

SIXTH SEMESTER

Course Code: BTIT 601-18	Course Title : Big Data	3L:0T:0P	3Credits
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Unit 1

Introduction to Big Data: Types of Digital Data-Characteristics of Data – Evolution of Big Data - Definition of Big Data - Challenges with Big Data - 3Vs of Big Data - Non Definitional traits of Big Data - Business Intelligence vs. Big Data - Data warehouse and Hadoop environment - Coexistence. Big Data Analytics: Classification of analytics - Data Science - Terminologies in Big Data - CAP Theorem - BASE Concept. NoSQL: Types of Databases – Advantages – NewSQL - SQL vs. NOSQL vs NewSQL. Introduction to Hadoop: Features – Advantages – Versions - Overview of Hadoop Eco systems - Hadoop distributions - Hadoop vs. SQL – RDBMS vs. Hadoop - Hadoop Components – Architecture – HDFS - Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting - Compression. Hadoop 2 (YARN): Architecture - Interacting with Hadoop Eco systems.

[10hrs] (CO 1, CO2)

Unit 2

No SQL databases: Mongo DB: Introduction – Features - Data types - Mongo DB Query language - CRUD operations – Arrays - Functions: Count – Sort – Limit – Skip – Aggregate - Map Reduce. Cursors – Indexes - Mongo Import – Mongo Export. Cassandra: Introduction – Features - Data types – CQLSH - Key spaces - CRUD operations – Collections – Counter – TTL - Alter commands - Import and Export - Querying System tables.

[8hrs] (CO 3)

Unit 3

Hadoop Eco systems: Hive – Architecture - data type - File format – HQL – SerDe - User defined functions - Pig: Features – Anatomy - Pig on Hadoop - Pig Philosophy - Pig Latin overview - Data types - Running pig - Execution modes of Pig - HDFS commands - Relational operators - Eval Functions - Complex data type - Piggy Bank - User defined Functions - Parameter substitution - Diagnostic operator. Jasper Report: Introduction - Connecting to Mongo DB - Connecting to Cassandra

[8hrs] (CO 4)

Unit 4

Analytical Approaches, Introducing to various Analytical Tools, Installing R, Handling Basic Expressions in R, Variables in R, working with Vectors, Storing and Calculating Values in R, Creating and Using Objects, interacting with Users, Handling Data in R Workspace, Executing Scripts, Reading Datasets and Exporting Data from R, Manipulating and Processing Data in R, working with Functions and Packages in R, Performing Graphical Analysis in R, Techniques Used for Visual Data Representation, Types of Data Visualization

[10 hrs] (CO 5)

Suggested Readings/ Books:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publication, 2015.
2. Big Data, Black Book by DT Editorial Services, Dreamtech Press.
3. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, “Big Data for Dummies”, John Wiley & Sons, Inc., 2013.

4. Tom White, “Hadoop: The Definitive Guide”, O’Reilly Publications, 2011.
5. Kyle Banker, “Mongo DB in Action”, Manning Publications Company, 2012.
6. Russell Bradberry, Eric Blow, “Practical Cassandra A developers Approach“, Pearson Education, 2014.

Course Outcomes

- CO1:** Understand fundamental concepts of Big Data and its technologies
- CO2:** Apply concepts of MapReduce framework for optimization
- CO3:** Analyze appropriate NoSQL database techniques for storing and processing large volumes of structured and unstructured data
- CO4:** Understand various components of Hadoop ecosystems
- CO5:** Explore modern tools and packages for data visualization

Course Code: BTIT 604 -18	Course Title : Big Data Lab	0L:0T:2P	3Credits
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Detailed List of Tasks:

1. (i) Perform setting up and Installing Hadoop in its two operating modes:
 - Pseudo distributed,
 - Fully distributed.
2. Use web based tools to monitor your Hadoop setup.
3. Implement the following file management tasks in Hadoop:
 - Adding files and directories
 - Retrieving files
 - Deleting files
4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
 - Find the number of occurrence of each word appearing in the input file(s)
 - Performing a MapReduce Job for word search count (look for specific keywords in a file)
5. Stop word elimination problem:
 - Input:
 - o A large textual file containing one sentence per line
 - o A small file containing a set of stop words (One stop word per line)
 - Output:
 - o A textual file containing the same sentences of the large input file without the words appearing in the small file.
6. Using various mathematical functions on console in R
7. Write an R script, to create R objects for calculator application and save in a specified location in disk.
8. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets
9. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset.
 - Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
 - Reading Excel data sheet in R.
 - Reading XML dataset in R.
10. Visualizations using R packages
 - Find the data distributions using box and scatter plot.
 - Find the outliers using plot.

