AC 29/4/2013 Item no. 4.88

UNIVERSITY OF MUMBAI

Revised Syllabus

Program -M.C.A.

(MASTER OF COMPUTER APPLICATION)

(SECOND AND THIRD YEAR)

(As per Credit Based Semester and Grading System With effect from 2013-2014 for Second year & from 2014-15 for third year)

MCA

Semester V

Syllabus

MCA501	Advanced Web Technology & Dot Net							
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA501	**Advanced web technology & Dot Net**	**04**	**--**	**--**	**04**	**--**	**--**	**04**

Examination Scheme						
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	**20**	**20**	**80**	**--**	**--**	**--**	**100**

Subject Code **MCA501**

Name of Subject **Advanced Web Technology and Dot Net**

Semester **Semester V**

Objectives: The course aims to impart the concepts of advanced web programming techniques, provide extension to web technology acquired . Helps to understand basics of server side technologies and apply them to develop dynamic web applications and the DOTNET framework, C# language features and Web development using ASP.NET

Outcomes : Students will learn latest technologies, tools and frameworks. Students will produce well designed standalone as well as dynamic Web applications.The students will know about popular technologies C# , ASP .NET , Ajax, JQuery and latest trends like Semantic web, Web Services, Silverlight

Unit No.	Contents	No. of Hrs
Unit I	**Introduction :** The World Wide Web: WWW Architecture , Web Search Engines , Web crawling ,Web indexing , Web Searching , Search engines optimization and limitations; Introduction to the semantic web(RDF, OWL)	**4 Hrs**
Unit II	**Introduction to .NET framework :** Evolution of .NET , Comparison of Java and .NET, Architecture of .NET framework , Common Language Runtime ,	**5 Hrs**

	Common Type System , Metadata , Assemblies , Application Domains , CFL , Features of .NET , Advantages and Application	
Unit III	**C# :** Basic principles of object oriented programming ,,Basic Data Types,Building Blocks- Control Structures,operators,expressions,variables, Reference Data Types- Strings , Data time objects,Arrays,Classes and object,ExceptionHandling,Generics,FileHandling,Inheritance and Polymorphism,Database programming	**8 Hrs**
Unit IV	**Web Applications in ASP.NET :** ASP.Net Coding Modules, ASP.NET Page Directives, Page events and Page Life Cycle , PostBack and CrossPage Posting , ASP.Net Application Compilation models , ASP.NET server Controls , HTML Controls, Validation Controls, Building Databases **Introduction to JQuery :** What is jQuery? JavaScript vsjQuery , How to use jQuery in ASP.NET?	**8 Hrs**
Unit V	**Managing State :** Preserving State in Web Applications , Page-Level State , Using Cookies to Preserve State , ASP.NET Session State , Storing Objects in Session State , Configuring Session State , Setting Up an Out-of-Process State Server , Storing Session State in SQL Server , Using Cookieless Session IDs , Application State	**5 Hrs**
Unit VI	**Introduction to web services :**What is a Web Service? Software as a service , Web Service Architectures , SOA , Creating and consuming Web , XML Web Services, Designing XML Web Services , Creating an XML Web Service with Visual Studio, Creating Web Service Consumers ,Discovering Web Services Using UDDI	**5 Hrs**
Unit VI I	**Advance .NET Concepts :** Introducing WPF , WPF Class Hierarchy , Introducing WCF The WCF Architecture , WCF Endpoints , Introducing WF , Describing Components of WF , Exploring Activities , Describing Types of Workflows , Exploring Built-in Activities , Understanding Bookmark Activities , Handling Runtime Errors ,Hosting Workflows ,Creating a Simple WF Application **Exploring Silverlight** , Architecture of Silverlight , Silverlight Controls in Silverlight Applications, Creating a Simple Silverlight Application Integrating Silverlight with ASP.NET Applications **Introducing AJAX Controls** The ScriptManager Control , The ScriptManagerProxy Control , The Timer Control , The UpdatePanel Control , The UpdateProgress Control	**10 Hrs**

Instructions for Assignments and Tutorials: The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Beginning C# - Wrox Publication
2. Advance .NET Technology second edition by ChiragPatel- DreamTech Press
3. Learning jQuery Third Edition - Jonathan Chaffer and Karl Swedberg , SPD Publication
4. Professional C# 2012 and .NET 4.5- Wrox Publication
5. Internet and Web Technologies, RAJ KAMAL, Tata McGraw Hill
6. .NET programming Black Book
7. Murach's ASP. Net 4. 0 Web Programming with C# 2010
8. Pro C# 5.0 and the .NET 4.5 Framework – Andrew Trolsen, APress
9. C# with Visual Studio – Vijay Mukhi , BPB
10. Heard First C# Second Edition , O'Reilly
11. Murach's ADO. Net 4 Database Programming with C# 2010 4th Edition
12. Web Technologies Black book , DreamTech Press
13. Developing Web Application- Second Editon - Ralph Moseley & M. T. Savaliya, Wiley

