

**Course: 201: Service Oriented Architecture**

<b>Course Code</b>	<b>201</b>
<b>Course Title</b>	<b>Service Oriented Architecture</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	-
Purpose of Course	The purpose of course is to establish foundation of service oriented technologies and cloud computing.
Course Objective	To provide in-depth knowledge modern SOA and application of SOA-specific methodologies, technologies and standards
Pr-requisite	Fundamental knowledge of software engineering, basic knowledge of programming, networking and internet
Course Out come	After completion of this course, the student will be capable of identifying, modeling and implementing service based applications and web services.
Course Content	<p><b>Unit 1 Fundamentals of SOA</b></p> <p>1.1 Loose Coupling</p> <p>1.1.1 Distributed computing and Problems of interoperability</p> <p>1.1.2 Hardware, Software, and Network Transparency</p> <p>1.1.3 XML for openness, flexibility and loose coupling</p> <p>1.2 Services and Service orientation</p> <p>1.2.1 Line of business services, Reusable Technical Services, Service contracts, web service platform, Service requesters and Service Providers</p> <p>1.2.2 Service characteristics</p> <p>1.3 Need, Characteristics, Benefits and Limitations of SOA</p> <p>1.3.1 Overview of SOA Principles and guidelines</p> <p>1.3.2 Characteristics of SOA – Platform, Location, Protocols, Programming Language, Invocation Patterns, Security, Service Versioning, Service Model, Information Model, Data Format</p> <p>1.3.3 Business and Technical Benefits of SOA</p> <p>1.3.4 Challenges introduced by SOA</p> <p><b>Unit 2 Introduction to SOA Architecture</b></p> <p>2.1 Infrastructure Services</p> <p>2.1.1 Resource Virtualization Service</p> <p>2.1.2 Service-Level Automation and Orchestration</p> <p>2.1.3 Utility Business Services.</p> <p>2.2 Enterprise Service Bus – Transport, QoS based Routing, Mediation, Web Services Gateway</p> <p>2.3 SOA Enterprise Software Models - Industry Models, Platform-Independent Realization, Platform Specific Realization, J2EE Realization, Services Integration on Web/Application Server,</p>

Server/Service On Demand Operating Environment

**Unit 3 Introduction to web Services**

- 3.1 Web Service Platform- elements and principles, Web service Architecture
- 3.2 Web Service Technologies-Service Description and WSDL, Service Discovery and UDDI, Service Interactions and HTTP + SOAP , Service composition
- 3.3 Service Contracts-elements, definition and documentation, principles, Service-Level Abstractions, WSDL and service contracts-Architecture
- 3.4 Service-Level Data Model- Service-Level Data Models and Internal Data Models , Reconciliation of data models, XML-Related technologies for Service-Level Data Model
- 3.5 Service Level Interaction Patterns-SOAP and HTTP interaction, Request/Response Interactions, Request/Callback Interactions, Asynchronous Store-and-Forward Messaging, Asynchronous Messaging, Publish/Subscribe Interaction
- 3.6 Atomic services and composite services
- 3.7 Generating Proxies and Skeletons from Service Contracts in Java and C#
- 3.8 Service Level Communication and Alternative Transports-WSDL Extensibility, SOAP over IBM WebSphere MQ, SOAP over JMS

**Unit 4 SOA and web services**

- 4.1. Integration-Common business drivers, common technical challenges, requirements for Ideal solution, integration at various layers of technology stack
- 4.2. Integration and Interoperability using XML and Web services
  - 4.2.1 Web Services Integration(WSI)
  - 4.2.2 Service-oriented Integration(SOI)
  - 4.2.3 .Net and J2EE Interoperability
- 4.3. Multi channel Access
  - 4.3.1 Business benefits of Multichannel Access
  - 4.3.2 SOA Architecture for Multi-channel Access- Client Ties, Channel Access Tier, Communication Infrastructure, Business Service Access Tier, Business Tier
- 4.4 Overview of : WS-Coordination, WS-Choreography, WS-Addressing, WS-Routing, WSIF, WS-Transaction

