



**PSGR KRISHNAMMAL COLLEGE FOR WOMEN**

**College with Potential for Excellence**

(An Autonomous Institution, Affiliated to Bharathiar University)  
(Reaccredited with 'A' Grade by NAAC, An ISO 9001:2008 Certified Institution)  
Peelamedu, Coimbatore-641004



**DEPARTMENT OF COMPUTER SCIENCE (PG)**

**CHOICE BASED CREDIT SYSTEM**

**MASTER OF INFORMATION TECHNOLOGY (M.Sc IT)**

**2015-2017**

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**M.Sc Information Technology**  
**Syllabus and Scheme of Examination**  
**2015 - 2017**

Semester	Part	Subject Code	Title of paper	Instruction hours/week	Contact hours	Duration of Examination	Examination			Credits
							Marks			
I	III	RDA1401	Paper 1: Design and Analysis of Algorithms	4	56	3	40	60	100	4
I	III	MIN1402	Paper 2: Computer Networks and Communication	4	56	3	40	60	100	4
I	III	ROO1403	Paper 3: Object Oriented Software Engineering	4	56	3	40	60	100	4
I	III	RPH1404	Paper 4: PHP/MYSQL	4	56	3	40	60	100	4
I	III	RAD1505	Paper 5:Advanced Database Management Systems	4	56	3	40	60	100	4
I	III	MIN14P1	Lab1: ADBMS Lab	5	75	3	40	60	100	3
I	III	MIN14P2	Lab2: PHP / MYSQL Lab	5	75	3	40	60	100	3
II	III	RNF1406	Paper 6: .Net Framework	4	56	3	40	60	100	4
II	III	RXM1407	Paper7:XML and Web services	4	56	3	40	60	100	4
II	III	MIN1508	Paper8: Information Security	4	56	3	40	60	100	4
II	III		Elective – I	4	56	3	40	60	100	4
II	III	MIN14P3	Lab3: .Net Lab	5	75	3	40	60	100	3
II	III	MIN14P4	Lab4: XML and Web service Lab	5	75	3	40	60	100	3
II	IV	MTH14A5	Interdisciplinary course: Statistical and Optimization Techniques	4	60	3	-	100	100	4
II		PGINST	Summer Internship							Grade
III	III	MIN1409	Paper 9:Mobile Computing	4	56	3	40	60	100	4
III	III	MIN1410	Paper 10:Software Testing	4	56	3	40	60	100	4
III	III	RBD1511	Paper 11 : Big Data Analytics	4	56	3	40	60	100	4
III	III		Elective – II	4	56	3	40	60	100	4
III	III	RRM11S1	Special Course : Research Methodology	4	60	3	-	100	100	4
III	III	MIN14P5	Lab 5: Software Testing Lab	5	75	3	40	60	100	3
III	III	MIN14P6	Lab 6: Mobile Computing Lab	5	75	3	40	60	100	3

III	IV	MIN15CE	Comprehensive Exam– Online	-		3	-	-	100	Grade
IV	III	MIN13PROJ	Project Work and Viva-Voce	12		-	20	80	100	12
IV	III	RSP1212	Advanced Learner Course 1 – Software Project Management	-	-	3	-	100	100	5*
IV	III	RER1213	Advanced Learner Course 2 – Enterprise Resource Planning	-	-	3	-	100	100	5*
			Total						2300	90

\*Credits applicable to candidates who take up Advanced level course examination

**List of Electives**

<b>S. No</b>	<b>Course Code</b>	<b>Course Title</b>
1	RI14E01	Internet Protocols
2	RCC14E02	Cloud Computing
3	RA14E03	Artificial Intelligence and Expert Systems
4	RS15E04	Soft Computing
5	RSM15E05	Software Metrics
6	RW15E06	Software Architecture
7	RD15E07	Digital Image Processing
8	RR14E08	Information Retrieval
9	RV14E09	Virtual Reality
10	RG14E10	Grid Computing

**QUESTION PAPER PATTERN**  
(From the academic year 2014-15)  
**(EXCEPT IDC AND SPECIAL COURSE)**

**Maximum: 100 marks**

**Section – A (Answer not to exceed one page)**

**Evaluation of Knowledge**

- Definition
- Explanation ( 5 x 6 = 30 Marks)

**Section – B (Answer not to exceed four pages)**

**Evaluation of Understanding**

- Recollection
- Description and
- Illustrations ( 4 x 12 = 48 Marks)

**Section – C (Compulsory)**

**Essay type of questions from different units**

**(Answer not to exceed four pages)**

**Evaluation of Analytical and Synthesis/application skill**

- Originality (3 marks)
- For moderate answer (5 marks)
- For superficial presentation (3 marks) ( 2 x 11 = 22 Marks)

**Semester** : I  
**Course Title** : Design and Analysis of Algorithms  
**Course Code** : RDA1401  
**Credits** : 4

**Course Objective**

**Lecture Hours: 56**

- Describe and implement a variety of advanced data structures.
- Demonstrate Knowledge of different methods for representing a graph.
- Analyze the asymptotic performance of algorithms.
- Apply important algorithmic design paradigms and methods of analysis.

**Course Coverage**

**UNIT I**

**(11 Hours)**

**Introduction:** Algorithms – Analysis of algorithms – Best case and worst case complexities, Analysis of some algorithms using simple data structures, amortized time complexity. **Binary search trees:** Searching – Insertion and deletion of elements – Analysis.

**UNIT II**

**(12 Hours)**

**AVL trees:** Definition – Height – searching – insertion and deletion of elements, AVL rotations – Analysis. **Red black trees:** Definition – searching – insertion and deletion of elements – algorithms and their time complexities. **Splay trees:** Definition – Steps in Splaying – Analysis.

**UNIT III**

**(11 Hours)**

**Multway search trees:** Indexed Sequential Access – m-way search trees – B-Tree – searching, insertion and deletion -  $B^+$  trees - Tries. **Graphs:** Definition – representations, Adjacency matrix, packed adjacency list and linked adjacency list, – network representation – Graph search methods, Breadth first Search and Depth first Search.

**UNIT IV**

**(11 Hours)**

**Divide and conquer:** The General Method – Examples – Finding the Maximum and Minimum - Merge sort - Quick sort - Binary Search. **Greedy method:** The General Method – Optimal Storage on Tapes – Knapsack Problem – Job Sequencing with Deadlines – Optimal Merge Patterns - Minimum cost spanning Trees – Single Source Shortest Path.

**UNIT V**

**(11 Hours)**

**Dynamic programming:** The General Method – Multistage Graphs - All pairs shortest path problem – Traveling sales Person problem. **Back tracking:** The General Method – The Eight Queen Problem – Sum of Subset Problem – Graph Coloring – Hamiltonian Cycles.

**Text Book:**

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran	Fundamentals of Computer Algorithms	Universities Press(India) Private Limited, Hyderabad,2/e	2008
2	Robert L Kruse	Data Structures & Program Design	Prentice Hall, New Delhi	2008

**Reference Books:**

<b>S.No</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of publication</b>
1	S. Sridhar	Design and Analysis of Algorithms	Oxford University Press, India	2014
2	Himanshu B. Dave	Design & Analysis of Algorithms	Pearson Education; 2 <sup>nd</sup> edition	2013
3	Thomas H. Cormen et al.,	Introduction to Algorithms	MIT Publishers, 3 <sup>rd</sup> Edition	2010

**Semester** : I  
**Course Title** : Computer Networks and Communication  
**Course Code** : MIN1402  
**Credits** :4

**Course Objective**

**Lecture Hours: 56**

To understand the principles in the design of data communications and Networking.

On successful completion of the course the students should have

- General overview of Data communications and System Operations
- Understand the concept of Digital, Analog Transmission and Switching Networks
- Gain knowledge of Telephone and Cable ,Cellular ,Satellite and Optical Networks

**Course Coverage**

**UNIT I**

**(11 Hours)**

**Introduction:** Data communications – Networks – The Internet – Protocol And Standards – Data And Signals: Analog and Digital – Periodic Analog signals – Digital signals – Transmission Impairment – Data rate limits – Performance.

