COURSE STRUCTURE (R20)
AND
DETAILED SYLLABUS
(III YEAR)

COMPUTER SCIENCE & SYSTEMS ENGINEERING

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with .A. Grade and NBA (CSE, ECE, EEE & ME)
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\multicolumn{7}{c}{III Year – I SEMESTER}

S.No	Course Code	Course Title	Category	L	T	P	Credits
1	R20CSS-PC3101	Design and Analysis of Algorithms	PC	3	0	0	3
2	R20CSS-PC3102	Computer Networks	PC	3	0	0	3
3	R20CSS-PC3103	Formal Languages And Automata Theory	PC	3	0	0	3
4	R20CSS-OE3101 R20CSS-OE3102 R20CSS-OE3103	Open Elective Course / Job Oriented Elective 1. Entrepreneurship & Incubation 2. Full Stack Technologies 3.Scripting Languages	OE	3	0	0	3
5	R20CSS-PE3101.1 R20CSS-PE3101.2 R20CSS-PE3101.3	**Professional Elective- I** *1.* Embedded Systems *2.* GPU Computing *3.* Quantum Computing	PE	3	0	0	3
6	R20CSS-PC3104	Computer Networks Lab	PC	0	0	3	1.5
7	R20CSS-PC3105	ADS Lab	PC	0	0	3	1.5
	R20CSS-SD3101	SKILL COURSE (R Programming Lab)	PC	0	0	4	2
		Employability Skills -II*	MC	3	0	0	0
		MOOCS-1	MC	0	0	0	0
		Summer Internship – 1 (Evaluation)	SI	0	0	0	0
			Total	18	0	11	20.5

III Year – II SEMESTER

S.No	Course Code	Course Title	Category	L	T	P	Credits
1	R20CSS-PC3201	Data Mining and Data Warehousing	PC	3	0	0	3
2	R20CSS-PC3202	Web Technologies	PC	3	0	0	3
3	R20CSS-PC3203	Compiler Design	PC	3	0	0	3
4	R20CSS-PE13202.1 R20CSS-PE13202.2 R20CSS-PE13202.3	**Professional Elective -II** 1. Distributed Systems 2. Cloud Computing **3.** Mean Stack Technology	PE	3	0	0	3
5	R20CSS-OE3201 R20CSS-OE3202 R20CSS-OE3203	**OpenElective-** (InterDisciplinary) **1.** NoSQL Databases **2.** Internet Of Things(IoT) **3.** Block Chain Technology	OE	3	0	0	3
6	R20CSS-PC3204	Data Mining and Data Warehousing Lab	HM	0	0	3	1.5
7	R20CSS-PC3205	Web Technology Lab	PC	0	0	3	1.5
8	R20CSS-PC3206	Compiler Design Lab	PC	0	0	3	1.5
	R20CSS-SD3102	Amazon Web Services	SC	1	0	2	2
		Constitution of India	MC				
		MOOCS-2	MC	0	0	0	0
			Total	18	0	3	19.5

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3101	**Design and Analysis of Algorithms**	3	0	0	3

COURSE OBJECTIVES:

The objectives of this course is to acquire knowledge on the

- Analyze the asymptotic performance of algorithms
- Write rigorous correctness proofs for algorithms
- Demonstrate a familiarity with major algorithms and data structures
- Apply important algorithmic design paradigms and methods of analysis
- Synthesize efficient algorithms in common engineering design situations

COURSE OUTCOMES:
- Understand the correctness of algorithms using inductive proofs and invariants, analyze worst-case running times of algorithms testing asymptotic analysis
- Describe the divide-and-conquer paradigm and explain when an algorithmic design
- Situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ these paradigms Synthesize greedy algorithms and analyse them.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms and analyzethem
- Describe the Backtracking and branch and bound paradigms and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize Backtracking and branch and bound algorithms, and analyse them

UNIT - I:
Introduction: What is an Algorithm, Algorithm Specification, Pseudo code Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

Learning Outcomes: student will be able to
- Understand Algorithm and performance analysis
- Apply asymptotic notations on various algorithms and calculate complexity

UNIT - II:
Decrease-and-Conquer: Insertion Sort Algorithms for Generating Combinatorial Objects Decrease-by-a-Constant-Factor Algorithms Variable-Size-Decrease Algorithms
Divide and Conquer: Merge Sort, Quick Sort, Multiplication of Large Integers and Strassen's Matrix Multiplication
Transform and conquer: Pre-sorting Balanced Search Trees, Heaps and Heap sort

Learning Outcomes: student will be able to
- Understand Decrease and Conquer algorithms like Insertion sort
- Understand Divide and Conquer Algorithms like Merge sort, Quick Sort
- Understand Transfer and Conquer Algorithm like Heap sort

UNIT - III:
The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

Learning Outcomes: student will be able to
- Understand and Analyze Greedy Method
- Understand various algorithms with examples

UNIT - IV:
Dynamic Programming: The General Method Multistage graph, All - Pairs Shortest Paths, String Edition, 0/1 Knapsack, Reliability Design, optimal binary search trees.

Learning Outcomes: student will be able to
- Understand various algorithms on Dynamic Programming

UNIT - V:
Backtracking: The General Method, The S-Queens Problem, Sum of Subsets, Graph Coloring Hamiltonian Cycles
Branch and Bound: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson problem.

Learning Outcomes: student will be able to
- Understand various Backtracking Algorithms and problems
- Understand various Branch and Bound Algorithms and problems

TEXT BOOKS:

1) Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2) Introduction to the design and analysis of Algorithms Anany Levitin pearson ,3rd edition
3) Introduction to Algorithms Thomas H CormenPHILearning

REFERENCE BOOKS:

1) The Design and Analysisof Computer Algorithms, AlfredVAho John EHopcroft Jeffrey DUllman
2) Algorithm Design, Jon Kleinberg, Pearson
3) Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education,2006

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3102	**Computer Networks**	3	0	0	3

Course Objectives:

- Understand the network architecture and applications.
- Understand about the basic Networking Components and their functionality.
- Understand the functionalities of the Data Link Layer.
- Understand the protocols for data transfer.
- Analyse different protocols and architecture of IEEE 802.11

Course Outcomes:

1. Understand and Compare the Reference Models.
2. Identify the Network Components and learn about their functionality.
3. Analyse the services provided by the Data Link Layer to the Network Layer.
4. Understand the use of Data Link Layer protocols.
5. Understand the architecture of IEEE 802.11

Unit 1
Introduction: Components of a Data Communication system, Dataflow, Network Topologies LAN,MAN,WAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model
Learning Outcomes:student will be able to
- Understand the components involved to form a Computer Network (L2).
- Understand the data flow in a Computer Network and the use of protocols.(L2)
- Analyzethe importance of each layer in the reference models.(L4).

Applications: Conceptual Framework of a Network, ATM, Online reservation systems, reservation systems.

Unit 2
Physical Layer and overview of PL Switching:
Transmission Media: Guided,Unguided.Bandwidth,throughput,Latency.
Multiplexing: frequency division multiplexing, wavelength division multiplexing, synchronous time division multiplexing, statistical time division multiplexing,
Learning Outcomes: Studentwill be able to
- Understand the Connecting Devices.(L2).
- Analyzedifferent types of Multiplexing. (L4)
- Understand the performance metrics of a Network. (L3).

Applications: Identify the use of different devices in real time computer networks and data processing tasks.

Unit 3
Data Link Layer Design Issues:
Data link layer: Design issues, Framing: fixed size framing, variable size framing, flow control, error control, errordetection and correction, CRC,
Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol forNoisyChannel.Sliding window protocol: One bit, Go back N, Selective repeat, Stop and wait protocol,

Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing.

