KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)
FACULTY OF ARTS, SCIENCE AND HUMANITIES
DEPARTMENT OF COMPUTER SCIENCE
M. Phil.,/ Ph.D.,
(Scheme of Examination for 2016 – 2017 onwards)

Code	Course(s)	ESE(Marks)	Exam Hrs
16RCS101	Research Methodology and Pedagogy	100	3
16RCS201	Advanced Trends in Computer Science	100	3
16RCS301	Cryptography and Network Security	100	3
16RCS302	Advanced Networking	100	3
16RCS303	Data Mining and Warehousing	100	3
16RCS304	Digital Image Processing	100	3
16RCS305	Soft Computing	100	3
16RCS306	Web Technology	100	3
16RCS307	Object Oriented Analysis and Design	100	3
16RCS308	Software Engineering	100	3
16RCS309	Grid Computing	100	3
16RCS310	Mobile Computing	100	3
16RCS311	Cloud Computing		

16RCS101 Paper-I Research Methodology and Pedagogy 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To impart knowledge in the concept of problem identification and research methodology
- To familiarize with basic of *research* and the *research* process
- To demonstrate the different types of research and its applicability
- To comprehend the knowledge of social research
- To exhibit in sampling design and sampling techniques
- To enrich the knowledge in writing a good research report.

Course Outcomes (COs)

1. Read, interpret, and critically evaluate social research.
2. Identify, explain, and apply the basic concepts of research, such as variables, operationalization, sampling, reliability, and validity.
3. Recognize the ethical issues involved in research, and practice ethical research standards.
4. Identify and explain the difference between quantitative, qualitative, and mixed methods research and what types of research questions can be answered with each method.
5. Use theory and previous research to create research questions and hypotheses and to identify and analyze the appropriate method and variables needed for research questions.
6. Use a variety of research methods through hands-on experience.

UNIT I - RESEARCH METHODOLOGY

Research Methodology: Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – Research methods versus methodology. Research and Scientific Method – Importance of knowing how Research is done – Research process – Criteria for good Research – Problems encountered by Researchers in India. Journal Reading Techniques - Defining the Research problem – What is the Research Problem – Selecting the Problem – Necessity of Defining the problem – Technique involved in Defining the Problem – An illustration – Conclusion.

UNIT II - METHODS OF DATA COLLECTION

Collection of primary data – Collection of data through questionnaires – Schedules – Differentiation between questionnaires and schedules – Other methods of data collection – Collection of secondary data – Selection of appropriate method for data collection– Guidelines for constructing questionnaire/Schedule–Guidelines for successful Interviewing – Difference between survey and experiment – Data Collection using Journals

UNIT III - RESEARCH DESIGN

Need for Research Design – Features of good design – Important concepts relating to Research Design – Different Research Design – Basic principles of Experimental Designs – Conclusion – Developing a Research Plan. 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 a Research Reports – Conclusions.

UNIT IV - STATISTICAL ANALYSIS

Central tend in correlation, auto correlation and regression analysis, curve fitting - probability models-distribution. Testing of hypothesis- Analysis variance, testing means for small and large sequence. Simulation-render generation techniques and distribution monte carlo model. Data Analysis: Mathematical and statistical analysis using software tools.

UNITV - PEDAGOGICAL METHODS IN HIGHER EDUCATION

Objectives and roll of higher education- important characteristics of an effective Lecture-Quality teaching and learning- Lecture preparation Characteristics of instructional design Methods of teaching and learning: Large Group – Technique-Lecture Seminar, Symposium, Tam Teaching, Project, Small group Technique- Simulation, role playing Demonstration, Brain storing, case discussion and assignment, Methods of evaluation- Self evaluation, student evaluation. Diagnostic testing remedial teaching Question banking-Electronic media in education –'e' learning researches web based learning.

SUGGESTED READINGS

1. Deepak Chawla , Neena Sondhi. (2016). Research Methodology: Concepts and Cases. 2nd Edition. Vikas Publishing House Private Ltd, New Delhi.
2. C.R. Kothari. (2018). Research Methodology – Methods and Techniques. 2nd Edition. New Age International (P) Limited. New Delhi.
3. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams . (2018). The Craft of Research . 3rd Edition, University of Chicago Press.
4. C Eileen M. Trauth. (2001). Qualitative Research in IS: Issues & Trends. IDEA Group Publishing. USA/London (ISBN: 1-930708-06-08)
5. www.dcs.gla.ac.uk/~johnson/teaching/research_skills/research.html
6. http://www.csc.liv.ac.uk/~ullrich/COMP516
7. http://www.idi.ntnu.no/~thomasos/paper/interpretive.pdf
8. Vedanayagam, E.G .(1989). Teaching technology for college teachers. Sterling Publishers(P) Ltd., New Delhi.
7. Kumar K.L. (1997) Educational Technologies, New age International. New Delhi.
8. Winkler, Anthony C. & Jo Roy Mc Cuen. (1985). Writing a research Paper: A Handbook, 2nd edition, Harcourt,NY.

16RCS201 Paper II: Advanced Trends in Computer Science 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks, queues, lists, trees and graphs
- To understand the principles of distributed Component technologies like CORBA and Agile.
- To get a thorough knowledge of J2EE and Web services protocols
- To introduce various techniques of the grid computing

Course Outcomes(Cos)

1. Give a comprehensive introduction of common data structures, and algorithm design and analysis.
2. Understand concepts about searching and sorting techniques
3. Understand basic concepts about stacks, queues, lists, trees and graphs
4. Understand the distributed Component technologies like CORBA and Agile.
5. Get a thorough knowledge of J2EE and Web services protocols
6. Introduce various techniques of the grid computing

UNIT I - ALGORITHMS AND ANALYSIS

Elementary Data Structures, Greedy Method: Knapsack Problem – Job Sequencing With Deadlines – Optimal Merge Patterns, Dynamic Programming: Multistage Graphs Optimal Binary Search Trees – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem – Flow Shop Scheduling.

