

1. BIOMETRICS

Unit I

INTRODUCTION: Biometric fundamentals – Biometric Concepts and techniques – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems: FAR, FRR, FTE rate, EER and ATV rate.

Unit II

PHYSIOLOGICAL BIOMETRICS: Leading technologies : Finger-scan – Facial-scan – Iris-scan — components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.

Unit III

BEHAVIOURAL BIOMETRICS: Leading technologies: Signature-scan – Keystroke scan – Voice-scan- components, working principles, strengths and weaknesses.

Unit IV

BIOMETRIC APPLICATIONS: Categorizing biometric applications – application areas: criminal and citizen identification, surveillance, PC/network access, e-commerce and retail/ATM – costs to deploy – other issues in deployment

Unit V

PRIVACY AND STANDARDS IN BIOMETRICS: Types of errors: Acquisition Errors, Matching Errors, Performance Metrics: FTE, FTA, FNMR, FMR, Verification performance metrics, Identification Performance metrics.

REFERENCES:

1. Samir Nanavati, Michael Thieme, Raj Nanavati, “Biometrics – Identity Verification in a Networked World”, Wiley-dreamtech India Pvt Ltd, New Delhi, 2003
2. Paul Reid, “Biometrics for Network Security”, Pearson Education, New Delhi, 2004
3. John R Vacca, “Biometric Technologies and Verification Systems”, Elsevier Inc, 2007
4. Anil K Jain, Patrick Flynn, Arun A Ross, “Handbook of Biometrics”, Springer, 2008
5. Shimon K.Modi, “Biometric in Identity Management: Concepts to Applications

2. DIGITAL IMAGE PROCESSING

UNIT I

Introduction: The Origins of Digital Image Processing – Application of Digital Image Processing – Fundamental Steps in Digital Image Processing – Component of Image Processing System.

Fundamentals: Image Acquisition using a single server – Image Acquisition using sensor arrays.

UNIT II

Image Sampling and Quantization: Basic Concepts – Representing Digital Images – Spatial and gray level resolution – Aliasing & more Patterns – Zooming and Shrinking Digital Images

Basic Relationships between pixels: Neighbours of a pixel – Adjacency, connectivity, regions and boundaries – Distance Measures, Image operations on a pixel Basics.

UNIT III

Color Image Processing: Fundamentals – Color Models – RGB Color Model – CMY & CMYK color model – HIS model – Color Image Smoothing & Color Image Sharpening.

Image Enhancement in Spatial Domain: Gray level transformation: Image negatives – Log Transformation – Piecewise-Linear transformation function – Enhancement using arithmetic / logic operations: Image subtraction – Image Averaging.

UNIT IV

Image Compression: Fundamentals: Coding redundancy – Inter pixel redundancy – Psycho-visual redundancy – Image Compression models: The source Encoder and Decoder – The channel Encoder and Decoder.

UNIT V

Image Segmentation: Detection of Discontinuities: Point Detection – Line Detection – Edge detection

Representation of Images: Chain codes – Polygon approximation – Signatures – Boundary Segments – Skeletons.

TEXT BOOKS

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Prentice Hall of India, 2nd Edition, 2006.

3. DATA MINING AND WAREHOUSING

UNIT I

Data Warehousing: Introduction, Operational Data Stores (ODS), Extraction Transformation Loading (ETL), Data Warehouse Architecture, Design Issues, Guidelines for Data Warehouse Implementation, Metadata.

Online Analytical Processing (OLAP): Introduction, Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

UNIT II

Data Mining: Introduction, Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications

Association Analysis: Basic Concepts and Algorithms, Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of Association Patterns

UNIT III

Classification -1: Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbour Classifiers.

Classification – 2: Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of clarification methods, Evaluation criteria for classification methods, Multiclass Problem.

UNIT IV

Clustering Techniques: Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partition Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis.

Web Mining: Introduction, Web content mining, Text Mining, Unstructured Text, Text clustering, Mining Spatial and Temporal Databases.

UNIT V

Applications and Trends in Data Mining : Data Mining Applications: Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in

Other Scientific Applications, Data Mining for Intrusion Detection, Data Mining System Products and Research Prototypes: How to Choose a Data Mining System, Examples of Commercial Data Mining Systems.

Additional Themes on Data Mining: Theoretical Foundations of Data Mining, Statistical Data Mining, Visual and Audio Data Mining, Data Mining and Collaborative Filtering, **Social Impacts of Data Mining:** Ubiquitous and Invisible Data Mining, Data Mining, Privacy, and Data Security, **Trends in Data Mining**

TEXT BOOKS:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2005.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.

