YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
DEPARTMENT OF B.Sc. COMPUTER SCIENCE & COGNITIVE SYSTEMS FIFTH SEMESTER
ACADEMIC YEAR 2023-24 OF 2023-26 BATCH (CBCS)

Sl. No.	Part	Course Code	Title of the Course	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	CSC22501A	Information& storage management (DSE-1)	4	3	40	60	100	4
		CSC22501B	Cloud Computing tools& techniques (DSE-1)						
2	II	CSC22502	Machine Learning Techniques (Core-15)	4	3	40	60	100	4
3	II	CSC22503	Software Testing (Core-16)	4	3	40	60	100	4
4	II	CSC22504	Client Relationship Management (Core-17)	4	3	40	60	100	4
5	II	CSC22505	Introduction to Digital Technology (Core-18)	5	3	40	60	100	4
PRACTICALS									
6	II	CSC22506	Machine Learning Techniques Lab (Core-15)	2	3	40	60	100	1
7	II	CSC22507	Software Testing Lab (Core-16)	2	3	40	60	100	1
8	II	CSC22508	Client Relationship Management Lab (Core-17)	2	3	40	60	100	1
9	II	CSC22509	Introduction to Digital Technology Lab(Core-18)	2	3	40	60	100	1
	Total			**29**	**-**	400	600	1000	**24**

*Discipline Elective (DSE)

INFORMATION AND STORAGE MANAGEMENT

Credits: 4 **Semester: V**
Course Code: CSC22501A **No. of Lecture Hrs: 60**

Objectives:To provide a variety of solutions for storing, connecting, protecting, securing, sharing, and optimizing digital information.

Course Outcomes:

CO1: **Understand** core elements of the data center.
CO2: **Explain** Data protection techniques
CO3: **Assess** various storage networking technologies
CO4: **Prepare** backup and archiving of data
CO5: **Organize** data using replication techniques

UNIT-I **12Hrs**

Introduction to Information Storage

1. Information Storage- Data, types of data, Big data, Storage and information 2
2. Evolution of Storage Architecture 1
3. Data Center Infrastructure-Core Elements, characteristics and managing 1

Data Center Environment

4. Application, DBMS, Host, Connectivity, Storage 3
5. Disk Drive Components and Performance 2
6. Host to Access Data, Direct attached storage- benefits and limitations 2
7. Storage Design Based on Application Requirements and Disk Performance 1

UNIT-II **12Hrs**

Data Protection

1. RAID implementation methods, Array components, Techniques 2
2. RAID levels, Impact on Disk Performance 3
3. RAID comparison, Hot Spare 1

Intelligent Storage Systems

4. Components of Intelligent storage systems 3
5. Storage Provisioning, types of intelligent storage systems 3

UNIT-III **12Hrs**

Storage Networking Technologies

1. Fibre Channel-Overview, SAN and its Evolution, Components of FCSAN 3
2. Connectivity. Switched Fabric Ports, FC Architecture 2
3. NAS: General-Purpose Servers versus NAS Devices, benefits 1
4. File Systems and Network File Sharing, Components of NAS 2
5. NAS I/O operations, Implementations and File Sharing protocols 2
6. Object based storage devices, Content Addressed storage 2

UNIT-IV **12Hrs**

BACKUP AND ARCHIVE

1. Backup purpose, Considerations, Granularity, Considerations 2

2. Methods, Architecture, Backup and Restore Operations, Topologies	2
3. Backup in NAS Environments, Targets	3
4. Data Deduplication for Backup, Backup in virtualized environment	2
5. Data Archive, Archive Solution Architecture	3

UNIT-V **12Hrs**

Location Replication

1. Replication Technology, Use of Local replicas, Replica consistency 2
2. Location Replication Technologies 3
3. Tracking Changes to Source and Replica, Restore and Restart considerations 2

Remote Replication

4. Modes, Remote replication technologies 3
5. Three Site replication 2

ESSENTIAL READINGS

1. Gnanasudaram, Somasundaram, Shrivatsava, Alok. 2012**. Information Storage and Management Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments**. 2nd Edition. John Wiley and Sons.

CLOUD COMPUTING TOOLS AND TECHNIQUES

Credits: 4 **Semester: VI**
Course Code: CSC22501B **No. of Lecture Hrs:60**

Objective:To providea basic understanding of cloud and virtualization along with it how one can migrate over it.

