**Syllabus for B.Tech. III year I Semester**

**Computer Science and Engineering**

**Data Science**

**WEB TECHNOLOGIES**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

**Code: 8EC07**

**Prerequisite:** Data Communications and Computer Networks, Object Oriented Programming through Java

**Course Objective:**

To understand the basics of Web Designing using HTML and CSS, perform the client-side scripting with JavaScript. Understand the different data stores XML, and JSON with full-stack web application development using Angular and study with Server-side programming using Java Servlets and PHP.

**Course Outcomes:**

At the end of this course the student will be able to

1. Demonstrate the use of HTML tags. Apply Styles using CSS and Bootstrap.
   1. Develop dynamic programs using Javascript and Typescript.
2. Develop scripts using XML and validate using parsers.
   1. Design a data-interchange format using JSON.

3. Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.

4. Design responsive web applications with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.

5. Comprehend the uses of Web servers and design the server-side scripts using Servlets.

6. Design and develop server-side scripts and components using PHP.

**UNIT I: Client-Side Web Development. (Text Book 1)**

**HTML 4** - List, Tables, Images, Forms, Div. (with all attributes and sub-elements)

**Cascading Style sheets 3** - Selectors (Basic, Combinatory, Attribute, Pseudo-class, Pseudo Element) using properties (font, background),

**Bootstrap** basics **(Text Book 2)**

**JavaScript** - Introduction, variables, objects (Boolean, Number, String, Date, Math, Regular expression, Array), Function, Event handlers (mouse, keyboard, window), Using CSS with JavaScript. Introduction to **Typescript.(Text Book 2)**

**UNIT II: Data Store**

**XML**: DTD, XML Schemas, Using XML Processors: DOM Parser and SAX Parser.

(Text Book 1)

**JSON**: Introduction, JSON vs XML, Data Types, Parsing JSON, stringify(), Objects, Array, JSON HTML, JSONP (Refer to Textbook: 1 and 5)

**UNIT III: Application Development Using Angular: (**Part –I) **(Text Book 2)**

**Basics:** MVC-The Angular way, Features of Angular, Model-View-Controller, My First Angular app.

**Expressions:** Angular Expressions, Angular vs JavaScript.

**Filters:** Built-In Filters, Using Angular Filters, Creating Custom Filters.

**Directives:** Introduction to Directives, Directive Lifecycle, Binding controls to data, Matching directives, Using Angular built-in directives, creating a custom directive.

**Controllers:** Role of a Controller, Controllers & Modules, Attaching Properties and functions to scope, Nested Controllers, Using Filters in Controllers, Controllers in External Files

**Modules:** Introduction to Angular Modules, Bootstrapping Angular.

**UNIT IV: Application Development Using Angular: (**Part- II) **(Text Book 2)**

**Forms:** Working with Angular Forms, Model Binding, Forms Events, Updating Models with a Twist, Form Controller, Validating Angular Forms, $error object.

**Scope:** Scope Lifecycle, Scope Inheritance, Scope & Controllers, Root scope, Scope Broadcasting, Two-way data binding, Scope Inheritance, Scope & Directives, $apply and $watch, Scope Events.

**Dependency Injection & Services:** Dependency Injection, Creating Services, Factory, Service & Provider, Using Dependency Injection, Using Angular built-in services.

**Single Page Application (SPA):** SPA and its Pros and Cons, Passing Parameters, Changing location, Installing the ngRoute module, Configure routes, Resolving promises, Creating Single Page Apps.

**UNIT V: Web Hosting (Text Book 3)**

Introduction to Servlets, Lifecycle of a Servlet, Servlet API: javax.servlet Package, javax.servlet.httppackage.Reading Servlet Context Parameters, Reading Initialization parameters, Request Dispatcher Handling HTTP Requests & Responses. Session Tracking.

**UNIT VI**: **Server Scripting Language: PHP (Text Book 1)**

Declaring variables, data types, array, string, operators, Expression, control statement, function, Reading data from form controls like text boxes, radio buttons, lists, etc.

Handling file upload. Connecting to the database with CRUD operation (Mysql as reference), Handling sessions and cookies. File handling in PHP.

**TEXTBOOKS**:

1. Web Programming: Building Internet Applications, 3rd Edition, [Chris Bates](https://www.wiley.com/en-us/search?pq=%7Crelevance%7Cauthor%3AChris+Bates), Wiley Publications.

# Angular - The Complete Guide [2021 Edition], Maximilian Schwarzmuller, Packt Publishing.

# Head First Servlets and JSP, 2nd Edition by Kathy Sierra, Bryan Basham, Bert Bates, O'Reilly Media, Inc.

**REFERENCES**:

1. Programming the World Wide Web, Robert W. Sebesta.
2. Building Web Applications with TypeScript, Angular and React, Sahil Malik, Ivo Gabe de Wolff, Gabriel Isenberg, Packt Publishing.
3. Web Technologies – Uttam Kumar Roy- Oxford University Press
4. Core SERVLETS AND JAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES, Marty Hall and Larry Brown Pearson
5. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson.
6. Murach’s Beginning JAVA JDK 5, Murach, SPD
7. An Introduction to Web Design and Programming –Wang-Thomson
8. Web Warrior Guide to Web Programming-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX
10. Java Script, D.Flanagan, O’Reilly, SPD.
11. Complete Reference to PHP.
12. https://www.w3schools.com/
13. https://angular.io/
14. <https://www.php.net/>
15. <https://www.typescriptlang.org/>

16.<https://www.json.org/json-en.html>

**Syllabus for B.Tech. III year I Semester**

**Computer Science and Engineering**

**Data Science**

**DATA MINING**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **L** | **T** | | **P** | **C** |
| **2** | **0** | **0** | | **2** |

**Code: 8MC01**

**Prerequisite:** Database Management Systems

**Course Objectives:**

To understand the principles of Data warehousing and Data Mining and understand types of data to improve the quality of data and efficiency using the mining process.

1. To be familiar with the Data warehouse architecture.
2. To understand applications of Association Rule Mining and algorithms to find them.
3. To perform classification and prediction of data.
4. To understand applications and algorithms for Clustering.
5. To introduce advanced topics in Data Mining.

**Course Outcomes:**

At the end of this course the student will be able to

1. Understand the fundamentals of Data Mining. and
2. Understand the techniques used in data preprocessing.
3. Learn insights of Data Mining Primitives and Infer the significance of Concept Description.
4. Apply the algorithms for mining association rules in large databases.
5. Discuss and apply the models of classification and use those models for the prediction of the new samples.
6. Apply various clustering techniques available for numerous applications. Identify the optimal clustering technique for a particular application

**UNIT – I**

**Introduction:** Fundamentals of data mining, KDD process, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task primitives, Integration of a Data mining System with a Database or a Data warehouse systems, Major issues in Data Mining.

**UNIT – II**

**Data Preprocessing:** Needs for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Data Mining Primitives, Data Mining Query Languages, Architectures of Data Mining Systems.

**UNIT – III**

**Mining Frequent, Associations and Correlations:** Basic concepts, Frequent Itemset mining methods, Mining multilevel association rules from Transaction Databases, Mining Multidimensional association rules from Relational databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

**UNIT – IV**

**Classification and Prediction:** Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Lazy Learner- k-nearest neighbor classifier, Prediction, Classifier Accuracy

**UNIT – V**

**Cluster Analysis Introduction**: Issues Regarding Classification and Prediction, Types of Data in Cluster Analysis, Major Clustering methods, Partitioning Methods, Hierarchical Methods, Density-Based methods, Grid-Based methods, Outlier Analysis.