Learning Outcomes: Student will be able to

- Understand DataLink Layer Services to the Network Layer. (L2)
- Understand Error Correction and Detection techniques. (L2)
- Apply Detecting Codes for sample data. (L3)

Applications: Error correction and detecting procedures on binary data.

Unit 4

Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance

Network Layer: Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

The Transport Layer: addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, End to end protocols: UDP,

Learning Outcomes: Student will be able to

- Understand Network Layer services and Routing algorithms (L2)
- Understand Transport Layer protocols. (L2)

Applications: Used to implement Routing algorithms for a network

Unit 5

Application layer: (WWW and HTTP): ARCHITECTURE : Client (Browser) ,Server , Uniform Resource LocatorHTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic MessageFormat, HTTP Request Message Format, HTTP Response Message Format

Learning Outcomes: Student will be able to

- Understand the Data Link Layer protocols. (L2)
- Understand which protocols are used for Noisy and Noiseless Channels. (L2)

Applications: Used to implement data transfer and collision detection mechanisms.

TEXT BOOKS:

1. Data Communications and Networking ,Behrouz A Forouzan,Fourth Edition.
2. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010

REFERENCE BOOKS:

1. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education
2. Larry L. Peterson and Bruce S. Davie, ìComputer Networks - A Systems Approachî (5th ed), Morgan Kaufmann/ Elsevier, 2011

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3103	**FORMAL LANGUAGES AND AUTOMATA THEORY**	3	0	0	3

Course Objectives:
- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines
- To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
- To understand the relation between Contexts free Languages, PDA and TM
- To learn how to design PDA as acceptor and TM as Calculators

Course Outcomes:
- Classify machines by their power to recognize languages.
- Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
- Employ finite state machines to solve problems in computing
- Illustrate deterministic and non-deterministic machines
- Quote the hierarchy of problems arising in the computer science

UNIT I
Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.
Learning outcomes: Student should be able to
- Understand the definition of automata and the concepts
- Apply the various methods for converting NFA to DFA and vice-versa
- Understand the concepts of mealy and moore machines

UNIT II
Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.
Learning outcomes: Student should be able to
- Understand the concepts of Regular Expressions
- Apply pumping lemma on regular sets

UNIT III
Formal Languages, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.
Learning outcomes: Student should be able to
- Understand the concept of CFG
- Apply normal forms on various examples
- Apply pumping lemma of CFG on various examples

UNIT IV

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

Learning outcomes: Student should be able to
- Understand the concept of PDA
- Create PDA for various examples

UNIT V

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.

Learning outcomes: Student should be able to
- Understand the concept of TM
- Create TM for various examples

Text Books:

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008

2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007

Reference Books:

1) Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI

2) Theory of Computation, V. Kulkarni, Oxford University Press, 2013

3) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014

e-Resources:

1) https://nptel.ac.in/courses/106/104/106104028

Subject Code	Subject Name	L	T	P	C
R20CSS-OE3101	**Open Elective Course / Job Oriented Elective** **Entrepreneurship & Incubation (MBA)**	3	0	0	3

CourseObjectives:

- Creationofenvironmentandfacilitiestoinstructstudentsandassistinidentifyingproducts orservices.
- Developinnovativeproducts,services,processesandtechniques.
- Abletoprepare financialproposalsandstart-ups.
- Promotetheideastocollaboratewithentrepreneurskillsinestablishmentofstart-ups.
- EncouragethestudentstolearncurrenttrendsofScienceandTechnologyopportunities.

Courseoutcomes:

:

- EnrichestheknowledgeofEntrepreneurialbehavior,andskilldevelopment.
- Initiatebusiness ideasthathavevalueintheend-market.
- Identifythevalidityofideaanditsuniquesellingproportion.
- Comprehendopportunityand challengesof-start up (L2)
- AnalyzevariousGovernmentandnon-Governmentfinancialresource.

UnitI: FundamentalsofEntrepreneurship
Entrepreneurship-Concept, Importance, Characteristics –Myths of Entrepreneurship -
Role ofEntrepreneursinIndianeconomy–
SocialandEthicalPerspectivesofEntrepreneurship.
**Application: Case lets: Business cases of young
entrepreneurs**.**LearningOutcomes:**
At theend ofthisunitstudentswillbeable to:

- Interpret theconceptsofentrepreneurshipand
thecharacteristicsofanentrepreneur.(L2)
- Explainthesignificanceofentrepreneurshipintheeconomicdevelopmentofanation.(L3)

Unit II: IdeationandEvaluationofBusinessIdeas
Opportunity identification – Ideations process - Sources of business ideas – Role of
creativity –Sources of Innovation –Technological Innovation and Entrepreneurship -
Product/ Servicedesign–DesignThinking.
Caselets:BusinesscasesofOYO.
Activity:Collectionofnovelbusiness ideas.

LearningOutcomes:

- At theend ofthisunitstudentswillbeable to:
- Choosetherightbusiness ideas.(L3)
- Evaluatethebusiness idea. (L2)

UnitIII: FeasibilityAnalysisandBusinessplan

Thrustareasofentrepreneurship- Techno-economicfeasibilityassessment-Financialfeasibility – Marketfeasibility– PreparationofBusinessplan–

Businesscanvas&Leancanvas.Activity:Preparationofbusiness plan(draft)

LearningOutcomes:

At theend ofthisunitstudentswillbeable to:
- Evaluatetechnicalfeasibility.(L1)
- DevelopLeancanvas. (L4)

UnitIV:BusinessIncubationandstartups

Fundamentalsofbusinessincubation-Servicesofincubators-Start-ups-meaning,significance-startupstrategy-Presentscenarioofstartups.

Activity: Analyzeandevaluatenewstart-up..

LearningOutcomes:

At theend ofthisunitstudentswillbeable to:
- Describetheprocessofbusinessincubation/incubators(L2)
- Selectasuitableincubatorandbuilda feasiblebusinessmodel.(L3)

Unit V:Financialresources

Sourcesoffinance–Bootstrapping-GovernmentSupport–M S M E s - CrowdFunding–VentureCapitalists&AngelInvestors.
Activity:Businessplanfinalversion

LearningOutcomes:

At theend ofthisunitstudentswillbeable to:
- Knowledgeaboutvarioussourcesoffinanceforentrepreneurship. (L2)
- AnalyzetheopportunitiesSeedcapital/Angelfinanciersandunderstandoperation.(L3)

Text Book:
1. T.VRao,DonaldF.Kuratko,Entrepreneurship, ASouth-AsianPerspective,CengageLearning,2012
2. DatsyDavies, IndianStartups,AmazonAsia-PacificHoldingsPrivateLimited,2016

ReferenceBooks:
1. P.N.Rath, SarjuePandita,Entrepreneurship:StartupIndia& StandupIndia,LexiconPublishingHouse,2018
2. MadhurimaLall, ShikhaSahai, Entrepreneurship,ExcelBooks(P)Ltd.2008
3. RajeevRoy,Entrepreneurship,OxfordHigherEducation.2011
4. H.Nandan,FundamentalsofEntrepreneurship,PHI Learning(P)Ltd,2013

WebResources:
https://www.startupindia.gov.in/https://strategyz

er.com/canvas/business-model-
canvashttps://canvanizer.com/new/lean-
canvashttps://msme.gov.in/
https://t-hub.co/

Subject Code	Subject Name	L	T	P	C
R20CSS-OE3102	**Open Elective Course / Job Oriented Elective** **Full Stack Technologies**	**3**	**0**	**0**	**3**

Course Objectives:
From the course the student will learn
- Translate user requirements into the overall architecture and implementation of newsystems and Manage Project and coordinate with the Client.
- Write backend code in Python/Java, PHP languages and Writing optimized front end codeHTML and JavaScript.
- Understand, create and debug database related queries and Create test code to validate theapplications against client requirement.
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution.

