasive computing systems
17. To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.
18. Creatively analyze mobile and wireless networks

Detailed Syllabus

Unit-1 Introduction to mobile communication and computing, Generations of mobile computing, Issues and Applications of mobile computing, Cellular concept and cellular architecture, Frequency reuse, handoff in mobile computing.
Unit-2 GSM: GSM architecture, HLR, VLR, protocol, Call flow sequence in GSM, Security in GSM.CDMA, IS-95 the North American CDMA, Service aspects, radio aspects.
Unit-3 Wireless LAN, Architecture, IEEE-802.11, Hidden and Exposed Terminal Problems. Bluetooth, Bluetooth Architecture, Mobile IP, Terminologies.
Unit-4 Location Management- Motivation, Network Architecture, Location Management in Cellular Network, Static and Dynamic Location Management, Location Management in Wireless Data Networks.
Unit-5 Data Management- Data Management Issues, Mobile Databases, Impact of Mobile Computing in the Area of Data Management, Data Replication, Asynchronous and Synchronous Replication.
Unit-6 File System: CODA File System. Adaptive Clustering: Adaptive Clustering for Mobile Wireless Networks, Architecture, Algorithm, Cluster Maintenance.

Text and Reference Books

1. Ashok K Talukdar: Mobile Computing-Technology, Applications and Service Creation, 1st Edition,TMH Publication, 2006.
2. J Schillar: Mobile Communications, 2nd Edition, Pearson Education, 2009.
3. Vishnu Sharma- Mobile computing , 4th Edition, Pearson Eduction, 2010.

Course Outcomes:

After completing the course, students will be able to:

1. Apply the fundamental design paradigms and technologies to mobile computing applications.
2. Demonstrate the different wireless technologies such as CDMA, GSM, and GPRS etc.
3. To design and considerations for deploying the wireless network infrastructure
4. To easily understand and design network architecture
5. Evaluate network protocols, routing algorithms, connectivity methods and characteristics
6. To understand and evaluate CODA File System and Adaptive Clustering for mobile computing

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