- Plot the histogram, bar chart and pie chart on sample data.

Suggested Tools: -

- RStudio
- Apache Hadoop
- Oracle VM Virtual Box

Course Code: BTIT602-18	Course Title: Web Technologies	3L:0T:0P	3 Credits
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Detailed Contents:

Module 1:

Introduction: History and evolution of Internet protocols, Internet addressing, Internet Service Provider (ISP), Introduction to WWW, DNS, URL, HTTP, HTTPS, SSL, Web browsers, Cookies, Web servers, Proxy servers, Web applications. Website design principles, planning the site and navigation.
[6 hrs][CO1]

Module 2:

HTML and DHTML: Introduction to HTML and DHTML, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images, Multimedia, Links, Audio, Video, Table and Forms, Document Layout, HTML vs. DHTML, Meta tags, Browser architecture and Website structure. Overview and features of HTML5.
[7 hrs][CO2]

Module 3:

Style Sheets: Need for CSS, Introduction to CSS, Basic syntax and structure, Types of CSS – Inline, Internal and External CSS style sheets. CSS Properties - Background images, Colors and properties, Text Formatting, Margin, Padding, Positioning etc., Overview and features of CSS3.
[7 hrs][CO3]

Module 4:

Java Script: Introduction, JavaScript's history and versions, Basic syntax, Variables, Data types, Statements, Operators, Functions, Arrays, Objects, dialog boxes, JavaScript DOM.
[7

hrs][CO4]

Module 5:

PHP and MySQL: Introduction and basic syntax of PHP, Data types, Variables, Decision and looping with examples, String, Functions, Array, Form processing, Cookies and Sessions, E-mail, PHP-MySQL: Connection to server.
[7 hrs][CO5]

Module 6:

Ajax and JSON: AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, Advantages & disadvantages, HTTP request, XMLHttpRequest Server Response. JSON– Syntax,

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Schema, Data types, Objects, Reading and writing JSON on client and server. Using JSON in AJAX applications. [8 hrs][CO6]

Students shall be able to:

- CO1. Understand and apply the knowledge of web technology stack to deploy various web services.
- CO2. Analyze and evaluate web technology components for formulating web related problems.
- CO3. Design and develop interactive client server internet application that accommodates user specific requirements and constraint analysis.
- CO4. Program latest web technologies and tools by creating dynamic pages with an understanding of functions and objects.
- CO5. Apply advance concepts of web interface and database to build web projects in multidisciplinary environments.
- CO6. Demonstrate the use of advance technologies in dynamic websites to provide performance efficiency and reliability for customer satisfaction.

Text Books:

- 1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education
- 2. Rajkamal, "Internet and Web Technology", Tata McGraw Hill
- 3. Ray Rischpater, "JavaScript JSON Cookbook", Packt Publishing.
- 4. Ivan Bayross, "Web Enabled Commercial Application Development using HTML, DHTML JavaScript, Perl, CGI", BPB Publications.
- 5. Peter Moulding, "PHP Black Book", Coriolis.

Course Code: BTIT605-18	Course Title: Web Technologies Lab	0L:0T:2P	1 credits
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List of Experiments:

- 1. Configuration and administration Apache Web Server.
- 2. Develop an HTML page to demonstrate the use of basic HTML tags, Link to different HTML page and also link within a page, insertion of images and creation of tables.
- 3. Develop a registration form by using various form elements like input box, text area, radio buttons, check boxes etc.
- 4. Design an HTML page by using the concept of internal, inline, external style sheets.
- 5. Create an HTML file to implement the styles related to text, fonts, links using cascading style sheets
- 6. Create an HTML file to implement the concept of document object model using JavaScript
- 7. Create an HTML page including JavaScript that takes a given set of integer numbers and shows them after sorting in descending order.