**UNIT II**

**(11 Hours)**

**Digital Transmission:** Digital–To–Digital Conversion – Analog-To-Digital Conversion –Transmission Modes - Switching

**UNIT III**

**(11 Hours)**

**Analog Transmission:** Digital-To-Analog Conversion – Analog-To-Analog Conversion–Using Telephone and Cable Networks for Data Transmission.

**UNIT IV**

**(12 Hours)**

**Multiple Access**– Channelization. Wireless LANs – Connecting LANs , Backbone Networks, and Virtual LANs – Wireless WANs: Cellular Telephone and Satellite Networks.

**UNIT V**

**(11 Hours)**

**SONET/SDH:** Architecture – SONET Layers – Frames – STS Multiplexing – Networks – Types of VTs – Virtual circuit Networks: Frame Relay and ATM.

**Text Book**

S.No.	Authors	Title	Publishers	Year of Publication
1	Behrouz . A . Forouzan	Data Communications and Networking	McGraw- Hill, New Delhi, 4 <sup>th</sup> edition	2007



## Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	G. Keiser	Optical Fibre Communications	TMH, New Delhi, 4 <sup>th</sup> edition	2010
2	K. Pahlavan and P. Krishnamurthy	Principles of Wireless Networks	PHI, New Delhi	2003
3	T. Pratt, C. Bostian and J. Allnut	Satellite Communications	Wiley Indian Pvt. Ltd, 2 <sup>nd</sup> Edition	2003
4	Uyless D. Black	Data Communications and Distributed Networks	PHI, New Delhi, 3 <sup>rd</sup> Edition	2009

**Semester : I**  
**Course Title : Object Oriented Software Engineering**  
**Course Code : ROO1403**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

- Understand the methodology for building software systems
- Understand the methods and technologies that enable the students to specify, design and implement complex systems

**Course Coverage**

**UNIT I**

**(11 Hours)**

Introduction to Software engineering – Software engineering Failures – what is software engineering?-Software Engineering Concepts-Software Engineering Development Activities-Modeling with UML: An Overview of UML-Modeling Concepts –A Deeper View into UML.

**UNIT II**

**(11 Hours)**

**Project Organization and Communication:** Introduction- An Overview of Projects –Project Organization Concepts- Project Communication Concepts- Organizational Activities.

**Analysis:** Introduction- An Overview of Analysis-Analysis Concepts – Analysis Activities: From Use Cases to Objects-Managing Analysis

**UNIT III**

**(12 Hours)**

**System Design:** Decomposing the System-Introduction-An Overview of System Design-System Design Concepts-System Design Activities: From Objects to Subsystems. System Design: Addressing Design Goals-Managing system Design.

**Object Design:** Reusing Pattern Solutions – Introduction- An Overview of Object Design-Reuse Concepts-Reuse Activities.

**Object Design:** Specifying Interfaces – Interface Specifying Concepts-Interface Specification Activities – Managing Object Design

**UNIT IV**

**(11 Hours)**

**Rationale Management:** Introduction-An Overview of Rationale –Rationale Concepts-Rationale Activities: From Issues to Decisions-Managing Rationale.

**Testing:** Introduction- An Overview of Testing- Testing Concepts- Testing Activities- Managing Testing.

**UNIT V**

**(11 Hours)**

**Configuration Management:** An Overview of Configuration Management-Configuration Management Concepts- Configuration Management Activities- Managing Configuration Management.

**Project Management:** Introduction - An Overview of Project Management - Project Management Concepts- Project Management Activities

**Text Book**

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Bernd Bruegge and Allen H. Dutoit	Object-Oriented Software Engineering: Using UML Patterns and Java	Pearson Education, New Delhi, 3 <sup>rd</sup> edition	2013

**Reference Books:**

<b>S.No</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of Publication</b>
1	David C. Kung	Object-Oriented Software Engineering: An Agile Unified Methodology	McGraw-Hill Higher Education	2013
2	Singh Yogesh	Object - Oriented Software Engineering	PHI	2012
3	Timothy C.Lethbridge and Robert Laganieri	Object-Oriented Software Engineering: Practical Software development using UML and Java	Tata McGraw-Hill Edition, New Delhi	2011

**Semester : I**  
**Course Title : PHP/MYSQL**  
**Course Code : RPH1404**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

- Understand the programming constructs of PHP Scripting Language
- Execute PHP and interact with MySQL database.
- Construct simple and complex queries using MySQL and PHP
- Implement the basics of MySQL database tables by adding, changing and deleting data
- Develop web pages using PHP and HTML forms

**Course Coverage**

**UNIT I**

**(11 Hours)**

**Introduction:** Server - Side Web Scripting - Syntax and Variables - Control and Functions. **Passing Information between Pages:** GET Arguments - POST Arguments - Formatting Form Variables - PHP Super global Arrays

**UNIT II**

**(12 Hours)**

**String:** Strings in PHP - String Functions-**Arrays and Array Functions:** Creating Arrays - Retrieving Values - Multidimensional Arrays - Inspecting Arrays – Deleting from Arrays - Iteration. **Advanced Array Functions:** Transformation of Arrays. **Number Handling:** Numerical Types - Mathematical Operators - Simple Mathematical Functions - Randomness

**UNIT III**

**(11 Hours)**

**Regular Expressions:** Tokenizing and parsing Functions - Regular Expressions - Perl - Compatible Regular Expressions - Advanced String Functions. **Working with the File system:** PHP File Permissions - File Reading and Writing Functions - File system and Directory Functions - Network Functions - Date and time Functions - Calendar Conversion Functions. **Working with Sessions and Cookies:** Sessions work in PHP - Session Functions - Configuration Issues - Cookies - Sending HTTP Headers.

**UNIT IV**

**(11 Hours)**

**Structured Query Language (SQL):** Relational Database and SQL-SQL standards-The Workhorses of SQL-Database Design-Privileges and Security. **PHP and MYSQL:** Connecting to MySQL - Making MySQL Queries - Fetching Data Sets - Multiple Connections - Error Checking - Creating MySQL Databases with PHP - MySQL Functions.

**UNIT V**

**(11 Hours)**

**Performing Database Queries:** HTML Tables and Database Tables - Complex mapping - Creating the sample Tables. **Integrating Web Forms and Databases:** HTML Forms - Basic Form Submission to a Database - Self Submission - Editing Data with an HTML Form.

### Text Book

S.No.	Authors	Title	Publishers	Year of Publication
1	Steve Suehring, Tim Converse and Joyce Park	PHP6 and MySQL Bible	Wiley-India. New Delhi	2012

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Mike McGrath	PHP and MySQL	McGraw Hill Education (India) Private Limited	2012
2	Beighley	Head First PHP & MySQL	O'Reilly	2011
3	W. Jason Gilmore	Beginning PHP and MYSQL: From Novice to Professional	Dreamtech Press, 4 <sup>th</sup> Edition	2010

**Semester** : I  
**Course Title** : **Advanced Database Management Systems**  
**Course Code** : **RAD1505**  
**Credits** : **4** **Lecture Hours: 56**

### **Course Objective**

After completing this course students will be able to

- Understand query processing, transaction management, concurrency control etc. in distributed environment
- Understand Indexing and Managing text in DBMS
- Develop an application using an advanced database system

### **Course Coverage**

**UNIT I** (11 Hrs)  
**Parallel Database:** Introduction - Architecture for Parallel Databases - Parallel Query Evaluation - Parallelizing Individual Operations - Parallel Query Optimization.

**UNIT II** (11 Hrs)  
**Distributed Database** - Distributed DBMS Architectures - Storing Data in a Distributed DBMS - Distributed Catalog Management - Distributed Query Processing - Updating Distributed Data - Distributed Transaction - Distributed Concurrency Control - Distributed Recovery.