UNIT II - BASIC SEARCH AND TRAVERSAL TECHNIQUES

The Techniques –Code Optimization – Biconnected Components And Depth – First Search. Backtracking: The 8 – Queens Problem – Sum of Subsets – Hamiltonian Cycles – Knapsack Problem.

UNIT III - COMPUTATIONAL MATHS

Mathematical logic : Statements and notation, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implementation, Normal torms. **Graph theory:** epresentation of Graph, DFS,BFS, Spanning Trees, planer Graphs. Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs Multi graphs and Euler circuits, Hamiltonian graphs, Chromatics Numbers

UNIT IV -DISTRIBUTED OBJECT MANAGEMENT

Object oriented Methodologies-Virtual Programming, Agile, XP, Scrum Process- Object design – design patterns Distributed Objects And Components – From Distributed Objects To Components – 3 Tier Client Server, Object Style – CORBA – Distributed Objects, CORBA Style – OMG's Object Management Architecture – CORBA 2.0 – CORBA Object Services – CORBA Common Facilities – CORBA Business Objects.

J2EE: Overview – Multi – Tier Architecture – The Enterprise Application – Clients – Sessions Management – Web Tier –ELB Tier. Web Services: XML Fundamentals – SOAP – WSDL – UDDI .

UNIT V - GRID COMPUTING

Introduction: Early Grid Activities, Current grid activities, Overview of grid business area, Grid Infrastructure and its relationship with other distributed architectures. Open grid service architecture (OGSA), Data management services, Overview of Globus GT3 Toolkit, Introduction to cloud computing and its issues.

SUGGESTED READINGS

1. Adam Drozdek. (2012). Data Structures and algorithm in C++. 3rd edition. Cengage Learning, New Delhi.
2. Sartaj Sahni. (2011). Data Structures, Algorithms and applications in C++. 2nd edition. Universities Press, New Delhi.
3. Mark Allen Weiss. (2011). Data Structures and Algorithms Analysis in Java.3rd edition. Pearson Education, New Delhi.
4. Sandeep Chatterjee, James Webber. (2010). Developing Enterprise Web Services, 1st Edition, Pearson Education.
5. Prabhu, C.S.R. (2008). Grid and Cluster Computing.Prentice Hall of India , New Delhi.
6. Robert Orfali, DanHarkey, Jan Edwards. (2008). The Essential Client/Server Survival Guide, 2nd edition .Galgotia Publications.
7. Janakiram, D. (2005). Grid Computing – A Research Monograph. TataMcGraw Hill Publishing Company Limited, New Delhi
8. C.J.Date. (1999). An Introduction to Database Systems ,6th edition .Addison Wesley
9. Abraham silberschatz, Henry F.Kortn, S.Sudharsan. (1997). Database System Concepts, 3rd edition.McGrawHill Publication .
10. James Rambaugh. (2001). Object Oriented Modeling and Design, Prentice Hall of India.
11. Peter Coad / Edward Yourdan. (2001). Object Oriented Analysis, 2nd edition. Pearson Education.
12. Joshy Joseph, craiz. (2000). Grid Computing,1st Edition. IBM Press.
13. Thomas H.Corman, Charles E.Leiserson, Ronald L.Rivest. (1998). Introduction to Algorithms , Prentice Hall of India.
14. Ramakrishnan, Gehrke. (2003). Database Management Systems, Mc Graw Hill Publication, 3rd Edition.
15. Grady Booch. (2000). Object Oriented Analysis and Design, Pearson Education, 2nd Edition.

Web Site References:

1. http://cgm.cs.mcgill.ca/~godfried/teaching/algorithms-web.html
2. www.apl.jhu.edu/~hall/java/FAQs-and-Tutorials.html
3. www.microsoft.com/Net
4. www.w3schools.com/ngws/default.asp
5. www.w3.org/XML
6. www.w3schools.com/xml
7. www.compinfo-center.com/apps/rdbms.htm
8. www.grid2002.org
9. www.gridcomputing.com

16RCS301 Paper – III: Special Paper I -Cryptography and Network Security 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100
End Semester Exam : 3 Hours

Course Objectives

This course will provide students with a theoretical knowledge to understand the fundamental principles of access control models and techniques and,

- To understand theory of fundamental cryptography, encryption and decryption algorithms
- To know about various encryption techniques.
- To understand various Block Ciphers, DES and AES algorithms
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on web security, electronic mail security, firewalls

Course Outcomes (COs)

On successful completion of the course the student should be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Understand basic concepts of system level security
6. Build secure authentication systems by use of message authentication techniques.

UNIT I - INTRODUCTION TO CRYPTOGRAPHY

Services. Mechanisms and Attacks – The OSI Security Architecture – A Model for Network Security – Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transporation Techniques – Rotor Machines – Steganography.

UNIT II - SIMPLIFIED DES

Block Cipher Principles – The Data Encryption Standard – The Strength of DES – Differential and Linear Cryptanalysis – Block Cipher Design Principles – Block Cipher Modes of Operation.

UNIT III – PUBLIC KEY CRYPTOSYSTEM

RSA Algorithm – Key Management – Diffie–Hell man Key exchange – Introduction to Elliptic Curve Cryptography. Message Authentication and Hash functions – Authentication Requirements – Authentication Functions – Message Authentication Codes – Hash Functions – Security of Hash functions and MAC.