REFERENCE BOOKS

1. Arun K Pujari: Data Mining Techniques, 2nd Edition, Universities Press, 2009.
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
3. Alex Berson and Stephen J. Smith: Data Warehousing.

4. SOFTWARE ENGINEERING

UNIT I

Software Product and Process : Introduction – Software Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering overview – product engineering overview.

Software Requirements : Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structures Analysis and Data Dictionary.

UNIT II

Analysis, Design Concepts and Principles: System Engineering – Analysis Concepts – Design Process and Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring and Control System.

Testing: Taxonomy of Software Testing – Types of Software Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based on Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing and Debugging – Software Implementation Techniques.

UNIT III

Software Project Management : Measures and Measurements – ZIPF's Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling – Risk Management – CASE Tools.

UNIT IV

Design Related Issues: System Requirement Specification - DFD, Data Dictionary, ER – Diagram, Process Organization and Interactions, System Design – Problem Partitioning, Top-Down and Bottom-up design – Decision tree, decision table and structured English, Functional vs. Object-Oriented Approach.

Coding & Documentation – Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. Testing – Levels of Testing, Integration Testing, Test

case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control.

User Interface - Module Introduction, Objectives of Usability, How to Approach Usability, Designing with Usability in mind, Measuring Usability, Guidelines for User Interface Design, User Interface Elements.

Software Project Management – Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring.

UNIT V

Quality Management - Quality Concepts - Review Techniques - Software Quality Assurance - Software Testing Strategies - Testing Conventional Applications - Testing Object-Oriented Applications - Testing Web Applications - Formal Modelling and Verification - Software Configuration Management - Product Metrics.

Managing Software Projects - Project Management Concepts - Process and Project Metrics - Estimation for Software Projects - Project Scheduling - Risk Management - Maintenance and Reengineering.

TEXT BOOKS

1. Ian Sommerville, “Software Engineering”, Seventh Edition, Pearson Education Asia, 2007.
2. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005.
3. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Seventh Edition, McGraw-Hill International Edition, 2005.
4. R. G. Pressman – Software Engineering, TMH.

5.

SOFT COMPUTING

UNIT -I

Fundamentals of ANN: The Biological Neural Network, Artificial Neural Networks - Building Blocks of ANN and ANN terminologies: architecture, setting of weights, activation functions -McCulloch-pitts Neuron Model, Hebbian Learning rule, Perception learning rule, Delta learning rule.

UNIT -II

Models of ANN: Single layer perception, Architecture, Algorithm, application procedure - Feedback Networks: Hopfield Net and BAM -Feed Forward Networks: Back Propagation Network (BPN) and Radial Basis Function Network (RBFN) -Self Organizing Feature Maps: SOM and LVQ.

UNIT -III

Fuzzy Sets, properties and operations -Fuzzy relations, cardinality, operations and properties of fuzzy relations, fuzzy composition.

UNIT -IV

Fuzzy variables -Types of membership functions -fuzzy rules: Takagi and Mamdani –fuzzy inference systems: fuzzification, inference, rulebase, defuzzification.

UNIT -V

Genetic Algorithm (GA): Biological terminology –elements of GA: encoding, types of selection, types of crossover, mutation, reinsertion –a simple genetic algorithm –Theoretical foundation: schema, fundamental theorem of GA, building block hypothesis.

TEXT BOOKS:

- 1 S. N. Sivanandam, S. Sumathi, S.N. Deepa, "Introduction to Neural Networks using MATLAB 6.0 ", Tata McGraw-Hill, New Delhi, 2006.
- 2 S. N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley-India, 2008.
- 3 D.E. Goldberg, "Genetic algorithms, optimization and machine learning", Addison Wesley 2000.

6. MOBILE COMPUTING

UNIT -I

Mobile computing: Components of wireless environment-Challenges in Mobile environment-Mobile devices -Middleware and gateways -Wireless Internet -Smart clients -Three-tier Architecture-Design considerations for mobile computing-Mobility and Location based services –Active transactions -Device Technology – Voice technology –Personal digital assistant.

UNIT -II

Mobile computing through Internet-Mobile-enabled Applications -Developing Mobile GUIs –VUIs and Mobile Applications –Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data -SMS architecture -Java card –GPRS – Mobile Computing through Telephony -Synchronization protocol -Context-aware applications.

UNIT -III

Mobile Communication: Wireless Transmission –Medium Access Control – Telecommunication Systems –Satellite Systems –Broadcast system –Wireless LAN –Mobile IP –Mobile TCP.