**UNIT III** (11 Hrs)  
**Object Database System** : Motivating Example - Structured Data Types - Operations on Structured Data - Encapsulation and ADTs - Inheritance - Object, OIDs, and Reference Types - Database Design for ORDBMS - ORDBMS Implementation Challenges - OODBMS - Comparing RDBMS, OODBMS, and ORDBMS.

**UNIT IV** (12 Hrs)  
**Data Warehousing And Decision Support:** Introduction to Decision Support - OLAP: Multidimensional Data Model - Multidimensional Aggregation Queries - Implementation Techniques for OLAP - Data Warehousing - Data Warehouse Architecture - Data Warehouse Implementation - Views And Decision Support - View Materialization - Maintain Materialized Views - **Data Mining** : Introduction to Data Mining – Counting Co-occurrences – Mining for Rules - Clustering – Similarity Search over Sequences

**UNIT V** (11 Hrs)  
**Information retrieval** : Introduction – Indexing for Text Search - Web Search Engines – Managing Text in a DBMS- Data Model for XML – XQuery - Efficient Evaluation of XML Queries. **Advanced Databases:** Main Memory Database - Temporal Databases - Spatial Databases - Geographic Information Databases - Multimedia Databases - Heterogeneous Databases. **Emerging Database Technologies:** Introduction – Cloud Computing and Data Management – Mobile Databases – Dealing with Massive Datasets: Map Reduce and Hadoop.

### Text Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Raghu Ramakrishnan and Johannes Gehrke	Database Management System	3/e, Singapore: McGraw-Hill	2003
2	G.K.Gupta	Database Management systems	Tata McGraw Hill Private Limited.	2011

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Pranab Kumar Das Gupta, P. Radha Krishna	Database Management System Oracle SQL and PL/SQL	PHI Learning Private Limited, New Delhi	2013
2	Rini Chakrabarti, Shilbhadra Dasgupta	Advanced Database Management System	Wiley India, Private Ltd.,	2011
3	Abraham Silberschatz et.al.,	Database System Concepts	6/e, Singapore: McGraw-Hill.	2011

**Semester** : I  
**Course Title** : ADBMS Lab  
**Course Code** : MIN14P1  
**Credits** : 3

**Course Objective** (75 Hrs)

To design and develop database systems for applications and to create solutions for real life tasks

**Course Coverage**

Exercises to solve real world problems by implementing various database systems like using RDBMS packages to tables(2) , triggers(1), cursors(2), connectivity with MS Access(2), Oracle(3) .

**Semester** : I  
**Course Title** : PHP / MYSQL Lab  
**Course Code** : MIN14P2  
**Credits** : 3

**Course Objective** (75 Hrs)

Implement and execute open source software like, PHP, Perl, Python, and MySQL

**Course Coverage**

Exercises to create web pages using PHP and MySQL (4)  
Design and develop a small application (6)



**Semester : II**  
**Course Title : .Net Framework**  
**Course Code : RNF1406**  
**Credits :4**

**Course Objective**

- Understand the concepts of .NET Programming and C# Technology.
- Design and develop web based enterprise applications.

**Course Coverage**

**UNIT I (11 Hours)**  
**.Net Framework:** Basics - .Net framework Technology - .Net Architecture - .Net Language - .Net framework Class library - MSIL - JIT Compiler - Working with assemblies.

**UNIT II (11 Hours)**  
**VB.Net:** Procedures - Modules - Arrays - Structures – Collections - Dialog Boxes – Dictionary Object.

**UNIT III (12 Hours)**  
**C#:** Forms - Classes: Access Modifiers - Abstract Class - Concrete Class. Methods: Constructor - Destructor -Overriding - Overloading - Operator Overloading. Arrays – Collections.

**UNIT IV (11 Hours)**  
**C#:** Enumerators and Iterators. Exceptions - Serializing objects - Deep serialization - XML based serialization - Multithreading – Interfaces and Structures - Delegates and Events – Indexers and Properties.

**UNIT V (11 Hours)**  
**Working with ADO.Net (VB.Net and C#):** Introduction to ADO.Net - Features of ADO.Net - Object model - Connection - Data Binding.

**Text Books**

S.No.	Authors	Title	Publishers	Year of Publication
1	Bill Evjen, Jason Beres	Visual Basic .Net Bible	Hungry Minds, New York	2009
2	Herbert Schildt	Complete Reference C#	Tata McGraw-Hill, New Delhi	2009
3	Joe Duffy	Professional .Net Framework 2.0	Wiley, New Delhi	2007

## Reference Books

<b>S.No</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of Publication</b>
1	Jon Skeet	C# in Depth	Dreamtech Press, 3 <sup>rd</sup> Edition	2014
2	Steven Holzner	Visual Basic.Net Programming	Dreamtech Publication	2012
3	Tim Patrick	Microsoft ADO.NET 4 Step by Step	Microsoft Press US	2011

**Semester : II**  
**Course Title : XMLand Web Services**  
**Course Code : RXM1407**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

- To understand the programming constructs of XML and to learn about web services building blocks like SOAP, WSDL, UDDI
- To apply XML in e-business

**Course Coverage**

**UNIT I (11 Hours)**

**XML Technology Family:** XML of Benefits – Advantages of XML over HTML – XML of Benefits – Advantages of XML over HTML – Advantages of XML over Databases and flat files –Drawbacks of to XML- fundamentals of XML : XML Based standards – Structuring with schemas – Validating XML with the DTD – Creating XML schemas –The Xfiles: Xpath, Xpointer and X-Link -DOM Core-SAX Basic.

**UNIT II (12 Hours)**

**Architecting web services:** Business motivations for web services-Technical motivations for web services- Service Oriented Architecture (SOA)- Architecting web services:- Implementation view-Web services technology stack-Logical view - Composition of web services – Deployment view- From application server to peer to peer - Process view-Life in the runtime.

**UNIT III (11 Hours)**

**Web services building blocks :** Basic SOAP Syntax-sending SOAP message- SOAP Implementation –Basic WSDL Syntax-SOAP Binding –WSDL Implementation – Introduction to UDDI-UDDI Invocation Model.

**UNIT IV (11 Hours)**

**Implementing XML in e-business:** B2B – B2C applications – Different types of B2B interaction – Components of E -Business XML systems – ebXML – Rosetta Net – Wireless Application with WAP and WML-Professional Services.

**UNIT V (11 Hours)**

**XML content management and security:** The RDF Family of specifications- The RDF Data Model- RDF Schema –Architecture of the Semantic Web.

### Text Book

S.No.	Authors	Title	Publishers	Year of Publication
1	Ron Schmelzer and Travis Vandersypen	XML and Web Services unleashed	Pearson Education	2011

### Reference Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Joe Fawcett et. al,	Beginning XML	John Wiley & Sons Inc, 5 <sup>th</sup> Edition	2012
2	Michael schwartzbach, Anders moller	An introduction to XML and web Technologies	Pearson Education Limited ,United Kingdom	2010
3	N.P.Gopalan and J.Akilandeswari	Web Technology A Developer's Perspective	PHI learning Pvt.Lt, 4 <sup>th</sup> Edition	2011

**Semester** : II  
**Course Title** : Information Security  
**Course Code** : MIN1508  
**Credits** : 4

**Course Objective**

**Lecture Hours: 56**

- Understand the importance of information security, ethical hacking, policies standards and security practices, risk management, implementation and maintenance.
- Understand the managerial and technical aspects of information security.
- Understand the latest trends in information security

**Course Coverage**

**UNIT I (11 Hours)**  
**Introduction To Information Security:** Introduction - Security - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Security Components - Approaches to Information Security Implementation - The Systems Development Life Cycle - The Security Systems Development Life Cycle.