Course Outcomes:
CO1: **Explain** the characteristics and components of cloud computing. CO2:
Illustrate architectural influences, benefits and limitations of cloud CO3:
Analyse various layers and models in cloud
CO4: **Assess** various cloud simulators
CO5: **Create** virtual machines using VMWare Simulator

UNIT-I **12Hrs**
Cloud Computing Overview

1. Origins of Cloud computing – Cloud components - Essential characteristics 3
2. On-demand self-service, Broad network access, location-independent resource pooling,Rapid elasticity, Measured Service 3
3. Comparing cloud providers with traditional IT service providers 3
4. Roots of cloud computing 3

UNIT-II **12Hrs**
Cloud Insights

1. Architectural influences – High-performance computing, Utility and Enterprise grid computing 4
2. Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security 2
3. Limitations – Sensitive information - Application development 1
4. Security level of third party - security benefits 2
5. Regularity issues: Government policies. 3

UNIT-III **12Hrs**
Cloud Architecture- Layers and Models

1. Layers in cloud architecture 2
2. Software as a Service (SaaS), features of SaaS and benefits 2
3. Platform as a Service (PaaS), features of PaaS and benefits 2
4. Infrastructure as a Service (IaaS), features of IaaS and benefits 2
5. Service providers, challenges and risks in cloud adoption. 2
6. Cloud deployment model: Public clouds, Private clouds,Community clouds Hybrid clouds - Advantages of Cloud computing. 2

UNIT-IV **12Hrs**

Cloud Simulators- CloudSim and GreenCloud

1. Introduction to Simulator, understanding CloudSim simulator	3
2. CloudSim Architecture(User code, CloudSim, GridSim, SimJava)	3
3. Understanding Working platform for CloudSim,	3

4. Introduction to GreenCloud 3

UNIT-V **12Hrs**

Introduction to VMWare Simulator

1. Basics of VMWare, advantages of VMware virtualization 2
2. Using Vmware workstation 1
3. creating virtual machines-understanding virtual machines 2
4. create a new virtual machine on localhost 2
5. cloning virtual machines, virtualizing a physical machine, 3
6. starting and stopping a virtual machine. 2

ESSENTIAL READINGS

1. Anthony T.Velte , Toby J. Velte Robert Elsenpeter. 2010. **Cloud computing a practical approach**. Tata McGraw- Hill. India: New Delhi
2. Miller, Michael. 2008. **Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online**

MACHINE LEARNING

Credits : 4 **Semester: V**
Course Code : CSC22502 **No. of Lecture Hours: 60Hrs**

Objectives:

- To acquire basic knowledge in machine learning techniques and apply the techniques in the area of pattern recognition and data analytics.
- To introduce python programming language as a machine learning tool.

Course Outcomes:

CO1: Demonstrate python constructs for machine learning.
CO2: Illustrate machine learning types and applications
CO3: Explain concepts of neural network and regression for machine learning CO4: Evaluate various classifiers of machine learning
CO5: Design unsupervised learning models.

UNIT -I **12Hrs**

MACHINE LEARNING WITH PYTHON

1. Data framing: numpy: Ndarray, Array attributes Array creation routines, Indexing and slicing, Array Broadcasting, Array manipulation, Mathematical functions, Statistical functions, Search, sort and counting functions, Matrix Library, Linear algebra. 4
2. Pandas: Series, Data frame, Panel, Basic functionality: axes, dtype, empty, ndim, size, values, head, tail. Descriptive Statistics, Reindexing, iterations, sorting, options and Customization, Indexing and Selecting Data, Statistical Functions, Window Functions, Aggregation, Missing data, Group by, Merging, concatenation, Categorical data, I/O tools:read_csv,read_table 4
3. Data Visualization: Matplotlib, Barplot, Histograms, Box plots, Area plot, Scatter plot, Pie chart, line chart, bar chart, Sea born 4

UNIT-II **12Hrs**

1. Machine learning: Introduction, applications, ML process 2
2. AI vs Machine Learning 1
3. Types of machine learning, Supervised vs Un Supervised learning 2
4. Machine learning algorithms and models 2
5. Testing machine learning algorithms 3
6. Basic statistics , bias and variance, Machine learning tools 2

UNIT-III **12Hrs**

1. Cross validation,Regularization, P-Value 2

NEURONS, NEURAL NETWORK AND LINEAR DISCRIMINANTS

2. The brain and the neuron, neural networks, perceptron, linear separability 4

REGRESSION

3.	Regression analysis in machine learning, types of regression	2
4.	Linear regression, Logistic regression, Linear vs Logistic regression	4

UNIT-III **12Hrs**

CLASSIFICATION

1. Introduction toclassification,classification vs regression	2
2. K-NN algorithm, Support vector machine algorithm	3
3. Linear discriminant analysis	2
4. Decision tree algorithm	2
5. Bayes theorem for Machine learning, Naïve Bayes classifier	3

UNIT-V **12Hrs**

UNSUPERVISED LEARNING and ASSOCIATION RULE LEARNING

1. Principal component analysis	2
2. Clustering in machine learning	2
3. Hierarchical clustering, K-means clustering	4
4. Association Rule learning	2
5. Apriori algorithm in machine learning	2

ESSENTIAL READINGS

1. Marsland, Stephen. 2015. Machine Learning, An Algorithmic Prespective. 2nd Edition. CRC Press
2. Website: https://www.javatpoint.com/machine-learning

SUGGESTED READINGS

1. Dutt Saikat, Chandra Mouli Subramanian, Das Amit Kumar. 2019. **Machine Learning.** 1st Edition. Pearson India Education Pvt Ltd. India: New Delhi
2. Jose, Jeeva. 2020. **Introduction to Machine Learning Using Python**. 1st Edition. Khanna Book Publishing Co. Pvt Ld. India: New Delhi.

