

Course : 201 Service Oriented Architecture& Cloud Computing

Course Code	201
Course Title	Service Oriented Architecture & Cloud Computing
redit	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 course is to establish foundation of service oriented technologies and cloud computing
Course Objective	To provide comprehensive knowledge of SOA specific technologies, standards and Cloud based systems and aspects related to it.
Pr-requisite	Fundamental knowledge of software engineering, programming, networking, internet and types of Information
Course Out come	After completion of this course, the student will gain comprehensive knowledge of SOA, Cloud based systems and aspects related to it.
Course Content	<p>Unit 1 Fundamentals of SOA</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</p> <p>1.2.1 Line of business services, Reusable Technical Services, Service contracts, 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</p> <p>1.3.3 Technical Benefits of SOA</p> <p>1.3.4 Challenges introduced by SOA</p> <p>Unit 2 Introduction to SOA & Web Services</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 Web Service Technologies-SOAP, WSDL, UDDI</p> <p>2.3 Service Level Interaction Patterns</p> <p>2.4 Integration & Interoperability using XML and Web services</p> <p>2.4.1 Web Services Integration(WSI)</p> <p>2.4.2 Service-oriented Integration(SOI)</p> <p>2.4.3 .Net and J2EE Interoperability</p> <p>2.5 Multi channel Access</p> <p>2.5.1. Business benefits of Multichannel Access</p> <p>2.5.2. SOA Architecture for Multi-channel Access</p>

	<p>2.6 Overview of Web Service Security.</p> <p>Unit 3 Fundamentals of Cloud Computing</p> <p>3.1 Introduction to Web 2.0 and Web3.0</p> <p>3.2 Virtualization</p> <p>3.3 Moving towards Cloud Computing</p> <p>3.4 Cloud characteristics and challenges</p> <p>3.5 Cloud Computing Essentials</p> <p>3.5.1 Cloud Computing Architectural Framework</p> <p>3.5.2 Cloud Deployment Models and Service Models</p> <p>3.5.3 Virtualization in Cloud Computing</p> <p>3.5.4 Parallelization in Cloud Computing</p> <p>3.6 Relationship between Cloud and SOA</p> <p>Unit 4 Cloud Service Models & Cloud Based Systems</p> <p>4.1 Infrastructure as a Service(IaaS)</p> <p>4.1.1 Server virtualization</p> <p>4.1.2 Storage virtualization</p> <p>4.1.3 Network virtualization</p> <p>4.2 Platform as a Service(PaaS)</p> <p>4.2.1 Azure</p> <p>4.2.2 GooleAppEng</p> <p>4.2.3 Hadoop</p> <p>4.2.4 SalesForce</p> <p>4.3 Software as a Service (SaaS)-Characteristics, Open SaaS and SOA</p> <p>4.3.1 Cloud services</p> <p>4.3.2 Web portal</p> <p>4.3.3 Web OS</p> <p>Unit 5 Cloud Service Models & Cloud Based Systems</p> <p>5.1 Cloud Based Storage</p> <p>5.1.1 Provisioning Cloud Storage - Unmanaged and Managed cloud storage, creating cloud storage systems, virtual storage containers.</p> <p>5.1.2 Cloud Backup solutions-types, features, cloud attached backups.</p> <p>5.1.3 Cloud storage Interoperability- Cloud Data Management Interface(CDMI), Open cloud Computing Interface(OCCI)</p> <p>5.2 Cloud Based Productivity Software</p> <p>5.2.1 Productivity applications and Characteristics</p> <p>5.2.2 Online Office systems- Acrobat.com, GoogleDocs, Microsoft Office Weapps etc.</p> <p>5.3 Security in public cloud.</p>
Reference Book	<ol style="list-style-type: none"> 1. Pro Newcomer & Lomow, “Understanding SOA with Web Services”, Pearson Education, 2007 2. Bieberstein,Bose,Fiammante,Jones and Shah “Service-Oriented Architecture(SOA) Compass”, Pearson Education, 2010 3. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005. 4. Thomas Erl, “SOA: Principles of Service Design “,Pearson Education, 2009

	<ol style="list-style-type: none"> 5. Pulier and Taylor, "Understanding Enterprise SOA", DreamTech, 2008 6. Michael HAVey, "SOA cookbook", SPD, 2008 7. Cloud Computing: Principles and Paradigms - R. Buyya et al-Wiley 2010 8. Cloud Computing Bible - Sosinsky - Wiley - India,2011 9. Cloud Computing Second Edition Dr. Kumar Saurabh - Wiley - India, 2012
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#