**UNIT II (11 Hours)**  
**The Need for Security:** Business Needs First - Threats - Attacks - Secure Software Development. **Risk management:** Overview - Risk Identification - Risk Assessment- Risk Control Strategies - Selecting a Risk Control Strategy - Quantitative Versus Qualitative Risk Control Practices

**UNIT III (12 Hours)**  
**Planning for Security:** Information Security Policy, Standards and Practices - The Information Security Blue print. **Security Technology:** Firewalls and VPNS - Intrusion Detection, Access Control, and other Security Tools - Intrusion Detection and Prevention Systems - Honey Pots - Honey Nets, and Padded Cell Systems - Scanning and Analysis Tools - Access Control Devices - Cryptography - Physical Security.

**UNIT IV (11 Hours)**  
**Implementation of Information Security:** Information Security Project Management - Technical Topics of Implementation - Non Technical aspects of Implementation

**UNIT V (11 Hours)**  
**Information Security Maintenance:** Security Management Models - The Maintenance Model - Digital forensics.

**Text Book**

S.No.	Authors	Title	Publishers	Year of Publication
1	Michael E. Whitman and Herbert J. Mattord	Principles of Information Security	Cengage Learning, 5 <sup>th</sup> Edition	2014

## Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Charles A.Sennewald	Effective Security Management	Elsevier, 5 <sup>th</sup> Edition	2011
3	Dhiren R. Patel	Information Security: Theory and Practice	Prentice Hall of India Pvt. Ltd	2008
4	S.M. Bhaskar, S.I. Ahson	Information Security: A Practical Approach	Alpha Science	2008

**Semester : II**  
**Course Title : .Net Lab**  
**Course Code : MIN14P3**  
**Credits : 3**

**Course Objective (75 Hrs)**

Design and develop web based enterprise applications using .NET Programming and C# Technology

**Course Coverage**

Exercises to design and develop packages using VB.NET(8 programs), C# Design (8 programs).

**Semester : II**  
**Course Title : XML and Web Services Lab**  
**Course Code : MIN14P4**  
**Credits : 3**

**Course Objective (75Hrs)**

Understand Web Services fundamentals, XML, WSDL, Namespaces, and SOAP Messages including how to send and receive messages over different transports using a variety of message exchange patterns (MEPs).

**Course Coverage**

Exercises to develop applications using WSDL(1), Namespaces(6) and SOAP(2)

**Semester** : II  
**Course Title** : STATISTICAL AND OPTIMIZATION TECHNIQUES  
**Course Code** : MTH14A5  
**Credits** : 4

**Course Objective**

**Lecture Hours: 60**

Understand the need for statistical and optimization techniques in solving real world problems. Analyze the models and their appropriate to use in practical situation

**UNIT I (12 Hours)**

Theoretical Distributions: Binomial Distribution - Poisson distribution- Normal Distribution. Testing of hypothesis: Test of significance for large samples and small samples.

**UNIT II (12 Hours)**

Chi - Square Distributions and Goodness of fit-F- test. Analysis of Variance (ANOVA): One-way Classification – Two-way Classification.

**UNIT III (12 Hours)**

Linear Programming: Introduction to Linear Programming – LPP Formulation - Graphical Method - Simplex Method - Big M Method - Two Phase Simplex Method- Dual Simplex Method.

**UNIT IV (12 Hours)**

Dynamic Programming: Recursive Nature of Computations in DP- Forward and Backward Recursion-Selected DP applications: Cargo- Loading Model- Workforce Size Model

**UNIT V (12 Hours)**

Simulation Modelling: Monte Carlo Simulation- Types of Simulation- Elements of Discrete Event Simulation- Generation of Random Numbers.

**Text Books**

S.No.	Authors	Title	Publishers	Year of Publication
1	S.P.Gupta	Statistical methods	Sultan Chand & Sons Publications	2005
2	Hamdy A Taha	Operations Research: An Introduction	Prentice Hall of India, New Delhi, 7 <sup>th</sup> Edition	2006



## Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	S.C.Gupta, V.K.Kapoor	Fundamental of Mathematical Statistics	Sultan Chand & Sons Publications	
2	Kanti swarup and Man Mohan	Operations research	Sultan Chand & Sons Publications, New Delhi	
3	S.D.Sharma.	Operations research		
4	Pillai, R.S.N. and Bagavathi	Statistics: Theory and Practice	S. Chand Company Ltd.,New Delhi	2012

**Semester : III**  
**Course Title : Mobile Computing**  
**Course Code : MIN1409**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

To provide basics for various techniques in mobile applications and mobile content services

**Course Coverage**

**UNIT I (11 Hours)**

**Introduction:** –Cellular networks - 802.11 wireless LAN – wireless mesh network – WiMax –WiFi -wireless sensor network – RFID – WPAN – issues and challenges of mobile computing.

**UNIT II (12 Hours)**

**Wireless Technologies:** The frequency spectrum – wireless communication – spread spectrum – GSM –GPRS – CDMA-2G-3G cellular systems. 802.11 Wireless LAN Architecture and Protocols – Bluetooth – Ultra wideband – Satellite Communication – Wireless sensor networks.

**UNIT III (11 Hours)**

**Mobile devices and OS:** Mobile hardware – software – Mobile OS – WAP - J2ME.

**UNIT IV (11 Hours)**

**Mobile networking:** Mobile IP – Wireless TCP – heterogeneous wireless networks – MANET – Mobile security and privacy.

**UNIT V (11 Hours)**

**Mobile Applications:** Location based services – Messaging – multimedia streaming – MCommerce – Mobile web 2.0.

**Text Books**

S.No.	Authors	Title	Publishers	Year of Publication
1	Asoke K Talukder, Roopa R Yavagal	Mobile Computing – Technology Applications and Service Creation	Tata McGraw Hill	2010
2	Martin Sauter	Beyond 3G - Bringing Networks, Terminals and the Web LTE, WiMAX, IMS, 4G Devices and the Mobile Web 2.0	Wiley Publishing Inc	2009
3	Pei Zheng, Lionel M. Ni	Smart Phone & Next-Generation Mobile Computing	Morgan Kaufmann Publishers	2009

**Semester :III**  
**Course Title : Software Testing**  
**Course Code: MIN1410**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

- Understand the testing concepts that are managerial, technical and process oriented
- Demonstrate the role of manual and automated testing in development of high quality software
- Apply and test the sample codes

**Course Coverage**

**(11 Hours)**

**UNIT I Introduction:** Software Testing Fundamentals - Testing Principles - Test Organization. Process Models: V Model - Modified V Model - Levels of Testing.

**UNIT II**

**(12 Hours)**

**Testing:** White box testing- Static Testing - Structural Testing. Black Box Testing: Requirement Based Testing - Positive and Negative Testing - Boundary Value Analysis - Decision Tables - ECP - State Based Testing - Compatibility Testing - Cause- Effect Graphing. Integration Testing - Regression Testing - Acceptance Testing.

**UNIT III**

**(11 Hours)**

**Object Oriented Testing:** Testing OOA and OOD Models - Strategies - Test Case Design for OO Software - Test Methods at Class Level - Interclass Test Case Design.

**UNIT IV**

**(11 Hours)**

**Testing Web Application:** Testing Concepts for Web Apps - Content Testing – User Interface Testing - Component Level Testing - Navigation Testing - Configuration Testing - Security Testing - Performance Testing.

**UNIT V**

**(11 Hours)**

**Testing Process:** Test Planning - Test Management - Test Case Design - Test Procedure Specification - Test Case Execution and Analysis - Test Reports - Automation Tools- TMM.