MCA502	Wireless & Mobile Technology							
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA502	**Wireless & Mobile Technology**	**04**	**--**	**--**	**04**	**--**	**--**	**04**

Examination Scheme							
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	**20**	**20**	**80**	**--**	**--**	**--**	**100**

Subject Code **MCA502**

Name of Subject **Wireless & Mobile Technology**

Semester **Semester V**

Objectives: The course aims to impart the concepts of wireless communication techniques, provide extension to communications fundamentals acquired. Helps to understand basics of mobile environment and the technology in the various wireless communications

Outcomes : Students will learn wireless technologies, tools and frameworks which will help them to understand the mobile and the other wireless communications.

Unit No	Contents	No. of Hrs
Unit I	**Introduction To Wireless Technology :** Mobile and wireless communications , Applications, history, market vision, overview Frequency of Radio Transmission, Signal Antennas, Signal Propagation , Multiplexing, Modulation, Spread Spectrum , Coding and Error Control (Convolution Codes)	5 Hrs

Unit II	**Wireless Communication** : Cellular systems- Frequency Management and Channel Assignment, Dropped call rates & their evaluation,CDMA – FDMA – TDMA – CSDMA , Generations of Cellular Networks 1G,2G,2.5G,3G and 4G	**6 Hrs**
Unit III	**Wireless Lan :** IEEE 802.11,WiFi, IEEE 802.16 ,Bluetooth, WIMAX , Standards – Architecture – Services	**8 Hrs**
Unit IV	**Mobile Communication Systems :** GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS , International roaming for GSM- call recording functions-subscriber and service data mgt - Mobile Number portability - VoIP service for Mobile Networks , GPRS – Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing	**8 Hrs**
Unit V	**Mobile Network Layer :** Mobile IP – Dynamic Host Configuration Protocol, Mobile Ad Hoc Routing Protocols– Multicast routing	**6 Hrs**
Unit VI	**Mobile Transport Layer :** TCP over Wireless Networks – Indirect TCP – Snooping TCP –Mobile TCP – Fast Retransmit / Fast Recovery Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP , TCP over 2.5 / 3G wireless Networks	**6 Hrs**
Unit VII	**Application Layer :** WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile, Caching model-wireless bearers for WAP - WML – WMLScripts – WTA - iMode- SyncML	**6 Hrs**

Instruction forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

Reference Books

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education
2. William Stallings, “Wireless Communications and Networks”, Pearson Education
3. Vijay Garg, “Wireless network evolution: 2G to 3G”, Prentice Hall, 2002.
4. MISRA “Wireless Communication and Networks: 3G and Beyond”, McGraw Hill
5. Principles of mobile computing and mobile communications by Melizza Othman CRC press
6. 802.11 Wireless Networks: The Definitive Guide , 2nd Edition Matthew Gast, O’Reilly
7. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic, Wiley India Edition
8. Wireless and Mobile Network Architectures Yi-Bing Lin, ImrichChlamtac
9. Wireless and Mobile Networks: Concepts and Protocols, Dr. Sunilkumar S. Manvi, S.Kakkasageri

MCA503	Soft Computing							
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA503	**Soft Computing**	**04**	**--**	**--**	**04**	**--**	**--**	**04**

Examination Scheme							
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	**20**	**20**	**80**	**--**	**--**	**--**	**100**

Name of Subject **Soft Computing**

Semester **V**

Objectives To teach MCA students fundamental concepts of soft computing, to make them understand Artificial Neural Network, Fuzzy Logic, Classical Sets and Fuzzy Sets, Genetic Algorithm, Applications of Soft Computing

Outcomes Understanding fundamental concepts of Soft Computing. Students should be able to apply Fuzzy Logic, Classical Sets and Fuzzy Sets, Genetic Algorithm on applications

Students should be able to apply Soft Computing concepts on Applications

Unit No	**Contents**	**No of. Hrs**
Unit I	**Introduction to Soft Computing:** Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics	**2 Hrs**