UNIT IV - DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS

Digital Signature Standard – Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E–mail Security – PGP – S / MIME – IP Security

UNIT V - WEB SECURITY

Secure Socket Layer – Secure Electronic Transaction. System Security – Intruders and Viruses – Firewalls– Password Security

SUGGESTED READINGS

1. Deepti Mittal, Ajay Raj. (2015). Cryptography and Network Security. 1st Edition, Laxmi Publication Private Ltd, Delhi.
2. K.HarBaskar . (2015). Cryptography and Network Security – A Practical Approach. 1st Edition, Laxmi Publication Private Ltd, Delhi.
3. William Stallings. (2012). Cryptography and Network Security. 4th Edition, Pearson Education, Delhi.
4. Behrouz A. Forouzan. (2010). Cryptography and Network Security. Special Indian Edition, Tata McGraw Hill, Delhi.
5. Roberta Bragg, Mark Rhodes-Ousley and Keith Strassberg. (2004). Network Security. 1st Edition, Tata McGraw Hill, Delhi.
6. Ankit Fadia. (1998). Network Security. 1st Edition, McMillan Publications, Delhi.
7. Bruce Schneir.(1998). Applied Cryptography. 1st Edition. CRC Press, New Delhi.
8. Menezes.A and Van Oorschot and Vanstone .S. (1997). Hand Book of Applied Cryptography". 1st Edition . CRC Press. (Free Downloadable)
9. William Stallings.(1998).Cryptography and Network Security. 3rd Edition, Pearson Education, New Delhi.

Web Site References

1. http://domino.research.ibm.com/comm/research_projects.nsf/pages/security.index.html
2. http://whitepapers.techrepublic.com.com
3. http://www.rsa.com
4. http://www.nsa.gov/home_html.cfm

16RCS302 Paper – III: Special Paper II - Advanced Networking 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To have an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about Ad–Hoc/Mobile Routing, sensor networks, MANET
- To understand the concepts of Network Service Quality and Resource Reservation and NS2 simulator tool

Course Outcomes (COs)

At the completion of the course, students will:

1. Identify the functions/ services of TCP/IP component and layer
2. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
3. Understand the routing IP datagrams and checksum.
4. Exposed to unicast and multicast routing.
5. Understand about Ad–Hoc/Mobile Routing, sensor networks, MANET
6. Understand the concepts of Network Service Quality and Resource Reservation and NS2 simulator tool

UNIT I – INTRODUCTION

Internet Protocol review, Router Basics – forwarding versus routing – ISPs – Evolution of the Internet Architecture – IP Addressing and Allocation Techniques – NAPs – Autonomous Systems.

UNIT II - ROUTING PROTOCOL FOUNDATIONS

Distance vector and link state – Dijkstra's algorithm – IGPs and EGPs – RIP – OSPF – ISIS. Introduction to BGP – EBGP and IBGP

UNIT III - INTERDOMAIN ROUTING AND BGP

Border Gateway Protocol details – messages and state machines – route aggregation. Policy and BGP – BGP decision process – Access lists, prefix lists, AS paths, Community – Route maps – Attributes – AS_Path, local preference, MED, Community, ATOMIC_AGGREGATE, Aggregator, Origin, NEXT_HOP, AS–SET – Route filtering. Architecture and BGP – Redundancy, symmetry, load balancing – Confederations, route reflectors.

UNIT IV - AD–HOC/MOBILE ROUTING

Peer to Peer Overlay Networks – Mesh Networks – Sensor Networks – MANET

UNIT V- NETWORK SERVICE QUALITY AND RESOURCE RESERVATION

Queues and Delays – Queuing and Scheduling – A Reservation Protocol – Differentiated Services Network simulator tools NS2

SUGGESTED READINGS

1. Andrew S. Tannenbaum. (2010). Computer Networks. 5th Edition. Pearson Education.
2. Forouzan, B. A.(2011). Data Communications and Networking .4th edition. THM, New Delhi.
3. Bassam Halabi. Internet Routing Architectures. (2014). Cisco Press, New Riders Publishing, ISBN 1-56205-652-2
4. Christian Huitema. (2000). Routing in the Internet. 2nd Edition, Prentice Hall.
5. J. Stewart. (1999). BGP4 : Inter Domain Routing in the Internet. Addison Wesley.
6. W. Richard Stevens.(2005). TCP/IP Illustrated, Volume 1: The Protocols. Addison Wesley.
7. Pete Loshin. (2004). IPv6Theory, Protocol, and Practice. 2nd Edition, The Morgan Kaufmann Series.

Web Site References:

1. http://www.academ.com/nanog/feb1997/BGPTutorial
2. http://www.ietf.org/html.charters/manet-charter.html
3. http://tools.ietf.org/html/rfc2475
4. http://www.ietf.org/rfc/rfc2205.txt

16RCS303 Paper – III: Special Paper III - Data Mining and Warehousing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.

Course Outcomes (COs)

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modeling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining.
6. Benefit the user experiences towards research and innovation integration

UNIT I - INTRODUCTION: FUNDAMENTALS OF DATA MINING

Data Mining Functionalities - Classification of Data Mining systems - Major issues in Data Mining - Data Warehouse and OLAP Technology for Data Mining Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - Further Development of Data Cube Technology - From Data Warehousing to Data Mining.

Data Preprocessing: Needs Preprocessing the Data - Data Cleaning - Data Integration and Transformation - Data Reduction - Discretization and Concept Hierarchy Generation - Online Data Storage. Preparing Data for Mining: Variable Measures.

UNIT II - DATA MINING PRIMITIVES

Languages, and System Architectures: Data Mining Primitives - Data Mining Query Languages - Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

Concepts Description: Characterization and Comparison: Data Generalization and Summarization - Based Characterization - Analytical Characterization: Analysis of Attribute Relevance - Mining Class Comparisons: Discriminating between Different Classes - Mining Descriptive Statistical Measures in Large Databases.