MACHINE LEARNING TECHNIQUES-LAB

Credits: 1 **Semester: V**

Course Code: CSC22506 **No. of Practical Hrs:30Hrs**

Objective: To demonstrate machine learning algorithms on datasets.

1. Program on pandas library
2. Program on numpy library
3. Program for data visualization tools
4. Program to demonstrate binarization of data and confusion matrix.
5. Program to demonstrate encoding techniques.
6. Program to demonstrate scaling and normalization.
7. Program for Linear regression
8. Program for Logistic regression
9. Program to build classifier using KNN
10. Program to build classifier using SVM
11. Program to build classifier using Naïve Bayes
12. Program to build classifier using LDA
13. Program to build classifier using Decision trees
14. Program to demonstrate K-means.
15. Program to demonstrate PCA.
16. Program for Hierarchical clustering
17. Program for Apriori algorithm to demonstrate Association rule learning

SOFTWARE TESTING

Credits: 4 **Semester: V**
Course Code: CSC22503 **No. of Lecture Hrs:60**

Course Objectives

- To learn the purpose of automation testing.
- To gain insight into the evolution of Selenium
- To get an overview of Selenium and its components
- Explore the features and use of Selenium-WebDriver
- To record and importing tests with Selenium IDE
- To learn data driven testing using TestNG

Course Outcomes

CO1:Understand Selenium Architecture and its components
CO2: Use Selenium WebDriver
CO3:Apply WebDriver advanced features
CO4: Write Test cases using TestNG
CO5: Develop Record and importing tests with Selenium IDE

UNIT I	**12Hrs**
1. Introduction to Automation	3
2. Planning before Automation	3
3. Introduction to Selenium	3
4. Installing Selenium Components.	3

UNIT II	**12Hrs**
1. Using Selenium IDE	3
2. Managing User Interface Controls	3
3. Creating First Selenium Web Driver Script.	3
4. Selenium Methods -Common Selenium Web Driver Methods	3

UNIT III	**12Hrs**
1. Verification Point in Selenium	3
2. Shared UI Map	3
3. Using Functions- creating and calling a function in web driver script	3
4. Using a Configuration File	3

UNIT IV	**12Hrs**
1. Handling Pop-up Dialogs and Multiple Windows	3
2. Working with Dynamic UI Objects	3
3. Data driven testing Parameterization	3

4. Debugging scripts, Exception handling in Web Driver	3

UNIT V **12Hrs**

1. Reporting in Selenium	3
2. Batch Execution	3
3. Automation Frameworks	3
4. Selenium Functions, Common Questions and Tips.	3

ESSENTIAL READINGS

1. NavneeshGarg. 2014. **Test Automation Using Selenium WebDriver with Java**AdactIn Group Pvt Ltd.
2. AdithyaGarg, Ashish Mishra. 2012. **A Practitioner's Guide to Test Automation Using Selenium.** McGraw Hill. New Delhi : India.
3. SatyaAvasarala. 2014. **Selenium Web Driver Practical Guide.** Packt Publishing.
4. Rex Allen Jones II. 2016. **Selenium Web Driver for Functional Automation Testing.** Test 4 Success, LLC.
5. David Burns. 2010. **Selenium 1.0 Testing Tools.** Packt Publishing.

SOFTWARE TESTING- LAB

Credits: 1 **Semester: V**
Course Code: CSC22507 **No. of Lecture Hrs: 30**

Objectives:

- To get an overview of Selenium and its components and compare commonly used automation tool with Selenium automation tools.
- To explore the features and use of Selenium-WebDriver

List of Programs

1. Write a test case based on controls.
2. Test data in a flat file.
3. Manual test case to verify student grade
4. Write and test a program to select the number of students who have scored more than 60 in any one subject(or all Subjects)
5. Write and test a program to login a specific web page.
6. Write and test a program to get the number of list items in a list / combo box.
7. Test a HTML file.
8. Test a program in MS Excel for Data Driven Wizard.
9. Test the addition of two values in C++ Program.

CLIENT RELATIONSHIP MANAGEMENT

Credits: 4 **Semester: V**
Course Code: CSC22504 **No. of Lecture Hrs: 60**

Objectives

- To Acquire knowledge about ServiceNow platform
- To get comprehensive knowledge of ITSM principles and architecture.
- To get acquainted with various features of Service Now platform and tool.
- To use Flows and Workflows for process automation
- To use various script types used throughout the platform
- To capturing and moving configurations between instances, using update sets

Course Outcomes

CO1: Define task management using assignment rules, presence, and work notes
CO2: Use various script types throughout the platform
CO3: Explain Flows and Workflows for process automation
CO4: Choose Access Control rules to protect ServiceNow instance data
CO5: Formulate Capturing and moving configurations between instances, using update sets