Unit II	**Artificial Neural Network: Introduction,** Fundamental Concept, Artificial Neural Network, Biological Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer), Evolution of Neural Networks, Basic Models of Artificial Neural Network **Supervised Learning Network-** Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network, back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, **Associative Memory Networks, Unsupervised Learning Networks, Special Networks**	**6 Hrs**
Unit III	**Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets,** Introduction to Fuzzy Logic, Classical Sets (Crisp Sets),Fuzzy Sets	**3 Hrs**
Unit IV	**Classical Relations and Fuzzy Relations:** Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations	**4 Hrs**
Unit V	**Membership Functions:** Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments	**3 Hrs**
Unit VI	**Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods	**3 Hrs**
Unit VII	**Fuzzy Arithmetic and Fuzzy Measures:** Introduction, Fuzzy Arithmetic- Interval Analysis of Uncertain Values, Fuzzy Numbers, Fuzzy Ordering, Fuzzy Vectors, Extension Principle, Fuzzy Measures- Belief and Plausibility Measures, Probability Measures, Possibility and Necessity Measures, Measures of Fuzziness, Fuzzy Integrals	**4 Hrs**
Unit VIII	**Fuzzy Rule Base and Approximate Reasoning:** Introduction,Truth Values and Tables in Fuzzy Logic, Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules), Aggregation of Fuzzy Rules, Fuzzy Reasoning (Approximate Reasoning)- Categorical Reasoning, Qualitative Reasoning, Syllogistic Reasoning, Dispositional Reasoning, Fuzzy Inference Systems (FIS)- Construction and Working Principle of FIS, Methods of FIS,Overview of Fuzzy Expert System	**4 Hrs**
Unit IX	**Fuzzy Decision Making:** Introduction, Individual Decision Making, Multiperson Decision Making, Multiobjective Decision Making, Multiattribute Decision Making, Fuzzy Bayesian Decision Making, **Fuzzy Logic Control Systems-** Introduction, Control System Design, Architecture and Operation of FLC System, FLC System Models, Application of FLC Systems	**3 Hrs**
Unit X	**Genetic Algorithm:** Basic concepts, Difference between genetic algorithm and traditional methods, Simple genetic algorithm, Similarity templates, Working principle, Procedures of GA, Genetic operators- reproduction, Mutation, crossover,	**4 Hrs**

basic building block hypothesis, the two-armed and k-armed bandit problem, Minimal deceptive problem, Applications

Unit XI **Applications of Soft Computing:** Introduction, A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Radar) Image for Flood Area- Image Fusion, Neural Network Classification, Methodology and Results, Optimization of Traveling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithms, Schemata, Problem Representation, Reproductive Algorithms, Mutation Methods, Results, Genetic Algorithm-Based Internet Search Technique- Genetic Algorithms and Internet, First Issue: Representation of Genomes, Second Issue: Definition of the Crossover Operator, Third Issue: Selection of the Degree of Crossover, Fourth Issue: Definition of the Mutation Operator, Fifth Issue: Definition of the Fitness Function, Sixth Issue: Generation of the Output Set, Soft Computing Based Hybrid Fuzzy Controllers- Neuro-Fuzzy System, Real-Time Adaptive Control of a Direct Drive Motor, GA-Fuzzy Systems for Control of Flexible Robots, GP-Fuzzy Hierarchical Behavior Control, GP-Fuzzy Approach,Soft Computing Based Rocket Engine Control- Bayesian Belief Networks, Fuzzy Logic Control, Software Engineering in Marshall's Flight Software Group, Experimental Apparatus and Facility Turbine Technologies SR-30 Engine, System Modifications, Fuel-Flow Rate Measurement System, Exit Conditions Monitoring **9 Hrs**

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Dr. S. N. Sivanandam and Dr. S. N. Deepa,"Principles of Soft Computing "John Wiley
2. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
3. N.P.Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.
4. SimanHaykin, "Neural Netowrks"Prentice Hall of India
5. imothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
6. Kumar Satish, "Neural Networks" Tata McGraw Hill

MCA504	Distributed computing and Cloud Computing

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA504	Distributed computing and Cloud Computing	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]				
Test 1	Test 2	Average					
20	20	20	80	--	--	--	100

Name of Subject **Distributed Computing and Cloud Computing**

Semester **Semester V**

Objectives To introduce distributed computing concepts , To elaborate on the design techniques and constraints, and to analyze the latest trends in distributed systems like Service Oriented Architectures and cloud computing

Outcomes The students would know about existing distributed systems, latest trends like SOA and cloud will be introduced, and students will know about popular cloud technologies like Amazon, Google and Microsoft

Unit No	Contents	No of. Hrs
Unit I	**Introduction to Distributed Computing Concepts**	3 hrs
	Basic concepts of distributed systems, distributed computing models, software concepts, issues in designing distributed systems, client server model and current case studies of the World Wide Web 1.0 and World Wide Web 2.0.	
Unit II	**Inter Process Communication**	5 hrs
	Fundamental concepts related to inter process communication including message-passing mechanism, a case study on IPC in MACH, concepts of group communication and case study of group communication CBCAST in ISIS, API for Internet Protocol	

Unit III **Formal Model Specifications and Remote Communication** **5 hrs**

Basic concepts of formal model definitions, Different types of communication systems, algorithms for message passing systems, Basic concept of middleware, Remote Procedural Call (RPC), a case study on Sun RPC, Remote Method Invocation (RMI) along with a case study on Java RMI.

Unit IV **Clock synchronization** **3 hrs**

clock synchronization, physical and logical clocks, global state mutual Exclusion algorithms, election algorithms.