**Unit 5 SOA and Webservice Security**

- 5.1 Overview of various security threats in SOA
- 5.2 Security Policies for Transport security, Message layer Security, Data Protection, Security Tokens, Cryptographic Key
- 5.3 Standards and Mechanism for SOA security-WS –Security Standard, WS-Trust, WS-Federation, WS-Secure Conversation, WS-Policy

Reference Book

- 1. Pro Newcomer & Lomow, “Understanding SOA with Web Services”,

	<p>Pearson Education, 2007</p> <ol style="list-style-type: none"> <li>2. Bieberstein, Bose, Fiammante, Jones and Shah "Service-Oriented Architecture(SOA) Compass", Pearson Education, 2010</li> <li>3. Alonso, Casati, Kuno and Machiraju, " Web services-concepts, Architectures and Applications", Springer, 2009</li> <li>4. CA, Barai and Caseli, "Service Oriented Architecture with Java", 2008</li> <li>5. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.</li> <li>6. Thomas Erl, "SOA: Principles of Service Design ", Pearson Education, 2009</li> <li>7. Pulier and Taylor, "Understanding Enterprise SOA", DreamTech, 2008</li> <li>8. Michael H Avey, "SOA cookbook", SPD, 2008</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course : 202 Web Programming using C#**

<b>Course Code</b>	<b>202</b>
<b>Course Title</b>	<b>Web Programming using C#</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2018
Purpose of Course	The purpose of the course is to make students capable of developing professional applications using latest tools and technologies of C#.Net.
Course Objective	To provide an in-depth knowledge of most recent server side programming technology.
Pr-requisite	Basic understanding of Web, HTTP, HTML, JavaScript, Programming in .Net and Object Oriented Concept, DBMS.
Course Out come	After completion of this course, the student will be capable of developing professional applications using latest tools and technologies of C#.Net.
Course Content	<p><b>Unit 1 ASP.NET using C#</b></p> <ul style="list-style-type: none"> <li>1.1 Life cycle of ASP.Net Application on IIS 7.0 &amp; Lifecycle of ASP.Net Web Page</li> <li>1.2 Structure of Application- Application Domain, Application Lifetime, Application Directory Structure</li> <li>1.3 Web Forms-Dynamic Compilation, Control Trees, Debugging and Tracing</li> <li>1.4 Client &amp; Server Side State Management-Application State, Session State, ViewState, Cookies etc.</li> <li>1.5 HTTP Handlers, Postback and Cross-page Posting</li> </ul> <p><b>Unit 2 Working with Data</b></p> <ul style="list-style-type: none"> <li>2.1 Working with ADO.NET</li> <li>2.2 Database Operations – SqlDataSource, XmlDataSource</li> <li>2.3 Data Access with LINQ <ul style="list-style-type: none"> <li>2.3.1 Introduction of LINQ</li> <li>2.3.2 LinqDataSource control</li> <li>2.3.3 LINQ to Dataset</li> <li>2.3.4 Overview of LINQ to SQL</li> </ul> </li> <li>2.4 Overview of ADO.Net Entity Framework</li> </ul> <p><b>Unit 3: Advanced Server Controls</b></p> <ul style="list-style-type: none"> <li>3.1 Data Binding with Controls</li> <li>3.2 Website Navigation Controls</li> <li>3.3 Server-side Ajax-ScriptManager, UpdatePanel, Timer, UpdateProgress,</li> </ul> <p><b>Unit 4 ASP.Net MVC Application</b></p> <ul style="list-style-type: none"> <li>4.1 Introduction to ASP.Net MVC Framework</li> <li>4.2 Building an MVC page</li> </ul>