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8. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.
9. Create a PHP file to print any text using variable.
10. Demonstrate the use of Loops and arrays in PHP
11. Create a PHP file using GET and POST methods.
12. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands.
13. Implement login page contains the user name and the password of the user to authenticate with Session using PHP and MySQL, also implement this with the help of PHP-Ajax.
14. A web application for implementation:
 - a. The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions.
 - b. If name and password matches, serves a welcome page with user's full name.
 - c. If name matches and password doesn't match, then serves "password mismatch" page
 - d. If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)
15. Demonstrate the use of Ajax and JSON Technologies in programming examples.
16. Demonstrate the use of web site designing tools such as Joomla, WordPress.
17. Implement at least one minor project using different technologies mentioned in theory of the subject.

ELECTIVES II

Course Code: BTIT 606-18	Course Title : Fundamentals of Virtualization	3L:0T:0P	3Credits
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Detailed Contents:

UNIT 1: Introduction to Virtualization

Physical and Virtual Machines, Traditional and Virtual Computing, Understanding virtualization, Need, Limitation and Applications of virtualization, Simulations and Emulations, Challenges in Virtualized Environment, Tools and Technologies in virtualized environments.
[8hrs] (CO 1)

UNIT 2: File Systems

Memory and Storage, File systems, Distributed file systems, Map and Reduce, Hadoop File Systems, Google File System, Big table. Various forms of virtualization: Desktop, Application, Server, Hardware, Storage, Memory and I/O virtualization
[9hrs] (CO 2)

UNIT 3: Server Virtualization

Server consolidation, Privileged Instructions, Binary translation, Hypervisors, Types of Hypervisors, Hypervisor Architecture, Full virtualization, Para Virtualization, Hardware Assisted virtualization, Implementation of hardware Assisted virtualization, Algorithms for Implementation of virtualization of virtualization, Challenges.
[6hrs] (CO 3)

UNIT 4 VM Management and Storage virtualization

VM lifecycle, Process and system level VMs, VM configurations, VM migrations, Migration types and process, VM provisioning, scaling, VM scheduling, load balancing: significance, types and algorithms, RAID, SCSI, iSCSI, Direct attached storage, Network Attached storage, Storage Area network.
[6hrs] (CO 4)

UNIT 5 Virtualization Performance and security

Performance issues, virtual machine sprawling, Hypervisor vulnerabilities, Hypervisor attacks, VM attacks, VM migration attacks, Security Solutions
[6hrs] (CO 5)

Course Outcomes:

After learning the course the students should be able to

CO1: Understanding Virtual machines and Implementation of virtual machines

CO2: Understanding virtualization and various ways of using virtualization

CO3: Implementation of private cloud platform using virtualization

CO4: Use virtual machines of public cloud platform

Suggested Readings/ Books:

Text Books:

1 Chris Wolf and Erick M. Halter, “Virtualization” A press; 1 edition 2005.

2 LatifaBoursas (Editor), Mark Carlson (Editor), Wolfgang Hommel (Editor), Michelle Sibilla (Editor), KesWold (Editor), “Systems and Virtualization Management: Standards and New Technologies”, October 14, 2008

Reference Books

1 Massimo Cafaro (Editor), Giovanni Aloisio (Editor), “Grids, Clouds and Virtualization” Springer; edition 2011.

2 Edward L. Haletky, “VMware ESX Server in the enterprise”. Prentice Hall; 1 edition 29 Dec 2007.

3 Gaurav Somani, “Scheduling and Isolation in Virtualization”, VDM VerlagDr.Müller [ISBN: 978- 3639295139], Muller Publishers, Germany, Sept. 2010

4 Edward Haletky, “VMware ESX and ESXi in the Enterprise – Planning Deployment of Virtualization Servers” [ISBN: 978-0137058976]., Prentice Hall; 2 edition February 18, 2011.