Course Code	202
Course Title	Web Programming using C#
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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>Unit 1 ASP.NET using C#</p> <ul style="list-style-type: none"> 1.1 Life cycle of ASP.Net Application on IIS & Lifecycle of ASP.Net Web Page 1.2 Structure of Application- Application Domain, Application Lifetime, Application Directory Structure 1.3 Client & Server Side State Management-Application State, Session State, ViewState, Cookies. 1.4 Postback and Cross-page Posting <p>Unit 2 Working with Data</p> <ul style="list-style-type: none"> 2.1 Working with ADO.NET 2.2 Database Operations – SqlDataSource, XmlDataSource 2.3 Data Access with LINQ <ul style="list-style-type: none"> 2.3.1 Introduction of LINQ 2.3.2 LinqDataSource control 2.3.3 LINQ to Dataset 2.3.4 Overview of LINQ to SQL 2.4 Overview of ADO.Net Entity Framework <p>Unit 3: Advanced Server Controls</p> <ul style="list-style-type: none"> 3.1 Data Binding with Controls 3.2 Website Navigation Controls 3.3 Server-side Ajax-ScriptManager, UpdatePanel, Timer, UpdateProgress <p>Unit 4 ASP.Net MVC Application</p> <ul style="list-style-type: none"> 4.1 Introduction to ASP.Net MVC Framework 4.2 Building an MVC page 4.3 CRUD operation in MVC

	<p>Unit 5 Web Service and Cloud programming with C#</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"> 1. Pro ASP.NET 4 in C# 2010– Matthew MacDonald – Apress 2. ASP.NET 4.0 Unleashed – Stephen Walther – Sams 3. Professional ASP.NET 3.5: In C# and VB (Programmer to Programmer)– by Bill Evjen – Wrox 4. Beginning ASP.NET 3.5 in VB 2008– Matthew MacDonald – Apress 5. ASP.Net 4.0 Black Book – dreamtech press 6. Essential Windows Communication Foundation(WCF) : For .Net Framework 3.5 - Steve Resnick - Pearson 7. ASP.Net 4 Unleashed - SAMS-Pearson
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

Course Code	203
Course Title	Advanced Scripting Languages
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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>Unit 1 Introduction Node.js</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>Unit 2 Node Modules and Node Package Manager (NPM)</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 Underscore, OAuth</p> <p>2.5 Overview of Other Utility Modules</p> <p>Unit 3 Node with the Local System and the Web</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</p> <p>Using APACHE to proxy a Node Application</p> <p>Query String Parsing and DNS Resolution</p>

	<p>Unit 4 Full-Stack Node development</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>Unit 5 Node in New Environment</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 Arduino</p> <p>5.5 Node and Raspberry Pi</p>
Reference Book	<ol style="list-style-type: none"> 1. Learning Node Moving to the server side Shelley Powers O'Reilly SPD Publication 2. Building Node Applications with MongoDB and Backbone Mike Wilson O'Reilly SPD Publication 3. GEO, CouchDB & NodeJS Mick Thompson O'Reilly SPD Publication
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

Course Code	204
Course Title	Data Warehousing & Data Mining
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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>Unit -1 Introduction to Data warehousing</p> <ol style="list-style-type: none"> 1.1 Data Warehouse characteristics 1.2 Data Marts 1.3 Applications of Data Warehousing 1.4 OLTP and OLAP systems 1.5 Star schema, Multifact star schema or snow flake schema, Fact Constellation schema 1.6 OLAP Operations in the Multidimensional data model 1.7 OLAP servers & Tools 1.8 Building a Data Warehouse 1.9 Metadata Repository <p>Unit -2 Introduction to Data Mining</p> <ol style="list-style-type: none"> 2.1 Importance of and Motivation behind data mining 2.2 Data mining process and knowledge discovery 2.3 Introduction to Data Mining techniques 2.4 Data Pre-processing-Cleaning, Integration and Transformation, Reduction, Discretization etc. 2.5 Major issues in Data Mining <p>Unit -3 Classification and Prediction</p> <ol style="list-style-type: none"> 3.1 Introduction and Applications of classification 3.2 Data Preparation for classification and prediction 3.3 Classifier types with their advantages and limitations <ol style="list-style-type: none"> 3.3.1 Decision tree Model based classifier 3.3.2 Decision tree Induction-based classifier 3.3.3 Rule based classifier 3.4 Measures for Attribute selection -Info.Gain, GINI Index, Entropy, Classification error 3.5 Overview of various classification algorithms(J48, ID3, C4.5)