	<p>4.3 CRUD operation in MVC</p> <p><b>Unit 5 Web Service and Cloud programming with C#</b></p> <p>5.1 Overview of ASP.Net Web Services</p> <p>5.2 Fundamental of WCF</p> <p>5.3 Service Endpoints</p> <p>5.4 Service Contract, Operation Contract and Data Contract</p> <p>5.5 WCF service instance management</p> <p>5.6 Restful WCF Services</p> <p>5.6 Introduction to WebAPI</p> <p>5.7 Fundamentals of programming for Google/Microsoft Azure Cloud</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Pro ASP.NET 4 in C# 2010– Matthew MacDonald – Apress</li> <li>2. ASP.NET 4.0 Unleashed – Stephen Walther – Sams</li> <li>3. Professional ASP.NET 3.5: In C# and VB (Programmer to Programmer)– by Bill Evjen – Wrox</li> <li>4. Beginning ASP.NET 3.5 in VB 2008– Matthew MacDonald – Apress</li> <li>5. ASP.Net 4.0 Black Book – dreamtech press</li> <li>6. Essential Windows Communication Foundation(WCF) : For .Net Framework 3.5 - Steve Resnick - Pearson</li> <li>7. ASP.Net 4 Unleashed - SAMS-Pearson</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course: 203 Advanced Scripting Languages**

<b>Course Code</b>	<b>203</b>
<b>Course Title</b>	<b>Advanced Scripting Languages</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	To provide comprehensive knowledge about JavaScript-based framework built on Google Chrome's JavaScript V8 Engine
Course Objective	To provide knowledge on how to develop I/O intensive web applications like video streaming sites, single-page applications, and other web applications using Node.js framework
Pr-requisite	Basic understanding of JavaScript, HTML, CSS and AJAX
Course Out come	After having completed the course the student will gain: ✓ Understanding of Node.js Environment ✓ Knowledge of Node Modules ✓ Technical know-hows of Full Stack Node.js based development ✓ Application of Node.js web development of real life application
Course Content	<p><b>Unit 1 Introduction Node.js</b></p> <p>1.1 Features and Applications</p> <p>1.1.1 Installing Node, Node Hosting Environments</p> <p>1.1.2 Node Building Blocks- Global and Process objects, buffers, Typed arrays and Strings, Streams, Callbacks and Asynchronous Event Handling- Event Queue, Event Emitter, Event Loop and Timers, Nested Callback and</p> <p>1.2 Exception Handling.</p> <p>1.3 REPL Terminal</p> <p><b>Unit 2 Node Modules and Node Package Manager (NPM)</b></p> <p>2.1 Overview of Node Module System</p> <p>2.2 Overview of Node Package Manager</p> <p>2.3 Creating and Publishing Node Modules</p> <p>2.4 Node Modules-Async, Commander and Underscoer, OAuth</p> <p>2.5 Overview of Other Utility Modules</p> <p><b>Unit 3 Node with the Local System and the Web</b></p> <p>3.1 Streams and Pipes</p> <p>3.2 Node and the File System- The fs.Stats class, The File System Watcher, File Read and Write, Directory access and Maintenance, File Streams</p> <p>3.3 Resource Access with Path</p> <p>3.4 The HTTP Module: Server and Client Using APACHE to proxy a Node Application</p>

	<p>Query String Parsing and DNS Resolution</p> <p><b>Unit 4 Full-Stack Node development</b></p> <p>4.1 The Express Application Framework</p> <p>4.2 Working with MongoDB-writing data, querying, Indexes, MapReduce</p> <p>4.3 NODE.JS RESTful API</p> <p><b>Unit 5 Node in New Environment</b></p> <p>5.1 SamsungIoT and GPIO</p> <p>5.2 Windows with Chakra Node</p> <p>5.3 Node for Microcontrollers and Microcomputers Fritzing</p> <p>5.4 Node and Aduino</p> <p>5.5 Node and Raspberry Pi 2</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Learning Node Moving to the server side Shelley Powers O'Relly SPD Publication</li> <li>2. Buliding Node Applications with MongoDB and Backbone Mike Wilson O'Relly SPD Publication</li> <li>3. GEO, CouchDB &amp; NodeJS Mick Thompson O'Relly SPD Publication</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course: 204: Data Warehousing & Data Mining**