UNIT -IV

ADHOC Wireless Network: Ad Hoc Wireless Network –MAC protocol –Routing protocols - Transport Layer Protocol -QOS –Energy Management.

UNIT -V

Wireless Sensor Network: Architecture and Design –Medium Access Control –Routing – Transport Layer –Energy model.

TEXT BOOKS:

- 1 William Stallings, "Wireless Communications & Networks", Pearson Education, 2005.
- 2 C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks -Architectures and Protocols", 2nd Edition, Pearson Education.
- 3 Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", TataMcGraw Hill, 2005.
- 4.Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff, Thomas Schack, "Pervasive Computing", Pearson, 2009.
- 5.Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

7. ARTIFICIAL NEURAL NETWORKS

Unit I

Characteristics of biological Neuron: Models of neuron –Terminology – Training of ANN – Preceptron – Preceptron learning –Training algorithms.

Unit II

Back Propagation network: Training algorithms – Applications Caveats –XOR function-Delta learning rule – Counter Propagation Networks – Normal operation of CPN – Training of Kohonen and Gross berg layers – data compression.

Unit III

Statistical methods: Training applications – general non-linear optimization problems – Boltzmann and Cauchy Training. Recurrent networks- Hop field net – applications.

Unit IV

Bi Directional associative memory (BAM) Structure - retrieving a stored association – encoding the associations – memory capacity -continuous, adaptive and competitive BAM. Adaptive Resonance Theory – architecture –characteristics – implementation – training example.

Unit V

Optical neural networks: Vector – matrix multipliers – Holographic Correlators - Cognition and neo-cognition.

Text Books

1. Philip D. Wassermann “Neural Computing :Theory and Practice”, Van Nastrand Reinhold.
2. James A.Freeman and David M.Skpura, “ Neural networks : Algorithms Applications and programming Techniques”, Addison -Wesley publishing company.

Reference Books

1. Beale and Jackson.“T – Neural – an Introduction”, Adam Hilger, 1990.
2. Robert J. Schalkoff, “ Artificial Neural Networks.” McGraw Hill International Ed, 1997.

8. NETWORK SECURITY

Unit I

Overview of Wireless Networks -Characteristics of the Wireless Medium – Physical Layer
Alternative for Wireless Networks -Wireless Medium Access Alternatives

Unit II

Network Planning -Wireless Network Operation – GSM and TDMA Technology

Unit III

CDMA Technology, IS-95 and IMT-2000 – Mobile Data Networks – Introduction to
Wireless LAN's

Unit IV

IEEE 802.11 WLAN's -Wireless ATM and HIPERLAN - Ad Hoc Networking and WPAN –
Wireless Geolocation Systems

Unit V

Case studies -Firewall Architecture

Text Books:

1. Keveh Pahlavan and Prashant Krishnamurthy, Principles of Wireless Networks, Prentice Hall of India, New Delhi, 2004
2. Norbert Pohlmann and Tim Crothers, Firewall Architecture for the Enterprise, Wiley Publishing Inc, New York, 2002.

9. BIG DATA ANALYTICS

UNIT I INTRODUCTION TO BIG DATA

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II MINING DATA STREAMS

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III HADOOP

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFSBasics- Developing a Map Reduce Application-How Map Reduce Works- Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT IV HADOOP ENVIRONMENT

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

UNIT V FRAMEWORKS

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

REFERENCE BOOKS

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012
4. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", JohnWiley & sons, 2012.
6. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007

10. PARALLEL COMPUTING

Unit I

The state of computing, Multiprocessors and Multicomputer, Multivector and SIMD computers PRAM and VLSI models, Architectural development Tracks. Program and Network properties: Conditions of Parallelism, program partitioning and scheduling, program flow mechanism, System interconnect architectures.

Unit II

Parallel Computing paradigms Description: Synchronous computation, Taxonomy of parallel algorithms, Design of parallel algorithms, parallel programming support, and paradigms for parallel algorithm: Binary tree paradigm, Growing by doubling, Pointer jumping technique, divide and conquer, partitioning,

Unit III

Design of simple algorithms: Scalar product of vectors, Matrix multiplication, partial sums, Binomial coefficients and Range minima problem.

Unit IV

Tree Algorithms Description: Euler circuits, Rooting a tree, Post order numbering, number of descendants, Lowest common ancestor, Tree Contraction, Arithmetic Expression Evaluation.