**Text Book**

S.No.	Authors	Title	Publishers	Year of Publication
1	Srinivasan Desikan,Gopaldaswamy, Ramesh	Software Testing:Principles and Practices	Pearson Education, Dorling Kindersley(India) Pvt Ltd	2011

## Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Srinivasan Desikan,Gopalaswamy, Ramesh	Software Testing:Principles and Practices	Pearson Education, Dorling Kindersley(India) Pvt Ltd	2011
2	William E.Lewis	Software Testing and Continuous Quality Improvement	Auerbach Publications, 3 <sup>rd</sup> Edition	2009

**Semester** : **III**  
**Course Title** : **Big Data Analytics**  
(Common to M.Sc(CS) / M.Sc(IT))  
**Course Code** : **RBD1511**  
**Credits** : **4**

**Course Objective**

**Lecture Hours:56**

- Deploy a structured lifecycle approach to data science and big data analytics projects
- Select visualization techniques and tools to analyze big data and create statistical models
- Use tools such as Map Reduce/ Hadoop, and in-database analytics.

**UNIT I (11 Hrs)**

**Introduction :** What is Big Data? Characteristics of Big Data- Structure of Big Data-Risk of Big Data- Exploring Big Data-Big Data Business model- Big Data Technologies-Web Data Overview – Web Data in Action.

**UNIT II (11 Hrs)**

**Big Data Tools and Techniques:** Understanding Big data Storage, HDFS, Map Reduce and Yarn, HBase, HIVE, Pig, Mahout. **Big Data Management:** Operational Databases-Map reduce fundamentals-Appliances and Big Data Warehouses.

**UNIT III (11 Hrs)**

**Developing Big Data Applications:** Parallelism- Simple scalability-Application Development Framework-Map Reduce Programming model and Examples- Big Data Development frameworks- The execution model. Big Data processing with Map Reduce.

**UNIT IV (12 Hrs)**

**NoSQL Data management for Big Data:** what is NoSQL-Schema less models-key-value stores-Document stores-Tabular stores-object data stores-Graph databases **Querying NoSQL stores:** Similarities between SQL and MongoDB query features-Accessing data from column oriented databases.

**UNIT V (11 Hrs)**

**Big Data Analytic Methods Hadoop:** History of Hadoop-Comparison with other systems-Apache Hadoop and Hadoop Ecosystem-Analyzing the data with Hadoop-Hadoop Streaming-Hadoop Distributed File System.

### Text books

S.No	Author	Title of book	Publisher	Year of Publication
1	Subu Sangameswar	Big Data – An Introduction (Unit-1)	Kindle	2013.
2	David Loshin	Big Data Analytics: From Strategic planning to enterprise integration with tools, techniques, NoSQL and graph (unit-2,3,4)	MK publications	2013
3	Bill franks	Taming the Big Data Tidal wave.(Unit-1)	John Wiley & Sons	2012
4	Tom White	Hadoop : The Definitive Guide.(Unit 5)	O'Reilly Media	3 rd Edition, 2012
5	Shashank Tiwari	Professional NoSQL(unit 4)	John Wiley & Sons	2011

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Min Chen,et.al	Big Data : Related Technologies, Challenges and Future Prospects	Springer.	2014
2	MaqsoodAlam, et.al,	Oracle NoSQL Database	McGraw-Hill Education.	2014
3	Judith Hurwitz,et.al	Big Data for Dummies	John Wiley & Sons	2013.

**Semester** : III  
**Course Title** : Special Paper: Research Methodology  
**Course Code** : RRM11S1  
**Credits** : 4

**Course Objective**

**Lecture Hours: 60**

Understand the concepts of research and its directions in various areas of computer science

**Course Coverage**

**UNIT I** (12 Hours)  
Research- Definition- importance and meaning of research-characteristics of research –type of research - steps in research. Research process – an overview. Identification of research area - selection and formulation of research problem – formulation of objectives.

**UNIT II** (12 Hours)  
Review of Literature – Course work - Literature Survey –Collecting research papers from journals – Web browsing – Efficient searching – Online resources - Reading a research paper- Scopus tool. Develop a theoretical framework – improve your methodology.

**UNIT III** (12 Hours)  
Preparing the research design- Data collection and preparation – Experimental study –Result analysis and Discussions. Writing a research paper – Publishing the results - IEEE format – Latex tool.

**UNIT IV** (12 Hours)  
Significance of Report Writing – Different Steps in writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a research Report – Precautions for Writing Research Reports. Ethical issues in research - Patent registration procedure – Funding agencies - Writing research proposals – Effective presenting methods.

**UNIT V** (12 Hours)  
Various research areas in Computer science - Image processing – Networks and security- Data mining and machine learning – wireless and sensor systems - Audio, speech, language and signal processing.

### Text Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Kothari, C.R	Research Methodology – Methods and Techniques	Wiley Eastern Limited	2 <sup>nd</sup> Edition, 2013
2	-----	Online resources and research articles	-----	-----

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	R. Panneerselvam	Research Methodology	Prentice Hall India Learning Private Limited 4 <sup>th</sup> Edition	2014
2	Ranjit Kumar	Research Methodology – A step-by-step guide for beginners	Pearson Education, 3 <sup>rd</sup> Edition	2011
3	Deepak Chawla and Neena Sondh	Research Methodology : Concepts and Cases	Vikas Publishing House Pvt. Ltd	2011



**Semester : III**  
**Course title : Software Testing lab**  
**Course Code: MIN14P5**  
**Credits : 3**

**Course Objective**

**Lecture Hours: 75**

Understand the working of various automated testing tools and apply these tools for small applications.

**Course Coverage**

Exercises to design and develop applications and to test them using appropriate automated testing tools for various phases.

**Semester : III**  
**Course title : Mobile Computing Lab**  
**Course Code: MIN14P6**  
**Credits : 3**

**Course Objective**

**Lecture Hours: 75**

To provide exercises for developing mobile applications

**Course Coverage**

Study of WML/J2ME simulators [1] , Design of simple calculator [1] , Design of calendar for any given month and year [1] , Design a timer to system time [1] , Design of simple game [1] , Animate an image [1] , Design a phone book containing the name, phone no, address, e-mail. [1].

**Semester : IV**  
**Course Title : ALC: Software Project Management**  
**Course Code: RSP1212**  
**Credits : 5**

### **Course Objective**

- Recognize the importance of planning and controlling the software engineering activities to meet the project goals for cost, schedule and quality
- Identify different quality standards adopted in software life cycle
- Understand the tools and techniques used in software project management
- Analyze the issues related to software projects

### **Course Coverage**

#### **UNIT I**

**Introduction:** Software Project – Categories - Problems with Software Projects. An Overview of Project Planning – Programme Management and Project Evaluation. Project Analysis and Technical Planning: Choosing Technologies – Technical Plan contents – Process models.

#### **UNIT II**

**Software Effort Estimation:** Problems with Software estimation - Basis for software estimation – Effort estimation techniques. Activity Planning: Objectives – Project Schedules - Sequencing and scheduling activities - Network Planning Models.

#### **UNIT III**

**Risk Management:** Risk management cycle – Risk identification – Risk assessment - Risk planning – Risk management. Resource Allocation - Monitoring and Control - Managing People and Organizing Teams.

#### **UNIT IV**

**Software Configuration Management:** Software Configuration Identification – Software Configuration control - Software Configuration Auditing - Software Configuration status Accounting – Dynamics of SCM – Tools of SCM - SCM Standards.

#### **UNIT V**

**Quality Management:** Quality concepts – Software Quality Assurance – Software Reviews – Formal Technical Reviews – Statistical Software Quality Assurance – Software Reliability – ISO and CMM & CMM/I Standards.