Unit V **Distributed System Management** **5 hrs**

Resource management, process management, threads, and fault tolerance

Unit VI **Distributed Shared Memory** **5 hrs**

Fundamental concepts of DSM, types of DSM, various hardware DSM systems, Consistency models, issues in designing and implementing DSM systems ,

Unit VII **Distributed File System** **4 hrs**

Concepts of a Distributed File System (DFS), file models, issues in file system design , naming transparency and semantics of file sharing, techniques of DFS implementation,

Unit VIII **Advances in Distributed Computing (SOA & Cloud Computing)** **4 hrs**

Service-Oriented Architecture, Elements of Service-Oriented Architectures, RPC versus Document Orientation, Major Benefits of Service- Oriented Computing, Composing Services, Goals of Composition, Challenges for Composition, Spirit of the Approach

Unit IX **Fundamentals of Cloud computing** **2 hrs**

Evolution of Cloud Computing ,cluster computing Grid computing, Grid computing versus Cloud Computing, Key Characteristics of cloud computing

Unit X **Cloud models** **4 hrs**

Benefits of Cloud models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Shared Private Cloud, Dedicated Private Cloud, Dynamic Private Cloud, Savings and cost impact

Web services delivered from cloud, Platform as a service, Software as a service, Infrastructure as a service

Unit XI Cloud Security Fundamentals **5 hrs**

Privacy and security in cloud, Security architecture , Data security, Identity and access management, security challenges

Unit XII Implementation of Cloud Technologies

Introduction to Cloud Technologies, Hypervisor, Web services, AJAX , MASHUP, Hadoop, Map reduce, Virtualization Technologies, Virtual Machine TechnologyCloud data centre, Case studies : Google, Microsoft, Amazon

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

Reference books:

1. Distributed Computing by Dr. SunitaMahajan , Seema Shah, Oxford University Press
2. Distributed Operating Systems by Tanenbaum S, Pearson Education
3. Distributed OS by Pradeep K. Sinha , PHI
4. Distributed Systems concepts and design by George Coulouris, Jean Dollimore, Tim Kindberg, Addison-Wesley
5. Cloud Computing a Practical Approach by Anthony T. Velte, Robert Elsenpeter, TMH
6. Cloud Computing insights into new-era infrastructure by Dr. Kumar Saurabh, Wiley India
7. Cloud Computing implementation, management and security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
8. Distributed Computing Architecture by Shivanandan
9. Cloud Application Architecture by George Reese, O'reilly and associates

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5051	**Cyber Security**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.**					
Test 1	**Test 2**	**Average**	**[Once in a semester]**					
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Name of Subject **Cyber Security**

Elective II

Semester **V**

Objectives Securing vital resources and information in the network is the most challenging feat for system enterprise. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.Gain familiarity with prevalent network and distributed system attacks, defenses against them.Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Outcomes Knowledge about the technical andlegal terms relating to thecybersecurity , cyber offences and crimes. Gain an insight to the Indian Act 2000 and the organizational implications of cyber Security

Unit No	**Contents**	**No of. Hrs**
Unit I	**Introduction to Cybercrime**	**4 hrs**

Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime,

Unit II **ITA 2000 :** Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes **4 hrs**

Unit III **Cyberoffenses& Cybercrime: Issues and challenges** **12 hrs**

How criminal plan the attacks, Social Engg, Cyber stalking, Cybercafe and Cybercrimes, Botnets, Attack vector, Cloud computing,Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices:Security Implications for Organizations, Organizational Measures for Handling Mobile, Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops

Internet Filtering Encryption issues, Internet Gambling, Spam - Unsolicited Junk E-mail, Digital Signatures, Anti-Spam Laws, Anti-Spam Suits, What is Cyber squatting? Ant cyber squatting, Software Piracy, Domain Name Disputes, File Sharing ,

Unit IV **Tools and Methods Used in Cyberline :** **6 hrs**

Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoSDDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)

Unit V **Cybercrimes and Cybersecurity: The Legal Perspectives** **6 hrs**

Why do we need Cyberlaw: The Indian Context, The Indian IT Act, Digital Signature and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario

Unit VI **Cybersecurity: Organizational Implications** **8 hrs**

Cost of Cybercrimes and IPR Issues:Lesson for Organizations, Web Treats for Organizations: The Evils and Perils, Security and Privacy Implications from Cloud Computing, Social Media Marketing:Security Risk and Perils for Organization, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization,Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling: An Essential Component,Intellectual Property in the Cyberspace of Cybersecurity, Importance of Endpoint Security in Organizations

Unit VII **Cyber Acts and related issues** **5 Hrs**

Children's Online Privacy Protection Act (COPPA), The Children's Internet Protection Act (CIPA Sexual Predator Laws), The Child Online Protection Act (COPA) , The Communications Decency Act (CDA), Electronic Signatures in Global

& National Commerce Act (E-Sign),

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References::