Course Outcomes(COs): At the end of the course, student will be able to
- Identify the Basic Concepts of Web & Markup Languages
- Develop web Applications using Scripting Languages & Frameworks
- Creating & Running Applications using JSP libraries
- Creating Our First Controller Working with and Displaying in Angular Js anNested Forms with ng-form
- Working with the Files in React JS and Constructing Elements with Data

UNIT – I: HTMLWeb Essentials:
Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers.Markup Languages: XHTML an Introduction to HTML, History, Versions, Basic, XHTMLSyntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tablesFrames-Forms- HTML 5.0.

Learning Outcomes: student will be able to

- Understand HTML Web Essentials.
- Understand Latest Version of HTML & Client and Server Communication.

UNIT – II: Cascading Style Sheets (CSS)
Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheetsand HTML- Style Rule Cascading and Inheritance-Text Properties-Box Model Normal FlowBox Layout beyond the Normal Flow-CSS3.0, Boot strap basics, Boot strap CSS3,Introduction to Java Script, Jscript basics, JScripts objects, JSON, Don.

Learning Outcomes: student will be able to

- Understand how to add styles and bootstrap to HTML.

UNIT – III: Jscript
Separating Programming and Presentation: JSP Technology, Introduction to JSP and ServletsRunning JSP Applications, Basic JSP-JavaBeans Classes and JSP-Tag Libraries and FilesSupport for the Model-View-Controller Paradigm- Mongo DB, JQuery, Mean stack

Fundamentals

Learning Outcomes: student will be able to

- Understand Jscript Programming MAV Controller.

UNIT – IV: Angular Js
Introducing AngularJS, Starting Out with AngularJS, Basic AngularJS, Directives and Controllers, AngularJS Modules, Creating First Controller, working with and Displaying, Arrays, more Directives, working with ng-repeat.

Learning Outcomes: student will be able to

- Understand about Angular JS and Directives.

UNIT – V: React JS
Introduction to React, Obstacles and Roadblocks, keeping Up with the Changes, Workingwith the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM,Children,Constructing Elements with Data, React Components, DOM Rendering, Factories

Learning Outcomes: student will be able to

- Understand about React JS will working out with applications.

Text Books:
1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", PearsonEducation, 2006
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, PearsonEducation, 2007
3. AngularJS: Up and Running Enhanced Productivity with Structured Web Apps By BradGreen, Shyam Seshadri Publisher: O'Reilly Media
Reference Books:
1. Learning React Functional Web Development with React and Redux By Alex Banks,Eve Porcello Publisher: O'Reilly Media
2.Head First Java, 2nd Edition by Bert Bates, Kathy Sierra Publisher: O'Reilly Media, Inc

Subject Code	Subject Name	L	T	P	C
R20CSS-OE3103	**Open Elective Course / Job Oriented Elective Scripting Languages**	3	0	0	3

Course Objectives:
The goal of the course is to study:
- The principles of scripting languages.
- Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.
- Scripting languages such as PERL, TCL/TK, python and BASH.
- Creation of programs in the Linux environment.
- Usage of scripting languages in IC design flow.

Course Outcomes:
Upon learning the course, the student will have the:
- Ability to use Linux Permissions for files and directory and users
- Ability to use Linux Network basics and DNS Server, Hosting Configuraiton.
- Ability to create and run scripts using PERL/TCl/Python in IC design flow.
- Ability to use Linux environment and write programs for automation of scripts inVLSI tool design flow.

UNIT –I:Linux Basics:
Introduction to Linux , File System of the Linux, General usage of Linux kernel & basiccommands, Linux users and group, Permissions for file, directory and users, searching a file& directory, zipping and unzipping concepts.

Learning Outcomes: student will be able to

- Ability to Understand Linux File System.
- Ability to Understand about File Permissions , Directory Permissions, zipping and Unzipping.

UNIT –II :Linux Networking:
Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol inLinux, Network file system, Domain Naming Services, Dynamic hosting configurationProtocol & Network information Services.

Learning Outcomes: student will be able to

- Ability to Understand Linux Networking Tools and Protocols.

UNIT –III :Perl Scripting:
Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions,Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running andDebugging Perl, Modules, Object – Oriented Perl.

Learning Outcomes: student will be able to

- Ability to Understand Perl Scripting and Modules.

UNIT –IV:TCL / TK Scripting:

Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands,Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, TkFundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events,Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

Learning Outcomes: student will be able to

- Ability to Understand TCL and TK Scripting.

UNIT –V : Python Scripting:

Introduction to Python, using the Python Interpreter, More ControlFlow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tourof the Standard Library.

Learning Outcomes: student will be able to

- Ability to Understand Python Scripting.

TEXT BOOKS:
1. Python Tutorial by Guido Van Rossum, Fred L. Drake Jr. editor , Release 2.6.4
2. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.
3. Teach Yorself Perl in 21 days by David Till.
4. Red Hat Enterprise Linux 4 : System Administration Guide Copyright, 2005 Red Hat Inc
REFERENCE BOOKS:
1. Learning Python – 2
nd Ed., Mark Lutz and David Ascher, 2003, O'Reilly.
2. Perl in 24 Hours – 3
rd Ed., Clinton Pierce, 2005, Sams Publishing.
3. Learning Perl – 4
th Ed. Randal Schwartz, Tom Phoenix and Brain d foy. 2005.
4. Jython Essentials – Samuele Pedroni and Noel Pappin.2002. O'Reilly.
5. Programming Perl – Larry Wall, Tom Christiansen and John Orwant, 3rd Edition,
O'Reilly, 2000. (ISBN 0596000278)

Subject Code	Subject Name	L	T	P	C
R20CSS-PE3101.1	**Professional Elective- I** **Embedded Systems**	3	0	0	3

Course Objectives:
• To introduce major components of an embedded system
• To introduce INTEL 8051 micro controller
• To explain interfacing of various communication and I/O devices to an embedded system
• To expose role of firmware, operating systems in correlation with hardware systems.
• To explain embedded software development tools
• To demonstrate implementation of embedded system

Course Outcomes:
1. Interpret embedded system and its hardware and software.
2. Comprehend the knowledge of microcontrollers
3. Develop interfacing with hardware
4. Illustrate different types of operating systems and Multitasking
5. Apply embedded Software development tools and Design and develop the embeddedsystem

Unit 1:
Introduction to Embedded Systems: What is embedded system, embedded systems vsgeneral computing systems, history of embedded systems, classification of embedded systems,major application areas of embedded systems, purpose of embedded systems, Processor andOS trends in embedded system. Embedded hardware units and devices in a system, embeddedsoftware in a system and an overview of programming languages, skills required for anembedded system designer, examples of the embedded systems.

Learning Outcomes:
1. Differentiate embedded system and general computing system (L4)
2. Classify embedded systems based on performance, complexity and era in which they are evolved (L4)
3. Discuss basic hardware and software units used in embedded systems (L2)

Unit 2 :

Intel 8051 micro controller: Microcontrollers and embedded processors, Introduction toClassic 8051 family Architecture, Von Neumann Architecture and Harvard architecture,Address and data bus with multiplexed I/O pins. Addressing modes, instruction set, I/Oprogramming and other application programming in Assembly and C language.