### Text Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Mike Cotterell, Bob Hughes	Software Project Management	Tata McGraw-Hill, New Delhi, 5 <sup>th</sup> Edition	2012
2	James F. Peters, Witold Pedrycz	Software Engineering – An Engineering Approach	John Wiley, 3 <sup>rd</sup> Edition	2010

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Gord Tallas	Software Project Management: Creating and Managing a Successful Plan	C Outskirts Press	2014
2	Rishabh Anand	Software Project Management	Kataria & Sons	2013
3	S.A. Kelkar	Software Project Management: A Concise Study	Prentice Hall India, 3 <sup>rd</sup> Edition	2013

**Semester** : IV  
**Course Title** : ALC: Enterprise Resource Planning  
**Course Code** : RER1213  
**Credits** : 5

**Course Objective**

- To know the basics of ERP
- To understand the key implementation issues of ERP
- To know the business modules of ERP
- To be aware of some popular products in the area of ERP
- To appreciate the current and future trends in ERP

**Course Coverage**

**UNIT I**

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM

**UNIT II**

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring

**UNIT III**

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

**UNIT IV**

ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD, SSA

**UNIT V**

ERP Case Studies: Post implementation review of ERP Packages in Manufacturing, Services and Textiles - Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions

**Text Book**

S.No.	Authors	Title	Publishers	Year of Publication
1	Alexis Leon	ERP Demystified	Tata McGraw-Hill, New Delhi	2014

## Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
<b>1</b>	K. Ganesh et al.,	Enterprise Resource Planning: Fundamentals of Design and Implementation	Springer	2014
<b>2</b>	D P Goyal	Enterprise Resource Planning A Managerial Perspective	McGraw Hill Education (India) Private Limited	2011
<b>3</b>	Rajesh Ray	Enterprise Resource Planning	McGraw Hill Education (India) Private Limited	2010

## **ELECTIVES**

**Semester : II**  
**Course Title : Internet Protocols**  
**Course Code : RI14E01**  
**Credits : 4**

### **Course Objective**

**Lecture Hours: 56**

Understand the protocols in the TCP/IP suite, voice video over IP(RTP), IP coverage, a discussion of Routing Architectures, Internet Application Services such as domain name system(DNS), Electronic Mail(SMTP,MIME), File Transfer and Access (FTP,TFTP, NFS), Remote Login(TELNET, rlogin) and Network Management (SNMP), a description of private network interconnections such as NAT and VPN.

### **Course Coverage**

#### **UNIT I (12 Hours)**

Introduction and Overview: The TCP/IP Internet - Internet Services - History and Scope Of The Internet - Two Approaches to Network Communication - Wide Area and LAN - Ethernet Technology - Switched Ethernet - Asynchronous Transfer Mode - Internetworking Concept and Architectural Model: Application-Level Interconnection - Network -Level Interconnection - Internet Architecture - Interconnection through IP Routers.

#### **UNIT II (11 Hours)**

Classful Internet addresses - Mapping Internet Addresses of Physical Addresses (ARP) - User Datagram Protocol (UDP).

**(11 Hours)**

#### **UNIT III**

Internet Protocol: Connectionless Datagram Delivery (IPv4), Forwarding IP Datagram, Error And Control Messages (ICMP).

#### **UNIT IV (11 Hours)**

Routing Between Peers (BGP), Routing Within an Autonomous System (RIP, OSPF), Mobile IP, Private Network Interconnection (NAT, VPN).

#### **UNIT V (11 Hours)**

World Wide Web (HTTP), Voice and Video Over IP (RTP, RSVP, QOS), A Next Generation IP (IPv6).

**TextBook**

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Douglas E. Comer	Internetworking with TCP/IP Principles, Protocols and Architecture	Prentice Hall India, New Delhi, 5 <sup>th</sup> Edition	2006

**Reference Books**

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Torsten Laser	TCP/IP - The Internet Protocol Stack	Grin Verlag	2013
2	Subrata Goswami	Internet Protocols: Advances, Technologies and Applications	Springer	2012
3	Eiji Oki et al.,	Advanced Internet Protocols, Services, and Applications	Wiley-Blackwell	2012

**Semester : II**  
**Course title :Cloud computing**  
**Course Code : RC14E02**  
**Credits :4**

**Course Objective**

**Lecture Hours: 56**

- Understand the benefits, limitations and various services of cloud computing
- Identify cloud computing collaborations and applications.

**Course Coverage**

**UNIT I (11 Hours)**

**Introduction:** Benefits and Limitations-Cloud Architecture – Storage – Services – ServiceProviders  
- Types of Cloud Service Development – Services and Tools.

**UNIT II (12 Hours)**

**Cloud Computing for everyone** - Cloud Computing for Community – Collaborating on Schedules- Collaborating on Group Projects and Events - Cloud Computing for the Corporation

**UNIT III (11 Hours)**

**Using Cloud Services:** Collaborating on Calendars, Schedules and Task Management – Online Scheduling Applications – Online Planning and Task Management. Collaborating on Event Management

**UNIT IV (11 Hours)**

**Collaborating on Contact Management** - Collaborating on Project Management- Collaborating on Word Processing, Spreadsheet, Presentations, Databases- Sharing Files and Photographs

**UNIT V (11 Hours)**

**Collaborating via Web based Communication Tools**-Collaborating via Social Networks and Groupware - Collaborating via Blogs and Wikis – Local Clouds- Thin Clients – Virtualization – Migration – Best Practices



### Text Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Michael Miller	Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online	Pearson publication,	2011
2	Dr.kumar saurabh	cloud computing	Wiley India edition,	2011
3	Toby Velte, Anthony Velte, and Robert Elsenpeter	Cloud Computing-A Practical Approach	Tata McGraw Hill, USA,	2009

### Reference Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Rishabh Sharma	Cloud Computing: Fundamentals, Industry Approach and Trends	Wiley India edition,	2014
2	Paul Mehner	Cloud Computing with the windows Azure Platform	Microsoft Press US	2013
3	Judith Hurwitz et.al,	Cloud Computing for Dummies	John Wiley India Pvt.Ltd	2012

**Semester : II**  
**Course title : Artificial Intelligence and Expert Systems**  
**Course Code : RA14E03**  
**Credits :4**

**Course Objective**

**Lecture Hours: 56**

- Understand the concepts of knowledge representation and problem solving, learning methods of Artificial Intelligence and role of expert systems
- Analyze the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular engineering problems
- Apply and develop expert systems for small applications

**Course Coverage**

**UNIT I**

**(11 Hours)**

**Problems and Search:** The AI problems – The underlying Assumption – AI Technique - The level of the Model – Criteria for Success – Problems, Problem Space, and Search: Defining the problem as a state space search – Production systems – problem characteristics – Production system characteristics – Issues in the design of Search Programmes

**UNIT II**

**(11 Hours)**

**Heuristic Search Techniques:** Generate and Test – Hill Climbing – Best First Search – Problem Reduction – constraint Satisfaction – Means ends Analysis

**UNIT III**

**(11 Hours)**

**Knowledge Representation Issues:** Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame problem

**UNIT IV**

**(12 Hours)**

**Using Predicate Logic:** Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates - Resolution Knowledge  
Representation using Rules: Procedural versus Declarative Knowledge – Logic programming – Forward versus Backward Reasoning – Weak slot –and- Filler Structures  
: semantic Nets – Frames – Strong Slot- and –Filler Structures : Conceptual Dependency  
– Scripts – CYC

**UNIT V**

**(11 Hours)**

**Expert systems:** Introduction to Expert systems -Expert system Tools – Building an Expert System – Difficulties with Expert System development

### Text Book

S.No.	Authors	Title	Publishers	Year of Publication
1	Elaine Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill, New Delhi, 3 <sup>rd</sup> Edition	2009

### Reference Books

S.No.	Authors	Title	Publishers	Year of Publication
1	Russell, Stuart J	Artificial Intelligence	Prentice Hall/Pearson Education, 2 <sup>nd</sup> edition,	2013
2	Winston, Patrick Henry	Artificial Intelligence	Addison-Wesley Pub. Co. Publication., 2 <sup>nd</sup> edition	2013
3	Luger, George F	Artificial Intelligence	Pearson Education, 6 <sup>th</sup> edition	2011

**Semester** : II  
**Course Title Course** : **Soft Computing**  
**Code Credits** : **RS15E04**  
: 4

**Course Objective**

**Lecture Hours:56**

- Understand the concepts of neural networks and the role of neural networks in creating independent, autonomous, intelligent machines
- Understand theoretical foundations of fuzzy set theory and fuzzy logic
- Apply neural networks to model real world problems

**Course Coverage**

**UNIT I (11Hrs)**

**Neural Networks** : Fundamentals of Neural Networks – Basic Concepts of Neural Networks – Model of an Artificial Neuron – Neural Network Architecture –Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architecture – Back Propagation Network – Architecture of Back Propagation Network – Back Propagation Learning.

