M.SC. II YEAR I SEMESTER:

Paper No	Paper Title/Subject	Workload Per Week (L+T+P)	Marks			CREDITS
			Internal	External	Total	
MSCCS211	CLOUD COMPUTING	4+0+0	20	80	100	4
MSCCS212	SOFTWARE ENGINEERING	4+0+0	20	80	100	4
MSCCS213	.NET PROGRAMMING	4+0+0	20	80	100	4
MSCCS214	CRYPTOGRAPHY AND NET WORK SECURITY	4+0+0	20	80	100	4
MSCCS215	DATA WAREHOUSING AND MINING	4+0+0	20	80	100	4
MSCCS216	.NET PROGRAMMING LABORATORY	0+0+4	00	50	50	2
MSCCS217	DATA MINING LABORATORY	0+0+4	00	50	50	2
MSCCS218	SOFTWARE ENGINEERIG LABORATORY	0+0+4	00	50	50	2
MSCCS219	SEMINAR	02	25		25	1
					675	27

MSCCS211	CLOUD COMPUTING	CC
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T – I
INTRODUCTION: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption. CLOUD MODELS: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service. CLOUD AS A SERVICE: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined

U N I T – II
CLOUD SOLUTIONS: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloud is sourcing. CLOUD OFFERINGS: Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. CLOUD MANAGEMENT: Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

U N I T – III
CLOUD VIRTUALIZATION TECHNOLOGY: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR)- VIO Server - Virtual Infrastructure Requirements. CLOUD VIRTUALIZATION: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

U N I T – IV
CLOUD AND SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and IT Services. CLOUD INFRASTRUCTURE BENCHMARKING: OLTP Benchmark - Business Intelligence Benchmark e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

TEXT BOOK:
1. Cloud Computing – Insight into New Era Infrastructure, Dr. Kumar Saurabh, Wiley India.

REFERENCE BOOKS:

1. Cloud Computing, Roger Jennings, Wiley India
2. Cloud Computing Explained, John Rhoton, Recursive Press
3. Cloud Computing Bible, Barry Sosinsky, Wiley
4. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Wiley
5. Cloud Computing for Dummies, Judith Hurwiz, Wiley Publishing.
6. The Cloud at your service, Rosenberg and Matheos, Manning Publications

MSCCS212	SOFTWARE ENGINEERING	SE
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I
INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving Role of Software - Software - The Changing Nature of Software - Software myths. A GENERIC VIEW OF PROCESS: Software Engineering-A Layered technology - A Process frame work - The capability Maturity Model Integration (CMMI) - Process Patterns - Process Assessment - Personal and Team Process Models - process Technology - Product and Process. PROCESS MODELS: Prescriptive Models - The waterfall Model - Incremental Process Models-Evolutionary Process Models - Specialized Process Models - The Unified Process. (Chapters1, 2 and 3)

UNIT- II
SOFTWARE ENGINEERING PRACTICE: Software engineering Practice - Communication Practice-Planning Practices - Modeling Practices - Construction Practice - deployment
SYSTEM ENGINEERING: Compute-Based systems - The System Engineering Hierarchy - Business Process Engineering: An Overview - Product Engineering:An Overview - System Modeling.REQUIRMENT ENGINEERING: A Bridge to Design and Construction - Requirements EngineeringTasks - Initiating the Requirements Engineering Process - Eliciting Requirements-Developing Use - Cases - Building the analysis Model - Negotiating Requirements - Validating Requirements. BUILDING THE ANALYSIS MODEL: Requirements Analysis - Analysis Modeling Approaches – Data Modeling Concepts-Object-oriented Analysis - Scenario-Based Modeling - Flow-OrientedModeling - Class-Based Modeling - Creating a Behavioral Model. (Chapters 5, 6, 7, 8)