Learning Outcomes:

1. Differentiate processor architectures (L4)
2. Discuss instruction set and addressing modes (L2)
3. Discuss basic programming in Assembly and C language (L2)

Unit 3:

Interfacing: Interfacing with Keyboards, Displays, D/A and A/D Conversions, MultipleInterrupts, Serial Data Communication.

Learning Outcomes:
1. Understand and apply Interfacing (L2)
2. Understand Serial Data Communication(L2)

Unit 4:

Hardware& software Codesign: Operating system basics, Types of operating systems, Tasks,Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processesand Scheduling, Task communication, Task synchronisation, Device Drivers, FundamentalIssues in Hardware Software Co-Design.

Learning Outcomes:
1. Understand and apply hardware & software architectures(L2)
2. Describe scheduling of Tasks(L2)

Unit 5:

Embedded Software development tools and Debugging techniques: Embedded Software development tools, Host and target systems, cross compilers, linkers, locators for embedded systems. Getting embedded software in to the target system. Debugging techniques. Testing on host machine, Instruction set emulators, logic analyzers. In-circuit emulators and monitors.

Learning Outcomes:

1. Understanding and use tools for Embedded Software development(L2)
2. Burning embedded software in to the target system(L3)
3. Apply debugging techniques (L3)

Text Books

1. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elseveir.
2. Ali Mazidi Mohammed Gillispie, Mazide Janice, "The 8051Microcontroller and Embedded Systems using assembly& C", 2nd Edition, Pearson Education, 2009.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

References

1. Raj Kamal, Embedded Systems: Architecture, Programming and Design, 3rd edition, McGraw Hill Education, 2017.
2. Shibu K V, Introduction to Embedded Systems, 2nd edition, McGraw Hill Education,2017.
3. Embedding system building blocks, Labrosse, via CMP publishers.
4. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

Subject Code	Subject Name	L	T	P	C
R20CSS-PE3101.2	**Professional Elective- I GPU Computing**	3	0	0	3

Course Objectives:
To learn parallel programming with graphics processing units (GPUs).
Course Outcomes: Students would learn
1. Concepts in parallel programming,
2. Implementation of programs on GPUs,
3. Debugging and profiling parallel programs.
4. Students can able to Debugging GPU Programs.
5. Case Studies.

Unit-1: Introduction:

History, GPU Architecture, Clock speeds, CPU / GPU comparisons,Heterogeneity, Accelerators, Parallel Programming, CUDA OpenCL / OpenACC, KernelsLaunch parameters, Thread hierarchy, Warps/Wavefronts, Threadblocks/Workgroups,Streaming multiprocessors, 1D/2D/3D thread mapping, Device properties, Simple Programs

Learning Outcomes:
• Understand and apply GPU Architecture and CPU / GPU.

Unit-2: Memory:

Memory hierarchy, DRAM / global, local / shared, private / local,textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory,Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programswith matrices, Performance evaluation with different memories

Learning Outcomes:
• Understand about Memory Hierarchy, DRAM.

Unit-3: Synchronization:
Memory Consistency, Barriers (local versus global), Atomics, Memoryfence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists,Linked-lists. Synchronization across CPU and GPUFunctions: Device functions, Host functions, Kernels functions, Using libraries (such asThrust), and developing libraries.

Learning Outcomes:
• Understand Memory Consistency.

Unit-4: Support:

Debugging GPU Programs. Profiling, Profile tools, Performance aspectsStreams: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers,Default Stream, Synchronization with streams. Events, Event-based- Synchronization -Overlapping data transfer and kernel execution, pitfalls.

Learning Outcomes:
- Understand GPU debugging Programs.

Unit-5: Case Studies:

Image Processing, Graph algorithms, Simulations, Deep Learning. AdvancedTopics: Dynamic parallelism, Unified Virtual Memory, Multi-GPU, processing, Peer access,Heterogeneous processing

Learning Outcomes:
- Understand about how Graph algorithms working by using deep learning.

Text Books:
Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-mei Hwu; Morgan Kaufman; 2010 (ISBN: 978-0123814722)

Reference Books:
CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN: 978-0124159334)

Subject Code	Subject Name	L	T	P	C
R20CSS-PE3101.3	**Professional Elective- I** **Quantum Computing**	3	0	0	3

Course Objectives:
- This course teaches the fundamentals of quantum information processing, including quantumcomputation, quantum cryptography, and quantum information theory.

Course Outcomes:

By the end of this course, the student is able to
- Analyze the behaviour of basic quantum algorithms
- Implement simple quantum algorithms and information channels in the quantum circuitmodel
- Simulate a simple quantum error-correcting code
- Prove basic facts about quantum information channels
- Analysis about Quntam Computing Models.

UNIT IIntroduction:
Quantum Measurements Density Matrices, Positive-Operator Valued Measure,Fragility of quantum information: Decoherence, Quantum Superposition and Entanglement,Quantum Gates and Circuits.

Learning Outcomes:
- Understand Quantum Measurements and Super position.

UNIT IIQuantum Basics and Principles:
No cloning theorem & Quantum Teleportation, Bellísinequalityand its implications, Quantum Algorithms & Circuits.

Learning Outcomes:
- Understand Quantum Teleportation.

UNIT IIIAlgorithms:
Deutsch and DeutschñJozsa algorithms, Groverís Search Algorithm, QuantumFourier Transform, Shoreís Factorization Algorithm.

Learning Outcomes:
- Understand Algorithms.

UNIT IV
Performance, Security and Scalability: Quantum Error Correction: Fault tolerance; QuantumCryptography, Implementing Quantum Computing: issues of fidelity; Scalability in quantumcomputing.

Learning Outcomes:
- Understand about Performance, Security and Scalability.

UNIT VQuantum Computing Models:

NMR Quantum Computing, Spintronics and QED MODEL,Linear Optical MODEL, NonlinearOptical Approaches; Limits of all the discussedapproaches,Future of Quantum computing.

Learning Outcomes:
- Understand about NMR Quantum Computing, QED Model.

Text Books:
1. Eric R. Johnston, Nic Harrigan, Mercedes and Gimeno-Segovia ìProgramming Quantum Computers: Essential Algorithms And Code Samples, SHROFF/ OíReilly.
2. Dr. Christine Corbett Moran, Mastering Quantum Computing with IBM QX: Explore the world of quantum computing using the Quantum Composer and Qiskit, Kindle Edition Packt
3. V.K Sahni, Quantum Computing (with CD), TATA McGrawHill.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3104	**Computer Networks Lab**	0	0	3	1.5

COURSE OBJECTIVES:
- To understand the system calls.
- To understand the concepts of framing techniques.
- To understand the error detecting techniques.
- To understand routing strategies.
- To understand the connection oriented and connection less services.

COURSE OUTCOMES:
1. Implement the simple commands used for networking.
2. understand the Framing techniques.
3. implement the Error Detection techniques.
4. implement the Routing protocols.
5. understand the Connection Oriented and Connection Less service.

List of Programs:
Week 1: Study of different types of network cables and practically implement the cross-wired cable and straight through cables using crimping tool.
Week2: Configuration of various topologies related to LANs and WANs Using Packet Tracer.
Week3: Study on Network Layer and data link layer using Packet Tracer
Week 4: Write a program to implement Bit Stuffing and Byte Stuffing.
Week 5: Write a program to implement CRC.
Week 6: Take an example subnet of hosts. Obtain broadcast tree for it.
Week 7: Implement Dijkstra's algorithm to compute the shortest path through a graph and Configure RIP using Packet tracer.
Week 8: Take an example subnet graph with weights indication delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.
Week 9: Configure a network using Link state Protocol OSPF using Packet Tracer.
Week 10: Configure DHCP on router using Packet Tracer.
Week 11: Configure VLAN Using Packet Tracer.