UNIT III - MINING ASSOCIATION RULES IN LARGE DATABASES

Association Rule Mining - Mining Single -Dimensional Boolean Association Rules from Transactional Databases - Mining Multilevel Association Rules from Transaction Databases - Mining Multidimensional Association Rules from Relational Databases and Data

Warehouses - From Association Mining to Correlation Analysis – Constraint - Based Association Mining.

Classification and Prediction: Issues Regarding Classification and Prediction - Classification by Decision Tree Induction - Bayesian Classification - Other Classification Methods – Prediction - Classifier Accuracy.

UNIT IV -CLUSTER ANALYSIS INTRODUCTION

Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods – Density -Based Methods - Grid-Based Methods - Model-Based Clustering Methods - Outlier Analysis. Machine Learning: Basic Concepts in machine learning - Supervised and Unsupervised Learning. Mining Spatial Databases - Mining Multimedia Databases - Mining Time-Series and Sequence Data - Mining Text Databases - Mining the World Wide Web - Visual Data Mining

UNIT V - OVERVIEW OF DATA MINING TOOLS

Applications:

Data Mining: Data Mining in Bio Informatics - Data Mining in Banking - Data Mining in Tele communications - Data Mining in Crime Detection - Data Mining in Oil and Gas Industry - Data Mining in Pharmaceutical Industry - Data Mining in Student recruiting and retention - Data Mining in Electronic commerce .
Defining Privacy for Data Mining - Trends in Spatial data mining.

Data Warehousing: Case Studies-Data warehousing in Government and Education – Insurance - Manufacturing Industry – Marketing - Multi-Industry.

SUGGESTED READINGS

1. Han, Kamber & Pei. (2013). Data Mining: Concepts and Techniques. 3rd Edition. University Press.
2. Zaki & Meira. (2014) . Data Mining and Analysis Fundamental Concepts and Algorithms. Prentice Hall of India, New Delhi .
3. Agarwal . (2015). Data Mining: The Textbook. Prentice Hall of India, New Delhi
4. K.P.Soman, Shyam Diwakar, V.Ajay. (2006). Insight into Data Mining Theory and Practice, Prentice Hall of India.
5. Jiawei Han & Micheline Kamber. (2001). Data Mining – Concepts and Techniques, Harcourt, India.
5. Arun K Pujari .(2001). Data Mining Techniques, University Press.
6. Michael J. A.Berry, Gordon S.Linoff. (2007). Data mining Techniques, Second Edition.
7. Hillol Kargupta , Anupam Joshi, Krishnamoorthy Sivakumar and Yelena Yesha. (2005). Data Mining Next Generation Challenges and Future Directions, Prentice Hall of India.
8. G.K.Gupta. (2006). Introduction to Data mining with case studies, Prentice Hall of India.

Web Site References:

1. http://www.the-data-mine.com/bin/view/Misc/ApplicationsOfDataMining
2. http://www.biomedcentral.com/info/about/datamining
3. http://www-users.cs.umn.edu/~han/kdd/kdd-info.html

4. http://www.dmreview.com/article_sub.cfm?articleId=1046025
5. http://www.datamining.databasecorner.com/?
6. http://www.web-datamining.net/tools/
7. http://www.thearling.com/text/dmtechniques/dmtechniques.htm
8. http://databases.about.com/od/datamining/a/datamining.htm
9. http://www.dwreview.com/DW_Overview.html
10. www.kdnuggets.com
11. http://www.improvedoutcomes.com/docs/WebSiteDocs/Clustering/Clustering_Overview.
12. http://dms.irb.hr/tutorial/tut_dtrees.php
13. http://www.aaai.org/AITopics/pmwiki/pmwiki.php/AITopics/MachineLearning
14. http://robotics.stanford.edu/~nilsson/mlbook.html
15. http://www.twocrows.com/applics.html

16RCS304 Paper – III: Special Paper IV - Digital Image Processing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To make the students learn the fundamental theories and techniques of digital image processing.
- To study the mathematical transforms necessary for image processing, image manipulation and a preliminary understanding of Computer Vision.
- To make students to understand the image degradation and enhancement.
- To understand the basic relationships between pixels in an image
- To know various segmentation techniques, and object descriptors.
- To implement pattern recognition to enhance an image.

Course Outcomes(COs)

1. Perform image manipulations and analysis in many different fields.
2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.
3. Implement the understanding in sharpening the image.
4. Perform the image segmentation using the compression method.
5. Understand the image to represent as an region.
6. Analyze the basic algorithms used for image processing &image compression with morphological image processing.

UNIT I – INTRODUCTION

Digital image processing – Origins of digital image processing- Examples of fields that use digital image processing-Fundamental steps in digital image processing- Components of an image processing system-Representing digital image.

UNIT II - BASIC RELATIONSHIPS BETWEEN PIXELS

Basic gray level transformations- Histogram processing - Basic spatial filtering- Smoothing special filtering-Image Degradation/Restoration process-Noise Models.

UNIT III - IMAGE SEGMENTATION: THRESHOLDING

Edge Based Segmentation – Region Based Segmentation – Matching. Image Compression: Error Criterion - Lossy Compression - Lossless Compression.