**UNIT – VI**

**Mining Complex Types of Data:** Social Network Analysis, Spatial Data Mining, Multimedia Data Mining, Mining Time-Series data, Mining sequence Patterns in Transactional Databases, Text Mining, Mining the World Wide Web.

**TEXT BOOKS:**

**1.** Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.

2. Data Mining Techniques – ARUN K PUJARI, University Press.

**REFERENCE BOOKS:**

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

2. Data Mining Techniques – ARUN K PUJARI, University Press.

3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.

4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.

5. The Data Warehouse Lifecycle Toolkit – RALPH KIMBALL WILEY STUDENT EDITION

6. Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367

**Syllabus for B. Tech. III Year I semester**

**Computer Science and Engineering**

**Data Science**

**Data Warehousing and Business Intelligence**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**(Professional Elective –IV)**

**Code: 8MC02**

**Prerequisite: Nil**

**Course Objectives:**

1. Introduce the Business intelligence concepts, techniques and models

2. Understand the modeling process behind business analytics

3. To analyze different data analysis tools and techniques Expected

**Course Outcomes:**

**At the end of this course the student will be able to**

|  |
| --- |
| 1. Understand the importance of business intelligence and its applications in today’s world. |
| 1. Illustrate the different form of analytics such as business analytics, predictive analytics. |
| 1. Compare in detail the various aspects of business intelligence. |
| 1. Understand the technological components of operational intelligence. |
| 1. Analyze and understand the broad concepts in prescriptive analytics with Decision Tables. |
| 1. Apply business intelligence process for web mining and web analytics. |

**UNIT-I**

Business Intelligence: Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.

**UNIT-II**

Analytics: A Comprehensive Study, Business Analytics, Analytics, Software Analytics, Embedded Analytics, Learning Analytics, Predictive Analytics, Prescriptive Analytics, Social Media Analytics, Behavioral Analytics (Text Book-2)

# UNIT - III

BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts - A cyclic process of Intelligence Creation. The value of Business Intelligence-Value driven & Information use.

# UNIT - IV

Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)

# UNIT - V

Business intelligence implementation-Business Intelligence and integration implementation-connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI.

**UNIT-VI**

Operational Intelligence: Technological Components, Operational Intelligence, Business Activity Monitoring, Complex Event Processing, Business Process Management, Metadata, Root Cause Analysis (Text Book-2)

**TEXT BOOK**

1. Rajiv Sabherwal “Business Intelligence” Wiley Publications, 2012.
2. Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.
3. Drew Bentley, Business Intelligence and Analytics, Published by Library Press

**REFERENCES:**

1. S. Christian Albright, Wayne L. Winston, Business Analytics: Data Analysis & Decision

Making, 6th Edition, CENGAGE INDIA, 2017

1. Dinabandhu Bag, Business Analytics, Routledge, 1st edition, 2016
2. Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, Morgan Kaufmann, 1st edition 2014
3. Introduction to business Intelligence and data warehousing, IBM, PHI.

**Syllabus for B. Tech. III Year I semester**

**Computer Science and Engineering**

**Data Science**

**DATA COMMUNICATIONS AND COMPUTER NETWORKS**

**L T P/D C**

**3 0 0 3**

**Code: 8EC05**

**Prerequisite: NIL**

## *Course Objectives:*

1. To Study in detail about various analog and digital modulation and demodulation

techniques.

1. To have a thorough knowledge of various multiplexing schemes and Data communication protocols,
2. To Learn flow control, error control and access control mechanisms.
3. To Learn routing and congestion control algorithms, internet protocols.
4. To Understand Transport layer entities such as DNS and HTTP.

**Course Outcomes:**

At the end of this course the student will be able to

1. Understand concepts of different networks, network models and transmission medias.
2. Classify various data conversion techniques and Multiplexing, Demultiplexing techniques.
3. Summarize the design issues of Datalink layer and solve problems on Error and Flow control.
4. Infer MAC layer protocols, various connecting devices, IP addressing concepts and design a network(using subnetting and supernetting techniques)
5. Analyze various routing algorithms and outline the concepts of Internet control protocols and congestion control techniques.
6. Recognize services and protocols of transport layer, application layer along with network security issues.

**UNIT I**

**Introduction:** Data Communications, Networks: Topologies, PAN,LAN,MAN,WAN. The Internet, Protocols and Standards. Network Models: The OSI Model, Layers in the OSI Model, TCP/IP Protocol Suite.

**Physical layer & Media:** Guided Media, Unguided Media.

**UNIT II**

Data and Signals: Analog and Digital, Digital Transmission: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Analog Transmission, Digital-to-analog Conversion, Analog-to-analog Conversion. Bandwidth utilization: Multiplexing and Demultiplexing.

**UNIT III**

**Switching:** Circuit-Switched Networks, Packet Switching, Message Switching.

**Data Link Layer:** Services, Data Link Control, Framing, Flow and Error Control, Error Detection and Correction, CRC, Checksum, Hamming code , Sliding Window Protocols, HDLC, Point-to-Point Protocol.

**UNIT-IV**

**MAC sub layer:**MAC Address, Multiple AccessProtocol, Aloha, CSMA Protocols, IEEE Standards, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, IEEE 802.11.

**Connecting Devices:** Repeaters, Hubs, Bridges, Switches, Routers, Gateways.

**Network Layer:** Logical Addressing, IPv4, IPv6,Subnetting and Supernetting, Internetworking.

**UNIT V**

Datagram and Virtual-Circuit Networks, Forwarding and Routing, Routing Protocols: Flooding, Shortest path routing technique, Distance Vector routing, Count to Infinity problem, Link State routing, Hierarchical routing technique, Multicasting, Broadcasting.

**Internet control protocols:** ICMP, ARP, RARP, DHCP

**Congestion Control:** Congestion Control in virtual –circuits and Datagram Subnets,

**Traffic Shaping:** Leaky-Bucket and Token-Bucket Algorithms.

**UNIT VI**

**Transport Layer:** Transport Services, Connection establishment, Connection release and TCP and UDP protocols.

**Application Layer**: Domain Name System, Electronic Mail and File Transfer Protocol, WWW and HTTP, Simple Network Management Protocol (SNMP)

**Security and Privacy**: Security attacks and services.

**TEXT BOOKS:**

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

**REFERENCE BOOKS :**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education

2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

3. Data Communications, William Stallings, Seventh edition.

**Syllabus for B.Tech. III year I Semester**

**Computer Science and Engineering**

**Data Science**

**ENVIRONMENTAL SCIENCE AND ECOLOGY**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **2** | **0** | **0** | **2** |

**Code: 8HC05**

***Course Objectives:***

*The student will be able to:*

1. *To understand structure and function of ecosystem*
2. *To learn classification and uses of natural resources*
3. *To learn about Understanding the impacts of developmental activities and mitigation measures.*
4. *To know the source, causes and preventive methods of pollution*
5. *To understand the importance of ecological balance for sustainable development.*
6. *To understand the environmental policies and regulations*

***Course Outcomes***

*After completion of the course, the student will be able to:*

1. *Understand about ecosystem and energy flow among the organisms.*
2. *Know the resources available, use of them and overexploitation of the resources in the nature.*
3. *Learn the value, use and value of biodiversity.*
4. *Understand the causes and effect of pollution and implement measures in control of pollution.*
5. *Understand the sustainable development and implement green technology for sustainable development.*
6. *Learn and implement policy to protect the environment.*

**UNIT-I Ecosystems**: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

**UNIT-II Natural Resources**: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

**UNIT-III Biodiversity and Biotic Resources**: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

**UNIT-IV Environmental Pollution and Control Technologies**: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants. Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

**UNIT-V Sustainable development and Green Technology**: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism ( CDM ).

**UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment**: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**TEXT BOOKS:**

1. Perspectives in *Environmental Studies*: *Kaushik* A. and *Kaushik*, C.P. New Age International (P) Ltd. (2008)

**REFERENCE BOOKS:**

1. Environmental Studies by Erach Bharucha, 2005 University Press.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

**Syllabus for B.Tech. III year I Semester**

**Computer Science and Engineering**

**Data Science**

**DATA MINING LAB**

**L T P/D C**

**0 0 2 1**

**Code: 8MC62**

**Prerequisite:** Database Management Systems

**Course Objectives:**

Learn how to build a data warehouse and query it. Learn to perform data mining tasks using a data mining toolkit. Understand the data sets and data preprocessing. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression. Exercise the data mining techniques with varied input values for different parameters. To obtain Practical Experience Working with all real data sets. Emphasize hands-on experience working with all real data sets.

**Course outcomes:**

## At the end of this course the student will be able to

1. Work with the ETL and Mining tools.
2. Demonstrate the classification, clustering techniques on the data sets.
3. Comprehend the results obtained in the clustering, Association and Classification techniques applied on the data sets with varied input parameters.
4. Ability to apply mining techniques for realistic data.

**Exercises**

1. Perform filter transformation for the employee database.
2. Add the commission of 1000 Rs in the Salary field of Employee table using Expression Transformation.
3. Use Aggregator transformation to display the average salary of employees in each department.
4. Use Joiner transformation to display the Sailor\_Name form Sailors table and Boat\_Name from Boats table in a new table.
5. Perform steps to load top 2 salaries for each department without using Rank Transformation and SQL queries in Source Qualifier.
6. Compare the GRI and Apriori usage (Prepare a sample data set in Spread Sheet).
7. Determine the Drugs importance w.r.t. Age, Cholestrol and BP using C 5.0.
8. Predict the accuracy of the test data set using Neural Net model using a Case Study of Botanical data set.
9. Compare the C 5.0 and Neural Net using the sample data.
10. Using the BASKETS1n dataset, select the data as given below.

a) Customer age < 35 and count the customers who buy dairy and VEG products

b) Find the AVG income of customers who buy at least 5 products

1. Using the BASKETS1n dataset, select the data as given below.
2. Derive the field whose home own is 'YES' and Age > 30 and sort data w.r.t. income in Ascending order, and output only the item fields.

b) Find the mean value of salary w.r.t age={Young, Middle, Senior}.

**Syllabus for B. Tech. III Year I semester**

**Computer Science and Engineering**

**Data Science**

**COMPUTER NETWORKS LAB**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

**Code: 8EC65**

**Prerequisite: Data Structures**

## *Course Objectives:*

## *To provide an understanding of the design concepts of framing Error Detection & correction, Routing, Congestion concepts and Network tools.*

**Course Outcomes:**

## At the end of this course the student will be able to

1. Implement and analyze framing methods of the data link layer.
2. Implement and analyze framing methods of the data link layer.
3. Illustrate and implement error detection & correction techniques.
4. Implement different Routing Algorithms.
5. Understand basic Network Commands.
6. Use of Wireshark and NS-2 tools

**Computer Networks Lab Exercises:**

1. Implement the data link layer framing methods such as

a) Character / Byte stuffing

b) Bit stuffing.

2. Implement on a data set of characters the three CRC polynomials

a) CRC 12 b) CRC 16 c) CRC CCITT.

3. Implement Hamming code for error detection and error correction

4. Implement Dijkstra's algorithm to compute the shortest path through a graph.

5. Take an example subnet graph with weights indicating delay between nodes. Now obtain a Routing table for each node using a distance vector routing algorithm.

6. Implement Congestion control using Leaky-Bucket Algorithm

7. Execute the basic Networking Commands

|  |  |
| --- | --- |
| 1. Arp | 1. Hostname |
| 1. ipconfig | 1. ipconfig/all |
| 1. Ipconfig/renew | 1. Ipconfig/release |
| vii. Ipconfig/flushdns | viii. Pathping |
| ix. Ping | x. Route |
| xi. tracert |  |

8. Demonstration of NS-2

**Syllabus for B.Tech. II year I Semester**

**Computer Science and Engineering**

**Data Science**

**WEB TECHNOLOGIES LAB**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

**Code: 8EC67**

**Prerequisite:** Object Oriented Programming through Java Lab

## *Course Objectives:*

## *Implement programs using HTML tags, Java scripts along with Event Handling. Implement scripts using XML, DOM parser, and SAX parser for project development. Also, the student should understand and implement the MVC architecture applications.*

**Course Outcomes:**

At the end of this course, the student will be able to

1. Demonstrate the use of HTML tags and be able to design web pages.Develop dynamic programs involving Java scripts, popup windows in JavaScript along Event Handling.

2. Develop scripts using XML and XSLT and read XML documents using parsers, DOM parser, and SAX parser. Develop JSON files and access them via HTML pages.

3. Implement Angular with Expressions, Filters, Directives, Controller, and Modules.

4. Develop a Single Page Application with implementation of Scope and Form.

5. Implement Java servlets using Apache Tomcat Server for User authentications

6. Develop an application in PHP with Database connectivity.

**Hardware and Software required:**

1. A working computer system with either Windows or Linux

2. A web browser either Microsoft Edge or Firefox or Chrome

3. Visual Studio IDE or Eclipse IDE

4. XML editor like Altova Xml-spy [www.Altova.com/XMLSpy – free] ,Stylusstudio , etc.,

5. Tomcat web server and Apache web server

6. XAMPP for PHP and Database programs JVM(Java virtual machine) must be installed on your system

**Week-1:**

1. Create a web page with advanced layouts and positioning with CSS and HTML.
2. Design a website with different methods of embedding CSS in a web page.
3. Create a static web page which displays your personal details. (Hint: CSS3 and HTML5)
4. Create a web page through which the user can enter his / her details to become an authenticated user of that page.

**Week-2:**

1. Create a web page that shows different methods of embedding JavaScript with validation.
2. Create a web page with rollover menus. Rollover menus should be created using JavaScript.
3. Create a simple calculator, which can perform the basic arithmetic operations.

**Week-3:**

1. Write an XML file which will display the Book information which includes the following:

1) Title of the book 2) Author Name 3) ISBN number

4) Publisher name 5) Edition 6) Price

1. Write a Document Type Definition (DTD) or XML Schema Definition (XSD) to validate the above XML file.

**Week-4:**

1. Prepare a JSON file with Student information and display the content in HTML Table format.

**Week-5:**

1. Prepare a program that displays the name that we feed in the ng-init directive.
2. AngularJS expression can contain arithmetic operators which will produce the result based on the type of operands
3. Program for AngularJS expression can contain variables declared via ng-init directive.
4. Return the names that contain the letter "i".
5. Type a letter in the input field, and the list will shrink/grow depending on the match.
6. By using ng-click directive on the table headers, we can run a function that changes the sorting order of the array.
7. Creating a custom myFormat filter will format every other character to uppercase.

**Week-6:**

1. Program to implement ay 5 directives from ng-app, ng-init, ng-model, ng-controller, ng-bind, ng-repeat ,ng-show ,ng-readonly, ng-disabled , ng-if, ng-click.
2. Demonstrates by attaching properties to the $scope object inside a controller and then displaying property value in HTML.
3. Program to handle click events of a button.
4. Program to create the "message" property is defined inside myController, so it will only be available to div1 and div2 but not div3 and div4. The same way, message property defined inside anotherController will only be available to div4. The div3 element does not come under any controller, so "message" property will be null or undefined.
5. Program to implement complex and nested controllers
6. Create a module using controllers

**Week-7:**

1. Prepare a angular Student information form
2. Prepare a program to implement Scope & Directives, $apply and $watch

**Week-8:**

1. Write a program for Single Page Application (SPA) using angular.

**Week-9:**

1. Install APACHE TOMCAT web server and while installation, assign port number 8181. Make sure that this port is available i.e., no other process is using this port.
2. Write a servlet program to print welcome messages on the browser.
3. Develop a web application to pass the parameters from the HTML page and display them using servlet.