Reference Books:
1. Unix Network Programming, Volume 1: The Sockets Networking API Addison-WesleyProfessional Computing Series
2. Network Programmability and Automation: Skills for the Next-Generation Network Engineer

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3105	**FORMAL LANGUAGES AND AUTOMATA THEORY LAB**	3	0	0	3

Lab Objectives:
The objective of this course is to acquire knowledge on the
- concept of Finite Automata and Regular Expression
- designing of Push Down Automata
- designing of Turing Machine
- relation between Regular Language and Finite Automata and machines

Lab Outcomes:
1. Demonstrate the concept of Finite Automata and Regular Expression.
2. Demonstrate the designing of Finite Automata
3. Design the grammar for respective language.
4. Demonstrate the designing of Push Down Automata
5. Demonstrate the designing of Turing Machine

List of Experiments:
Understanding of software like JFLAP (Java Formal Languages and
Automata Package) for experimenting with formal languages
1. Deterministic Finite Automata (DFA)
2. Nondeterministic Finite Automata (NFA)
3. Conversion of NFA to DFA
4. DFA Minimization
5. DFA to regular grammar conversion
6. DFA to regular expression conversion
7. Combining automata
8. Regular expression to DFA conversion
9. Mealy and Moore machine
10. Pushdown automata
11. Single tape Turing machine
12. Multi-tape Turing machine
13. Context free grammars (CFG) with single symbols
14. CFG with multiple symbols
15. Regular expressions
16. Regular pumping lemma
17. Context free pumping lemma
18. CFG to Chomsky Normal form transformations

Text Books:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

E-Resources
https://softfamous.com/postdownload-file/jflap/8447/3913/

S.No	Course Code	Course Title	Category	L	T	P	Credits
III Year – II SEMESTER							
1	R20CSS-PC3201	Data Mining and Data Warehousing	PC	3	0	0	3
2	R20CSS-PC3202	Web Technologies	PC	3	0	0	3
3	R20CSS-PC3203	Compiler Design	PC	3	0	0	3
4	R20CSS-PE13202.1 R20CSS-PE13202.2 R20CSS-PE13202.3	**Professional Elective -II** *1.* Distributed Systems *2.* Cloud Computing *3.* Mean Stack Technology	PE	3	0	0	3
5	R20CSS-OE3201 R20CSS-OE3202 R20CSS-OE3203	**OpenElective-** (InterDisciplinary) *1.* NoSQL Databases *2.* Internet Of Things(IoT) *3.* Block Chain Technology	OE	3	0	0	3
6	R20CSS-PC3204	Data Mining and Data Warehousing Lab	HM	0	0	3	1.5
7	R20CSS-PC3205	Web Technology Lab	PC	0	0	3	1.5
	R20CSS-PC3206	Compiler Design Lab	PC	0	0	3	1.5
	R20CSS-SD3102	Amazon Web Services	SC	1	0	2	2
		Constitution of India					
8		MOOCS-2	MC	0	0	0	0
			Total	18	0	3	19.5

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3201	**Data Mining and Data Warehousing**	3	0	0	3

Course objectives:
- Students will be enabled to understand and implement classical models andalgorithms in Data Warehousing and Mining.
- They will learn about different tools used in data mining.
- They will learn how to analyze the data, identify the problems, and choose therelevant models and algorithms to apply
- They will further be able to assess the strengths and weaknesses of various methodsand algorithms and to analyze their behavior

Course Outcomes:
- Understand stages in building a Data Warehouse and correlate the various systemarchitectures.
- Understand the need and importance of reporting and query tools.
- Understand the need and importance of data mining functionalities.
- Understand the process of classification.
- Apply the Clustering techniques on sample data.

UNIT –I:Data Warehousing:
Data warehousing Components –Building a Data warehouse –- Mappingthe Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for DecisionSupport – Data Extraction, Cleanup, and Transformation Tools –Metadata
Learning Outcomes:
At the end of this module student will be able to:
- Differentiate a data warehouse with data mining(L2)
- Understand different system Architectures.(L2)

UNIT –II: Business Analysis:
Reporting and Query tools and Applications – Tool Categories – TheNeed for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need –Multidimensional Data Model –OLAP Guidelines – Multidimensional versus Multi relationalOLAP – Categories of Tools – OLAP Tools and the Internet
Learning Outcomes:
At the end of this module student will be able to:
- Understand the OLAP architecture(L2)
- Recognize OLAP tools.(L2)

UNIT III:Data Mining:
Introduction – Data – Types of Data – Data Mining Functionalities –Interestingness of Patterns – Classification of Data Mining Systems – Data Mining TaskPrimitives – Integration of a Data Mining System with a Data Warehouse – Issues –DataPreprocessing.
Learning Outcomes:
At the end of this module student will be able to:
- Summarize the process of Data Mining .(L2)

UNIT –IV:Association Rule Mining and Classification:

Mining Frequent Patterns, Associations andCorrelations – Mining Methods – Mining various Kinds of Association Rules – CorrelationAnalysis – Constraint Based Association Mining – Classification and Prediction – BasicConcepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification –Classification by Back propagation – Support Vector Machines – Associative Classification –Lazy Learners – Other Classification Methods – Prediction.

Learning Outcomes:
At the end of this module student will be able to:
- Experiment the process of classification on sample data.(L3)
- Construct a decision tree for any sample data.(L3)
- Apply Association rules on sample data.(L3)

UNIT –VClustering and Trends in Data Mining:
Cluster Analysis – Types of Data – Categorizationof Major Clustering Methods – K-means–
Partitioning Methods – Hierarchical Methods –Density-Based Methods –Grid Based Methods –
Model-Based Clustering Methods –Clustering High Dimensional Data – Constraint – Based
Cluster Analysis – Outlier Analysis– Data Mining Applications.

Learning Outcomes:
At the end of this module student will be able to:
- Understand the concept of Clustering.(L2)
- Apply the traditional clustering techniques on sample Data(L3).

Text Books:
1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata
McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third
2. Edition, Elsevier, 2012.AULibrary.com

Reference Books:
1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining",
Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, "Insight into Data Mining Theory and
Practice",Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy
Edition,Prentice Hall of India, 2006.
4. Daniel T. Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3202	**Web Technologies**	3	0	0	3

Course Objectives:
- Creating Web User Interfaces
- Creating dynamic Web pages
- Implementing the usage of Scripts in Web Pages
- Analyzing real world objects into Web Pages as Scripts Handlers
- Analyzing look and feel kind of applications which are useful for real world
- Web framework implementation using Model View Controller
- Writing background scripts to run the virtual machines and servers
- Interpreting the server side scripts to call Remote procedural calls back to client

Course Outcomes:
- Demonstrate knowledge on web page design elements.
- Design web pages with dynamic content
- Create Responsive layout with customized forms
- Write simple client-side scripts using AJAX
- Build web applications using PHP

UNIT-I:HTML
Introduction: Fundamentals of HTML, Working with text,Organizing text in HTML,Working with links and URLs, Creating tables, Working with images, Canvas, Forms,Frames and Multimedia.

HTML5: Introduction, HTML5 document structure, Creating editable content, Checkingspelling mistakes.