UNIT IV - SHAPE REPRESENTATION AND DESCRIPTION

Region Identification - Contour Based Representation And Description – Region Based Shape Representation And Description

UNIT V - INTRODUCTION TO INFORMATION CODING

Introduction to image compression techniques Image Recognition: Introduction – Statistical Pattern Recognition - Neural Net- Syntactic Pattern Recognition - Graph Matching - Clustering

SUGGESTED READINGS

1. Rafael C. Gonzalez, Richard E. Woods. (2016). Digital Image Processing, 3rd Edition, Pearson Education, Delhi.
2. T.Veerakumaran, S.Jayakumar.(2009).Digital Image Processing, 1st Edition, Mcgraw Higher Ed, Delhi.
3. Castleman .(2007). Digital Image Processing, 1st Edition, Pearson Education Limited, Delhi.
4. Milan Sonka and Vaclav Hlavac and Roger Boyle. (2004). Image Processing, Analysis and Machine Vision. 2nd Edition. Vikas Publishing House, NewDelhi.
5. Nick Efford. (2000). Digital Image Processing – A Practical introduction using JAVA. 1st Edition , Pearson Education Limited, Delhi.
6. Chanda. B and Dutta Majumder .D. (2000). Digital Image Processing and Analysis. 1st Edition, Prentice Hall of India, New Delhi

Web Site References

1. www.icaen.uiowa.edu/~dip/lecture/lecture.html
2. www.ece.ucsb.edu/~manj/ecei81bso4/reviue(gw2002).pdf
3. www.wikipedia.org/wiki/image_processing
4. http://unjobs.org/authors/rafael-c.-gonzalez/image processing

16RCS305 Paper – III: Special Paper V – Soft Computing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100
End Semester Exam : 3 Hours

Course Objectives

- To understand the scope and evolution of soft computing
- To learn the various soft computing frame works
- To be familiar with design of various neural networks
- To be exposed to fuzzy sets and fuzzy logic
- To understand fuzzy measures and reasoning
- To learn genetic programming.

Course Outcomes(COs)

1. Understand the scope and evolution of soft computing
2. Learn the various soft computing frame works
3. Be familiar with design of various neural networks
4. Be exposed to fuzzy sets and fuzzy logic
5. Understand fuzzy measures and reasoning
6. Learn genetic programming.

UNIT I - FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS

Biological prototype, Artificial neuron, Single layer artificial, neural networks, multilayer artificial neural networks, training of artificial neural networks.

UNIT II - PERCEPTIONS

Perceptron Representation, perceptron learning, perceptron Training algorithm. Back propagation: Introduction to back propagations and Back propagation training algorithm, counter propagation networks.

UNIT III - KOHONEN SELF-ORGANIZING NETWORKS

Introduction, the Kohonen algorithm, weight training, Grossberg layer, Training the Grossberg Layer.

UNIT IV - HOPFILED NETWORKS

Introduction, The Hopfiled model, Hopfiled network algorithm, Boltzmann's machine applications of Hopfiled Networks,Associative Memories, Bi- directional Associative Memories.Adaptive Resonance Theory: Architecture of Adaptive Resonance Theory,Algorithm, Applicability of Artificial neural Networks to pattern Recognition and Image Processing, Dimensionality of neural Networks for pattern Recognition- Case Studies

UNIT V - FUZZY ARITHMETIC

Fuzzy numbers, linguistic variables, arithmetic operations on intervals, fuzzy numbers, and lattice of fuzzy numbers, Possibility theory**:** fuzzy measures, evidence theory, fuzzy sets and possibility theory, possibility Vs probability theory, Fuzzy logic: Multivalued logics,

propositions, quantifiers, linguistic hedges, inferences. Uncertainty based information, Fuzzy systems: fuzzy controllers, fuzzy systems and neural networks, fuzzy neural networks, fuzzy automata, dynamic systems- Applications

SUGGESTED READINGS

1.Chandra .S.S.V. (2014). Artificial Intelligence and Machine Learning. Kindle Edition.

2. Dr.R.P.Das. (2012). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi

3. Flasiński, Mariusz. (2016). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.

4. Dr.R.P.Das. (2012). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi.

5. Neural computing: Theory and practice – Waserman

6. Sets and Fuzzy logic theory and applications—George J. Klir/Bo Yuan

7. S.N. Sivanandam, S. Sumathi and S. Deepa. (2006). Introduction to Neural Networks using MAT LAB 6.0, 1st Edition, Tata Mcgraw Hill, Delhi

8. Simon Haykin. (2003). Neural Networks. 1ST Edition, New Delhi: Pearson Education.

9. An introduction to Neural Computing – I. Alexander and Helen MartWilliam Jackson.

10. Robert J Schaluoss. (1997). Artificial Neural Networks. 1ST Edition, New Delhi: McGraw Hill.

11.Kishan Mehrotra, Chiluvuri K. Mohan and Sanjay Rana. (1997).Elements of Artificial Neural Networks. 1ST Edition, Mumbai: Penaram International.

Web Site References

1. www.doc.ic.ac.uk/~nd/surprise_96/journal/vol4/cs11/report.html
2. http://www.statsoft.com/textbook/stneunet.html
3. http://www.fuzzy-logic.com

16RCS306 Paper – III: Special Paper VI: Web Technology 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To understand the fundamentals of HTML, CSS and JavaScript and use different objects
- To understand XML , Namespace and W3C XML Schema
- To know the basics of JSP, its objects and forms
- To relate JSP and Java Bean through its components
- To develop web application that deals with database and website development.
- To get Familiar with Document Object Model for XML

Course Outcomes(COs)

1. Create a client side scripting web application using HTML forms, CSS and Java Script
2. Understand the Document Object Model for XML and JavaScript.
3. Understand XML , Namespace and W3C XML Schema
4. Understand the server side scripting of JSP, its objects and forms
5. Relate JSP and Java Bean through its components
6. Develop web application that deals with database and website development.

UNITI - HTML, DHTML

HTML : Overview of HTML – Basic Concepts – HTML and Images – Lists- Formatting Tags –Links and Addressing – Tables – Frames –Layers –Styles Sheets – Forms –HTML and Media Types. DHTML – Object Model –HTML and Scripting access – CSS.