	<p>Unit 4 Clustering</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>Unit -5 Association Rule Mining & Other Data Mining Techniques</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"> 1. Data Warehouse Toolkit R. Kinball JohnWiley & Sons 2. Decision Support and Data Warehouse Systems Efrem G. Mallach TMH 3. Data Warehousing Fundamentals PaulrajPulliah Wiley 4. Data Warehousing in the real world S. Anahory& D. Murray Addison Wesley 5. The Data Warehouse Lifecycle Toolkit R. Kinball, L.Reeves Mosley JohnWiley &Sons 6. Principles of Data Mining David Hand, HeikkiMannila,Padhraic SmythPHI 7. Data Warehousing C.S.R.PrabhuPHI 8. Data Mining Next Generation Challenges & Future Directions HillolKargupta, AnupamJoshi, Yelena Yesha, Krishnamoorthy Sivakumar PHI 9. Data Mining Concepts & Techniques Jiawei Han, MichelineKamber 10. Data Mining Introductory and Advanced Topics Dunham Pearson 11. Data Mining Techniques and Trends N.P Gopalan, B. Sivasalvan PHI
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 - Internet of Things

Course Code	204
Course Title	Internet of Things
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 2020
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: <ul style="list-style-type: none"> 1. Understanding about the architectural detail of IoT 2. Exposure to working with Arduino & Raspbery pi 3. Knowledge about domain specific applications of IoT
Course Content	<p>Unit 1: Introduction to The Internet of Things</p> <p>1.1 The Internet of Things overview - History of IoT, Components of IoT, Characteristics of IoT, About Objects/things in IoT</p> <p>1.2 Enabling Technologies of IoT</p> <p>1.2.1 Cloud Computing</p> <p>1.2.2 Big Data Analytics</p> <p>1.2.3 Wireless Sensor Networks</p> <p>1.2.4 Embedded systems</p> <p>1.2.5 Communication protocols</p> <p>1.3 Near Field Communication & RFID</p> <p>Unit2: IoT Architecture</p> <p>2.1 M2M to IoT</p> <p>2.1.1. Introduction of M2M - Components of M2M</p> <p>2.1.2. Difference between IoT and M2M</p> <p>2.2 IoT Reference Model or physical design and logical design of IoT</p> <p>2.3 IoT Reference Architecture</p> <p>Unit 3: Arduino</p> <p>3.1 Introduction to Arduino</p> <p>3.2 Flavours of Arduino</p> <p>3.3 Architecture of Arduino board</p>

	<p>3.4 Getting started with Arduino</p> <p>3.4.1 Installing Arduino Desktop IDE</p> <p>3.4.2 Installing Board drivers, Configuring board type, uploading the program</p> <p>3.5 Hardware interfacing & programming</p> <p>3.5.1. LED on/off using timer</p> <p>3.5.2. Arduino alarm system which detects movement of an intruder with a high pitched alarm sounds and flashing lights.</p> <p>3.5.3. Arduino Traffic Light Controller</p> <p>Unit 4 : Raspberry pi</p> <p>4.1 About the board</p> <p>4.2 Linux on Raspberry pi</p> <p>4.3 Raspberry pi interfaces of Data Transfer</p> <p>4.4 Reading general purpose Input/Output pin</p> <p>4.5 Hardware interfacing & programming</p> <p>4.5.1 Controlling LED with Raspberry pi</p> <p>4.5.2 Interfacing a light sensor(LDR) with Raspberry pi</p> <p>Unit 5: IoT Application Areas and Security Concerns</p> <p>5.1 IoT Application Areas</p> <p>5.1.1. Home Automation</p> <p>5.1.2. Smart Cities</p> <p>5.1.3. Smart Energy & Smart Grid</p> <p>5.1.4. Smart Health</p> <p>5.1.5. Smart Manufacturing</p> <p>5.1.6. Smart Agriculture</p> <p>5.2 IoT - Security risks and challenges</p>
Reference Book	<ol style="list-style-type: none"> 1. IoT & Applications I.A. Dhotre Technical Publication 2. Designing the Internet of Things Adrian McEwen and Cassimally Wiley 3. The Internet of Things Connection objects to web Edited by Hakima Chauchi Wiley 4. Introduction to Embedded System -By Shibu K V , McGrawHill 5. Getting Started with Internet of Things –By Cuno Pfister, O’Reilly 6. Learning Internet of Things-By Peter Waher , Packt Publication 7. Internet of Things : A Hands on Approach – By Arshdip Bahga and Vijay Madiseti 8. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press) 9. Raspberry Pi User Guide –By Eben Upton and Garath Halfacree, Wiley 10. Raspberry Pi for Dummies , Wiley 11. Raspberry Pi IoT in C -By Harry Fairhead, I/O Press
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 - Information Security