**Week-10:**

1. Develop a web application using servlet to perform Session Tracking with hidden form fields, cookies and url-rewriting and http sessions. (Files to developed- Html,Java, Web.xml)
2. Write a servlet using the RequestDispatcherclass.Develop a web application using servlet to perform the user Authentication:

A. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following:

1. Create a Cookie and add these four user id’s and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display “ You are not an authenticated user “.

Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters() method.

B. Authenticate the user when he submits the login form using the username and password from the database.

**Week-11:**

1. Write a PHP to test the database connection
2. Write a php to create a Table.

**Week-12:**

1. Write a PHP to insert values form HTML to database(registration Page)
2. Write a PHP to insert values to a Database.
3. Write a PHP to select values from a database table.
4. Write a PHP to update existing records of a database table.
5. Write a PHP to validate user login

**Syllabus for B.Tech III Year I semester**

**Computer Science and Engineering**

**Data Science**

**SUMMER INDUSTRY INTERNSHIP-I**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **0** | **1** |

**Code: 8M591**

**Prerequisite:** All Courses till this semester

**Course Objectives:**

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Course Outcomes:**

At the end of this course the student will be able to

1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills.

A summer industry internship project shall be carried out by a group of students consisting of 2 to 3 in number during summer third year first semester at industries. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship projects. Project shall consist of design, fabrication, software development or building of prototype or application app. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work (internal guide 10M external guide : 5M) : 15 marks

Report : 05 marks

Demonstration / presentation (internal presentation

is evaluated by HOD, senior faculty and internal guide) : 10 marks

--------------

30 marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the internal guide.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**DATA VISUALIZATION TECHNIQUES**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **0** | **0** | **2** |

**Code : 8MC03**

**Prerequisite : Nil**

**Course Objective:** To understand various data visualization techniques.

**Course Outcomes:**

1. Visualize the objects in different dimensions.

2. Design and process the data for Virtualization.

3. Apply the visualization techniques in physical sciences, computer science, applied

mathematics and medical science.

4. Apply the virtualization techniques for research projects. (K1, K3).

**UNIT - I**

**Introduction and Data Foundation:** Basics - Relationship between Visualization and Other Fields - The Visualization Process - Pseudo code Conventions - The Scatter plot. Data Foundation - Types of Data - Structure within and between Records - Data Preprocessing - Data Sets

**UNIT - II**

**Foundations for Visualization:** Visualization stages - Semiology of Graphical Symbols - The Eight Visual Variables - Historical Perspective - Taxonomies - Experimental Semiotics based on Perception Gibson‘s Affordance theory – A Model of Perceptual Processing.

**UNIT - III**

**Visualization Techniques: Spatial Data:** One-Dimensional Data - Two-Dimensional Data – Three-Dimensional Data - Dynamic Data - Combining Techniques. **Geospatial Data:** Visualizing Spatial Data- Visualization of Point Data -Visualization of Line Data - Visualization of Area Data - Other Issues in Geospatial Data Visualization

**UNIT - IV**

**Multivariate Data:** Point-Based Techniques - Line- Based Techniques -Region-Based Techniques - Combinations of Techniques – Trees Displaying Hierarchical Structures –

Graphics and Networks- Displaying Arbitrary Graphs/Networks.

**UNIT - V**

**Interaction Concepts and Techniques: Text and Document Visualization**: Introduction - Levels of

Text Representations - The Vector Space Model - Single Document Visualizations -Document

Collection Visualizations - Extended Text Visualizations **Interaction Concepts**: Interaction Operators -Interaction Operands and Spaces - A Unified Framework. **Interaction Techniques**: Screen Space -Object-Space -Data Space -Attribute Space- Data Structure Space - Visualization Structure – Animating Transformations -Interaction Control

**UNIT - VI**

**Research Directions in Virtualizations:** Steps in designing Visualizations – Problems in designing effective Visualizations- Issues of Data. Issues of Cognition, Perception, and Reasoning. Issues of System Design Evaluation, Hardware and Applications.

**TEXT BOOKS:**

1. Matthew Ward, Georges Grinstein and Daniel Keim, “Interactive Data Visualization

Foundations, Techniques, Applications”, 2010.

2. Colin Ware, “Information Visualization Perception for Design”, 2nd edition, Margon Kaufmann Publishers, 2004.

**REFERENCE BOOKS:**

1. Robert Spence “Information visualization – Design for interaction”, Pearson Education, 2nd

Edition, 2007.

2. Alexandru C. Telea, “Data Visualization: Principles and Practice,” A. K. Peters Ltd, 2008.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**

**Code : 8LC01**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **0** | **0** | **2** |

**Prerequisite:** Knowledge on Data Structures.

**Course Objectives:**

1. To learn the distinction between optimal reasoning vs. human like reasoning.

2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

3. To learn different knowledge representation techniques.

4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

**Course Outcomes:**

1. Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.

2. Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.

3. Learn different knowledge representation techniques.

4. Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

5. Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.

**UNIT-I:**

Introduction to AI- Intelligent Agents, Problem-Solving Agents,

Searching for Solutions - Breadth-First Search, Depth-First Search, Hill-climbing Search, Simulated Annealing Search, Local Search in Continuous Spaces.

**UNIT-II**

Games- Optimal Decisions in Games, Alpha-Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents.

Logic-Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

**UNIT-III**

First-Order Logic-Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

**UNIT-IV**

Planning-Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches, Hierarchical Planning.

**UNIT-V**

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes’ Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain.

**UNIT-VI**

Bayesian Networks- The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability.

**TEXT BOOKS:**

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Pearson Education, Third Edition.

**REFERENCES:**

1. Artificial Intelligence, 3rd Edn.,E. Richand K. Knight(TMH)

2. Artificial Intelligence, 3rd Edn.,Patrick Henny Winston, Pearson Education.

3. Artificial Intelligence, Shivani Goel, Pearson Education.

4. Artificial Intelligence and Expert systems–Patterson, Pearson Education.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**AUTOMATA THEORY AND COMPILER DESIGN**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

**Code : 8FC07**

**Prerequisite : Nil**

## *Course Objectives:*

## Learn principles of Finite state machine, finite automation models, and transition diagrams.

## Understand regular languages and expressions for writing grammars.

## Understand context free grammars useful in designing compilers.

## Study the design and working of a complier .

## Study the role of grammars in compiler design.

## Learn a various parsing techniques for design of compilers.

## Course Outcomes:

## At the end of this course the student will be able to

|  |
| --- |
| 1.  Design the finite automata different Languages |
| 2.  Construct finite Automata for a given regular expressions, and derive strings with suitable examples. Conceptualize context free grammars and normal forms. |
| 3. Design the push down automata and Turing Machine for complex languages. |
| 4. Understand LEX tool and relate parsing techniques, |
| 5. Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool. |
| 6. Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form. |

**UNIT-I:** Strings, Alphabet, Language, Operations, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton,   
 Equivalence between NFA to DFA conversion.

**UNIT-II: Regular Languages**, Regular sets, regular expressions, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Closure properties of regular sets (proofs not required).