UNIT - III
DESIGN ENGINEERING: Design within the Context of Software Engineering - design Process andDesign Quality - Design Concepts - The Design Model - Pattern-Based Software Design.
CREATING AN ARCHITECTURAL DESIGN: Software Architecture - Data Design - Architectural Styles and Patterns - Architectural Design- Assessing Alternative Architectural Designs - Mapping Data Flow into Software Architecture. MODELING COMPONENT-LEVEL DESIGN: What is a Component? - Designing Class-Based Component-Level Design - Object Constraint Language - designing Conventional Components. (Chapters 9, 10 and 11)

UNIT - IV
PERFORMING USER INTERFACE DESIGN: The Golden Rules - User Interface Analysis and Design- Interface Analysis - Interface Design Steps - Design Evaluation.RISK MANAGEMENT: Reactive vs. Proactive Risk Strategies - Software Risks - Risk Identification - Risk Projection - Risk Refinement - Risk Mitigation, Monitoring, and Management - The RMMM Plan.QUALITY MANAGEMENT: Quality Concepts - Software Quality Assurance - Software Reviews -Formal Technical Reviews - Formal Approaches to SQA - Statistical Software Quality Assurance -Software Reliability - The ISO 9000 Quality Standards - The SQA Plan. (Chapters 12, 25, 26)

TEXT BOOK:
1.   SOFTWARE ENGINEERING BY R.S. PRESSMAN (Mc. Graw Hill Sixth Edition)
REFERENCE BOOKS:
1.   SOFTWARE ENGINEERING BY GHEZZI (PHI)
2.   SOFTWARE ENGINEERING FUNDAMENTALS BY BEHFOROOZ AND HUDSON OXFORDUNIVERSITY PRESS
3.   SOFTWARE ENGINEERING BY FAIRLEY (Mc.Graw Hill)

MSCCS213	.NET PROGRAMMING	.NET
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

UNIT - I

Fundamentals of Visual Basic, Exception handling, windows forms, Control Classes, Different Types of Boxes, Labels, Buttons, Panels. (Chapters 1 to 7)

UNIT - II

WINDOWS FORMS: Different types of Bars, Menus, Views.
OBJECT - ORIENTED PROGRAMMING: Classes and objects constructors and destructors, inheritance, modifiers, Interfaces, Polymorphism, Vate Binding, Graphics handling and File handling. (Chapters 8 to 13)

UNIT - III

WEB FORMS: Working with web forms, Web forms and HTML, The Web control class, Web Forms and Boxes, Web Forms and Buttons, Validation Controls, Ad Rotators, Web Forms and HTML controls. (Chapters 14 to 19)

UNIT - IV

DATA ACCESS WITH ADO.NET : Accessing data with the server explorer, Data adapters and Data sets, Binding Controls to databases, Handling databases in code, Database access in Web Applications. Creating user Controls, Webuser Controls, and Multithreading creating Windows services, Web Services and Deploying applications. (Chapters 20 to 25)

TEXT BOOK:

1. VB.NET PROGRAMMING (BLACK BOOK) BY STEVEN HOLZNER (Dreamtech- 2003) REFERENCE

REFERENCE BOOKS:

1. VB.NET PROGRAMMING BY T. GADDIS (Dreamtech)
2. Microsoft Visual Basic. Net step by step By Halvosrson (PHI)
3. OOP with Microsoft Visual Basic.Net ByReynoldHacrtte (PHI)

MSCCS214	CRPTOGRAPHY AND NETWORK SECURITY	CNS
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

U N I T - I

INTRODUCTION:- Attacks, Services, and Mechanisms, Security Services. CONVENTIONAL ENCRYPTION: CLASSICAL TECHNIQUES: Steganography, Classical Encryption Techniques. CONVENTIONAL ENCRYPTION: MODERN TECHNIQUES:- Simplified DES. The Data Encryption Standard, Differential and Linear Cryptanalysis, Block Cipher Modes of Operation.