1. Nina Godbole, SunitBelapure, Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India, New Delhi
2. KAHATE ,"Cryptography and Network Security", TMH
3. Information Systems Security, Nina Godbole, Wiley India, New Delhi
4. Cybersecurity: The Essential Body of Knowledge, Dan Shoemaker, William Arthur Conklin, Wm Arthur Conklin, Cengage Learning.
5. Cyber Security, Edward Amoroso, Silicon Press, First Edition
6. Cyber Security &Global Information Assurance,Kennetch J. Knapp, Information Science Publishing.
7. William Stallings, Cryptography and Network Security, Pearson Publication

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5052	**Multimedia Technology**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Name of Subject **Multimedia Systems**

Semester **V**

Objectives Students should be aware of multimedia system, its characteristics, properties, architecture, applications in different fields.Students should know various elements, objects, medium of mu Students should understand importance of compression and decompression methods, should be aware with standard compression techniques like JEPG & JPEG 2000 for still images ,MPEG and its variation for Video and Audio.Students should know various file formats for text, image, audio & video. In terms of audio, they should be aware with MIDI, MP3, WAV format which we use in day to day life.Students should know latest multimedia applications like Animation, Virtual Reality, Knowledge based multimedia systems.

Outcomes Students will be aware of multimedia system, its characteristics, properties, architecture, applications in different fields, its various elements, objects, medium. Students understood compression and decompression methods, techniques like JEPG& JPEG 2000 for still images, MPEG and its variation for Video and Audio. Students shall understand what is authoring system, need of authoring system, choosing of authoring system depending on application type, user interface issues. Student will be aware of Copyright Act, various methods of licensing. Students will be aware of latest multimedia applications like Animation, Virtual Reality, Knowledge based multimedia systems

Unit No	Contents	No of. Hrs
Unit I	**Introduction** to Multimedia: Definition and Scope of Multimedia, its Components & applications, Interactive Multimedia, Multimedia Growth, Multimedia Advantages & disadvantages. Major categories of Multimedia titles. Multimedia Products, Kiosk, Multimedia in Public place, Multimedia on Web,Multimedia in business. Multimedia in mobile phones, iPod, Hypermedia and Hypertext. Hypermedia Applications.	**6 Hrs**
Unit II	**Graphics & Text**: Graphics: Bitmap Graphics, Vector Graphics, Image file format, GIF vs. JPEG, Graphics image sources, Graphics on internet. Graphic programs feature. Animation: Principals of animations, Animation types & technique , Applications of Animation , Morphing , Warping,Animation file and formats, Text: Text in multimedia Applications, General guidelines ,Designing and use of text , working with text, Text fonts, Menus and Navigation, Font editing drawing tools.	**7 Hrs**
Unit III	**Sound , Audio and Video :** Multimedia system sounds , Sound, Sound file formats, MIDI, MIDI Messages, MIDI Vs Digital Audio, sound on Internet, Adding sound & video to your multimedia project, Analog display standards, Digital display standards, Digital video Basics , Video recording and tap formats , Video on internet, Difference between computer , TV and Video, Optimizing video files for CD-Rom.	**7 Hrs**
Unit IV	**Multimedia Authoring Tools**: Making instance multimedia, Types of Authoring tools, Time based authoring tools, card and page based authoring tools, Icon and object based authoring tools, Authoring Vs Presentation, Story boarding, Graphic design principle for PowerPoint, Development process for Multimedia Applications, Contents analysis for different applications.	**5 Hrs**
Unit V	**Designing and Producing**: Designing, designing the structure of multimedia, Different types of Multimedia structure. Hot spots, Buttons, User interface analysis & Design: Rules of user interface design, models of user interface design, User interface Analysis & Elements of user interface, User interface design, User interface evaluation &examples.Delivering: Testing, Preparing of delivery.	**6 Hrs**
Unit VI	**Planning and costing:** The process of making multimedia & multimedia skills, multimedia skills team, Planning & costing: Project planning, scheduling & costing, Idea analysis, Idea management software, Pre testing, Task planning, Building a Team, Prototype, Multimedia project team roles. Development: Alpha Development, Beta Development.	**7 Hrs**
Unit VII	**Coding and Compression**: Introduction to coding and compression techniques,	**7 Hrs**

Entropy encoding, run length, Arithmetic encoding, Huffman, LimpelZiv encoding, JPEG compression process, MPEG audio and video compression, Various CD Formats ,MPEG Standards.

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References :

1. Multimedia Madness, RonWodaski , SAMS pub.
2. Multimedia : Making it works, Tay Vaughan , TMH pub
3. Multimedia Communication –Rao, Wiley -Dreamtech
4. Multimedia System : S.K. Triphathi, S. V. Raghvan
5. Mutimedia System Design, P.K. AndleighKthakar, Prentice hail of India
6. Multimedia System , J.E.K Budford , Addision Wesley.