**Context Free Grammars:** Context free grammar, derivation trees, Right most and leftmost derivation of strings. Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greiback normal form,

**UNIT-III:** Push down automata: definition, model, acceptance of CFL, Introduction to DCFL andDPDA.  
**Turing Machine:** Turing Machine, definition, model, design of TM, recursively enumerable languages. Chomsky hierarchy of languages

**UNIT IV:** Overview of compiler – Environment, pass, phase, phases of compiler, LEX tool,

Top Down Parsing: Top down parsing technique, Recursive decent parsing with back tracking, Ambiguous grammar, Elimination of left recursion, Left factoring, Predictive parsing, LL (1).

**UNIT V** Bottom up parsing: shift reduce parser SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar, YACC tool.

**UNIT VI:** Semantic Analysis: Syntax directed translation, S- Attributed, L Attributed definition, Type checker, Intermediate code generation: 3-address code form, DAG. Code optimization: Optimization, loop optimization, peep-hole optimization, Symbol table format

**TEXTBOOKS:**

1. Introduction to Automata Theory Languages and Computation. Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Theory of Computation? Sipser 2nd edition Thomson
3. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education

**REFERENCES:**

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. Elements of Theory of Computation?, Lewis H.P. &amp; Papadimition C.H. Pearson /PHI.
4. Theory of Computer Science Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI Course Requirements.
5. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
6. Compiler Construction, LOUDEN, Thomson

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**MACHINE LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code: 8EC17**

**Prerequisite: Introduction to Data Science**

**Course Objectives:**

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability based learning techniques
4. To understand graphical models of machine learning algorithms

**Course Outcomes:**

At the end of this course, the student is able to

1. Understand the fundamental concepts of ML and Designing a Learning System.

2. Understand the basic concepts of linear models, tree and Probabilistic Models.

3. Understand various Dimensionality Reduction Techniques and Apply Various

Evolutionary Algorithms with models.

4. Understand the Graphical models and Analytical Learning.

**UNIT-I**

**INTRODUCTION:** Learning– Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Linear Discriminants: Definitions of Perceptron, Linear separability, Linear Regression.

Design a Learning System– Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm. **(Textbook-1)**

**UNIT-II**

**LINEAR MODELS:**

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Interpolations and Basis Functions – Support Vector Machines. **(Textbook-2)**

**UNIT-III**

**TREE AND PROBABILISTIC MODELS:**

Learning with Trees– Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms. **(Textbook-2)**

**UNIT-IV**

**DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS:**

Dimensionality Reduction– Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example. (Textbook-1)

**UNIT-V**

**GRAPHICAL MODELS:**

Markov Chain Monte Carlo Methods– Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods. **(Textbook-1)**

**UNIT – VI**

**ANALYTICAL LEARNING**

Learning with perfect domain theory– Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm. **(Textbook-2)**

**TEXT BOOKS:**

1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

2. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.

**REFERENCES:**

1. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.

3. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

**Syllabus for B. Tech III Year II semester**

**Computer Science and Engineering**

**Data Science**

**INTELLECTUAL PROPERTY RIGHTS**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **1** | **0** | **0** | **1** |

**Code: 8GC49**

**Prerequisite : Nil**

**Course Objective:**

This course is intended to impart awareness on intellectual property rights and various regulatory issues related to IPR

**Course Outcomes:**

At the end of this course the student will be able to

1. Demonstrate a breadth of knowledge in Intellectual property

2. Overview of Patents, Searching, filling and drafting of Patents

3. Overview of copyright & GI .

4. Overview of Trade Mark & Trade Secret,

5. Overview of Integrated Circuit and Industrial Design.

6. Knowledge about different national and international: Conventions and Treaties Governing the IPRs

**UNIT I: Introduction to IPR:** Discovery, Invention, Creativity, Innovation, History & Significance of IPR, Overview of IPR -Patent, Copyright, Trade Mark, Trade Secret , GI, Industrial Design & Integrated Circuit, Non-patentable criteria

**UNIT II: Patents**: Patents- Patentability Criteria, Types of Patents-Process, Product & Utility Models, Software Patenting and protection, Patent infringement- Case studies- Apple Vs Samsung, Enfish LLC Vs Microsoft, Overview of Patent search-Types of Searching, Public & Private Searching Databases, Basics of Patent Filing & Drafting, Indian Patents Law

**UNIT III: Copyrights and Geographical Indications:** Types of Copyrights, Procedure for filing, copyright infringement, Copyright Law, Geographical Indications –Tirupati Laddu , Darjeeling Tea, Basmati rice

**UNIT IV: Trademark and Trade secrets:** Trade Marks –Commercial importance, protection, registration, Case Studies- Sabena and Subena, Castrol Vs Pentagon, Trade Secrets- Case Studies-Kentucky Fried Chicken (KFC), Coca-Cola

**UNIT V: Protection of Industrial Designs & Integrated Circuits:** Industrial Designs – Scope, protection, filing, infringement; Integrated Circuits & Layout design, Semiconductors, Unfair competition, Designs Act.

**UNIT VI: International Conventions & Treaties:** Overview of WTO, GATT, TRIPS, WIPO, Berne Convention, Rome convention, Paris Convention, Patent Cooperation Treaty (PCT), Madrid Protocol, Budapest Treaty, Hague agreement

**TEXT BOOKS:**

1. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3rd Edition, Cengage learning, 2012
2. N.S. Gopalakrishnan& T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

**REFERENCE BOOKS:**

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey &KhushdeepDharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. AjitParulekar and Sarita D’ Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

**Syllabus for B. Tech III Year II semester**

**Computer Science and Engineering**

**Data Science**

**MACHINE LEARNING LAB**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

**Code: 8MC64**

**LIST OF EXPERIMENTS (MACHINE LEARNING):**

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye’s rule in python to get the result. (Ans: 15%)

2. Extract the data from database using python

3. Implement k-nearest neighbours classification using python

4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

|  |  |  |
| --- | --- | --- |
| VAR1 | VAR2 | CLASS |
| 1.713 | 1.586 | 0 |
| 0.180 | 1.786 | 1 |
| 0.353 | 1.240 | 1 |
| 0.940 | 1.566 | 0 |
| 1.486 | 0.759 | 1 |
| 1.266 | 1.106 | 0 |
| 1.540 | 0.419 | 1 |
| 0.459 | 1.799 | 1 |
| 0.773 | 0.186 | 1 |

5. The following training examples map descriptions of individuals onto high, medium and low

credit-worthiness.

medium skiing design single twenties no -> highRisk

high golf trading married forties yes -> lowRisk

low speedway transport married thirties yes -> medRisk

medium football banking single thirties yes -> lowRisk

high flying media married fifties yes -> highRisk

low football security single twenties no -> medRisk

medium golf media single thirties yes -> medRisk

medium golf transport married forties yes -> lowRisk

high skiing banking single thirties yes -> highRisk

low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the

unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the

dataset?

6. Implement linear regression using python.

7. Implement Naïve Bayes theorem to classify the English text.

8. Implement an algorithm to demonstrate the significance of genetic algorithm.

9. Implement the finite words classification system using Back-propagation algorithm.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**ARTIFICIAL INTELLIGENCE AND COMPILER DESIGN LAB**

**Code: 8MC65**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

## *Prerequisite: Nil*

**Course Objectives:**

1. Become familiar with basic principles of AI toward problem solving, knowledge representation, and learning.

2. To experiment on the basic techniques of compiler construction and tools that can be used to perform syntax-directed translation of a high-level programming language into an executable code.

**Course Outcomes:**

1. Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.