<b>Course Code</b>	<b>204</b>
<b>Course Title</b>	<b>Data Warehousing &amp; Data Mining</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2016
Purpose of Course	The purpose of the course is to make student capable of understanding and implementing concepts and techniques related to data warehousing and data mining.
Course Objective	To provide a comprehensive knowledge of Data Warehousing and different Data Mining Techniques
Pr-requisite	Basic Concept of RDBMS, Information System, OLTP
Course Out come	After completion of this course, the student will be capable to carry out data warehousing related activities, data preprocessing, data mining and analysis
Course Content	<p><b>Unit -1 Introduction to Data warehousing</b></p> <ol style="list-style-type: none"> <li>1.1 Data Warehouse characteristics</li> <li>1.2 Data Marts</li> <li>1.3 Applications of Data Warehousing</li> <li>1.4 OLTP and OLAP systems</li> <li>1.5 Star schema, Multifact star schema or snow flake schema, Fact Constellation schema</li> <li>1.6 OLAP Operations in the Multidimensional data model</li> <li>1.7 OLAP servers &amp; Tools</li> <li>1.8 Building a Data Warehouse</li> <li>1.9 Metadata Repository</li> </ol> <p><b>Unit -2 Introduction to Data Mining</b></p> <ol style="list-style-type: none"> <li>2.1 Importance of and Motivation behind data mining</li> <li>2.2 Data mining process and knowledge discovery</li> <li>2.3 Introduction to Data Mining techniques</li> <li>2.4 Data Pre-processing-Cleaning, Integration and Transformation, Reduction, Discretization etc.</li> <li>2.5 Major issues in Data Mining</li> </ol> <p><b>Unit -3 Classification and Prediction</b></p> <ol style="list-style-type: none"> <li>3.1 Introduction and Applications of classification</li> <li>3.2 Data Preparation for classification and prediction</li> <li>3.3 Classifier types with their advantages and limitations               <ol style="list-style-type: none"> <li>3.3.1 Decision tree Model based classifier</li> <li>3.3.2 Decision tree Induction-based classifier</li> <li>3.3.3 Rule based classifier</li> </ol> </li> <li>3.4 Measures for Attribute selection -Info.Gain, GINI Index, Entropy, Classification error</li> </ol>



	<p>3.5 Overview of various classification algorithms(J48, ID3, C4.5)</p> <p><b>Unit 4 Clustering</b></p> <p>4.1. Introduction and Applications of clustering</p> <p>4.2. Types of Data Variables in clustering-Interval scaled, Binary, Nominal, Ordinal, RatioScaled</p> <p>4.3. Categorization of Major clustering Methods</p> <p>4.4. Partitioning Methods - <i>k</i>-Means and <i>k</i>-Medoids</p> <p>4.5. Introduction other clustering methods- Hierarchical Clustering, Agglomerative Clustering, Density based Clustering Methods, Grid-Based Clustering, Model Based Clustering</p> <p><b>Unit -5 Association Rule Mining &amp; Other Data Mining Techniques</b></p> <p>5.1 Basic concepts and Roadmap for association rule mining and its Applications</p> <p>5.2 Overview of Apriori and FPGrowth Algorithms for Association Rule Mining</p> <p>5.3 Other Data Mining Techniques</p> <p>5.3.1 Data Prediction-Linear regression based prediction</p> <p>5.3.2 Outlier Analysis- Statistical based, Distance based, Deviation based</p> <p>5.3.3 Conceptual Techniques- Data characterization and Generalization, Data Comparison or Discrimination</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Data Warehouse Toolkit R. Kinball JohnWiley &amp; Sons</li> <li>2. Decision Support and Data Warehouse Systems Efreem G. Mallach TMH</li> <li>3. Data Warehousing Fundamentals PaulrajPulliah Wiley</li> <li>4. Data Warehousing in the real world S. Anahory&amp; D. Murray Addison Wesley</li> <li>5. The Data Warehouse Lifecycle Toolkit R. Kinball, L.Reeves Mosley JohnWiley &amp;Sons</li> <li>6. Principles of Data Mining David Hand, HeikkiMannila,Padhraic SmythPHI</li> <li>7. Data Warehousing C.S.R.PrabhuPHI</li> <li>8. Data Mining Next Generation Challenges &amp; Future Directions HillolKargupta, AnupamJoshi, Yelena Yesha, Krishnamoorthy Sivakumar PHI</li> <li>9. Data Mining Concepts &amp; Techniques Jiawei Han, MichelineKamber</li> <li>10. Data Mining Introductory and Advanced Topics Dunham Pearson</li> <li>11. Data Mining Techniques and Trends N.P Gopalan, B. Sivasalvan PHI</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course: 204 Subject: Internet of Things**