Course Code: BTIT 614-18	Course Title: Fundamentals of Virtualization lab	L:0;T:0; 2P:	1Credits
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Detailed List of Tasks:

1. Creating Private cloud using Virtualization tool(XEN)
2. Working with Virtual machine in Public cloud(AWS/Azure)
3. Hadoop Installation and Working with HDFS
4. Map reduce programming on pubic cloud
5. Virtual machine migration and cloning on private cloud
6. Implementation of Storage virtualization using FreeNAS
7. Load balancing on public cloud platform

Suggested Tools:

The virtualization systems management tools that currently have the greatest market share include:

- **VMware** vCenter and vRealize Suite (many of the third-party tools have similarities to the vRealize Suite)
- **Microsoft System Center Virtual Machine Manager.**
- **Citrix Systems XenCenter.**
- **VMTurbo Operations Manager.**
- **Dell Foglight.**

CourseCode: BTIT607-18	CourseTitle: Distributed Systems	3L:0T:0P	3Credits
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Detailed Contents:

Unit-1: Introduction to Distributed systems, Operating Systems, Types of distributed systems, Concurrent Programming, Characteristics & Properties of Distributed Systems – Taxonomy - Design goals – Transparency Issues.

System architectures; Centralized, Decentralized and Hybrid architectures, Architectures versus middleware, Self-management in distributed systems, feedback control model.

[7hrs] (CO 1)

Unit 2: Processes and communication: Introduction to threads, Threads in distributed systems, role of virtualization in distributed systems, Clients, Servers, Code migration and approaches to code migration.

Types of communication, Layered protocols and its types, Remote procedure call, Basic RPC operation, Parameter passing, Asynchronous RPC, Message-oriented transient and persistent communication.

[7hrs] (CO 2)

Unit 3: Naming and Synchronization: Names, identifiers, and addresses, concept of flat naming, Structured naming and attribute based naming.

Coordination and clock synchronization, Logical clocks, Mutual exclusion, distributed mutual exclusion, Global positioning of nodes and election algorithms.

[7hrs] (CO 3)

Unit 4: Consistency and replication: Introduction, reasons for replication, Data-centric consistency models; Continuous consistency, Sequential consistency, Causal consistency, Client-centric consistency, Eventual consistency, Monotonic reads and writes.

Replica management; Replica-server placement, Content replication and placement and Content distribution.

[7hrs] (CO 4)

Unit 5: Security and Fault tolerance: Security threats, policies, and mechanisms, Design issues, Cryptography, Access control and Security management.

Introduction to fault tolerance, Process resilience, Reliable group communication, Recovery.

[7hrs] (CO 5)

Course Outcomes:

After undergoing this course, the students will be able to learn about:

CO1: Basic principles of distributed systems, its types, properties and architecture.

CO2: Concepts of threats in Distributed systems and types of communications.

CO3: Coordination and synchronization principles in distributed systems

CO4: Fundamentals of various types of consistency and replica management techniques.

CO5: Concepts related to fault tolerance, recovery and security mechanisms.

Suggested Readings/ Books:

1. A S Tanenbaum, Martin Steen, "Distributed Systems: Principles and Paradigms", 2/E, PHI
2. Colouris, Dollimore, Kindberg, "Distributed Systems Concepts & Design", 4/E, Pearson Ed.

Course Code: BTIT 608-18	Course Title : Machine Learning	3L:0T:0P	3Credits
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Detailed Contents:

UNIT 1: Introduction: Well-Posed learning problems, Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning, Unsupervised learning and Reinforcement learning.

[4hrs] (CO 1)

UNIT 2: Data Pre-processing: Need of Data Pre-processing, Data Pre-processing Methods: Data Cleaning, Data Integration, Data Transformation, Data Reduction; Feature Scaling (Normalization and Standardization), Splitting dataset into Training and Testing set.

[4hrs] (CO 2)

UNIT 3: Regression: Need and Applications of Regression, Simple Linear Regression, Multiple Linear Regression and Polynomial Regression, Evaluating Regression Models Performance (RMSE, Mean Absolute Error, Correlation, RSquare, Accuracy with acceptable error, scatter plot, *etc.*)

[6hrs] (CO 3)

UNIT 4 Classification: Need and Applications of Classification, Logistic Regression, Decision tree, Tree induction algorithm – split algorithm based on information theory, split algorithm based on Gini index; Random forest classification, Naïve Bayes algorithm; K-Nearest Neighbours (K-NN), Support Vector Machine (SVM), Evaluating Classification Models Performance (Sensitivity, Specificity, Precision, Recall, *etc.*). **Clustering:** Need and Applications of Clustering, Partitioned methods, Hierarchical methods, Density-based methods.