**LIST OF EXPERIMENTS (ARTIFICIAL INTELLIGENCE):**

1. Write a program in prolog to implement simple facts and Queries

2. Write a program in prolog to implement simple arithmetic

3. Write a program in prolog to solve Monkey banana problem

4. Write a program in prolog to solve Tower of Hanoi

5. Write a program in prolog to solve 8 Puzzle problems

6. Write a program in prolog to solve 4-Queens problem

7. Write a program in prolog to solve Traveling salesman problem

8. Write a program in prolog for Water jug problem

**LIST OF EXPERIMENTS (COMPILER DESIGN):**

1) Implement DFA accepting the language containing even binary numbers.

2) Implement DFA that accept all the strings of a’s and b’s 3rd symbol from is RHS always a

3) Implement DFA accepting the language of strings not ending with 00 over the input (0,1)

4) Implement the DFA that accepts all the string of a’s and b’s where number of a ‘s is divisible by 3 and number of b‘s is divisible by2.

5) write lex program to implement lexical analyzer functionality.

6) Write a lex program to count the number of words and number of lines in a given file or program.

7) Write a ‘C’ program to implement lexical analyzer using c program.

8) write recursive descent parser for the grammar

E->E+T E->T T->T\*F T->F F->(E)/id.

9) write recursive descent parser for the grammar

S->(L) S->a L->L,S L->S

10) Write a C program to calculate first function for the grammar

E->E+T E->T T->T\*F T->F F->(E)/id

11) Write a YACC program to implement top down parser for the given grammar.

12) Write a YACC program to evaluate algebraic expression.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**COMPREHENSIVE VIVA VOCE**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **0** | **1** |

**Code: 8M680**

**Prerequisite:** All core Courses till this semester

Course Objectives:

## Prepare students in basics and advanced relevant courses to revise and face technical interviews for enhancing employability.

**Course Outcomes:**

At the end of this course the student will be

1. Assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.

Comprehensive Viva Voce will be conducted in third year second semester for 100 marks. Out of 100 marks 30 marks are evaluated internally and 70 marks for external evaluation.

**Internal:**

Comprehensive Viva Voce is conducted twice in a semester and evaluated for 30 marks each and average will be considered for internal.

Internal Examination : 30 Marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, and subject experts.

**Syllabus for B. Tech. III Year II semester**

**Computer Science and Engineering**

**Data Science**

**GROUP PROJECT**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

**Code: 8M692**

## Course Objectives:

## To acquire basic knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Course Outcomes:**

At the end of this course the student will be able to

1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills largely improve.
5. Work as an individual and in a team.

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work : 15 marks

Report : 05 marks

Demonstration / presentation : 10 marks

-----------

30 marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**Syllabus for B. Tech. IV Year I semester**

**Computer Science and Engineering**

**Data Science**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

#### BIG DATA ANALYTICS

**Code: 8EC18**

**Prerequisites: Machine Learning**

# Course Objectives:

# To explore the fundamental concepts of big data analytics.

1. To understand storage and parallel processing of Big Data using Hadoop
2. To introduce programming tools like HIVE, SQOOP, HBASE in Hadoop ecosystem.
3. To understand the applications using Apache Spark RDD Concepts.
4. To know high level API like Data Frames and Spark SQL
5. To teach the fundamental techniques and principles in achieving big data analytics with stream processing.

**Course Outcomes:**

At the end of this course, the student will be able to

|  |
| --- |
| 1. Comprehend the fundamentals of big data analytics and understand how Hadoop solves the big data problem in real life. |
|
| 2. Interpret the challenges with big data and elaborate the knowledge about the technological developments in big data environment. |
| 3. Demonstrate the difference between NOSQL and SQL databases. |
| 4. Discuss the Hadoop distributed file system (HDFS) framework and anatomy of Hadoop map-reduce. |
| 5. Design the algorithms to process big data using Apache Spark Low Level API. |
|
| 6. Apply Hadoop Data Analysis to social Media Analytics and Opinion Mining on Tweets. |
|

**UNIT– I:**

Introduction to Big Data: Big Data Analytics, Characteristics of Big Data – The Four Vs, importance of Big Data, Different Use cases, Data-Structured, Semi-Structured, Un-Structured

Introduction to Hadoop and its use in solving big data problems. Comparison Hadoop with RDBMS, Brief history of Hadoop, Apache Hadoop EcoSystem, Components of Hadoop, The Hadoop Distributed File System (HDFS):, Architecture and design of HDFS in detail, Working with HDFS (Commands)

**UNIT-II**

Anatomy of Hadoop map-reduce (Input Splits, map phase, shuffle, sort, combiner, reduce phase) (theory)

Hive:Introduction to Hive, data types and file formats, HiveQL data definition(Creating Databases and Tables),HiveQL for Data loading, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join Strategies.

**UNIT-III**

SQOOP : Introduction to SQOOP, SQOOP imports : From Database to HDFS/Hive, SQOOP exports: From HDFS/Hive to Database, Incremental imports

NoSQL &HBase: Overview, HBasearchitecture, CRUD operations

**UNIT-IV**

SPARK Basics: History of Spark, Spark Architecture, Spark Shell,Working with RDDs in Spark:RDD Basics, Creating RDDs in Spark. RDD Operations. Passing Functions to Spark, Transformations and Actions in Spark, Spark RDD Persistence

Working with Key/Value Pairs : Pair RDDs, Transformations on Pair RDDs, Actions Available on Pair RDDs

**UNIT-V**

Structured API :DataFrames,SQL : Overview of Structured Spark Types, Schemas, Columns and Expressions, DataFrame Transformations, Working with different types of data,

Aggregations- Aggregation Functions, Grouping, User-Defined Aggregation Functions, ,Joins-[Inner Joins](https://learning.oreilly.com/library/view/spark-the-definitive/9781491912201/ch08.html#inner-joins), [Outer Joins](https://learning.oreilly.com/library/view/spark-the-definitive/9781491912201/ch08.html#outer-joins), Processing CSV Files, JSON Files, Text Files and Parquet Files, Spark SQL

**UNIT-VI**

Spark streaming:Stream Processing Fundamentals, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output(Kafka)

Case study: Twitter Stream processing application

# Text Books:

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley,2012
2. SPARK: The Definitive Guide, Bill Chambers &MateiZaharia, O'Reilley, 2018 Edition

**REFERENCES:**

1. "Hadoop Operations", O'Reilley, Eric Sammer,2012
2. "ProgrammingHive",O'Reilley,E.Capriolo,D.Wampler,andJ.Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George,2011
4. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and AmbigaDhiraj

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **M** | **L** | **L** | **L** | **L** | **M** | **L** |  |  |  |  | **M** |

**Syllabus for B. Tech. IV Year I semester**

**Computer Science and Engineering**

**Data Science**

**LINUX PROGRAMMING**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code : 8FC10**

**Prerequisite :** Operating Systems

**Course Objectives:**

1. Induce working principles of Linux operating system, usage of File handling utilities, Security by file permissions, process utilities, Disk utilities, networking utilities.
2. Impart the shell responsibilities and meta-characters of it, control structures, shell interrupt processing, functions, debugging shell scripts.
3. Impart basics of file concepts kernel support for file, file structure and low-level I/O functions, system calls (file API’s). Induce knowledge regarding Directory management and its API.
4. Demonstrate basics of process creation, execution and synchronization mechanisms. Give knowledge regarding a signal, need for having them, usage of various signals.
5. Narrate the need for Inter Process Communication. Explore the possible mechanisms to implement System V APIs. To demonstrate the usage of Message queues.
6. Incorporate implementation for semaphore API and shared memory API. To explain the need for using a basic Client-Server model.