Learning Outcomes:
After completion of this unit, student will be able to
- Identify basic steps that are followed to develop web applications [L2]
- Understand the functions of different HTML5 tags and how to use them [L2]
- Design and develop basic web pages using HTML5[L3]

UNIT-II:CSS AND JAVASCRIPT
CSS: Introduction, CSS selectors, Inserting CSS in an HTML document, Backgrounds, Fonts,and Text styles, Creating boxes, Displaying, Positioning and floating elements, Features ofCSS3,Media queries. Javascript: Overview of JavaScript, JavaScript functions, Events, Imagemaps and animations, JavaScript objects, Working with browser and document objects.

Learning Outcomes:
After completion of this unit, student will be able to
- Learn the basic syntax of the CSS Style rule[L2]
- Get an idea about different CSS Selectors[L2]
- Use style rules to apply styles to different elements[L3]
- Understand HTML5 DOM object hierarchy[L2]
- Understand java script event handling mechanism[L2]

UNIT-III:JQUERY and BOOTSTRAP

JQuery: Introduction, JQuery selectors, Events, Methods to access HTML elements andattribute.
Bootstrap: Getting started with Bootstrap, Creating responsive layouts using

Bootstrap CSS - Basic HTML structure for Bootstrap, Responsive classes, Rendering images,the grid system, Constructing data entry forms.

Learning Outcomes:

After completion of this unit, student will be able to

- Understanding the Bootstrap file structure[L2]
- Learning the basics of responsive design[L2]
- Understanding the all-important grid system in Bootstrap[L2]
- Introduce Bootstrap as a responsive design framework[L2]

UNIT-IV

XML: Document type Definition, XML schemas, Document object model, XSLT,DOM and SAX Approaches,AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

Learning Outcomes:

After completion of this unit, student will be able to

- Learn the basic building blocks of XML Documents [L1]
- Understand how name clashes are avoided using namespaces [L2]
- Learn how to create forms dynamically [L2]
- Learn how to generate dynamic tables[L2]
- Write interactive web applications using AJAX [L3]

UNIT-V:

INTRODUCTION TO PHP

Introduction, Data types, Variables, Constants, Expressions, String interpolation, Controlstructures, Functions, Arrays, Embedding PHP code in web pages, Object Oriented PHP.PHP Web forms: PHP and web forms, Sending form data to a server, Working with cookiesand session handlers PHP with MySQL: Interacting with the database, Prepared statement,Database transactions.

Learning Outcomes:

After completion of this unit, student will be able to

- Examine the relationship between PHP and MySQL L2]
- Plan a PHP Web application [L4]
- Create and use a Logon Window [L6]
- Manage User sessions using cookies and sessions [L3]

Text Books:

1. Kogent Learning Solutions Inc, HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, Dreamtech Press, Second Edition, 2016.
2. W. Jason Gilmore, Beginning PHP and MySQL, APress, Fourth Edition, 2011.

Reference Books:

1. Snig Bahumik, Bootstrap Essentials, PACKT Publishing, 2015 (e-book).
2. Thomas A. Powell, The Complete Reference: HTML and CSS, Tata McGraw Hill, Fifth Edition, 2010.
3. Andrea Tarr, PHP and MySQL, Willy India, 2012.
4. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3203	**Compiler Design**	3	0	0	3

Course Objectives:

The objectives of this course is to acquire knowledge on the

- The phases of acompiler
- Design of lexical analyzers, Syntax analyzers, Intermediate code generators
- Usage of Lex/Bison tools in writing compilers
- Different optimizations and analyses required to do those optimizations
- Issues in the code generation, code generation algorithms

Course Outcomes:

The students should be able to:

1. Understand the basics of language processing and implement lexical analyzer for any language
2. Understand the different types of parsing and implement parser for any language
3. Understand the different intermediate code Generation Techniques
4. Design a intermediate code generators for any language construct.
5. Understand the issues in the code generation and code generationalgorithms.

UNIT – I
Introduction and Lexical Analysis: Language Processors, the structure of a compiler, the scienceof building a compiler, phases of a compiler. Lexical Analysis: The role of the lexical analyzer,identifying tokens, Transition diagrams for recognizing tokens, Input buffering, The lexical analyzergenerator Lex, Finite automata, Conversion from regular expressions to automata, design of a lexicalanalyzer generator, Optimization of DFA-based patternmatchers.

Learning Outcomes: Student will be able to
- Understand basics of compiler and its phases (L2)
- Apply the concept of lexical analyzer on some example (L3)

UNIT – II
Syntax Analysis: Introduction, Context-Free Grammars, BNF(Backus-Naur Form),EBNF(Extended Backus-Naur Form). Pre-processing of grammars: left recursion elimination, leftfactoring. **Top-Down Parsing:** Recursive-descent parsers, LL(1) parsers**. Bottom-Up parsing:**Introduction to LR parsers, Simple LR, Canonical LR, Lookahead LR. Extending parsers to handleambiguous grammars, Parser generators Yacc/Bison.

Learning Outcomes: Student will be able to
- Understand the concept of Syntax Analysis and CFG (L2)
- Apply the top down and bottom-up parsing techniques on some examples. (L3)

UNIT – III

Syntax-Directed Translation, Semantic Analysis, Intermediate Code Generation: SyntaxDirected Definitions, Evaluation orders for SDDs, Applications of Syntax-Directed Translation,Syntax-Directed Translation Schemes and Implementing L-Attributed SDDs.

Intermediate code generation: Variants of Syntax trees,Three-address code, Types and declarations, Type checking, Control flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

Learning Outcomes: Student will be able to
- Understand the concept of SDDs and SDT (L2)
- Understand Intermediate Code Generation and Type checking concepts (L2)

UNIT - IV

Code Optimization: Run-time Environment: Storageorganization, Activation record, Stack allocation, Access to nonlocal data on the stack, Heapmanagement, Introduction to garbage collection, Introduction to trace-based collection.

Machine-Independent optimizations: The principal sources of optimization, Basic blocks andflow graphs, Introduction to data-flow analysis, Foundations of data-flow analysis, Constantpropagation.

Learning Outcomes: Student will be able to
- Understand the concept of Code Optimization (L2)
- Understand the concept of data flow analysis (L2)
- Applying the concept of Basic Blocks and Flow Graphs on some examples (L3)

UNIT - V

Target Code Generation: Code Generation: Issues in the design of a Code Generator, The target language, Addresses in the target code, A simple code generator.

Machine-dependent Optimizations: Peephole optimization, Register allocation and assignment, Dynamic Programming code generation.

Learning Outcomes: Student will be able to
- Understand the concept of Target Code Generation (L2)
- Understand the concept of Machine dependent optimization (L2)

Textbooks:
1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred VAho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
2. Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:
1. Modern Compiler Implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
2. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
3. Lex &yacc, 2nd Edition by John Levine, Doug Brown, Tony Mason

E-resources:
1. https://www.edx.org/course/compilers
2. https://nptel.ac.in/courses/106/108/106108113/

Subject Code	Subject Name	L	T	P	C
R20CSS-PE13202.1	**Professional Elective -II Distributed Systems**	3	0	0	3

Course Objectives:
- Provides an introduction to the fundamentals of distributed computer systems, assumingthe availability of facilities for data transmission, IPC mechanisms in distributedsystems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributedComputing infrastructures with various computing principles

Course Outcomes:
- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used indistributed systems.
- Gaining practical experience of inter-process communication in a distributedenvironment

UNIT-I:
Characterization of Distributed Systems: Introduction, Examples of DistributedSystems,Resource Sharing and the Web, Challenges.System Models: Introduction, Architectural Models- Software Layers, SystemArchitecture,Variations, Interface and Objects, Design Requirements for DistributedArchitectures,Fundamental Models- Interaction Model, Failure Model, Security Model.