[12hrs] (CO 4)

UNIT 5 Association Rules Learning: Need and Application of Association Rules Learning, Basic concepts of Association Rule Mining, Naïve algorithm, Apriori algorithm. **Artificial Neural Network:** Need and Application of Artificial Neural Network, Neural network representation and working, Activation Functions. **Genetic Algorithms:** Basic concepts, Gene Representation and Fitness Function, Selection, Recombination, Mutation and Elitism.

[14hrs] (CO 5)

Course Outcomes:

After undergoing this course, the students will be able to:

CO1: Analyse methods and theories in the field of machine learning

CO2: Analyse and extract features of complex datasets

CO3: Deploy techniques to comment for the Regression

CO4: Comprehend and apply different classification and clustering techniques

CO5: Understand the concept of Neural Networks and Genetic Algorithm

Suggested Readings/ Books:

Text Books:

1. Mitchell M., T., Machine Learning, McGraw Hill (1997) 1stEdition.
2. Alpaydin E., Introduction to Machine Learning, MIT Press (2014) 3rdEdition.
3. Vijayvargia Abhishek, Machine Learning with Python, BPB Publication (2018)

Reference Books:

1. Bishop M., C., Pattern Recognition and Machine Learning, Springer-Verlag (2011) 2ndEdition.
2. Michie D., Spiegelhalter J. D., Taylor C. C., Campbell, J., Machine Learning, Neural and Statistical Classification. Overseas Press (1994).

Course Code: BTIT616-18	Course Title: Machine Learning Lab	L:0;T:0;2 P:	1Credits
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Detailed List of Tasks:

1. Implement data pre-processing
2. Deploy Simple Linear Regression
3. Simulate Multiple Linear Regression
4. Implement Decision Tree
5. Deploy Random forest classification
6. Simulate Naïve Bayes algorithm
7. Implement K-Nearest Neighbors (K-NN), k-Means
8. Deploy Support Vector Machine, Apriori algorithm
9. Simulate Artificial Neural Network

10. Implement the Genetic Algorithm code

Suggested Tools Python/R/MATLAB

Course Code: BTIT 609-18	Course Title : Agile Software Development	3L:0T:0P	3Credits
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Detailed Contents:

UNIT 1: Introduction

Need of Agile software development, History of Agile, Agile context– manifesto, principles, methods, values. The benefits of agile in software development.

[6hrs] (CO 1)

UNIT 2: Agile Design Methodologies

Fundamentals, Design principles–Single responsibility, Open-closed, Liskov-substitution, Dependency-inversion, Interface-segregation.

[6hrs] (CO 2)

UNIT 3: Scrum

Introduction to scrum framework, Roles: Product owner, team members and scrum master, Events: Sprint, sprint planning, daily scrum, sprint review, and sprint retrospective, Artifacts: Product backlog, sprint backlog and increments. User stories- characteristics and contents.

[8hrs] (CO 3)

UNIT 4: Kanban

Introduction to Kanban framework, Workflow, Limit the amount of work in progress, pulling work from column to column, Kanban board, Adding policies to the board, Cards and their optimization.

[6hrs] (CO 4)

UNIT 5: Extreme Programming

Basic values and principles, Roles, Twelve practices of XP, Pair programming, XP team, Life cycle and tools for XP.

[6hrs] (CO 5)

UNIT 6: Agile Testing

The Agile lifecycle and its impact on testing, Test driven development– Acceptance tests and verifying stories, writing a user acceptance test, Developing effective test suites, Continuous

integration, Code refactoring. Risk based testing, Regression tests, Test automation. **[6hrs]**

(CO 6)

Course Outcomes:

After undergoing this course, the students will be able to:

CO1: Understand concept of agile software engineering and its advantages in software development.

CO2 Explain the role of design principles in agile software design.

CO3 Define the core practices behind Scrum framework.

CO4 Understand key principles of agile software development methodology-Kanban.

CO5 Describe implications of functional testing, unit testing, and continuous integration.

CO6 Understand the various tools available to agile teams to test the project.