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5053	**Information Security and Audit**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Name of Subject **Information Security and Audit**

Elective II

Semester **V**

Objectives The subject aims to learn about the theory underlying computer-security.. The emphasis is on network security appliances and networking infrastructure such as firewalls, access control, secure network design and Virtual Private Networks.

Outcomes On successful completion of this subject students will be able to describe the theoretical aspects of computer security with an in-depth focus on modern network security threats. Design, configure, test, manage, monitor and support network security infrastructure devices. And network security theory into practice using industry based techniques, processes and standards.

Unit No	**Contents**	**No of. Hrs**
Unit I	**Security Principles and Practices:**	**5 hrs**

Information System Security Principles, Threats and Attacks, Classification of threats and assessing damages, Protecting Information Systems Security,

Information System Security Engineering Process

Security Policies, standards, Guidelines and Procedures

Unit II **Data and Program Security:** **6 hrs**

Data Protection, End Point security, Physical Security, Insider threats and data Protection

Secure programs, Non-malicious program errors, malicious code, Targeted malicious code, Controls against program threats

Unit III **Operating System Security:** **4 hrs**

Role of Operating systems in Information systems applications, Operating systems Security, Patched Operating systems, Protected Objects and Methods of Protection, Memory Address Protection, Control of Access to General Objects, File Protection Mechanism

Unit IV **Database Security :** **4 hrs**

Database Security Requirements and Challenges, Database Integrity, Data Security Policies, Sensitive data, Interface, Multilevel database

Application Software Controls :Concurrency Control, Cryptograph control, Audit train control.

Unit V **Steganography and Digital Forensics:** **3 hrs**

Steganography- Overview and Principles, need of steganography, pros and cons, Steganography vs Cryptography, Types of Steganography

Digital Forensics- Introduction, Forensic life cycle,Water marking.

Unit VI **Laws, & Legal Framework for Information Security:** **5 hrs**

Introduction, Information Security and Law, Understanding the Laws of Information Security, Indian IT Act, Laws of IPR, Patent laws, Copyright Law, Case Study

Ethical Issues in Information Security: Introduction, Issues in Network enterprises, Computer Ethics and Security and Privacy Policies, Case study

Unit VII **Software Web Services Security :** **5 hrs**

Technologies for web services (XML, SOAP, WSDL & UDDI), Web Services Security – Token types, XML encription, XML segment.

UnitVIII **Secutiry of Wireless Networks:** **4 hrs**

An overview of wireless technology, Wired world versus wireless world: putting

Wireless Networks in Information Security Context,Attacks on Wireless Networks

Unit IX **Auditing for Security:** **9 hrs**

Introduction, Organizations Roles and Responsibilities for Security Audits, Auditors Responsibilities for Security Audits, Types of Security Audits, Technology Based Audits, Phases in Security Audits, Budgeting for Security Audits.

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Nina Godbole, “Information Systems Security”, Wiley India
2. Eric Cole, “Network Security Bible”, Wiley India Edition
3.
4. C. P. Pfleeger, and S. L. Pfleeger, “Security in Computing”, Pearson Education.
5. Matt Bishop, “Computer Security: Art and Science”, Pearson Education.

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5054	**Bioinformatics**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Name of Subject **Bioinformatics**

Semester **V**

Objectives To impart knowledge on introduction and historical and academic perspective to the field of bioinformatics, To learn the key methods and tools used in bioinformatics, and the influence of biological science on computing science

Outcomes The student should be able to Understand the theoretical basis behind bioinformatics Communicate about essential and modern biology and how it relates to Informatics and explore the tools and techniques used in Bioinformatics

Unit No	Contents	No of. Hrs
Unit I	What is Bioinformatics? , Bioinformatics as multidisciplinary domain , Goal and scope of bioinformatics , Future prospectus of bioinformatics , Use of computers to biologists	**4 Hrs**
Unit II	Biological research on the web, Public biological databases : Primary sequence database, Protein sequence databases , Secondary databases , Protein pattern databases , Searching biological databases- depositing data into public	

	databasesFinding software , Judging the quality of information	**6 Hrs**
Unit III	Introduction to Protein structure , Chemistry of proteins : 1D to 3D , Peptide bond, Amino Acid Web based protein structure tools : Structure visualization , Cn3D, RasMol Structure modeling , MolMol , JMol Structure classification : Types of classification, Databases (SCOP,CATH) Structure alignment : Comparing two structures (ProFit) Structure analysis : ProCheck	**9 Hrs**
Unit IV	Composition of DNA and RNA , Watson and Crick Solve the Structure of DNA, Importanace and features of DNA sequence analysis , Development of DNA Sequencing Methods, Genefinders and Feature Detection in DNA ,	**6 Hrs**
Unit V	Pairwise Sequence Comparison, Pairwise Sequence alignemnt methods : Dot plot , Dynamic programming , Local and Global similarities , Word and K-tuple , BLAST , FASTA, Multiple sequence alignment methods : Progressive , ClustalW , Iterative , DiAlign	**9 Hrs**
Unit VI	Phylogenetic Analysis : Phylogenetic Trees Based on Pairwise Distances, Phylogenetic Trees Based on Neighbor Joining, Phylogenetic Trees Based on Maximum Parsimony , Phylogenetic Trees Based on Maximum Likelihood Estimation Introduction to motif	**6 Hrs**
Unit VII	Automating data analysis using Perl , Perl basics , Pattern matching and regular expressions , Parsing BLAST output using Perl	**5 Hrs**