U N I T - II

CONFIDENTIALITY USING CONVENTIONAL ENCRYPTION:- Traffic Confidentiality, Random Number Generation. PUBLIC-KEY CRPTOGRAPHY:- Principles of Public-Key Cryptosystems, The RSA Algorithm, DiffieHellman Key Exchange, Elliptic Curve Cryptography. INTRODUCTION TO NUMBER THEORY:- Prime and Relatively Prime Numbers, Fermat's and Euler's Theorem, Euclid's Algorithm, The Chinese Remainder Theorem, Discrete Logarithms.

U N I T - III

MESSAGE AUTHENTICATION AND HASHFUNCTIONS:- AuthenticationRequirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs. DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS:- Digital Signatures, Authentication Protocols, Digital Signature Standard.

U N I T - IV

ELECTRONIC MAIL SECURITY: S/MIME. IP SECURITY: IP Security Overview, IP Security Architecture, Encapsulating Security Payload, Key Management. FIREWALLS: Firewall Design Principles, Trusted Systems. (Chapters 1,2,4,5,6,7,8,10,12,13 and 16)

TEXT BOOK:

1. CRYPTOGRAPHY AND NETWORK SECURITY principles and Practice FOURTH Edition By William Stallings (Pearson Asia)

REFERENCE BOOKS:

1. DAVIES &PRICE: SECURITY FOR COMPUTER NETWORKS - Wiley (1984)
2. MAYER &MATYAS: CRYPTOGRAPHY - Wiley B. SCHNEIER: APPLIED CRYPTOGRAPHY - (John Wiley)

MSCCS215	DATA WAREHOUSE AND DATA MINING	DMW
WORK LOAD: 4 PPW	**INTERNAL MARKS: 20**	**EXTERNAL MARKS: 80**

UNIT-I

Data Mining- Data Mining Overview, Kinds of Data can be mined, Kinds of patterns can be mined, Data Mining Functionalities, Technologies used, Data Mining Applications, Major issues in Data Mining,
Data objects and attribute types, Basic statistical descriptions of data, Measuring Data Similarity and Dissimilarity. (Chapters 1, 2.1 to 2.2.2, 2.4)

UNIT-II

Data Pre-Processing: Data Cleaning, Data Integration - Data reduction: Overview, Attribute subset selection, clustering, sampling, Data cube Aggregation, Histograms. Data Transformation and Data Discretization and concept Hierarchy Generation.
Data Warehouse: Basic Concepts, Data Warehouse modeling, Data Warehouse Design.
Data Warehouse implementation- Data cube implementation overview and OLAP server architecture, Attribute oriented induction. (Chapters 3.1 to 3.5, 4.1, 4.2, 4.3, 4.3.1, 4.3.2, 4.3.3, 4.4, 4.4.1, 4.4.4,4.5)

UNIT-III

Basic Concepts of frequent patterns- Frequent Item sets, Mining methods, Apriori and FP-Growth, Association rules.
Classification and Prediction: Classification by Decision Tree Induction-Information gain, Gini Index, Tree Pruning. Classification methods: Bayesian Classification, Rule-Based Classification. Model evolution and Selection: Metrics for evaluating (Chapters 6.1, 6.2, 8.1, 8.2, 8.3, 8.4, 8.5)

UNIT - IV

Cluster   analysis: Overview of Clustering Analysis Methods, Partitioning   Methods- K-Means, K-Medoids.   Hierarchical   methods- BRICH. Density-based methods- DB-SCAN, DENCLUE. Grid Based methods- STING. Evolution of Cluster Analysis Overview.
 Outliers, Outlier Analysis. (Chapters 10.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.3.3, 10.4.1, 10.4.3, 10.5.1, 10.6, 12.1)

TEXT OOK:

1. DATA MINING CONCEPTS & TECHINIQUES BY JIAEEI HAN, MICHELINE & KAMBER (3ndEDITION) Harcourt India (Elsevier Publishing Company)