Learning Outcomes: Student will be able to
- Understand the concept of Distributed Systems

UNIT-II:
Interprocess Communication: Introduction, The API for the Internet ProtocolsTheCharacteristics ofInterprocess communication, Sockets, UDP Datagram Communication,TCPStream Communication; External Data Representation and Marshalling; ClientServerCommunication; Group Communication- IP Multicast- an implementation ofgroupcommunication, Reliability and Ordering of Multicast.

Learning Outcomes: Student will be able to
- Understand the concept Inter process Communication, UDP Datagram
- Understand the concept of IP Multicast.

UNIT-III:
Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues forRMI,Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call,Events andNotifications, Case Study: JAVA RMI

Learning Outcomes:
Student will be able to
- Understand the concept Remote Invocation
- Understand the concept Distributed Object Modal.

UNIT-IV:
Operating System Support: Introduction, The Operating System Layer, Protection,Processesand Threads Address Space, Creation of a New Process, Threads.

Learning Outcomes: Student will be able to
- Understand the concept of Operating System Support

UNIT-V:
Distributed File Systems: Introduction, File Service Architecture; Peer-to-PeerSystems:Introduction, Napster and its Legacy, Peer-to-Peer Middleware, RoutingOverlays.

Learning Outcomes: Student will be able to
- Understand the concept Distributed File System and Peer-to-Peer Middleware.

TEXT BOOKS:
1. Ajay D Kshemkalyani, MukeshSighal, ìDistributed Computing, Principles, Algorithms and Systemsî, Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, ìDistributed Systems- Concepts and Designî, Fourth Edition, Pearson Publication

Reference Books

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI

Subject Code	Subject Name	L	T	P	C
R20CSS-PE13202.2	**Professional Elective -II Cloud Computing**	3	0	0	3

Course Objectives:
- To implement Virtualization
- To implement Task Scheduling algorithms
- Apply Map-Reduce concept to applications
- To build Private Cloud
- Broadly educate to know the impact of engineering on legal and societal issuesinvolved

Course Outcomes:
At the end of the course, student will be able to
1. Interpret the key dimensions of the challenge of Cloud Computing
2. Examine the economics, financial, and technological implications for selecting cloudcomputing for own organization
3. Assessing the financial, technological, and organizational capacity of employers foractivelyinitiating and installing cloud-based applications
4. Evaluate own organizations needs for capacity building and training in cloudcomputing-related IT areas
5. Illustrate Virtualization for Data-Center Automation

UNIT I
Introduction: Network centric computing, Network centric content, peer-to-peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing.

Learning Outcomes: Student will be able to
- Understanding about Network Centric Computing

UNIT II
Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, OpenSource Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecologicalimpact, responsibility sharing, user experience, Software licensing

Learning Outcomes: Student will be able to
- Understanding about Cloud Infrastructure in different cloud Platforms.

UNIT III
Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machinemonitors, virtual machines, virtualization- full and para, performance and security isolation,hardware support for virtualization

Learning Outcomes: Student will be able to
- Understanding about Cloud Resource Virtualization.

UNIT IV

Storage Systems: Evolution of storage technology, storage models, file systems and database,distributed file systems, general parallel file systems. Google file system. Apache Hadoop,Big Table, Megastore (text book 1)

Learning Outcomes: Student will be able to
- Understanding about Storage Systems.

UNIT V
Cloud Application Development: Amazon Web Services : EC2 – instances, connectingclients, security rules, launching, usage of S3 in Java, Cloud based simulation of a Distributedtrust algorithm, Cloud service for adaptive data streaming (Text Book 1), Google: GoogleApp Engine, Google Web Toolkit (Text Book 2)

Learning Outcomes: Student will be able to
- Understanding about Cloud Application Development.

Text Books:
1. Cloud Computing, Theory and Practice,1st Edition, Dan C Marinescu, MK Elsevier publisher ,2013
2. Cloud Computing, A Practical Approach, 1st Edition, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH,2017
Reference Books:
1. Mastering Cloud Computing, Foundations and Application Programming,1st Edition, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH,2013
2. Essential of Cloud Computing, 1st Edition, K Chandrasekharan, CRC Press, 2014.
3. Cloud Computing, A Hands on Approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2014.

Subject Code	Subject Name	L	T	P	C
R20CSS-PE13202.3	**Professional Elective -II Mean Stack Technology**	3	0	0	3

Course Objectives:
• From the course the student will learn
• Translate user requirements into the overall architecture and implementation of newsystems and Manage Project and coordinate with the Client
• Writing optimized front end code HTML and JavaScript
• Monitor the performance of web applications & infrastructure and Troubleshootingweb application with a fast and accurate a resolution
• Design and implementation of Robust and Scalable Front End Applications

Course Outcomes:
After the completion of the course, student will be able to
1. Enumerate the Basic Concepts of Web & Markup Languages
2. Develop web Applications using Scripting Languages & Frameworks
3. Make use of Express JS and Node JS frameworks
4. Illustrate the uses of web services concepts like restful, react js
5. Apply Deployment Techniques & Working with cloud platform

UNIT I
Introduction to Web: Internet and World Wide Web, Domain name service, Protocols:HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document typeDefinition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

Learning Outcomes: Student will be able to
• Understanding about HTTP, FTP, SMTP and XML, DOM and SAX.

UNIT II
JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions,Control Statements, Arrays, Functions, Constructors, Pattern Matching using RegularExpressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings,Angular JS Form Validation & Form Submission, Single Page Application developmentusing Angular JS.

Learning Outcomes: Student will be able to
• Understanding about JavaScript and Angular JS.

UNIT III
Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js:Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, GettingStarted with Express, Your first Express App, Express Routing, Implementing MVC inExpress, Middleware, Using Template Engines, Error Handling , API Handling ,Debugging, Developing Template Engines, Using Process Managers, Security &Deployment.

Learning Outcomes: Student will be able to
• Understanding about Node.js.

UNIT IV
RESTful Web Services: Using the Uniform Interface, Designing URIs, Web Linking,Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React'sFuture, Keeping Up

with the Changes, Working with the Files, Pure React, Page Setup, TheVirtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data,React Components, DOM Rendering, Factories.

Learning Outcomes: Student will be able to
- Understanding about RESTFul Web Services.

UNIT V
Mongo DB: Introduction, Architecture, Features, Examples, Database Creation &Collection in Mongo DB. Deploying Applications: Web hosting & Domains, DeploymentUsing Cloud Platforms.

Learning Outcomes: Student will be able to
- Understanding about Database Mongo DB, Web hosting and Domains.

Text Books:
1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. Pro Mean Stack Development, ELadElrom, Apress
4. Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5. JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:
1. Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5. Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:
1. http://www.upriss.org.uk/perl/PerlCourse.html
2. www.android.universityupdates.in | www.universityupdates.in | www.ios.universityupdates.in

Subject Code	Subject Name	L	T	P	C
R20CSS-OE13201	**Open Elective-(Inter Disciplinary) NoSQL Databases**	3	0	0	3

Course Objectives:
The objective of this course is to
- Explore the emergence, requirements and benefits of a NoSQL database.
- Understand the basic architecture and data models of a NoSQL database (key-value stores,document databases, column-family stores, graph databases).