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Developing Bioinformatics Computer Skills by Cynthia Gibas, Per Jambeck, O'Reilly
2. Introduction to Bioinformatics by T K attwood& D J Parry-Smith, Addison Wesley Longman
3. Bioinformatics A beginners Guide-Machael, Wiley-Dreamtech
4. Biotechnology: a multi-volume comprehensive treatise Volume 5b by Rehm and Reed
5. An Introduction to Bioinformatics Algorithms by Neil C. Jones,Pavel A. Pevzner

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5055	**Software Quality Assurance**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Name of Subject **Software Quality Assurance**

Semester **V**

Objectives To give a focus on concept of quality its models and improvements, guidance on measuring quality and metrics and quality management system through its elements. It focuses on principles and practices in quality management system and gives guidance on measure and metrics in process and product domain of quality

Outcomes The students gets knowledge on software quality, its model and improvements, in-depth knowledge on measuring quality, knowledge on quality management system and on principles and practices of QMS

Unit No	**Contents**	**No of. Hrs**
Unit I	**Fundamentals Of Software Quality Engineering**	**9 Hrs**

Concepts of Quality-Hierarchical Modeling- Quality Models- Quality Criteria And its Interrelation –Fundamentals of Software Quality Improvement- Concepts of Process Maturity- Improving Process Maturity

Unit II **Development In Measuring Quality** **9 Hrs**

Selecting Quality Goals And Measures-Principles Of Measurement-Measures And Metrics-Quality Functional Deployment-Goal/Question/Measures Paradigm- Quality Characteristics Tree-The FURPS Model And FURPS-Gilb Approach- Quality Prompts

Unit III **Quality Management System** **9 Hrs**

Element Of A Quality Engineering Program- Quality Control , Assurance And Engineering- Reliability, Maintainability, Verifiability, Testability, Safety And Supportability- Historical Perspective Element Of QMS-Human Factors-Time Management-QMS For Software- Quality Assurance-ISO9000 Series- A Generic Quality Management standard-Tools For Quality

Unit IV **Principles And Practices In Qms** **9 Hrs**

Process-Product-Project-People In Software Development And Management Spectrum-Principle And Critical Practices In QMS-ISO 9001And Capability Maturity Models-Six Sigma, Zero Defects And Statistical Quality Control.

Unit V **Measures And Metrics In Process And Project Domain** **9 Hrs**

Key Measures For Software Engineers-Defects- Productivity And Quality-Measuring And Improving The Development Process- Assigning Measures To Process Elements And Events- Isikawa Diagrams- Metrics For Software Quality – Integrating Metric Within Software Engineering Process-Metrics For Small Organization

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Brian Hambling " Managing Software Quailty", Tata McGraw Hill
2. Juran. J.M.Franks, M.Gyrna, "Quality Planning and Analysis(from the product development through use)",Tata McGraw Hill
3. Alcon Gillies" Software Quality: Theory and Mangement", International Thomson, Computer Press 1997.
4. Software Testing Quality Assurance-Naik –Tripathi, Wiley -Dreamtech
5. Stephan H.Kan, "Metric and Model in Software Quality Engineering", Addison Wesley, 1995.
6. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition ,McGraw Hill, 2001
7. Humphrey Watts," Managing the Software Process", Addison Wesley,1986.

L501	Laboratory I -AWT + Dot Net

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L501	Laboratory I – AWT + Dot Net	--	06	--	--	06	--	03

Examination Scheme				
End Sem. Exam. [Once in a semester]				
Laboratory Name		Term Work	Pract	Oral	Total
L501	Laboratory I – AWT + Dot Net	25	50	25	100
	AWT	15	25	15	55
	Dot Net	10	15	10	35
	Journal/Documentation	--	10	--	10

Semester **Semester V**

Subject Code **L501**

Name of Subject **Lab I - AWT + Dot Net**

Objectives To enable the students to understand the concepts of the advanced web technologies and enable students to learn to produce well designed, effective standalone applications using .NET technology and enable students to learn the implementation of web services. The subjects enable students to learn to produce well designed, effective Web applications.

Outcomes Students understand the concepts of the advanced web technologies. Students learn to produce well designed, effective standalone applications using .NET technology. Students learn to the implementation of web services. Students learn to produce well designed, dynamic Web applications.