Suggested Readings/ Books:

1. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson.
2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall.
3. Mike Cohn, "User Stories Applied: For Agile Software Development", Addison Wesley Signature Series.
4. Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley.
5. Paul VII, "Agile: The Complete Overview of Agile Principles and Practices (Agile Product Management)".
6. Robert Martin, "Agile Software Development, Principles, Patterns, and Practices", Pearson New International Edition.
7. Greene Jennifer," Learning Agile", O'Reilly Series.

Course Code:BTIT 617-18	Course Title : Agile Software Development Lab	L:0T:2P	1Credits
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Detailed List of Tasks:

1. Understand the background and driving forces for taking an Agile Approach to Software Development.
 2. Build out a backlog and user stories.
 3. To study automated build tool.
 4. To study version control tool.
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5. To study Continuous Integration tool.
 6. Apply Design principle and Refactoring to achieve agility.
 7. Perform Testing activities within an agile project.
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ELECTIVE III

Course Code: BTIT 610-18	Course Title : Cryptography and Network Security	3L:0T:0P	3Credits
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Detailed Contents:

UNIT 1: Introduction (3 Hours)

Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism, Conventional Encryption Model, CIA model

[5hrs] (CO 1)

UNIT 2: Math Background

Modular Arithmetic, Euclidean and Extended Euclidean algorithm, Prime numbers, Fermat and Euler's Theorem

[5hrs] (CO 1)

UNIT 3: Cryptography

Dimensions of Cryptography, Classical Cryptographic Techniques Block Ciphers (DES, AES) : Feistel Cipher Structure, Simplified DES, DES, Double and Triple DES, Block Cipher design Principles, AES, Modes of Operations Public-Key Cryptography : Principles Of Public-Key Cryptography, RSA Algorithm, Key Management, Diffie- Hellman Key Exchange, Elgamal Algorithm, Elliptic Curve Cryptography

[12hrs] (CO 2)

UNIT 4 Hash and MAC Algorithms

Authentication Requirement, Functions, Message Authentication Code, Hash Functions, Security Of Hash Functions And Macs, MD5 Message Digest Algorithm, Secure Hash Algorithm, Digital Signatures, Key Management : Key Distribution Techniques, Kerberos

[6hrs] (CO 3)

UNIT 5 Security in Networks

Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME

[7hrs] (CO 4)

Course Outcomes:

After undergoing this course, the students will be able to:

CO1: Understand the fundamental principles of access control models and techniques, authentication and secure system design

CO2: Have a strong understanding of different cryptographic protocols and techniques and be able to use them.

CO3: Apply methods for authentication, access control, intrusion detection and prevention.

CO4: Identify and mitigate software security vulnerabilities in existing systems.

Suggested Readings/ Books:

1. Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education
 2. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR
 3. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
 4. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.
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Course Code: BTIT 618-18	Course Title: Cryptography and Network Security Lab	L:0;T:0; P:	Credits
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Detailed List of Tasks:

1. W.A.P. to implement Ceaser Cipher
2. W.A.P. to implement Affine Cipher with equation $c=3x+12$
3. W.A.P. to implement Playfair Cipher with key ldrp
4. W.A.P. to implement polyalphabetic Cipher
5. W.A.P. to implement AutoKey Cipher
6. W.A.P. to implement Hill Cipher. (Use any matrix but find the inverse yourself)
7. W.A.P. to implement Rail fence technique
8. W.A.P. to implement Simple Columnar Transposition technique
9. W.A.P. to implement Advanced Columnar Transposition technique
10. W.A.P. to implement Euclidean Algorithm
11. W.A.P. to implement Advanced Euclidean Algorithm
12. W.A.P. to implement Simple RSA Algorithm with small numbers

Suggested Tools -

MANAGEMENT INFORMATION SYSTEMS

L 3 T 0 P 0

BTIT 611-18

Credits 3

Module 1: Fundamentals of Information Systems:

The Fundamental Roles of Information System in Business, Trends in Information Systems, The Role of e-Business, Types of Information Systems, Components of Information Systems, Information System Resources, Information System Activities, Strategic Uses of Information Technology.
[8hrs] (CO1)

Module 2: e-Business Systems

Introduction, Cross-Functional Enterprise Applications, Enterprise Application Integration, Transaction Processing Systems, Enterprise Collaboration Systems, Functional Business Systems, Marketing Systems, Manufacturing Systems, Human Resource Systems, Accounting Systems, Financial Management Systems **[8hrs] (CO2)**