UNIT II - SCRIPTING LANGUAGES

Java Script : Introduction – Programming Fundamentals – Variables – Data Types – Statements- Functions and Objects – Navigator Object Model – Cookies. CGI &Perl : Concepts of CGI – Perl – Basics – Variables – Arrays – Controlling Program Flow – Perl Functions- File Handling – Database Connectivity.

UNIT III - XML

XML – XML Fundamentals –Creating XML Documents – Well Formed and Valid XML Documents –General Syntax – Components of XML Documents – Elements, Attributes and Entities – XML Data Design – DTD – XML Schema- XSTL.

UNIT IV -SERVLETS AND JSP

Servlet Architecture Overview- Servlet Life cycle- Parameter Data – Sessions- Cookies – Data Storage –Servlet and Concurrency. JSP: Introduction – JSP and Servlets- Running JSP Applications – Basic JSP – Java Bean Classes and JSP – Tag Libraries and Files.

UNIT V -CASE STUDY

Develop Blogging application and transform the Blogging Application from a loose collection of various resources to an integrated web application.

SUGGESTED READINGS

1. David Flanagan. (2014). Javascript: The Definitive Guide (6th ed.). O'Reilly Media.
2. Dave Mercer. (2012). ASP.NET – Beginner's Guide(2nd ed.). New Delhi: MCGraw Hill
3. Thau. (2008). The Book of JavaScript: A Practical Guide to Interactive WebPages.
4. Jeffrey C. Jackson. (2007). Web Technologies, Pearson Education, 1st Edition.
5. David Flanagan. (2006). Javascript: The Definitive Guide. O'Reilly Media.
6. Paul Wilton. (2005). Beginning JavaScript. 2nd Edition. Wiley Dreamtech India(P) ltd, New Delhi.
7. Thomas A Powell. (2000). The Complete SUGGESTED READINGSHTML, 2nd Edition, Tata McGraw Hill Publishing, New Delhi.
8. Rohit Khurana. (2000). Java Script, APH Publishing Corporation. New Delhi.
9. Ivan BayRoss. (2000). HTML, DHTML, Java Script, Perl CGI, BPB Publications, 1st Edition.
10. Sybex. (2001). XML Complete, BPB Publications, 1st Edition.
11. Deitel Nieto. (2000).World Wide Web. 3rd Edition, Pearson Education, New Delhi.

Web Site References

1. http://www.w3schools.com/js/default.asp
2. http://www.w3schools.com/xml/default.asp
3. www.amazon.com/web-server-technology
4. http://www.brics.dk/ixwt

Paper III: Special Paper – VII: Object Oriented Analysis and Design 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- to use an object-oriented method for analysis and design
- To analyze information systems in real-world settings and to conduct methods such as interviews and observations
- To have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other is development methods and techniques
- To know techniques aimed to achieve the objective and expected results of a systems development process
- To know different types of prototyping
- To know how to use UML for notation.

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Understand the concepts and terms used in the object-oriented approach to systems analysis and design
2. Use Unified Modeling Language 2.2
3. Perform object-oriented analysis and design
4. Identify the characteristics of the UML and explain UML is relevant to the process development.
5. Draw class Diagrams, Object Diagram and Interaction Diagram.
6. Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state-chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.

UNIT I

The Object Model: The evolution of the object model - Elements of the object model - Applying object model. Classes and Objects: The nature of an object - Relationships among objects.

UNIT II

Classes and Objects: The nature of the class - Relationship among classes - The Interplay of Classes and Objects - On building quality classes and objects. Classification: The Importance of proper classification - Identifying proper classes and objects - Key abstraction mechanism.

UNIT III

UML - Goals of UML - Syntax of Expressions and Diagrams. Nature and purpose of Models: A Model - Levels of Models - Meaning of Model. UML Walkthrough: UML views - Static views - use case view - interaction views - state machine view - activity view - physical view - model management view- extensibility constructs. Static view: Overview - classifiers - relationships - associations - generalizations - realization - dependencies - constraints - instances..

UNIT IV

State machine view: state machine - event - state - transition - composite state. Activity view: activity diagram - activities and other views. Interaction view: collaboration - interaction -

sequence diagram - activation - collaboration diagram - patterns. A design patterns-MVC , Fecade, bridge patterns Physical views: Overview - component - node.

UNITV

Model Management View: Package - Dependencies on Packages - Access and import dependency - model and subsystem. Extension Mechanism: Constraints - tagged value - stereotypes - tailoring UML. UML Environment: Semantics responsibilities - notation responsibilities - programming language responsibilities - modeling with tools.

REFERENCE :

1. Grady Booch. ***Object Oriented Analysis and Design.*** 2nd Edition, New Delhi: Addison Wesley 2001.
2. James Rumbaugh, Ivar Jcobson, Grady Booch. ***The Unified Modeling Language Reference Manual.*** 1st Edition, New Delhi: Addison Wesley 2003.
3. Martin Fowler, Kendall Scott. ***UML Distilled.*** 2nd Edition, New Delhi: Pearson Education, 2004.

Web Site References

1. http://www.ooad.org
2. http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysis-and-Design
3. burks.bton.ac.uk/burks/pcinfo/progdocs/oocourse/oocnotes.htm

16RCS308 Paper – III: Special Paper VII: Software Engineering 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To Apply their knowledge of mathematics, sciences, and computer science to the modeling, analysis, and measurement of software artifacts.
- To Work effectively as leader/member of a development team to deliver quality software artifacts.
- To Analyze, specify and document software requirements for a software system.
- To implement given software design using sound development practices.
- To Verify, validate, assess and assure the quality of software artifacts.
- To Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.