**UNIT II (12Hrs)**

**Neural Network Associative Memory**: Auto Correlations – Hetero Correlations - Exponential BAM – Associative Memory for Real Coded Pattern Pairs – Adaptive Resonance Theory – Introduction – ART1 – ART 2 - Applications .

**UNIT III (11Hrs)**

**Fuzzy Set Theory**: Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Method - Applications

**UNIT IV (11Hrs)**

**Genetic Algorithms** : History – Basic Concepts – Creation of off Springs – Working Principle – Encoding – Fitness Function – Reproduction .Genetic Modeling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator – Bit Wise Operator – Applications – Advances in Genetic Algorithm

**UNIT V (11Hrs)**

**Hybrid System**: Integration of Neural Network – Fuzzy Logic – Genetic Algorithm- Hybrid System – Neural Network – Fuzzy Logic – Genetic Algorithm Weight Determination – Application – Fuzzy Back Propagation Network – Language Recognition Type Fuzzy Members – Fuzzy Neuron – Fuzzy Back Propagation Architecture – Learning in Fuzzy Back Propagation – Applications – Knowledge Base Evaluation

### Text Books

S.No	Author	Title of book	Publisher	Year of Publication
1	S.Rajasekaran and G.A.Vijayalakshmi Pai	Neural Networks,Fuzzy Logic and Genetic Algorithms Synthesis and Application	Prentice Hall of India,Pvt Ltd	2011

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	Vinoth Kumar and R. Saravana Kumar	Neural Networks and Fuzzy Logic	S.K. Kataria & Sons	2012
2	Haykin Simon	Neural Networks and Learning Machines	Prentice Hall of India, 3 <sup>rd</sup> Edition	2011
3	Tang,Tan and Yi	Neural Networks : Computational Models and Application	Springer Verlag Publications	2010

**Semester : II**  
**Course title : Software Metrics**  
**Course Code :RM15E05**  
**Credit : 4**

### **Course Objective**

**Lecture Hours: 56**

To understand the quantitative approach in software process and to measure the internal and external product attributes in software and its reliability.

### **Course Coverage**

#### **UNIT I**

**(11Hrs)**

**Measurement in Software Engineering:** Objectives for Software Measurement – Measurement for understanding, Control and improvement – Scope of Software Metrics. **Basics of measurements:** Representational theory of measurement – measurement models – measurement Scale and Scale types. **Software Metrics Data Collection:** Defining Good data – Data Collection for incident reports – How to collect data – Reliability of data collection procedure.

#### **UNIT II**

**(11Hrs)**

**Measuring Internal Product Attributes (Size):** Properties of Software Size - Code Size – Design Size – Requirement Analysis and Specification Size – Functional Size measures and estimators – Applications of Size measures – Problem, Solution Size, and Computational Complexity.

#### **UNIT III**

**(12Hrs)**

**Measuring Internal Product Attributes (Structure):** Aspects of Structural measures - Control flow structure of program units – Hierarchical measures - Code structure and Test Coverage measures - Design Level Attributes – Object oriented Structure attributes and measures

#### **UNIT IV**

**(11Hrs)**

**Measuring External Product Attributes:** Modeling Software Quality – Measuring Aspects of quality- usability measure – maintainability measure- Security measure

#### **UNIT-V**

**(11Hrs)**

**Software Reliability:** Basics of reliability theory – Software reliability Problem – Parametric reliability growth models – Predictive Accuracy – Recalibration of Software reliability growth prediction – Wider aspects of Software reliability.

### Text Book

<b>S.No</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Norman Fenton, James Bieman	Software Metrics – A rigorous & Practical Approach	CRC Press	2015

### Reference Books

<b>S.No</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Norman E. Fenton, Shari Lawrence Pfleeger	Software Metrics – A Rigorous and Practical Approach	Thomson Publications	2014
<b>2</b>	Dev Raheja, Louis J.Gullo	Design for Reliability	John Wiley & Sons, New Jersey	2012
<b>3</b>	Alain Abran	Software Metrics and Software Metrology	John Wiley & Sons, New Jersey	2010

**Semester : III**  
**Course Title : Software Architecture**  
**Course Code: RW15E06**  
**Credits : 4**

## **Course Objective**

**Lecture Hours:56**

To provide insight on Software architecture, design patterns, Quality, Designing and Documenting Software Architecture and their tools.

## **Course Coverage**

### **UNIT I**

**(11Hrs)**

**Architecture Business Cycle:** Introduction - Software processes and the architecture business cycle - What makes a “good” architecture? - Architectural patterns, reference models and reference architectures - Importance of software architecture - Architectural structures and views.

### **UNIT II**

**(11Hrs)**

**Architectural Styles and Case Studies:** Architectural styles- Pipes and Filters - Data abstraction and object-oriented organization- Event-based, implicit invocation - Layered systems- Repositories- Interpreters – Process control - Other familiar architectures - Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.

### **UNIT III**

**(11Hrs)**

**Quality:** Functionality and architecture - Architecture and quality attributes- System quality attributes- Quality attribute scenarios in practice- Other system quality attributes - Business qualities- Architecture qualities. **Achieving Quality:** Introducing tactics - Availability tactics- Modifiability Tactics- Performance tactics - Security tactics - Testability tactics – Usability Tactics- Relationship of tactics to architectural patterns - Architectural patterns and styles.

### **UNIT IV**

**(12Hrs)**

**Architectural Patterns** – Introduction- From mud to structure: Layers, Pipes and Filters, Blackboard. **Distributed Systems:** Broker. **Interactive Systems:** MVC, Presentation- Abstraction-Control. **Adaptable Systems:** Microkernel; Reflection. **Some Design Patterns:** Structural decomposition. Organization of work: Master – Slave; Access Control: Proxy.

### **UNIT V**

**(11 Hrs)**

**Designing and Documenting Software Architecture:** Architecture in the life cycle- Designing the architecture- Forming the team structure- Creating a skeletal system. Uses of architectural documentation- Views-Choosing the relevant views- Documenting a view- Documentation across views. **Tools for Architectural design** - Unicon, A4 - Exploiting style in architectural design – Architectural Interconnection



## Text Books

S.No	Author	Title of book	Publisher	Year of publication
1	Len Bass, Paul Clements, Rick Kazman	Software Architecture in Practise	Pearson Education, 3 <sup>rd</sup> Edition,	2012
2	Mary shaw Garlan	Software Architectural Perspectives on an emerging discipline	Prentice hall of India	2007
3	Frank Buschmann, Hans Rohnert, Peter sommerlad	Pattern-Oriented Architecture , A systems pattern	John Wiley	1996

## Reference Books

S.No	Author	Title of book	Publisher	Year of publication
1	Muhammad Ali Babar, Alan W. Brown, Ivan Mistrik	Agile Software Architecture: Aligning Agile Processes and Software Architectures	Elsevier Inc	2014
2	Nick Rozanski, Eoin Woods	Software System Architecture : Working with Stakeholders	Pearson Education	2012
3	Ian Gorton	Essential Software Architecture	Springer-Verlag Berlin	2011

**Semester : III**  
**Course Title : Digital Image Processing(Common to M.Sc(CS) / M.Sc(IT)**  
**Course Code : RD15E07**  
**Credits : 4**

**Course Objective**

**Lecture Hours: 56**

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

**Course Coverage**

**UNIT I**

**(11 Hrs)**

Digital image processing: Origins of digital image processing, steps in digital image processing, digital image fundamentals: elements of visual perception, light and electromagnetic spectrum, image sampling and quantization, basic relationship between pixels.