UNIT I - SERVICE NOW INTERMEDIATE LEVEL 15 Hrs

1. Administrator-ServiceNow Introduction-ServiceNow Platform UI ServiceNow 5
2. ITSM overview-Managing Users, Groups and Roles, departments, companies and Assignment Rules 5
3. Tables, Columns, Attributes, Dictionary Entries ,Schema Map-Managing Forms , Layouts and Lists-Dictionary Overrides and Simple Reference Qualifiers 5

UNIT II SYSTEM PROPERTIES 15 Hrs

1. Incident management - Problem management- Change management Overview of other ITSM Modules - Overview of other ITSM Modules 3
2. SLA Basics-Introducing to Client and Server Side Scripting-Server Side Scripting 3
3. Server Side Glide API -server-side scripting - Server Side Glide API 3
4. Server Side script Debugging- Best Practices-Business Rules 3
5. Client Side APIs-UI Policies and Data Policies-Client Scripts -Debugging. 3

UNIT III CLIENT SCRIPTS & CLIENT GLIDE APIS-BEST PRACTICES 15 Hrs

1. Client-side scripting & policies (UI and Data) 3
2. Modularize programming using UI Actions (both Server and Client Side) 3
3. Script Include-Glide AJAX-UI Pages and UI Macros-Managing Update Sets 3
4. Custom Applications Automated Test Framework 3
5. Events-Inbound/Out Bound notifications-Mail Templates and Scripts. 3

UNIT IV MANAGE WORKFLOWS 15 Hrs

1. Managing Stage Sets -Manage Workflows -Manage Workflows 2
2. Flow Designer (Over view)- Service Catalogs, Categories, Items and variables 3
3. Manage Execution Plans and workflows-Cart Layouts-Client scripts and UI policies- Record Producers-Order Guides & Scriptable Order Guides-Scheduled Jobs. 3

4. VTB Agent Intelligence (Over View)-Restrict access to applications and application modules 2
5. Automatically create application Access Controls -Manually create, test, and debug Access Controls 2
6. Managing ServiceNow imports and exports-Managing Import Sets and Transform Map-Configure and run Reports and Dashboards Security Controls, Database Views 3

UNIT V- SERVICENOW SERVICE PORTALS OVERVIEW 15 Hrs

1. ServiceNow Service portals core components 3
2. Scripting in Service Portal 3
3. ITSM Virtual Agent – Overview 3
4. Performance Analytics Overview 3
5. Servicenow on Mobile, Servicenow Integration Overview. 3

ESSENTIAL READINGS

1. Tim Woodruff. 2018. **Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation.** 2nd Edition. Packt Publishing Ltd.
2. Ashish Rudra Srivastava. 2017. **ServiceNow Cook Book**. Packt Publishing Ltd
3. Andrew Kindred. 2018. **Mastering ServiceNow Scripting**. Packt Publishing.

Websites

1. https://www.servicenow.com/products/it-service-management.html
2. https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/resource-center/data-sheet/ds-itsm.pdf
3. https://www.guru99.com/servicenow-tutorial.html

CLIENT RELATIONSHIP MANAGEMENT LAB

Credits: 1
Course Code: **CSC22508**

Semester: V
No. of Practical Hrs: **30Hrs**

Objectives:

- To get acquainted with various features of Service Now platform and tool.
- To use Flows and Workflows for process automation
- To use various script types used throughout the platform
- To capture and moving configurations between instances, using update sets

List of programs

1. Creating tickets for servicing requests from clients
2. Creating reports of status of client services

INTRODUCTION TO ROBOTICS

Credits: 4 **Semester**: V
Course Code: **CSC22505** **No. of Lecture Hrs**:**75Hrs**

Objectives

- To understand the fundamental concepts of Robotics
- To recognize the use of Robotics in various Industries
- To understand the principles of Automatix, Automation Anywhere
- To understand and create Bots

Course Outcomes

CO1: Understand the fundamental concepts of Robotics
CO2: Recognize the use of Robotics in various Industries
CO3: Understand the principles of Automatix
CO4: Understand the principles of Automation Anywhere
CO5: Create bots and understand their various types

Unit I **15 Hrs**

DIGITAL PRIMER

1. Why is Digital Different?	3
2. Digital Metaphors On Cloud 9	3
3. A Small Intro to Big Data-Social Media & Digital Marketing	3
4. Artificial Intelligence- Unchain the Block chain	3
5. Internet of Everything and Immersive Technology.	3

Unit II **15 Hrs**

1. Digital For Industries	3
2. Manufacturing and Hi-tech	3
3. Banking and Financial Services	3
4. Insurance and Healthcare, Retail-Travel & Hospitality	3
5. Communications, Media & Information Services-Government.	3

Unit III **15 Hrs**

1. Automatix	3
2. Art of RPA	3
3. Introduction-Setting the Context	3
4. RPA Prelude-RPA Demystified, RPA vs BPM	3
5. RPA Implementations-RPA in Industries-Tools-Automatix - Art of RPA	3

Unit IV **15 Hrs**

1. AUTOMATION ANYWHERE Getting Started with AA Enterprise	5
2. Exploring AA Enterprise	5
3. AA Enterprise – Architecture.	5