Unit V

Searching and Sorting Algorithms Description: Sequential searching, Parallel search in CREW PRAM, Parallel search in more data, searching in unsorted array, Merging by Ranking, Bitonic merging, Sequential sorting algorithms –Bubble sort, Insertion sort, Shell Diminishing increment sort, Heap Sort, Merge sort, Sorting networks.

Text Books:

[1] C.Lin, L.Snyder, Principles of Parallel Programming, Pearson, Addison Wesley, 2009.

[2] D.B. Kirk, Wen-mei W. Hwu, Programming Massively Parallel Processors, Morgan Kaufmann, 2010.

[3] J.L. Hennessy and D.A. Patterson, Computer Architecture: A Quantitative Approach, 4th ed. Morgan Kaufmann Publishers, 2007.

11. MACHINE LEARNING TECHNIQUES

UNIT I FOUNDATIONS OF LEARNING

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – approximation generalization tradeoff – bias and variance – learning curve

UNIT II LINEAR MODELS

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – going beyond linearity – generalization and overfitting – regularization – validation

UNIT III DISTANCE-BASED MODELS

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees – locality sensitive hashing – non-parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

UNIT IV TREE AND RULE MODELS

Decision trees – learning decision trees – ranking and probability estimation trees – regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

UNIT V REINFORCEMENT LEARNING

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal-difference learning – active reinforcement learning – exploration – learning an actionutility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

REFERENCES:

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2012.
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
7. T. M. Mitchell, "Machine Learning", McGraw Hill, 1997.
8. S. Russel and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2009.

12. CLOUD COMPUTING

UNIT I

Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

UNIT II

Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages

UNIT III

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs.

UNIT IV

Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google Application.

UNIT V

Best Practice Cloud IT Model : Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership

REFERENCES

1. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach [ISBN: 0071626948]
3. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]
4. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing –A Practical Approach", Tata McGraw Hill Education Pvt. Ltd, 2010.
5. Michael Miller, "Cloud Computing: Web based Applications that change the way you work and Collaborate online", Que Publishing, August 2008.
6. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On demand computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pvt. Ltd, July 2008.
7. Prof (Dr.) Andreas Polze, "A Comparative Analysis of Cloud Computing Environments".

13. GRID AND CLOUD COMPUTING

UNIT-I

Introduction to Grid Computing-Anatomy and Physiology of Grid –Early Grid Activities – Current Grid Activities–Grid Standards -Grid Business Areas–Grid Challenges and Applications-Grid Computing Organization and their roles.

UNIT -II

Service Oriented Architecture –Web Service Architecture –Grid Architecture –Implementing Grid Architecture-Globus Toolkit –Services -Open Grid Services Architecture -Grid Scheduling and Resource Management–Framework–Grid Resource Management Systems – Principles of Local Schedulers -Grid Scheduling with QoS –Data Management -Grid Security.

UNIT -III

Cloud Computing –Overview –Applications-Intranets and the Cloud –Companies in the Cloud Today-Cloud Computing Services-On Demand Computing –Discovering Cloud Services-Development Services and Tools.

UNIT -IV

Cloud hardware and infrastructure-clients-security-network-services-platforms-cloud storage - Cloud software architecture issues-Classification of Cloud Implementations.

UNIT -V

Operating System for the Cloud -Application Patterns and Architecture –Case Studies-Cloud Computing services available under various platforms.

TEXT BOOKS:

- 1 Josh Joseph, Craig Fellenstein, “Grid Computing”, IBM Press, Pearson Education, 2004.
- 2 Ian Foster, Carl Kesselman (eds.),”The Grid: Blueprint for a New Computing Infrastructure” , Morgan Kaufmann Publishers, 2004.
- 3 Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications, Firewall Media”, 2009.

4Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing –A Practical Approach”, Tata McGraw Hill Education Pvt. Ltd, 2010.

5 Michael Miller,” Cloud Computing: Web based Applications that change the way you work and Collaborate online”, Que Publishing, August 2008.

6 Haley Beard,”Cloud Computing Best Practices for Managing and Measuring Processes for On demand computing, Applications and Data Centers in the Cloud with SLAs”,Emereo Pvt. Ltd, July 2008.

7 Prof (Dr.) Andreas Polze, “A Comparative Analysis of Cloud Computing Environments”.

14. NETWORK SECURITY

UNIT I

Internet Security & Encryption: Encryption of static data, IPSec, AH, ESP, IKE, ISAKMP/Oakley, Tunnel mode, Transport mode, Virtual Private Networks (VPNs), SSH Tunneling, IP6 issues, Cloud Security Issues.