Course Outcomes(COs)

1. Apply their knowledge of mathematics, sciences, and computer science to the modeling, analysis, and measurement of software artifacts.
2. Analyze, specify and document software requirements for a software system.
3. Implement a given software design using sound development practices.
4. Verify, validate, assess and assure the quality of software artifacts.
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.

UNIT I - THE EVOLVING ROLE OF SOFTWARE

Software - software crisis - software process model. Component based development: - The formal methods model – fourth generation techniques. Software Project Planning – Project Planning Objectives - Software Scope – Resources. System planning and initial investigation, bases for planning – Investigation

UNIT II - ANALYSIS CONCEPTS AND PRINCIPLES

Requirement analysis principles – The Information domain – modeling – partitioning – Essential and implementation views. Software prototyping methods and tools. Specification: Specification principles – representation – software requirements specification.

UNIT III - DESIGN CONCEPTS AND PRINCIPLES

The Design process: design and software quality – The Evolution of Software Design. Design principles:- Design concepts – effective modular design – the design model – design documentation – Software Architecture.

UNIT IV - SOFTWARE TESTING TECHNIQUES

Testing Techniques/Tools selection process – Selecting Techniques/tools – Structural System Testing techniques- Functional System Testing Techniques – Unit Testing Technique – Functional Testing and Analysis – Functional Testing – Test factor/Test Technique Matrix- The Cost of Computer Testing – Life Cycle Testing concept – Verification and validation in the software. Assess Project Management Development Estimate and Status - Develop Test Plan - Requirements Phase Testing -Design Phase Testing -Program Phase Testing

UNITV - SOFTWARE QUALITY ASSURANCE

Case studies: WinRunner – QTP (Quick Test Professional)

SUGGESTED READINGS:

1. Pressman, R.S. (2009). Software Engineering: A Practitioner's Approach. 7th edition. McGraw-Hill, New Delhi.
2. Aggarwal, K.K., & Singh, Y. (2008). Software Engineering. 2nd edition. New Age International Publishers.
3. Sommerville, I. (2007). Software Engineering. 8th edition. Addison Wesley. New Delhi.
4. Bell, D. (2005). Software Engineering for Students. 4th edition. Addison- Wesley, New Delhi.
5. Mall, R. (2004). Fundamentals of Software Engineering. 2nd edition. Prentice-Hall of India, New Delhi.
6. Richard Fairley. (1997). Software Engineering Concepts. 8th Edition. Tata McGraw Hill Publishing Company, New Delhi.
7. Elias M. Awad.(1996). System Analysis and Design. 2nd Edition. BPB Publication, New Delhi.

Website Reference

1. www.opensourcetesting.org
2. www.onestoptesting.com
3. www.cs.queensu.ca
4. www.ece.cmu.edu

16RCS309 Paper – III: Special Paper VIII: Grid Computing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3 Hours

Course Objectives

- To portray the recent trends in the field of Grid computing and creation and management of Internet-based utility computing infrastructure**.**
- To introduce the principles underlying the function of distributed systems and their extension to grid computing.
- To introduce students to the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
- To provide a good understanding of the concepts, standards and protocols in Grid computing
- To enable students to be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.
- To perform analysis, design and implementation of ARC grid computing model.

Course Outcomes (COs)

After successful completion of this course, student will be able to

1. Understand and explain the basic concepts of Grid Computing.
2. Explain the principles underlying the function of distributed systems and their extension to grid computing
3. Explain the advantages of using Grid Computing within a given environment.
4. Identify fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
5. Understand Data management and transfer in Grid environments.
6. Perform analysis, design and implementation of ARC grid computing model.

UNIT I - IT INFRASTRUCTURE EVOLUTION

Introduction Microprocessor Technology, Optical Networking Technology, Storage Technology, Wireless Technology, Sensor Technology, Global Internet infrastructure,World Wide Web and Web Services, open-source Movement Productivity Paradox and Information Technology –Introduction, Productivity Paradox, Return on Technology Investment , Multi-Story Bureaucracy, Information technology Straightjacket,Consolidation, Outsourcing, Toward a Real-time Enterprise, Opertional Excellence, Business Value of Grid Computing – Introduction,Grid Computing Business Value Analysis,Risk Analysis, grid Marketplace

UNIT II - GRID COMPUTING TECHNOLOGY

An Overview, Introduction,History, High Performance Computing.cluster computing,peer-to-peer computing, internet computing, grid omputing,Grid computing Model,Grid Protocols, Globus Toolkit, Open Grid Services Architecture ,Types of Grids Application Characteristics

UNIT III - DESKTOP GRIDS

Introduction,Background Desktop Grids Defined, The Desktop Grid Value Proposition, Challenges, Technology-key Elements to Evaluate,Desktop Grid Suitability- Key Areas for

Exploration ,The Grid Server, Role of Desktop Grids in an Enterprise computing Infrastructure, Practicals Uses of Desktop Grids , Cluster Grids- Introduction, cluster,SSI Industry Exmples, HPC Grids –Introduction, Five Steps to Scientific Insight, Application and Architecture, HPC Application Development Environment, Production HPC Reinvented,HBC Grids Acknowledgements

UNIT IV - DESKTOP SUPERCOMPUTING

– Native programming for Grids . Introduction –historical Background-parallel computing, Parallel Programming Paradigms, Problems of Current Parsllel Programming Paradigms, Desktop Supercomputing Programming Paradigm. Parallel Programming in CxC. Parallelzing Existing Applications

UNIT V - GRID-ENABLING SOFTWARE APPLICATION

Introduction.Need of Grid users. Requirements for Grid- Enebling software, Grid programming tools, Application Examples

SUGGESTED READINGS

1. Christophe Cerin, Gilles Fedak . (2012). Desktop Grid computing. CRC Press.
2. Nikoloas . P.Preve. (2011). Grid Computing. Springer.
3 . Venkatesh Krishna . P and V.Saritha . (2010). Grid Computing. Ane Books Private Ltd.
4. Anar Abbas. (2006). Grid computing: A practical Guide to Technology and Applications Firewall Media (an Import of Laxmi Publication Pvt Ltd).
5. Joshy joseph, Craig fellenstien. (2004). Grid Computing , Pearson Education.
6. Rajkumar Buyya. (2008). High performance cluster computing, Architecture and systems Vol-1 , Pearsons Education.