Contents

- Program to demonstrate the use of silverlight
- Program using AJAX controls

References :

1. B.M. Harwani ,"Practical ASP.NET Projects", SPD Publication
2. .NET programming Black Book, DreamTech Press
3. Jack Purdum, "Beginning C# 3.0: An Introduction to Object Oriented Programming", Wrox Publication,2008
4. Jonathan Chaffer and Karl Swedberg "Learning jQuery", 3rd Edition , SPD Publication,2012
5. ChiragPatel, "Advance .NET Technology" 2nd Edition , DreamTech Press,2012
6. CristianNagel,BillEvjen,JayGlynn,Karli Watson, Morgan Skinner, "Professional C# 2012 and .NET 4.5" , Wrox Publication
7. Anne Boehm,JoelMurach, "murach's ASP. NET 4 Web Programming with C# 2010", 4th Edition , SPD Publication,2011
8. Anne Boehm,Ged Mead, "murach's ADO. NET 4 database Programming with C# 2010", 4th Edition , SPD Publication,2011
9. Andrew Trolsen, "Pro C# 5.0 and the .NET 4.5 Framework" 6th Edition, APress,2013
10. Vijay Mukhi and SonalMukhi, "Visual Studio .NET with C#" , BPB Publication
11. Andrew Stellman and Jennifer Greene, "Head First C#", 2nd Edition , O'Reilly, SPD Publication
12. Web Technologies Black book , DreamTech Press, 2013
13. Ralph Moseley & M. T. Savaliya, "Developing Web Application", 2nd Edition, Wiley,2012

L502	Lab II- Wireless & Mobile Technology + Mini project

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L502	Laboratory II – Wireless & Mobile Technology + Mini project	--	06	--	--	06	--	03

Examination Scheme
End Sem. Exam. [Once in a semester]

Laboratory Name		Term Work	Pract	Oral	Total
L502	Laboratory II – Wireless & Mobile Technology + Mini project	25	50	25	100
	Wireless & Mobile Technology	15	25	15	55
	Mini project	10	15	10	35
	Journal/Documentation	--	10	--	10

Name of Subject **WIRELESS AND MOBILE TECHNOLOGY LAB AND MINI PROJECT**

Semester **V**

Objectives This subject aims to provide a working knowledge of latest wireless and communication technology and an interactive environment in which the students can learn and practice their skills in mobile applications, mobile software development, and game design. It provide students with skills to apply design and development principles in the construction of recent mobile technologies and PhoneGap which is a mobile development ramework which enables programmers to build application for mobile devices using JavaScript, HTML5 and CSS

Outcomes Students would be able to demonstrate knowledge and understanding of mobile , Application Programming Interface(API), in order to develop mobile. Using mobile development framework like PhoneGap, it enables students to develop applications irrespective of the underlying mobile operating system.

Unit No	Contents	No of. Hrs
Unit I	**Introduction To Phonegap** o A Little PhoneGap History o Why Use PhoneGap? o How PhoneGap Works o Designing for the Container o Writing PhoneGap Applications o Building PhoneGap Applications o PhoneGap Limitations o PhoneGap Plug-Ins o Getting Support for PhoneGap o PhoneGap Resources o Hybrid Application Frameworks	**4 Hrs**
Unit II	**Phonegap Development, Testing, And Debugging** o Hello, World! o PhoneGap Initialization o Leveraging PhoneGap APIs o Enhancing the User Interface of a PhoneGap Application o Testing and Debugging PhoneGap Applications o Dealing with Cross-Platform Development Issues o API Consistency	**8 Hrs**
Unit III	**Configuring An Android Development Environment For Phonegap** o Installing the Android SDK o Eclipse Development Environment Configuration o Creating an Android PhoneGap Project o Testing Android PhoneGap Applications	**8 Hrs**
Unit IV	**API** o Accelerometer ▪ Querying Device Orientation ▪ Watching a Device's Orientation o Capture ▪ Using the Capture API ▪ Configuring Capture Options ▪ Capture at Work o Contacts ▪ Introduction ▪ Listing all available contacts ▪ Displaying contact information for a specific individual ▪ Creating and saving a new contact o Events ▪ Creating an Event Listener ▪ Device ready Event ▪ Application Status Events ▪ Network Status Events	**20 Hrs**

        - Button Events
    - File System, Storage, Connection and Local Databases
        - Introduction, Saving a file to device storage, Opening a local file from device storage
        - Displaying the contents of a directory
        - Creating a local SQLite database, Uploading a file to a remote server
        - Caching content using the web storage local storage API
    - Notification
        - Visual Alerts (Alert and Confirm), Beep, Vibrate
        - Notification in Action
        -

Unit VI Mini Project will be made with mobile technology with android as the platform or Advanced Web Technologies like ASP.NET, C# **20 hrs**

References :

1. PhoneGap Essentials – John M. Wargo
2. Beginning PhoneGap – RohitGhatol , Yogesh Patel
3. Hello, android ED brunette pragmatic bookshelf