REFERENCE BOOKS:

1. Data Mining Introductory and advanced topics-MARGARET H DUNHAM, PEARSON EDUCATION
2.Data Mining Techniques - ARUN K PUJARI, University Press.
3.Data Warehousing in the Real World - SAM ANAHORY &DENNIS MURRAY. Pearson Ed   Asia.
4.Data Warehousing Fundamentals - PAULRAJ PONNAIAH WILEY STUDENT   EDITION
5.DATA WAREHOUSING, DATA MINING & OLAP BY ALEX BERSON AND STEPHEN J. SMITH (TMH)

MSCCS216	.NET LAB	.NETL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

• The concepts covered in the corresponding theory paper are to be implemented.

MSCCS217	DATA MINING LAB	DML
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

Weka is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a datasets#. Weka contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization.

Launching WEKA, COMMAND-LINE(simple CLI), EXPLORER-User Interface, Preprocessing, Classification, Clustering, Associating, Selecting Attributes, Visualizing; EXPERIMENTER-Simple, Advanced; KNOWLEDGEFLOW-Introduction, Features, Components; ArffViewer; Converters;etc.,

RESOURCES:

Manuals and Software:
• http://www.cs.waikato.ac.nz/ml/weka/index.html
Collections of Datasets:
• # http://www.cs.waikato.ac.nz/ml/weka/datasets.html

MSCCS218	SOFTWARE ENGINEERING LAB	STL
WORK LOAD: 4 PPW	REVIEW ASSESSMENT	EXTERNAL MARKS: 50

SOFTWARE TESTING – Introduction, purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle. Basic Structural Modeling: Classes, Relationships, Class & Object Diagrams. Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Component, Deployment, Component diagrams and Deployment diagrams; Caste Study on Unified Library Application(ULA).

To learn and use the testing tools to carry out the functional testing, load/stress testing and use the following (or similar) automated testing tools to automate testing:

        a) Win Runner/QTP for functional testing.

        b) Load Runner for Load/Stress testing.

        c) Test Director for test management.

List of Sample Programs /Experiments

1. The student should take up the case study of Unified Library Application (ULA) which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.

2. Student has to take up another case study of his/her own interest and do the same whatever mentioned in first problem. Some of the ideas regarding case studies are given in reference books which were mentioned and it would be referred for some new idea.

REFERENCE BOOKS:

1. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech

2. Software Testing Concepts and Tools, P.Nageswara Rao, Dreamtech Press.

3. Grady Booch, James Rumbaugh, Ivan Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition

MSCCS219	**SEMINAR**		S
WORK LOAD: 0 2	**INTERNAL MARKS: 25**	**EXTERNAL MARKS: 00**	

- This course is meant to give students practice speaking in front of an audience and to explore topics of their own choosing in detail.
- Students will research topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To help students improve as speakers, each student will receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.

M.SC. II YEAR II SEMESTER:

Paper No	Paper Title/Subject	Workload Per Week L+T+P	Marks			CREDITS
			Internal	External	Total	
MSCCS221	PROGRAMMING WITH R	4+0+0	20	80	100	4
MSCCS222	PROGRAMMING WITH R LAB	0+0+4	00	50	50	2
MSCCS223	MAJOR PROJECT	0+0+0	75	175	250	10
MSCCS224	COMPREHENSIVE VIVA	0+0+0	00	50	50	2
MSCCS225	SEMINAR	02	25	00	25	1
					475	19

MSCCS221	PROGRAMMING WITH R	DAR
WORK LOAD: 4 PPW	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

Unit I
Introduction- What Is R?, Installing R, Choosing an IDE, Your First Program, Installing Extra Related Software, *Scientific Calculator*- Mathematical Operations and Vectors, Assigning Variables, Special Numbers, Logical Vectors; *Inspecting Variables*- Classes, Different Types of Numbers, Other Common Classes, Checking and Changing Classes, Examining Variables, Workspace

Unit II
Vectors, Matrices, and Arrays; Lists and Data Frames-Lists, NULL, Pairlists, Data Frames; *Environments and Functions*

Unit III
Strings and Factors, Flow Control and Loops, Advanced Looping; Packages- Loading Packages, Installing Packages, Maintaining Packages; *Dates and Times*-Date and Time Classes, Conversion to and from Strings, Time Zones, Arithmetic with Dates and Times, Lubridate.