**UNIT II**

**(12 Hrs)**

Image transformation and filters: basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filter, sharpening spatial filter.

**UNIT III**

**(11 Hrs)**

Filtering in frequency domain: preliminary concepts, sampling and the Fourier transforms of sampled functions, the discrete Fourier transform (DFT), properties of 2-D DFT, filtering in the frequency domain.

**UNIT IV**

**(11 Hrs)**

Image restoration, reconstruction and image segmentation: image degradation/ restoration process, noise models, restoration in the presence of noise only spatial filtering , periodic noise reduction by frequency domain filters, linear, position – invariant degradation , estimating the degradation functions, inverse filtering , wiener square error filtering, constrained least square filtering , geometric mean filter. Image segmentation: point, line and edge detection, thresholding, region -based segmentation.

**UNIT V**

**(11 Hrs)**

Color image processing: color fundamentals, color models, pseudo color image processing, full color image processing, color transformation, smoothing and sharpening image segmentation based on color, noise in color images. Image compression: fundamentals, basic compression methods, digital image watermarking.

### Text book

S.No	Author	Title of book	Publisher	Year of Publication
1	RafaelC.Gonzalez, Richard E. Woods	Digital Image Processing	Pearson Education	3 <sup>rd</sup> Edition, 2013.

### Reference Books

S.No	Author	Title of book	Publisher	Year of Publication
1	S. K. Ghosh	Digital Image Processing	Alpha science International Ltd	2012
2	William K. Pratt	Image Processing Techniques	Oxford university Press	2011

**Semester : III**

**Course Title : Information Retrieval**

**Course Code: RR14E08**

**Credits : 4**

### **Course Objective**

**Lecture Hours: 56**

- Understand the concepts of document representation, document indexing, digital information storage, retrieval, and distribution
- Summarize the advantages and disadvantages of different information-retrieval design models
- Translate vague information needs into specific queries that a given IR system can parse and execute correctly.
- Develop effective search strategies for IR systems

### **Course Coverage**

#### **UNIT I**

**(11 Hours)**

**Boolean retrieval:** Information retrieval problem - Processing Boolean queries - Boolean model versus ranked retrieval. **The term vocabulary and postings lists:** Document delineation and character sequence decoding - Determining the vocabulary of terms - Faster postings list intersection via skip pointers - Positional postings and phrase queries.

#### **UNIT II**

**(12 Hours)**

**Dictionaries and tolerant retrieval:** Search structures for dictionaries - Wildcard queries - Spelling correction - Phonetic correction. **Index construction:** Hardware basics - Blocked sort-based indexing - Single-pass in-memory indexing - Distributed indexing - Dynamic indexing - Other types of indexes.

#### **UNIT III**

**(11 Hours)**

**Scoring, term weighting and the vector space model:** Parametric and zone indexes - Term frequency and weighting - The vector space model for scoring. **Evaluation in information retrieval:** Information retrieval system evaluation - Standard test collections - Evaluation of unranked retrieval sets - Evaluation of ranked retrieval results - Assessing relevance - Critiques and justifications of the concept of relevance - A broader perspective: System quality and user utility - Results snippets.

**UNIT IV****(11 Hours)**

**XML retrieval:** Basic XML concepts - Challenges in XML retrieval - A vector space model for XML retrieval - Evaluation of XML retrieval - Text-centric vs. data-centric

XML retrieval. **Text classification and Naive Bayes:** The text classification problem - Naive Bayes text classification - Properties of Naive Bayes - Feature selection - Evaluation of text classification.

**UNIT V****(11 Hours)**

**Vector space classification:** Document representations and measures of relatedness in vector spaces - Rocchio classification - k nearest neighbor - Linear versus nonlinear classifiers - Classification with more than two classes - The bias-variance tradeoff.

**Flat clustering:** Clustering in information retrieval - Problem statement - Evaluation of clustering - K-means - Cluster cardinality in K-means - Model-based clustering.

**Text Book**

S.No.	Authors	Title	Publishers	Year of Publication
1	Christopher D. Manning, Prabhakar Raghavan, Henrich Schutze	Introduction to Information Retrieval	Cambridge University Press, New York, 1 <sup>st</sup> Edition	2008

**Reference Books**

S.No	Author	Title of book	Publisher	Year of Publication
1	Stefan Buttcher et.al	Information Retrieval - Implementing and Evaluating	MIT Press	2012
2	Dr Ricardo Baeza-Yates et.al	Modern Information Retrieval: The Concepts and Technology	Addison Wesley	2011
3	David A. Grossman and Ophir Frieder	Information Retrieval	Universities Press, 2 <sup>nd</sup> Edition,	2010

**Semester** : III  
**Course Title** : Virtual Reality  
**Course Code** : RV14E09  
**Credits** : 4

**Course Objective**

**Lecture Hours: 56**

- Understand the technologies, underlying infrastructure of virtual reality systems and the modeling techniques in virtual reality
- Apply and design virtual reality applications

**Course Coverage**

**UNIT I**

**(11 Hours)**

**Introduction:** Virtual Reality – VR software – VR Devices – History of VR –Future directions of VR.

**UNIT II**

**(11 Hours)**

**Input Devices:** Trackers- Navigation-Gesture interfaces.

**UNIT III**

**(12 Hours)**

**Output Devices:** Graphics - 3D sound – Haptic displays. Computer Architecture for VR.

**UNIT IV**

**(11 Hours)**

**Modeling:** Geometric modeling – Kinematics modeling – Physical modeling – Modeling management.

**UNIT V**

**(11 Hours)**

**VR programming** - Human factors in VR -Applications of VR

**Text Book**

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Grigore C. Burdea, Philippe Coiffet	Virtual Reality Technology	Wiley Dreamtech India, New Delhi, 2 <sup>nd</sup> Edition	2010

## Reference Books

<b>SN .no</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Morgan Kaufmann	Application, and Design	San Francisco	2013
2	Philippe Fuchs and Guillaume Moreau	Virtual Reality: Concepts and Technologies	CRC Press	2012
3	Ted simp Scon,	Virtual Machines	New Delhi: Cengage Learning	2011

**Semester** : III  
**Course Title** : Grid Computing  
**Course Code** : RG14E10  
**Credits** : 4

**Course Objective** **Lecture Hours: 56**  
To understand the Technology Applications and Tool Kits for Grid Computing

### **Course Coverage**

**UNIT I** (11 Hours)  
**Grid Computing:** Introduction – Definition and Scope of Grid Computing.

**UNIT II** (12 Hours)  
**Grid Computing Initiatives:** Grid Computing Organizations and their roles – Grid Computing analog – Grid Computing Road map.

**UNIT III** (11 Hours)  
**Grid Computing Applications:** Merging the Grid Sources – Architecture with the Web Devices Architecture.

**UNIT IV** (11 Hours)  
**Technologies:** OGSA – Sample use cases – OGSA platform components – OGSI – OGSA Basic services.

**UNIT V** (12 Hours)  
**Grid Computing Toolkits:** GLOBUS GT3 Toolkit: Architecture – GT3 Software Architecture Model. GLOBUS GT3 Toolkit: Programming Model – Grid Service Behavior Implementation – Factory Callback Mechanism – Grid Service Lifecycle Callbacks and Lifecycle Management – Grid Service Lifecycle Model – GT3 Tools.



### Text Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Joshy Joseph & Craig Fellenstein	Grid Computing	Pearson Education	2012

### Reference Books

<b>S.No.</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Ahmar Abbas	Grid Computing: A Practical Guide to Technology and Applications	Morgan Kaufmann Publishers	2013
2	Javadi Shahram	Recent Advances in Smart Grids	LAP Lambert Academic Publishing	2013
3	G. A. Gravvanis et.al	Grid Technology and Applications: Recent Developments	Nova Science Publishers Inc	2011