Module 3: Enterprise Business Systems

Customer Relationship Management, Three Phases of CRM, Benefits and Challenges of CRM, Trends in CRM, Enterprise Resource Planning, Benefits and Challenges of ERP, Trends in ERP, Supply Chain Management, Benefits and Challenges of SCM, Trends in SCM. **[8hrs] (CO3)**

Module 4: e-Commerce Systems

Introduction to e-Commerce, The Scope of e-Commerce, Essential e-Commerce Processes, Electronic Payment Processes, e-Commerce Applications and Issues, Business-to-Consumer e-Commerce, Business-to-Business e-Commerce. **[6hrs] (CO4)**

Module 5: Decision Support System

Introduction, Decision Support Trends, Decision Support Systems, Management Information Systems, Online Analytical Processing, Executive Information Systems, Knowledge Management Systems, Artificial Intelligence Technologies in Business, Expert Systems, Components of an Expert System, Expert System Applications, Benefits of Expert Systems, Limitations of Expert Systems. **[10hrs] (CO4)**

Course Outcomes: The student will be able to:

CO1: Understand the role of Information System and its strategic use

CO2: Understand the concept of Enterprise Applications and its various types

CO3: Learn about core concepts of CRM, ERP and SCM

CO4: Know about e-commerce platforms along with intelligent decision support system.

Text Books

1. Management Information systems, James A. O'Brien, George M. Marakas, McGraw Hill Publishing Company Limited.

Reference Books

1. Management Information Systems- Managing the Digital Firm, Kenneth C. Laudon, Jane P. Laudon, Pearson Education Limited.
2. Management Information Systems, Kenneth J. Sousa, Effy Oz, Cengage Learning.

MANAGEMENT INFORMATION SYSTEMS LAB

L O T O P 2

BTIT 619-18

Credits 1

List of Experiments:

1. Prepare a case study to show the importance of Information System in developing a Business. **(CO1)**
2. Plan some Information System Activities for the Strategic Uses of Information Technology in e-commerce business. **(CO1)**
3. Prepare a real world case study based on CRM for an online start-up business. **(CO2)**
4. Design an ERP model for an organisation involved in data management. **(CO2)**
5. Prepare a real world case study to discuss how SCM helps enterprise to optimise resources. **(CO2)**
6. Study and analyse a real world online business model involved in B2C activities. **(CO3)**
7. Study and analyse a real world business model involved in B2B activities with its advantages. **(CO3)**
8. Discuss a case study to highlight the importance of Decision Support System in real world. **(CO4)**
9. Develop an Expert System model for an organisation involved in research and development activities of medicines. **(CO4)**
10. Highlight some case studies where Artificial Intelligence based Technologies played a key role in developing Business. **(CO4)**

Course Outcomes: The student will be able to:

CO1: Study the role of Information System in real world case studies.

CO2: Understand working models of CRM, ERP and SCM

CO3: Learn about B2B, B2C activities with real world examples.

CO4: Learn to understand DSS, Expert System in developing business applications.

Course Code: BTIT 612-18	Course Title : Digital Image Processing	3L:0T:0P	3Credits
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Detailed Contents:

UNIT 1: Introduction of Digital Image Processing (DIP)

Introduction to the DIP areas and applications; Components of Digital Image Processing; Elements of Visual Perception; Image Sensing and Acquisition; Image Sampling and Quantization; Relationships between pixels; color models.

[7hrs] (CO 1)

UNIT 2: Image Enhancement

Spatial Domain: Gray level transformations; Histogram processing; Basics of Spatial Filtering; Smoothing and Sharpening Spatial Filtering

Frequency Domain: Introduction to Fourier Transform; Smoothing and Sharpening frequency domain filters; Ideal, Butterworth and Gaussian filters

[10hrs] (CO 2)

UNIT 3: Image Restoration

Noise models; Mean Filters; Order Statistics; Adaptive filters; Band reject Filters; Band pass Filters; Notch Filters; Optimum Notch Filtering; Inverse Filtering; Wiener filtering

[8hrs]

(CO 3)

UNIT4: Feature Extraction and Image Segmentation

Feature Extraction: Contour and shape dependent feature extraction, Extraction of textural features

Segmentation: Detection of Discontinuities; Edge Linking and Boundary detection; Region based segmentation; Morphological processing- erosion and dilation.