**Course Outcomes:**

At the end of this course, the student will be able to

|  |  |
| --- | --- |
| 1. List and demonstrate the basic Linux utilities |  |
| 1. Recite and solve problems using Shell Scripting |  |
| 1. Understand and elaborate File System structure and kernel supportfor files in Linux. |  |
| 1. Summarize the fundamentals of process control primitives and signal handling. |  |
| 1. Classify the techniques of Inter process communication and apply them to real world problems. |  |
| 1. Demonstrate the significance of Semaphores for Kernel support and simulate program using the same. |  |

**UNIT-I :**  Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, using system commands in awk.

(Applications: Determining what types of files are present in a system, debugging issues with file accessibility, finding a process troubling for a task and discarding from its existing, Write and extract necessary information from huge test files.)

**UNIT – II:** Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

(Applications: Writing shell scripts for automating most of the regular jobs, taking backup on regular basis and restoring the same)

**UNIT-III:** Files: File Concept, File System Structure, I nodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls (File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links. (Applications: write some system programs to interact with file system, developing small system software’s to work with files and devices, developing program’s on directory management system)

**UNIT-IV**: Process – Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs. Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

(Applications: Applications to find number of typical processes are under different context and controlling them in synchronous manner. Develop user defined modules for handling a signal and controlling several issues with signals.)

**UNIT-V**: Inter-process Communication: Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues Kernel support for messages, UNIX system V APIs for messages, client/server example.

(Applications: Developing applications complying with IPC mechanisms, developing an application that exchanges a set of messages among different processes. Write a client server application to go with any concurrent approach)

**UNIT- VI:** Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores. Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, semaphore and shared memory example.

(Applications: Develop critical section handling mechanisms to deal with any real problems. Building applications to share a piece of memory resource among processes concurrently)

**TEXT BOOKS:**

* + 1. Unix System Programming using C++, T.Chan, PHI.
  1. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH, 2006.
  2. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition,rp-2008

**REFERENCES:**

1. Linux System Programming, Robert Love, O’Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix Network Programming, W.R. Stevens, PHI.
4. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education

**Syllabus for B. Tech. IV Year I semester**

**Computer Science and Engineering**

**Data Science**

**CYBER SECURITY AND CYBER LAWS**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code: 8FC08**

**Prerequisite: Nil**

**Course Objectives:**

1. To learn fundamentals of cryptography and its application to network security.
2. To understand network security threats, security services, and countermeasures.
3. To learn computer security, Internet, E-commerce and E-governance with reference to Free
4. Market Economy
5. To learn International Efforts relating to Cyberspace laws and Cyber crimes
6. To learn Law relating to electronic records and intellectual property rights in India
7. To understand ethical laws of computer for different countries.
8. To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
9. To learn Miscellaneous provisions of IT Act and Conclusions

**Course Outcomes:**

At the end of this course the student will be able to

1. Familiarize the cryptographic procedures and Understand its primitives
2. Outline Security policy in Legislation and Comprehend E-Commerce frame work, models and its associated threats
3. Justify the role of electronic signatures in E-Commerce and summarize the various laws relating to it.
4. Categorize international cyber laws and cyber crimes.
5. Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000
6. Classify and Outline theoffences under the Cyberspace law and the Internet in India

**UNIT-I**

**Introduction to cyber Security, cryptography, Types of Attacks, Secrete Key Cryptography**

Introduction: Cyber attacks, Defense Strategies and Techniques Mathematical background for Cryptography: Modulo arithmetic, The greatest common divisor, Useful Algebraic Structures, Chinese Remainder Theorem Basics of Cryptography: Secret versus Public key Cryptography, Types of attacks, Elementary substitution Ciphers, Elementary Transposition Ciphers, Other Cipher Properties Secrete Key Cryptography: Product Ciphers, DES Construction, Modes of Operation, MAC and other Applications, Attacks, Linear Crypt analysis.

**UNIT-II**

**Introduction to Computer Security, Internet, E-commerce and E-governance with reference to Free Market Economy**

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

**UNIT-III**

**Law relating to electronic records and intellectual property rights in India**

Legal aspects of Electronic records / Digital signatures, Cyber laws, the roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

**UNIT-IV**

**International Efforts relating to Cyberspace laws and Cyber crimes**

International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

**UNIT-V**

**Penalties, Compensation**

Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and judicial review.

**UNIT-VI**

**Offences under the Cyberspace, Internet in India and Miscellaneous provisions of IT Act and Conclusions**

Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.

**TEXT BOOK:**

1. Network security and Cryptography by Bernard Menezes CENGAGE Learning Publications, 2010.

2. Cyber Laws and IT Protection, Harish Chander, PHI, 2012

**REFERENCE BOOKS:**

**1.** Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)”, 2ndEdition, O’ Reilly Media, 2006.

**2.** Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, New Delhi, 2006.

3. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.

4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **M** |  | **M** | **H** |  |  |  |  | **M** |  |  | **M** |

H: High, M: Medium, L: Low Correlation

**Syllabus for B. Tech. IV Year I semester**

**Computer Science and Engineering**

**Data Science**

**BIG DATA ANALYTICS LAB**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

**Code: 8MC65**

**Course Objectives:**

1. The purpose of this course is to provide the students with the knowledge of Big data Analytics

principles and techniques.

2. This course is also designed to give an exposure of the frontiers of Big data Analytics

**Course Outcomes:**

1. Use Excel as an Analytical tool and visualization tool.

2. Ability to program using HADOOP and Map reduce.

3. Ability to perform data analytics using ML in R.

4. Use cassandra to perform social media analytics.

**List of Experiments:**

1. Implement a simple map-reduce job that builds an inverted index on the set of input

documents (Hadoop)

2. Process big data in HBase

3. Store and retrieve data in Pig

4. Perform Social media analysis using cassandra

5. Buyer event analytics using Cassandra on suitable product sales data.

6. Using Power Pivot (Excel) Perform the following on any dataset

a) Big Data Analytics

b) Big Data Charting

7. Use R-Project to carry out statistical analysis of big data

8. Use R-Project for data visualization of social media data

**TEXT BOOKS:**

1. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.

2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s

Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiely CIO Series,

2013.

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

4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition,IBM Corporation, 2012.

**REFERENCE BOOKS:**

1. Big Data and Business Analytics, Jay Liebowitz, Auerbach Publications, CRC press (2013).

2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and

Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media

(2013), Oracle press.

3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley,

ISBN: 9788126551071, 2015.

4. Understanding Big data, Chris Eaton, Dirk deroos et al., McGraw Hill, 2012.

5. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.

6. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced

Analytics, Bill Franks, 1st Edition, Wiley and SAS Business Series, 2012.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **L** | **L** |  | **L** | **M** | **L** |  |  | **M** |  |  | **M** |

**Syllabus for B. Tech. IV Year I semester**

**Information Technology**

**LINUX LAB**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **4** | **2** |

**Code: 8FC68**

**Prerequisite: NIL**

**Course Objectives:**

1. To make use of File handling utilities, Security by file permissions, process utilities, Disk utilities, networking utilities.
2. To understand meta-characters of BASH, acquire the knowledge regarding control structures, shell interrupt processing, functions, debugging shell scripts.
3. To impart usage of kernel support for files using C, understand file structure and low-level I/O functions, system calls (file API’s). Induce knowledge regarding Directory management and its API.
4. To analyze syntaxes for process creation, execution and synchronization mechanisms. Give knowledge regarding a signal, need for having them, usage of various signals.
5. To understand the possible mechanisms to implement System V APIs and analyze the usage of Message queues APIs.
6. To incorporate implementation for semaphore API and shared memory API. To explain the need for using a basic Client-Server model.