<b>Course Code</b>	<b>204</b>
<b>Course Title</b>	<b>Internet of Things</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	--
Purpose of Course	The purpose of this course is to impart knowledge on Internet of Things (IoT), which relates to the study of sensors, actuators, and controllers, among other Things, IoT applications and examples overview (building automation, transportation, healthcare, industry, etc.)
Course Objective	This course is an introduction for students to IoT. The course also gives students an idea about various components of IoT and explains the working of them. The course also explains the role of embedded systems in IoT ecosystem.
Pr-requisite	Fundamental knowledge of Computer Organization, Computer Networks and Internet, Basic programming knowledge
Course Out come	After having completed the course the student will gain: 1. Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved 2. Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules 3. Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi
Course Content	<b>Unit 1:Introduction to The Internet of Things</b> 1.1 The Internet of Things overview - History of IoT, Component of IoT, Advantage and Disadvantage of IoT, Application of IoT, About Objects/things in IoT, The identifier in the IoT 1.2 Enabling Technologies of IoT - Identification technology, Sensing and actuating technology, Other technologies, Connected objects' communication 1.3 Application Areas - Smart cities, Smart Energy and Smart Grid, Smart Transportation and Mobility, Smart Factory and Smart Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory Sensing, Social Networks and IoT 1.4 Future Internet Technologies : Cloud Computing, IoT and Semantic Technologies, Autonomic Computing 1.5 Infrastructure, Networks and Communications, Processes, Data Management 1.6 Security, Privacy and Trust, Device level energy issues, IoT Related Standardization

## **Unit 2: M2M to IoT**

- 2.1 Introduction of M2M Basic Perspective
  - 2.1.1 Architecture and Components of M2M
  - 2.1.2 Key Application Area
  - 2.1.3 Comparison of M2M and IoT
- 2.2 M2M and IoT Value Chains
- 2.3 An emerging industrial structure for IoT
  - 2.3.1 Information-Driven global value chain
- 2.4 The International Driven Global Value Chain and Global Information Monopolies
- 2.5 M2M to IoT an Architectural Overview - Building Architecture
- 2.6 Main Design Principal and Needed Capabilities
- 2.7 An IOT Architecture Outline

## **Unit 3: IoT Reference Architecture**

- 3.1 Reference Model and Architecture
- 3.2 IoT Reference Model - IoT Domain Model, Information Model, Functional Model, Communication Model, IoT Security Model
- 3.3 IoT Reference Architecture - Functional View, Information View, Deployment and Operational View
- 3.4 Prototyping Embedded Device
  - 3.4.1 Electronics - Sensors, Actuators, Scaling up the Electronics
  - 3.4.2 Embedded Computing Basics - Microcontroller, System-On-Chips, Choosing right platforms
  - 3.4.3 Arduino - Developing on the Arduino, Overview of Arduino Hardware
  - 3.4.4 Raspberry Pi- Cases and Extension Boards, Developing on the Raspberry Pi, Overview of Raspberry Pi Hardware

## **Unit 4: IoT Application for Value Creation**

- 4.1 Introduction
- 4.2 IoT Applications for Industry - Future Factory Concept
- 4.3 Brownfield IoT
- 4.4 Smart Objects and Smart Applications
- 4.5 Value Creation from Big Data and Serialization
- 4.6 IoT for Reality Industry
- 4.7 IoT for Oil and Gas Industry
- 4.8 Opinions on IoT application and Value for Industry
- 4.9 eHealth