16RCS310 Paper – III: Special Paper IX: Mobile Computing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100
End Semester Exam : 3 Hours

Course Objectives

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications.
- To identify the use of mobile wireless technologies
- To know the types of mobile wireless technologies that are currently being used
- To understand the working of mobile wireless technologies access to network resources.

Course Outcomes (COs)

1. Grasp the concepts and features of mobile computing technologies and applications
2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support
3. Identify the important issues of developing mobile computing systems and applications
4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;
5. Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools;
6. Organize and manage software built for deployment and demonstration.

UNIT I - MEDIUM ACCESS CONTROL

Motivation for Specialized MAC-SDMA-FDMA-TDMA-CDMA- Comparison of Access mechanism – telecommunication: GSM-DECT-TETRA-UMTS-IMT-200 - Satellite Systems :Basics – routing- Localization- Handover- Broadcast Systems : Overview _ Cyclic Repetition of Data- digital Audio Broadcasting - Digital Video Broadcasting

UNIT II - WIRELESS LAN

Infrared Vs Radio Transmission – Infrastructure Networks- Ad Hoc Network- IEEE 802.11 – HIPERLAN- Bluetooth – Wireless ATM: Working Group- Services- References Model- Function – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point control Protocols

UNIT III - MOBILE IP

Goals – Assumptions and Requirement –Entities- IP packet Delivery –Agent Advertisement and Discovery – Registration – Tunneling and encapsulation- Optimization –Reverse Tunneling- Ipv6- DHCP- Ad hoc Networks

UNIT IV - TRADITIONAL TCP

Indirect TCP- Snooping TCP – Mobile TCP –Fast retransmit/ Fast Recovery- Transmission/timeout Freezing- Selective Retransmission – Transaction Oriented TCP

UNIT V - WAP ARCHITECTURE

– Datagram protocol – Transport Layer Security – Transaction protocol- Session Protocol- application Environment – Wireless Telephony Application

SUGGESTED READINGS

1. Ashok, K.Talukder,& Roopa, R. Yavagal. (2008). Mobile Computing. Tata Mc-Graw Hill Publishing Company Pvt Ltd, New Delhi.
2. Raj Kamal . (2011). Mobile Computing. Pearson Education. Tomasz Imielinski,
3. Henry F. Korth . (2014). Mobile Computing. Springer , US.
4. Mischa Schwartz. (2005). Mobile Wireless Communications. Cambridge University Press.
5. J.Schiller. (2000). Mobile Communication, Addison Wesley.
3. William Stallings. (2004). Wireless Communication and Networks, Pearson Education
4. Singhal. (2003). AP-Wireless, Application Protocol, Pearson Education.
5. Lother Merk,Martin, S.Nicklaus and Thomas Stober. (2003). Principles of Mobile Computing, Second Edition,Springer.
6. William C.Y.Lee. (1993). Mobile Communication Design Fundamentals, John Wiley.

16RCS311 Paper – III: Special Paper X: Cloud Computing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External:100 Total: 100

End Semester Exam : 3

Course Objectives

To learn about the basic things involved in cloud computing and its architecture.

- To know the basics of cloud computing and its types.
- To know about the services such as IaaS, PaaS, SaaS, IDaaS and CaaS.
- To understand the Virtualization Technologies.
- To understand the Information Security, Privacy and Compliance Risks.
- To learn commercial Google Web services – Open Nebula.
- To portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.

Course Outcomes (COs)

On successful completion of the course the student should be able to:

1. Understand cloud architecture and model.
2. Identify various service models of Cloud computing.
3. Explore cloud infrastructure.
4. Learn Threat issues and Database Integrity Issues.
5. Learn Open Source and Commercial Clouds such as Microsoft Azure, Amazon EC2.
6. Provide a good understanding of the concepts, standards and protocols in Cloud computing

UNIT I - INTRODUCTION TO CLOUD COMPUTING

Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

UNIT II - INFRASTRUCTURE AS A SERVICE (IAAS)

Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) - Compliance as a Service (CaaS)- Cloud storage.

UNIT III - VIRTUALIZATION TECHNOLOGIES

Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

UNIT IV - CLOUD INFORMATION SECURITY OBJECTIVES

Confidentiality, Integrity, and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad

Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations

General Issues- Trusted Cloud Computing -Identity Management and Access Control

UNIT V - CASE STUDY ON OPEN SOURCE AND COMMERCIAL CLOUDS

Microsoft Azure- Amazon EC2-Google Web services-Open Nebula.

SUGGESTED READINGS

1. Dr Kumar Saurabh.(2012). Cloud Computing, 2nd Edition, Wiley India.
2. Barrie Sosinsky .(2010). Cloud Computing Bible, Wiley- India
3. Rajkumar Buyya, James Broberg, Andrzej M Goscinski. (2011). Tata Mc-Graw Hill, New Delhi.
4. Ronald L. Krutz, Russell Dean Vines. (2010). Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley –India
5. OpenNebula 3 Cloud Computing by Giovanni Toraldo, Packt Publishing.
6. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. (2010). Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
7. Nikos Antonopoulos, Lee Gillam. (2012). Cloud Computing: Principles, Systems and Applications, Springer.

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx
5. en.wikipedia.org/wiki/OpenNebula