Unit V **15 Hrs**

1. Knowing the Bots 3
2. More AboutTaskBots 3
3. AA Enterprise - All About Recorders-Designers 3

4. MetaBots 3
5. Cognitive RPA. 3

ESSENTIAL READINGS:

1. Richard Murdoch. 2020. **Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant**. 1st Edition. **Packt Publishing**Kindle Store
2. Husan Mahey. 2020. **Robotic Process Automation with Automation Anywhere: Techniques to fuel business productivity and intelligent automation using RPA. 1st Edition. Packt Publishing** Kindle Store**.**
3. Kelly Wibbenmeyer, **The Simple Implementation Guide to Robotic Process Automation (RPA): How to Best Implement RPA in an Organization. 1st Edition. Packt Publishing.** Kindle Store**.**
4. Alok Mani Tripathi. 2018. **Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots ... with the leading RPA tool – UiPath. 1st Edition. Packt Publishing.** Kindle Store.

Web sites

1. https://en.wikipedia.org/wiki/Robotic_process_automation
2. https://en.wikipedia.org/wiki/Automatix_(software)
3. https://www.automationanywhereuniversity.com/
4. https://www.automationanywhere.com/in/products/iq-bot

INTRODUCTION TO ROBOTICS LAB

Credits: 1 **Semester**: V
Course Code: **CSC22509** **No. of Practical Hrs**: **30Hrs**

Objectives:

- To understand the principles of Automatix, Automation Anywhere
- To understand and create Bots

List of programs

1. Creating bots for automatic software installation
2. Creating bots for automatic software patch installation
3. Creating bots for file transfer
4. Creating bots for automatic file backup

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
DEPARTMENT OF B.Sc. COMPUTER SCIENCE &COGNITIVE SYSTEMS

SIXTH SEMESTER

~~ACADEMIC YEAR 2022-23 OF 2020-23BATCH (CBCS)~~

Sl. No.	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	CSC22601A	Principles of Information Security (DSE-2)	4	3	40	60	100	4
		CSC22601B	Cognitive Computing (DSE-2)						
2	II	CSC22602A	Infrastructure Security (DSE-3)	4	3	40	60	100	4
		CSC22602B	IT Infrastructure Library(DSE-3)						
3	II	CSC22603	Big Data Analytics (Core-19)	4	3	40	60	100	4
PRACTICALS									
4	II	CSC22604	Big Data Analytics Lab	2	3	40	60	100	1
5	II	CSC22605	Major Project (DSE-4)	15	3	40	60	100	6
	Total			**29**	**-**	200	300	500	**19**

*Discipline Elective (DSE)

PRINCIPLES OF INFORMATION SECURITY

Credits :4 **Semester : V**
Course Code: CSC22601A **No. of Lecture Hours: 60**

Objectives:

- To compile, analyze, and assess the applicability of best practices in addressing information.
- To address the issues relevant to the cyber security community

Course Outcomes:

CO1: **Explain** concepts of Security System Development Life Cycle, Need for Security
CO2: **Identify** the risk, assess and risk control strategies.
CO3: **Demonstrate** expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention
CO4: **Analyze** systems, tools, methods, and techniques for securing digital information within an organization
CO5: **Explai**n the concepts of Security Considerations in Mobile and Wireless Computing.

UNIT –I **12Hrs**
INTRODUCTION OF INFORMATION SECURITY

1.	Introduction to Security, Critical Characteristics of Information	2
2.	Balancing Information Security and Access, Approaches to Information Security Implementation, System Development Life Cycle	2
3.	Security System Development Life Cycle, Information Security :Art of Science	2
4.	Need For Security: Business Needs, Threats, Attacks	3
5.	Secure Software Development-software Assurance, Software Design Principles , Software Development Security Problems	3

UNIT –II **12Hrs**
RISK MANAGEMENT

1.	Overview of Risk Management	2
2.	Risk Identification	2
3.	Risk Assessment	2
4.	Risk Control Strategies	3
5.	Selecting a Risk Control Strategy	3

UNIT –III **12Hrs**
SECURITY TECHNOLOGY: FIREWALLS AND VPNS

1.	Firewalls: Processing modes, categorizations	2
2.	Firewall Architecture, Choosing a Firewall	2
3.	Configuring and Managing a Firewall	2

4.	Firewall Rules	2
5.	Protecting Remote Connections: Securing Authentication with Kerberos	2
6.	VPN: Transport and Tunnel Mode	2

UNIT-IV **12Hrs**

SECURITY TECHNOLOGIES: INTRUSION DETECTION AND OTHER SECURITY TOOLS

1. IDPS :terminology, types of IDPS 3
2. IDPS Detection Methods, IDPS Response Behavior 2
3. Strengths and Limitations of IDPS 1
4. Honeypots, Honey nets and Padded Cell Systems 1
5. Port Scanners, Firewall Analysis Tools 1
6. Operating System Detection Tools, Vulnerability Scanners 2
7. Packet Sniffers , Wireless Security Tools 2