Unit IV
Getting Data-Built-in Datasets, Reading Text Files, Reading Binary Files, Web Data, Accessing Databases; *Cleaning and Transforming*- Cleaning Strings, Manipulating Data Frames, Sorting, Functional Programming; *Exploring and Visualizing*- Summary Statistics, Three Plotting Systems, Scatterplots, Line Plots, Histograms, Box Plots, Bar Charts, Other Plotting Packages and Systems

TEXT BOOK:
1. Richard cotton "A step-by-step function guide to data analysis: Learning R" First edition, O'REILLY, 2013

REFERENCES
1. Michael J. Crawley "The R Book" Second Edition A John Wiley & Sons, Ltd., Publication, 2013.
2. Garrett Grolemund "Hands-On Programming with R" First Edition, O'Reilly Media, 2014
3. Roger D. Peng "R Programming for Data Science" Leanpub, 2014-15.

MSCCS222	PROGRAMMING WITH R LAB	DARL
WORK LOAD: 0 4	INTERNAL MARKS: 00	EXTERNAL MARKS: 50

- The concepts covered in the corresponding theory paper are to be implemented.

MSCCS223	MAJOR PROJECT	MP
WORK LOAD: 0 0	INTERNAL MARKS: 75	EXTERNAL MARKS: 175

The Project work constitutes a major component in most professional programmes. It needs to be carried out with due care, and should be executed with seriousness by the students. The project work is not only a partial fulfillment of the MSC requirements, but also provide a mechanism to demonstrate ASK (Attitude, Skills, and Knowledge) with specialization. The project work should compulsorily include the software development. Physical installations/configuring of LAN/WAN or theoretical projects or study of the systems, which doesn't involve s/w development, *ARE STRICTLY NOT ALLOWED.*

The students are expected to work on a real-life project preferably in some industry/ R&D Laboratories / Educational Institution / Software Company. Students are encouraged to work in their interested area. The student can formulate a project problem with the help of his / her Guide of the concerned college. APPROVAL OF THE PROJECT PROPOSAL IS MANDATORY by his/her Guide. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project. Project problem domain selected and the specifications should be genuine.

MSCCS224	COMPREHENSIVE VIVA	CV
WORK LOAD: 0 0	INTERNAL MARKS: 00	EXTERNAL MARKS: 50

- **Objective**

  Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.

- **Examination**
  Every student will be required to undergo comprehensive Viva-voce at the end of fourth semester of M.Sc.CS. A panel of external and internal examiners conducts the comprehensive viva-voice examination. The examiners award the marks out of a maximum of 50 marks.

- **Contents**
  The viva-voce shall normally cover the subjects taught in all the semester of M.Sc. Computer Science programme.

MSCCS225	SEMINAR		S
WORK LOAD: 0 2	**INTERNAL MARKS: 25**	**EXTERNAL MARKS: 00**	

- This course is meant to give students practice; speaking in front of an audience and to explore topics of their own choosing in detail.
- Students will research topics and organize presentations for faculty and other students. The topics may be any aspect of the Computer science and must be approved by the instructor in advance.
- To help students improve as speakers, each student will receive feedback from the fellow students and the instructor.

Expectations:
- Attendance at each seminar is mandatory for all students enrolled.
- In addition, students are expected to attend all other seminars in the department, such as invited guest speakers. It is expected that students will actively participate by asking questions of the speaker.
- The effort by students to meet these expectations will be considered in the determination of your final grade.