[10hrs] (CO 4)

UNIT 5: Image Compression and Encoding

Entropy-based schemes, Transform-based encoding, Predictive encoding and DPCM, Vector quantization, Huffman coding.

[10hrs](CO 5)

Course Outcomes:

After undergoing this course, the students will be able to:

CO1: Understand the basic concepts of DIP.

CO2: Improve the quality of digital images.

CO3: Understand and De-noise Digital Images

CO4: Segment digital images and extract various features from digital images

CO5: Understand various image compression techniques and apply such techniques to compress digital images for reducing the sizes of digital images.

Suggested Readings/ Books:

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.
2. Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, "Digital Image Processing", John Willey, 2002.
4. Nick Efford, "Digital Image Processing a practical introduction using Java", Third Edition, Pearson Education, 2004.
5. R.C. Gonzalez, R.E. Woods, and S. L. Eddins "Digital Image Processing using MATLAB", Pearson Prentice-Hall, 2004.

6. Sandipan Dey, "Hands-On Image Processing with Python", Packt, 2018

Course Code: BTIT 620-18	Course Title: Digital Image Processing Lab	L:0;T:0; P:	Credits
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Detailed List of Tasks:

11. WAP to draw Histogram of digital Image
12. WAP to enhance the quality of digital image using various gray level transformations.
13. WAP to enhance the quality of digital image using Average and median filters in spatial domain.
14. WAP to convert digital image from spatial domain to frequency domain.
15. Implement low pass filters in frequency domain for image enhancement.
16. Implement high pass filters in frequency domain for image enhancement.
17. Implement Optimum Notch Filtering for de-noising of digital image.
18. WAP to segment digital image using thresholding approach.
19. WAP to extract shape and texture based features from image.
20. WAP to compress digital image using entropy based approach.

Suggested Tools – MATLAB/Python/JAVA

Course Code: BTIT613-18	Course Title: Cloud Computing	3L:0T:0P	3Credits
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Detailed Contents:

UNIT1: Introduction : Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud, Comparing grid with utility computing, cloud computing and other computing systems, types of workload patterns for the cloud, IT as a service, Applications of cloud computing.

[8hrs] (CO1)

UNIT2: Cloud computing concepts: Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology, Hypervisors, Types of hypervisors, Multitenancy, Application programming interfaces (API), Elasticity and scalability.

[9hrs] (CO2)

UNIT 3: Cloud service models: Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models.

[6hrs] (CO3)

UNIT 4: Cloud deployment models: Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Community clouds, Migration paths for cloud, Selection criteria for cloud deployment.

[6hrs] (CO4)

UNIT 5: Security in cloud computing: Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches

Case Studies: Comparison of existing Cloud platforms /Web Services.

[6hrs] (CO5)

Course Outcomes:

After undergoing this course, the students will be able to:

CO1: Understand the core concepts of the cloud computing paradigm

CO2: Understanding importance of virtualization along with their technologies

CO3: Analyze various cloud computing service and deployment models and apply them to solve

problems on the cloud.

CO4: Implementation of various security strategies for different cloud platform

Suggested Readings/ Books:

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, "Cloud Computing: Principles and Paradigms", Wiley 2011
2. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, "Cloud Computing: A practical Approach", McGraw Hill, 2010.
3. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
4. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, "Cloud Computing for dummies", 2009.

Reference Books

1. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing" TMH 2013.
2. George Reese "Cloud Application Architectures", First Edition, O'Reilly Media 2009.
3. Dr. Kumar Saurabh "Cloud Computing" 2nd Edition, Wiley India 2012.

Course Code: BTIT 621-18	Course Title: Cloud Computing Lab	L:0;T:0; P:2	Credits
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Detailed List of Tasks:

- 1a. Install VirtualBox/VMware Workstation on different OS.
- 1b. Install different operating systems in VMware.
2. Simulate a cloud scenario using simulator.
3. Implement scheduling algorithms.
4. To study cloud security management.

5.To study and implementation of identity management

6.Case Study - Amazon Web Services/Microsoft Azure/Google cloud services.

Suggested Tools –Matlab, Cloudsim