UNIT-V **12Hrs**

SECURITY CONSIDERATIONS IN MOBILE AND WIRELESS COMPUTING

1. Proliferation of Mobile and Wireless Computing Era 2
2. Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era 2
3. Security Challenges posed by Mobile Devices, Registry Settings for Mobile Devices 2
4. Authentication Service Security 2
5. Organizational Security Policies and Measures in Mobile Computing Era 2
6. Use of RFID in Mobile Commerce nd Information Asset Protection 2

ESSENTIAL READING

1. Whitman Michael, E. and Mattord Herbert, J. 2011. **Principles of Information Security**. 4th Edition. USA: Course Technology.
2. Nina Godbole. **Information Systems Security: Security Management, Metrics, Frameworks and Best Practices.** 2nd Edition **Wiley Publications**

COGNITIVE COMPUTING

Credits: 4 **Semester: VI**
Course Code: CSC22601B **No.of Lecture Hrs: 60**

Objectives: To understand the fundamental concepts of Cognitive Computing

- To recognize the use of Cognitive Computing in various Industries
- To understand the principles of NLP in Cognitive Computing
- To understand the Cognitive Application

Course Outcomes

CO1: Understand the fundamental concepts of Cognitive Computing
CO2: Recognize the use of Cognitive Computing in various Industries
CO3: Understand the principles of NLP in Cognitive Computing
CO4: Understand the principles of Cloud & Cognitive Computing.
CO5: Create and Build the Cognitive Application and understand their usages.

UNIT-I **12Hrs**

Foundations of Cognitive Computing

1. Cognitive computing as new generation 2
2. Uses of cognitive systems, What makes a system cognitive? 2
3. Gaining insights from data, AI as foundation of Cognitive computing 2
4. Understanding cognition, two systems of Judgement and choice 2
5. Understanding complex relationships between systems 2
6. Elements of Cognitive system 2

UNIT-II **12Hrs**

Design Principles of Cognitive Computing

1. Components of Cognitive System 3
2. Building the Corpus, Bringing data into the Cognitive system 3
3. Machine Learning 2
4. Hypothesis Generation and Scoring 2
5. Presentation and visualization services 2

UNIT-III **12Hrs**

Natural Language Processing in Support of Cognitive System

1. Role of NLP in Cognitive system 2
2. Semantic web, application of NLP in business problems 4

BigData and Cognitive computing

3.	Dealing with human-generated data, defining big data	2
4.	architectural foundation for big data, Hadoop	2

5. Data in motion and streaming data, Integrating with traditional data 2

UNIT-IV **12Hrs**

The Role of Cloud and Distributed Computing in Cognitive Computing

1. Leveraging Distributed computing for Shared resources 2
2. Cloud services are fundamental to Cognitive system 2
3. Characteristics, cloud models, delivery models in cloud 3
4. Managing workloads, Security and Governance 2
5. Data integration and management in cloud 3

UNIT-V **12Hrs**

Process of Building cognitive application

1. Emerging cognitive platform, defining objective and domain 2
2. understanding intended users and defining their attributes 2
3. Defining questions and Exploring insights 2
4. Creating and refining corpora, training and testing 2
5. Building cognitive healthcare application 4

ESSENTIAL READING

1. **Hurwitz, Kaufman and Bowles. Cognitive computing and Big Data Analytics. by Wiley**.

INFRASTRUCTURE SECURITY

Credits: 4 **Semester: VI**

Course Code: CSC22602A **No. of Lecture hrs: 60**

Objectives

- To understand underlying principles of infrastructure security
- To explore software vulnerabilities, attacks, and protection mechanism
- To learn security aspects of wireless network infrastructure and protocols
- To investigate web server vulnerabilities and their countermeasures
- To develop policies for security management and mitigate security-related risks in the organization
- To Learn the different attacks on Open Web Applications and Web services.

Course Outcomes:

CO1: Understand the concept of attacks and Security protection mechanisms
CO2: Analyze and evaluate attacks on databases and cloud
CO3: Explain the need for OS and Multilevel security
CO4: Explain various risk assessment and IT security
CO5: Evaluate different attacks on Open Web Applications

UNIT-I **12Hrs**

Computer Security

1. Concepts, Threats, Attacks and Assets 2
2. Security Functional Requirements, Security Design principles 2
3. Attack Surfaces and Attack Trees, Computer Security strategies 2
4. Access control Principles, Subjects, Objects and Access Rights 2
5. Discretionary, role based and Attribute based control 4

UNIT-II **12Hrs**

Database and Cloud Security

1. Need for database security, DBMS and relational databases 2
2. SQL injection attacks, Database Access Control, Inference, Encryption 4
3. Cloud Computing, Risks and Countermeasures, Data protection in cloud 3
4. Cloud Security as a Service 3

UNIT-III **12Hrs**

Operating System Security

1. Introduction, System security planning, OS Hardening 3
2. Application Security, Security Maintenance 3
3. Linux, Windows and Virtualization Security 3