Course Code	205
Course Title	Information Security
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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>Unit 1 Security Basics</p> <ul style="list-style-type: none"> 1.1 Computer Security , Information Security , Threat and Attacks and Malicious Logic 1.2 Countermeasures 1.3 Security Policies , Confidentiality Polices and Integrity Policies 1.4 Operating System Security <ul style="list-style-type: none"> 1.4.1 Security Risks at Common Ports and Services , File Systems and Resources & user accounts 1.4.2 Operating System Hardening <p>Unit 2 Network and other securities</p> <ul style="list-style-type: none"> 2.1 Common network security Incidents and Attacks 2.2 Threat and attack at Boundary Devices and their defences 2.3 Firewall Implementation as a defence mechanism 2.4 VPN Implementation as a defence mechanism 2.5 Intrusion Detection and Prevention Implementation as a defence mechanism 2.6 Web related threats, attacks and defence mechanism 2.7 Database related threats, attacks and defence mechanism 2.8 Wireless network related threats, attacks and defence mechanism 2.9 Security in e-commerce, m-commerce-issues and solutions <p>Unit 3. Symmetric Ciphers</p> <ul style="list-style-type: none"> 3.1 Overview of basic encryption techniques (Caesar cipher, zebra technique, vinegar cipher, transposition cipher, play fair cipher, rail fence cipher, hill cipher) 3.2 Block Cipher 3.3 DES, Triple DES, AES

	<p>3.4 Contemporary Symmetric Cipher</p> <p>Unit 4. Asymmetric encryption</p> <p>4.1 Use of Number Theory</p> <p>4.2 Public-key Cryptography</p> <p>4.3 RSA</p> <p>4.4 Authentication Protocols</p> <p>4.4.1 Message authentication and hash function</p> <p>4.4.2 Hash algorithms - MD5 , SHA1</p> <p>4.4.3 Digital signatures</p> <p>4.4.4 SSL</p> <p>Unit 5 Secure Application level Protocols</p> <p>5.1 SMIME</p> <p>5.2 SFTP</p> <p>5.3 PGP</p> <p>5.4 Steganography</p> <p>5.5 HTTPS (SSL)</p>
Reference Book	<ol style="list-style-type: none"> 1. Computer Security: Art and Science, Matt Bishop Addison-Wesley 2. Introduction to Computer Security Matt Bishop Addison-Wesley 3. Information security William Stallings 4. Cryptography and Public Key Infrastructure on the Internet Klaus Schmech Willey 5. Beginning Cryptography with Java David Hook Wrox 6 Information Security-Theory and Practices Dhiren Patel PHI 7 Cryptography and Network Security, Fourth William Stallings Edition
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: 206 - Practical on Web Programming Using C#

Course Code	206
Course Title	Practical on Web Programming Using C#
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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 202 Web Programming Using C#
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/ Paper 202 Web Programming using C# 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 - Practical on Advanced Scripting Languages

Course Code	207
Course Title	Practical on Advanced Scripting Languages
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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 203 Advanced Scripting Languages
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 203 Advanced Scripting Language 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/ Paper 203 Advanced Scripting Language 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 IoT

Course Code	208
Course Title	Practical on IoT
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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 204 Internet of Things
Course Objective	The Objective of this course is to enable students to write programs for various microcontrollers and build IoT applications.
Pr-requisite	Basic understanding of computer organization and working of microprocessor, Programming in C language. Student must have opted the course 204-Internet of Things in the same semester in which student opts for this course.
Course Out come	After completion of this course, the student will be capable of developing IoT applications.
Course Content	The students will be required to carry out practical programming on various microcontrollers and on the topics covered in course/Paper 204: Internet of Things using C/C++/ Raspberry PI/Java/C#/Node JS languages. A Journal must be prepared for the practical work done.
Reference Book	As per course/Paper:204
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

Course Code	208
Course Title	Practical on Cryptography
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2020
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 205 Information Security
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: “ Information Security ” using C/C++/Java/C# languages. 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.