## **Unit 5 Internet of Things Privacy, Security and Governance**

- 5.1 Overview of Governance, Privacy and Security Issues
- 5.2 Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities
- 5.3 Data Aggregation for IoT in Smart Cities
- 5.4. First Step towards a Secure platform
  - 5.4.1 SMARTIE Approach
  - 5.4.2 Smart Transportation
  - 5.4.3 Smart Cities in India : An Overview

Reference Book	<ol style="list-style-type: none"> <li>1. IoT &amp; Applications I.A. Dhotre Technical Publication</li> <li>2. Designing the Internet of Things Adrian McEwen and Cassimally Wiley</li> <li>3. The Internert of Things Connection objects to web Edited by Hakima Chauchi Wiley</li> <li>4. Introduction to Embedded System -By Shibu K V , McGrawHill</li> <li>5. Getting Started with Internet of Things –By Cuno Pfister, O’Reilly</li> <li>6. Learning Internet of Things-By Peter Waher , Packt Publication</li> <li>7. Internet of Things : A Hands on Approach – By Arshdip Bahga and Vijay Madisetti</li> <li>8. Raspberry Pi User Guide –By Eben Upton and Garath Halfacree, Wiley</li> <li>9. Raspberry Pi for Dummies , Wiley</li> <li>10. Raspberry Pi IoT in C -By Harry Fairhead, I/O Press</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	<p>30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc.</p> <p>70% assessment is based on end semester written examination</p>

**Course: 205 Subject: Information Security**

<b>Course Code</b>	<b>205</b>
<b>Course Title</b>	<b>Information Security</b>
Credit	4
Teaching per Week	4 Hrs
Medium of Instruction	English
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2016
Purpose of Course	The purpose of the course is to make student capable of understanding and implementing concepts and techniques related to information security.
Course Objective	To provide a comprehensive knowledge of security issues and cryptography
Pr-requisite	Fundamentals of Operating Systems and Computer Networks
Course Out come	After completion of this course, the student will be capable to understand security issues and their solutions
Course Content	<p><b>Unit 1 Security Basics</b></p> <ul style="list-style-type: none"> <li>1.1 Computer Security , Information Security , Threat and Attacks and Malicious Logic</li> <li>1.2 Countermeasures</li> <li>1.3 Security Policies , Confidentiality Polices and Integrity Policies</li> <li>1.4 Operating System Security <ul style="list-style-type: none"> <li>1.4.1 Security Risks at Common Ports and Services , File Systems and Resources &amp; user accounts</li> <li>1.4.2 Operating System Hardening</li> </ul> </li> </ul> <p><b>Unit 2 Network and other securities</b></p> <ul style="list-style-type: none"> <li>2.1 Common network security Incidents and Attacks</li> <li>2.2 Threat and attack at Boundary Devices and their defences</li> <li>2.3 Firewall Implementation as a defence mechanism</li> <li>2.4 VPN Implementation as a defence mechanism</li> <li>2.5 Intrusion Detection and Prevention Implementation as a defence mechanism</li> <li>2.6 Web related threats, attacks and defence mechanism</li> <li>2.7 Database related threats, attacks and defence mechanism</li> <li>2.8 Wireless network related threats, attacks and defence mechanism</li> <li>2.9 Security in e-commerce, m-commerce-issues and solutions</li> </ul> <p><b>Unit 3. Symmetric Ciphers</b></p> <ul style="list-style-type: none"> <li>3.1 Overview of basic encryption techniques (Caesar cipher, zebra technique, vinegar cipher, transposition cipher, play fair cipher, rail fence cipher, hill cipher)</li> <li>3.2 Block Cipher</li> </ul>