Trusted Computing and Multilevel Security

4. The Bell-LaPadula Model and other formal models for Computer Security 3

UNIT-IV **12Hrs**

IT Security Management and Risk Assessment

1. IT Security Management, Organizational Context and Security Policy 3
2. Security Risk Assessment, Security Risk Analysis 3
3. IT Security Management Implementation, Safeguards, Security Plan 3
4. Implementation of controls and Monitoring Risks 3

UNIT-V **12Hrs**

Web Security

1. Browser attacks 3
2. Web Attacks Targeting users 3
3. Obtaining User or Website Data 3
4. Email attacks 3

ESSENTIAL READING

1. William Stallings and Lawrie Brown. 2015. **Computer Security Principles and Practice**. 3rd Edition. Pearson Education
2. PFleeger, Charles P, Pfleeger, Shari Lawrence, Margulies Jonathan. Security in Computing. 5th Edition. Prentice Hall

INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY

Credits : 4 **Semester: VI**
Course Code : CSC22602B **No. of Lecture Hours: 60Hrs**

Objectives

- To understand the Service lifecycle model
- To know the Key Principles Models and Concepts of service management
- To understand the process management and risk management
- To know the Challenges in providing IT Infrastructure Services
- To understand the event management concepts

Course Outcomes (COs)

CO1: Understand service lifecycle model
CO2: Know the key principles models and concepts of service management
CO3: Understand the process management and risk management
CO4: Know the challenges in providing IT infrastructure services
CO5: Understand the event management concepts.

UNIT- I **12Hrs**

1. Introduction ITIL - Service Life Cycle Model 2
2. Define ITIL - Components and Phases of a Service Life Cycle 3
3. Main concept of Service life cycle 2
4. Service management as a Practice 3
5. IT today and IT opportunity 2

UNIT II **12Hrs**

1. Introduction to Service and Service management and its value 3
2. The 4 Ps of Service Design 3
3. Key It service management roles 3
4. Key Principles Models and Concepts 3

UNIT-III **12Hrs**

1. Process - Functions - Specific Roles 4
2. RACI - Risk Management - Business Case 4
3. Life Cycle Phases - Service Strategy - Service Design - Service Transition Service operation – CSI 4

UNIT-IV **12Hrs**

1. Automation - Evolution of IT Infrastructure Services 3
2. Challenges in providing IT Infrastructure Services 3
3. The future state of IT Infrastructure Services 3

4. Automation and Analytics - the approach of the future 3

UNIT-V **12Hrs**

1. SNOC - Event Management – Objectives and Scope of event management 3
2. Value to the organization 2

3. Draw IT Infrastructure facilities for 7
   Hospital Management System, e - governance and Banking Sector

ESSENTIAL READINGS

1. Service Support (CCTA): Part 15 (IT Infrastructure Library)
2. IT Infrastructure Risk & Vulnerability Library: A Consolidated Register of Operational & Technology Infrastructure Vulnerabilities for IT Assurance Professionals
3. IT Infrastructure Risk and Vulnerability Library: A Consolidated Register of Operational and Technology Infrastructure Vulnerabilities for IT Assurance Professionals (Japanese Edition)

BIG DATA ANALYTICS

Credits: 4 **Semesters: VI**

Subject code: CSC22603 **No. of lecture hours: 60**

Objectives:

- To understand and learn about Big Data.
- To learn the analytics of Big Data.
- To understand MapReduce fundamentals.

Outcome: The student will demonstrate knowledge of Big Data, and will be able to analyze the data to deliver an effective data model using various big data technologies.

UNIT-I

Getting an Overview of Big Data: **12Hrs**

1. What is Big Data?, History of Data Management-Evolution of Big Data 1
2. Structuring Big Data, Elements of Big Data 1
3. Big Data Analytics, Careers and Future of Big Data 1

Exploring the Use of Big Data in Business Context:

4. Use of Big Data in Social Networking 1
5. Preventing Fraudulent Activities 1

Introducing Technologies for Handling Big Data:

6. Distributed and Parallel Computing for Big Data 1
7. Introducing Hadoop and Cloud Computing 1

Understanding Big Data Technology Foundations:

9. Exploring the Big Data Stack, Virtualization and Big Data Stack 2
10. Virtualization Approaches 2

UNIT-II **12Hrs**

Understanding Analytics and Big Data:

1. Comparing, Reporting and Analysis, Types of Analytics 2
2. Points to Consider During Analysis, Developing an Analytical Team 2

Analytical Approaches and Tools to Analyze Data:

3. Analytical Approaches, History of Analytical Tools 1
4. Popular Analytical Tools, Comparing Various Analytical Tools 1

Storing Data in Databases and Data Warehouses:

5. RDBMS and Big Data, Non-Relational Database 2

6. HBase- Architecture, Regions and role of HBase in Big Data processing 4

UNIT – III **12hrs**

Understanding Hadoop EcoSystem

1. Hadoop Ecosystem 2
2. Hadoop Distributed File System 3

Understanding MapReduce Fundamentals

1. The MapReduce Framework 1

Customizing MapReduce Execution and Implementing MapReduce program

2. Controlling MapReduce Execution with InputFormat 1
3. Reading Data with Custom RecordReader 1
4. Organizing Output Data with OutputFormat 1
5. Customizing Data with RecordWriter 1
6. Optimizing MapReduce Execution with Combiner 1
7. Controlling Reducer Execution with Partitioner 1