UNIT II

Firewalls: Packet Filters, Stateful, Stateless, Bastion Host, Circuit Level, Application Gateway, SOCKS, DMZ, Host-Based Firewall, Egress Filtering, Network Address Translation (NAT), Multi-homing, IPTables/NetFilter, implementing NAT.

UNIT III

Sniffers and Packet Crafting: Libpcap, dSniff, Wireshark, tcpdump, Mitigation of Sniffer Attacks, ARP Cache Poisoning, Port Stealing, Switch flooding, DNS and IP Spoofing, Session Hijacking, Sequence Numbers, Ettercap, idle host scanning, Default TTLs, Countermeasures, Packet Crafting using eghping, scapy.

Unit IV

Wireless Security:

802.11, wardriving, netstumbler, kismet, wellenreiter, WEP, WPA, cowpatty.

Unit V

Intrusion Detection & Prevention: Focus on NIDS, snort, Types of IDSs, Network IDSs, Anomaly based Detection, Signature based Detection, Evasion Techniques, False Positives, NIDS implementation using eg snort, Data Loss Prevention.

REFERENCES:

1. Eric Cole, Ronald L. Krutz, James Conley 2005, Network Security Bible, Wiley [ISBN: 0764573977]
2. John R. Vacca 2006, Guide to Wireless Network Security, Springer [ISBN: 0387954252]
3. Johnny Long, Chris Hurley, SensePost, Mark Wolfgang, Mike Petruzzi 2005, Penetration Tester's Open Source Toolkit, Syngress [ISBN: 1597490210]

4. Barrie Dempster, James Eaton-Lee 2006, Configuring IPCop Firewalls: Closing Borders with Open Source, Packet Publishing [ISBN: 1-904811-36-1]
5. Lucian Gheorghe 2006, Designing and Implementing Linux Firewalls and QoS using netfilter, iproute2, NAT, and L7-filter, Packt Publishing [ISBN: 1-904811-65-5]
6. Mark Rhodes-Ousley, Roberta Bragg, Keith Strassberg 2003, Network Security: The Complete Reference, McGraw-Hill [ISBN: 0072226978]
7. Chuck Easttom 2005, Network Defense and Countermeasures: Principles and Practices [ISBN: 978-0131711266]
8. Juniper Networks 2007, VPN Decision Guide: IPSec vs. SSL VPN Decision Criteria

15. INTERNET OF THINGS (IoT)

Unit I : Introduction to IoT

IOT terms and Basic Definitions, Disambiguation of IoT vs IoE vs M2M vs Others, Characteristics of IoT, Wireless Sensor Networks: Potential Applications, WSN System Architecture, WSN Network Topologies, Components of a WSN Node.

Architecture of IoT systems: Things in IoT, Applications of IoT and IoT Reference model, IoT Ecosystem, Enabling Technologies in IoT, Marketplace and Vision of IoT.

Unit II: Hardware aspects of IoT: Sensors and Actuators

Introduction to Sensors: Workflow of a Sensor in a typical system, Classification of Sensors, Sampling DAC and ADC conversion, Introduction to Actuators: Workflow of an Actuator in a typical system, Classification of Actuators, Types of Sensors, Interfacing concepts to embedded systems.

Unit III : Communications and networking aspects of IoT

High bandwidth networking: Ethernet, gigabit Ethernet, Ethernet topologies like bridge and switches, Passive optical fiber network and topologies, WiFi and WiMax. WiFi routers, radius servers, Wireless security with WPA-2, LEAP, enterprise WPA networks Low Bandwidth Wireless Networks: FSK, LoRa modulation basics, LoRaWAN basics, Peripherals networking: Basics of I2C, SPI, RS232, RS485 and CAN bus.

Unit IV : Software and middleware aspects of IoT

Middleware: Components of Middleware, Types of Databases, Micro services and API's, IP Communication protocols: HTTP, AMQP, MQTT and STOMP, Protocol definitions, use cases and differences.

Unit V : IoT Platform Design Methodology and Domain Specific IoT

Futuristic view of IoT, problems pertaining to implementation like scaling, feasibility and management, IoT Platform Design Methodology.

Text Book:

1. Srinivasa K G, Siddesh G.M and HanumanthaRaju R —Internet of Things,CENGAGE Learning India, 2017. (ISBN:978-93-868-5895-5).

References:

2.Vijay Madiseti and ArshdeepBahga, —Internet of Things (A Hands-on-Approach),

1stEdition, VPT, 2014. (ISBN: 978-8173719547).

3. Designing the Internet of Things by Adrian McEwen Smart Cities, Software above

the level of a single device,Ebooks on IoT by O'Reilly