**Course Outcomes:**

1. To understand how to work with Linux commands for handling files, processes, text utilities, backup and network utilities.
2. To explore basics of building shell scripts gain knowledge to compose various Shell Scripts.
3. To learn and demonstrate the I/O functions, low-level system calls System Calls available for file and directory handling.
4. To gain knowledge in implementing processes aspects, mastering the process APIs.
5. To understand how to implement pipes, FIFO, how to use for communication purpose in IPC.
6. To understand the significance of Semaphores for Kernel support and simulate program using the same.

**List of Experiments**

* + - 1. Basic Linux Commands File handling utilities, Security by file permissions, Process utilities, Disk utilities, sed, awk, grep.
      2. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
      3. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
      4. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
      5. C programming examples using Linux Operating systems.

a) wc b) cat c) cp

6. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

7. Write the following Shell scripts:

a) To accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

b) To list all of the directory files in a directory.

c ) To find factorial of a given integer.

8. a) Write an awk script to count the number of lines in a file that do not contain vowels.

b) Write an awk script to find the number of characters, words and lines in a file.

9. Implement in C the following UNIX commands using System calls a) rename b) link

10. Write a C program to emulate the UNIX ls – l command.

11. Write a C program on zombie process

12. Write a C program that illustrates the following. a) Creating a message queue. b) Writing to a message queue. c) Reading from a message queue.

13. Write a C program that illustrates file locking using semaphores.

14. Write a C program to implement record locking.

15. Write a C program to implement data communication between two processes using PIPE.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **H** | **M** | **M** | **M** | **M** | **M** | **L** | **M** | **H** | **H** | **L** | **H** |

**Syllabus for B. Tech. IV Year I semester**

**Information Technology**

**SUMMER INDUSTRY INTERNSHIP - II**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **0** | **1** |

**Code: 8M793**

**Prerequisite: NIL**

**Course Objectives:** To enhance the knowledge on selecting a Project, learn related tools and enhance programming and communication skills for employability.

**Course Outcomes:**

At the end of this course the student will be able to

1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills.

A summer industry internship project shall be carried out by a group of students consisting of 2 to 3 in number during summer third year first semester at industries. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship project. Project shall consist of design, fabrication, software development or building of prototype. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work (internal guide 10M

external guide : 5M) : 15 marks

Report : 05 marks

Demonstration / presentation (internal presentation

is evaluated by HOD, senior faculty and internal guide) : 10 marks

--------------

30 marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the internal guide.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **H** | **H** | **H** | **H** | **M** | **L** | **L** | **M** | **H** | **H** | **L** | **H** |

H: High, M: Medium, L: Low Correlation

**Syllabus for B. Tech. IV Year II semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **0** | **0** | **10** | **5** |

**Information Technology**

**MAJOR PROJECT**

**Code: 8M894**

**Prerequisite: All Courses till this semester**

**COURSE OBJECTIVES:**

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

COU**RSE OUTCOMES:**

At the end of this course, the students will be able to

1. Estimate the human and physical resources required, and make plan for the development of Project
2. Break down the Project into tasks and determine handover procedures
3. Identify links and dependencies, and schedule to achieve deliverables
4. Allocate roles with clear lines of responsibility and accountability with team spirit.
5. Design and develop the software or prototype using modern software tools wherever applicable to meet societal needs
6. Present the Project done and submit the report

A project shall be carried out by a group of students consisting of 2 to 3 in number in fourth year second semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

Out of total 100 marks for project work (in the final year second semester), 30 marks shall be for Internal Evaluation and 70 marks for the External Evaluation at the end of the Semester.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The committee consists of an external examiner, HOD, a Senior Faculty Member and Internal Guide.

**Division of marks for internal assessment – 30 marks**

**Division of Marks for External Evaluation – 70 Marks**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **M** | **M** |  |  | **M** | **H** |  | **H** |  |  |  |  |

H: High, M: Medium, L: Low Correlation

**Syllabus for B. Tech. III Year I semester**

**Computer Science and Engineering**

**Data Science**

**INFORMATION SECURITY**

**Professional Elective -I**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code: 8FC06**

**Prerequisite : Computer Networks**

**Course Objectives:** To learn the fundamental concepts of security attacks, security services. To apply conventional cryptographic techniques in order to do encryption. To apply Public key cryptography techniques in order to do encryption. To learn IP security Architecture and its role in security framework. To apply SSL and TLS for Web Security. To design and develop Intrusion Detection Systems and Firewall.

**Course Outcomes**

**At the end of this course, the student will be able to**

1. Get familiarized with the fundamental concepts of security attacks, security services.
2. Implement the conventional cryptographic techniques.
3. Simulate the Public key cryptography techniques.
4. Comprehend IP security Architecture and its role in security framework.
5. Implement SSL and TLS for Web Security.
6. Design Intrusion Detection Systems and Firewall.

**UNIT – I:** Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

**UNIT – II :** Conventional Encryption Principles, Conventional encryption algorithms: DES, TDES, AES, cipher block modes of operation, location of encryption devices, key distribution, Approaches of Message Authentication, Secure Hash Functions: SHA1 and HMAC.

**UNIT – III :** Public key cryptography principles, public key cryptography algorithms: RSA, DIFFIE HELL MAN, digital signatures, digital Certificates, Certificate Authority and key management

Kerberos, X.509 Directory Authentication Service. Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT - IV**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT – V**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Intruders, Viruses and related threats.

**UNIT – VI:** Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**TEXT BOOKS:**

* 1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 4th Edition.
  2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech

**REFERENCES:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)

2. Network Security - Private Communication in a Public World by Charlie

Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson

4. Principles of Information Security, Whitman, Thomson.

5. Network Security: The complete reference, Robert Bragg, Mark Rhodes,

TMH

6. Introduction to Cryptography, Buchmann, Springer.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Level** | **H** | **M** | **L** |  |  |  |  |  |  |  |  |  |

H: High, M: Medium, L: Low Correlation

**Syllabus for B. Tech III Year II semester**

**Information Technology**

**ADVANCED COMPUTER NETWORKS**

**(Professional Elective –IV)**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code: 8EC12**

**Prerequisite:** Data Communications and Computer Networks

**Course Objectives:**

This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

**Course Outcomes:**

At the end of this course the student will be able to

1. Appraise networking and Internet concepts and be familiar with OSI Model and TCP/IP model.
2. Detect networking errors learn correction techniques
3. Infer the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.
4. Differentiate Internet addressing IPv4 and IPv6 and Internet protocols
5. Conceptualize wireless networking and to Develop new protocols in networking
6. Design new virtual private networks

**UNIT I Computer Networks and the Internet: I**ntroduction to Internet and Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet – **(Chapter 1) of T1.**

**Foundation of Networking Models:** 6-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - **(Chapter 2) of T2**.

**UNIT II The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, And Ethernet – **(Chapter 6) of T1**

**Unit – III Routing and Internetworking:** Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer – **(Chapter 7) of T2**

**UNIT IV Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **(Chapter 19, 20) of T3**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **(Chapter 8) of T2**

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing – **(Chapter 2) of T1**

**UNIT V Wireless Networks and Mobile IP**: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks – **Wireless Sensor Networks** and Protocol Structures - **(Chapter 6, 19, 20) of T2**

**UNIT VI VPNs, Tunneling and Overlay Networks**: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony – **(Chapters 16, 18) of T2**

**TEXT BOOKS:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007

**REFERENCES:**

1. An Engineering Approach to Computer Networking , S.Keshav, Pearson Education, 1997
2. Computer Networks: Principles, Technologies And Protocols For Network Design,  Natalia Olifer, Victor Olifer, Wiley India, 2006.
3. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
4. Fundamentals of Business Data Communications, Jerry FitzGerald and Alan Dennis, Tenth Edition, Wiley, 2009.
5. Campus Network Design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
6. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007