	<p>3.3 DES, Triple DES, AES 3.4 Contemporary Symmetric Cipher</p> <p><b>Unit 4. Asymmetric encryption</b> 4.1 Use of Number Theory 4.2 Public-key Cryptography 4.3 RSA 4.4 Authentication Protocols 4.4.1 Message authentication and hash function 4.4.2 Hash algorithms - MD5 , SHA1 4.4.3 Digital signatures 4.4.4 SSL</p> <p><b>Unit 5 Secure Application level Protocols</b> 5.1 SMIME 5.2 SFTP 5.3 PGP 5.4 Steganography 5.5 HTTPS (SSL)</p>
Reference Book	<ol style="list-style-type: none"> <li>1. Computer Security: Art and Science, Matt Bishop Addison-Wesley</li> <li>2. Introduction to Computer Security Matt Bishop Addison-Wesley</li> <li>3. Information security William Stallings</li> <li>4. Cryptography and Public Key Infrastructure on the Internet Klaus Schmech Willey</li> <li>5. Beginning Cryptography with Java David Hook Wrox</li> <li>6 Information Security-Theory and Practices Dhiren Patel PHI</li> <li>7 Cryptography and Network Security, Fourth William Stallings Edition</li> </ol>
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on end semester written examination

**Course: 206 Practicals in Web Programming Using C#**

Course Code	206
Course Title	<b>Practicals in Web Programming Using C#</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods, tools and techniques of Web Programming learnt in course/paper <b>202 Web Programming Using C#</b>
Course Objective	The Objective of these course is to enable students to develop Full-Stack web application in C#.
Pr-requisite	Programming Skill in Structured and Object Oriented Programming and Core C#, Scripting Skills in HTML, Concepts of Networks, Web, HTTP etc.
Course Out come	After completion of this course, the student will be capable of developing web application using c# and related tools and technologies.
Course Content	The students will be required to carry out practical in Client and Server-side Web Application Development on the topics covered in course/ <b>Paper 202 Web Programming using C#</b> using the methods and tools discussed there in.  A Journal must be prepared for the practical work done.
Reference Book	As per course/Paper:202
Teaching Methodology	Lab Work
Evaluation Method	30% Internal assessment is based on Practical attendance, Problem Solving, internal examination etc. 70% assessment is based practical examination at the end of semester.

Course: 207 Practicals in Advanced Scripting Languages

Course Code	207
Course Title	<b>Practicals in Advanced Scripting Languages</b>
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods, tools and techniques of Scripting Languages learnt in course/paper <b>203 Advanced Scripting Languages</b>
Course Objective	The Objective of these course is to enable students to develop application in Advanced Scripting Languages.
Pr-requisite	Programming Skill in Structured and Object Oriented Programming, Scripting Skills in HTML and JavaScript, Concepts of Networks, Web, HTTP etc.
Course Out come	After completion of this course, the student will be capable of developing application based on course/paper <b>203 Advanced Scripting Language</b> and related tools and technologies.
Course Content	The students will be required to carry out practical in Scripting Languages on the topics covered in course/ <b>Paper 203 Advanced Scripting Language</b> using the methods and tools discussed there in.  A Journal must be prepared for the practical work done.
Reference Book	As per course/Paper:203
Teaching Methodology	Lab Work
Evaluation Method	30% Internal assessment is based on Practical attendance, Problem Solving, internal examination etc. 70% assessment is based practical examination at the end of semester.



**Course: 208 Practical on Cryptography**

<b>Course Code</b>	<b>208</b>
<b>Course Title</b>	<b>Practical on Cryptography</b>
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2016
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods, tools and techniques of cryptography learnt in course/paper <b>205 Information Security</b>
Course Objective	The Objective of this course is to enable students to apply various cryptographic algorithms.
Pr-requisite	Basic understanding of Programming and Algorithms, Programming in C language.
Course Out come	After completion of this course, the student will be capable of performing various types of cryptography.
Course Content	The students will be required to carry out practical programming of various basic cryptography techniques on the topics covered in course/Paper 205: “ <b>Information Security</b> ” using using C language.  A Journal must be prepared for the practical work done.
Reference Book	As per course/Paper:205
Teaching Methodology	Lab Work
Evaluation Method	30% Internal assessment is based on Practical attendance, Problem Solving, internal examination etc. 70% assessment is based practical examination at the end of semester.