UNIT – IV **12hrs**

Understanding Hadoop YARN Architecture:

1. Background and Advantages of YARN 2
2. YARN Architecture, Working of YARN, YARN Schedulers 2
3. YARN Configurations, YARN Commands, YARN Containers 2

Exploring HIVE:

4. Introducing Hive, Getting started with Hive 2
5. Data Types and Built-in functions in Hive, Hive DDL 2
6. Data manipulation in Hive, Data Retrieval Queries, Using Joins in Hive 2

UNIT – V **12hrs**

Analyzing Data with Pig

1. Introducing Pig, Running Pig 1
2. Getting Started with Pig Latin 1
3. Working with Operators in Pig 2
4. Working with Functions in Pig 2
5. Debugging Pig, Error Handling in Pig 1

NoSQL Data Management:

6. Introduction to NoSQL 1
7. Types of NoSQL Data Models 1
8. Schema-Less Databases, Materialized Views 1
9. Distribution Models, Sharding 1
10. Composing MapReduce Calculations in NoSQL 1

ESSENTIAL READING

1. DT Editorial Services. 2016. **Big Data Black Book**. Dreamtech Press.

SUGGESTED READING

1. White, Tom. 2012. **Hadoop: The Definitive Guide**. 3rd Edition. O'Reilly Media.

BIG DATA ANALYTICS LAB

Credits: 1 **Semester: VI**

Course Code: CSC22604 **No. of PracticalHours: 30**

Objectives: To understand Hadoop Ecosystem

Outcomes: Students will be able to demonstrate Hadoop commands, develop map reduce applications using Pig, Hive and Map Reduce Programming model.

S.No. Program

1. Implement the following file management tasks in Hadoop:
   a)Adding file and directories
   b) Creating file, Retrieving file and deleting files
2. Map Reduce program for basic word count.
3. Map Reduce program for sorting text data.
4. Map Reduce program for weather data.
5. Using Hive to implement DDL Commands
6. Using Hive to implement DML commands
7. Using Hive to retrieve data.
8. Using Hive to implement bucketing and partitioning.
9. Using Hive to implement built-in functions
10. Pig Latin script to work with operators
11. Pig Latin scripts using eval functions to analyze your data.
12. Pig Latin scripts using math functions to analyze your data.
13. Pig Latin scripts using string functions to analyze your data.
14. Pig Latin scripts to create user defined function.
15. Simple script to understand the using NoSQL in Hadoop systems

MAJOR PROJECT

(*Discipline Specific Elective-4)*

EVALUATION CRITERIA FOR MAJOR PROJECT

Credits : 6 **Semester : VI**
Course Code: CE18605 **No. of Practical Hours: 15**

Third year students in the Sixth Semester are required to take up a project work which carries a total of 100 marks i.e. internal 40 marks and external 60 marks.

The criteria for the Internal Evaluation of Project for 40 marks are as follows:

1.	Attendance		5 marks
2.	Review of weekly report		5 marks
3.	Internal Project Presentation–every week end (Presentation & communication skills, objectives, Work submission, methodology, results, and Practical relevance.)	10 marks 15 marks	
4.	Final internal presentation- at the end of semester (50% marks Evaluation done bythe internal guide, and 50% marks evaluated by other internal lecturers guiding the projects)		
5.	Project Report		5 marks

External Evaluation of the Project (60 marks): The Controller of Examination sends the Project Reports to the External Examiner in advance. The External Examiner evaluates the project for 60 marks based on project work done by the student. (The Project Report is evaluated for 40 marks and Viva-voce for 20 marks.

PHP

(ADD-ON COURSE)

Semester: IV **No. of Hours: 30**

Objectives:

To enable students learn open source web scripting language PHP. Build dynamic Web applications.

Outcome: Students will be able to create PHP programs that use various PHP library functions, and that manipulate files and directories, analyze and solve common web application tasks by writing PHP programs.

UNIT - I	**6 Hrs**
1. Origins and uses of PHP	1
2. Overview of PHP	1
3. General Syntactic Characteristics	2
4. Primitives, Operations and Expressions	2
UNIT- II	**6 Hrs**
1. Output	2
2. Control Statements	2
3. Arrays	2
UNIT- III	**6 Hrs**
1. Functions	2
2. Pattern Matching	2
3. Form Handling	2
UNIT- IV	**6 Hrs**
1. Files	2
2. Cookies	2
3. Session Tracking	2
UNIT- V	**6 Hrs**
1. Architecture for Databases Access	2
2. The MySQL Database System	2
3. Database Access with PHP and MySQL	2

ESSENTIAL READING

1.Robert W. Sebesta. **Programming the World Wide Web.**
4th Edition, Pearson Addison Wesley.

Loyola Academy, Alwal, Secunderabad 500 010