Course Outcomes:
On completion of this course, the students will be able to
1. Differentiate between various non-relational (NoSQL) database.
2. Create Documentoriented NoSQL databases using Mongo DB.
3. Create Column- oriented NoSQL databases using Apache HBASE.
4. Create NoSQL Key/Value databases using Riak.
5. Create Graph NoSQL databases using Neo4.

UNIT-I:
Introduction and Basic Concepts: Overview, and History of NoSQL Databases, Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters

Learning Outcomes: Student will be able to
- Understanding about NoSQL Databases and Types.

UNIT-II:
NoSQL Key/Value databases using MongoDB: Document Databases, What Is a Document Database? Features, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

Learning Outcomes: Student will be able to
- Understanding about NoSQL Key Values databases using MongoDB.

UNIT-III:
Column- oriented NoSQL databases using Apache HBASE: Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use.

Learning Outcomes: Student will be able to
- Understanding about HBASE Architecture.

UNIT-IV:
NoSQL Key/Value databases using Riak:Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets.

Learning Outcomes: Student will be able to

- Understanding about Key-value Store Consistency, Transactions.

UNIT-V:
Graph NoSQL databases using Neo4: NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.

Learning Outcomes: Student will be able to
- Understanding about Graph NoSQL Databases.

Text Books:
1.NoSQLDistilled: A Brief Guide to the Emerging World of Polyglot Persistence,Pramod J. Sadalage, Martin Fowler,Pearson Education, 2013.
2.Shashank Tiwari. Professional NoSQL. John Wiley and Sons. ISBN: 978-0-470-94224-6.

Reference Books:
1. i.A Guide to Modern Databases and the NoSQL Movement Edition, Redmond, E. &Wilson
2. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC.
3. Dan Sullivan. NoSQL for Mere Mortals. Addison-Wesley Professional. 2015.
4. Guy Harrison. Next-Generation Databases. Apress. 2016.

Subject Code	Subject Name	L	T	P	C
R20CSS-OE13202	**Open Elective-(Inter Disciplinary) Internet Of Things(IoT)**	3	0	0	3

Course Objectives:
The objectives of this course is to acquire knowledge on the
- What IoT is and how it works today and to Understand the Architectural Overview ofIoT
- To Understand the IoT Reference Architecture and RealWorld Design Constraints
- To Understand the various IoT Protocols.
- To understand and program IoT devices.

Course Outcomes:
The students should be able to:
1. Recognize the factors that contributed to the emergence of IoT
2. Design and program IoT devices like Microcontrollers, sensors and actuators.
3. Use real IoT protocols for communication.
4. Define the infrastructure for supporting IoT deployment.
5. Design an IoT device to work with a Cloud Computing infrastructure and Transfer IoT data to the cloud and in between cloud providers.

UNIT - I:
Introduction to IOT: Understanding IoT fundamentals, IOT Architecture and protocols,Various Platforms for IoT, Real time Examples of IoT , Overview of IoT components andIoTCommunication Technologies ,Challenges in IOT.

Learning Outcomes: Student will be able to
- Understanding about IOT and Fundamentals of IoT

UNIT - II:
Arduino Simulation Environment: Arduino Uno Architecture, Setup the IDE, WritingArduino Software, ArduinoLibraries, Basics ofEmbedded C programming for Arduino,Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.Sensor & Actuators with Arduino

Learning Outcomes: Student will be able to
- Understanding about Arduino Simulation Environment.

UNIT - III:
Raspberry Pi Programming: Installing and Configuring the Raspberry Pi,Getting Startedwith the Raspberry Pi,Using the Pi as a Media Centre, Productivity Machine and WebServer,Remote access to the Raspberry Pi. PreparingRaspberry Pi for IoT Projects.

Learning Outcomes: Student will be able to
- Understanding about Raspberry Pi Programming.

UNIT - IV:
Basic Networking with ESP8266 WiFi module : Basics of WirelessNetworking,Introduction to ESP8266 Wi-Fi Module ,Various Wi-Fi library , Web serverintroduction, installation,configuration ,Posting sensor(s) data to web server .IoT Protocols,M2M vs. IOT Communication Protocols.

Learning Outcomes: Student will be able to

- Understanding about Basic Networking and Wi-fi Library.

UNIT - V:
Cloud Platforms for IOT : Virtualization concepts and Cloud Architecture , Cloudcomputing, benefits ,Cloud services -- SaaS, PaaS, IaaS , Cloud providers & offerings ,Studyof IOT Cloud platforms , ThingSpeak API and MQTT , interfacing ESP8266 with Webservices

Learning Outcomes: Student will be able to
- Understanding about Cloud Platforms for IOT.

Text Books:
1.Simon Monk, Programming Arduino: Getting Started with Sketches, Second Edition McGraw-Hill Education
2.Peter Waher,Learning Internet of Things,Packt publishing.
3.OvidiuVermesan,PeterFriess, IoT-From Research and Innovation to Marketdeployment,River Publishers

Reference Books:
1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer.

Subject Code	Subject Name	L	T	P	C
R20CSS-OE13203	**Open Elective-(Inter Disciplinary) Block Chain Technology**	3	0	0	3

Course Objective:
- To provide conceptual understanding of the function of Blockchain as a method ofsecuring distributed ledgers.
- To understand the structure of a Blockchain and why/when it is better than a simpledistributed database
- To make students understand the technological underpinnings of Blockchain operations as distributed data structures and decision-making systems.
- To understand a "smart" contract and its legal implications.

Course Outcomes
Upon completion of the course, it is expected that student will be able to:
1. Define and explain the fundamentals of Blockchain.
2. Understand decentralization and the role of Blockchain in it.
3. Understand and analyze Bitcioin Cryptocurrency and underlying Blockchain network.
4. Understand Etherium currency and platform, and develop applications using Solidity.
5. Understand Hyperledger project and its components; critically analyze the challenges and future opportunities in Blockchain technology

UNIT-I:
Introduction: History and basics, Types of Blockchain, Consensus, CAP Theorem. Cryptographic Hash Functions: Properties of hash functions, Secure Hash Algorithm, Merkletrees, Patricia trees.

Learning Outcomes: Student will be able to
- Understanding types of Blockchain, CAP Theorem.

UNIT-II:
Decentralization: Decentralization using Blockchain, Methods of decentralization, decentralization framework, Blockchain and full ecosystem decentralization, Smart contracts, Decentralized Organizations, Platforms for decentralization.

Learning Outcomes: Student will be able to
- Understanding Decentralization using Blockchain.
- Understanding Methods of Decentralization.

UNIT-III:
Bitcoin: Introduction to Bitcoin, Digital keys and addresses, Transactions, Blockchain, The Bitcoin network, Bitcoin payments, Bitcoin Clients and APIs, Alternatives to Proof of Work, Bitcoin limitations.

Learning Outcomes: Student will be able to
- Understanding Bitcoins, Digital Keys and Address.

UNIT-IV:
Etherium: Smart Contracts, Introduction to Ethereum, The Ethereum network, Components of the Ethereum ecosystem, Blocks and Blockchain, Fee schedule, Ethereum Development Environment, Solidity.

Learning Outcomes: Student will be able to
- Understanding Ethereum Networks.

UNIT-V:
Hyperledger: Introduction, Hyperledger Projects, Protocol, Architecture, Hyperledger Fabric, Sawtooth Lake, Corda. Challenges and Opportunities: Scalability, Privacy, Blockchain for IoT, Emerging trends

Learning Outcomes: Student will be able to
- Understanding Hyperledger Projects, Hyperledger Fabric.

Text Book:
Mastering Blockchain, Imran Bashir, Second Edition, Packt Publishing

Reference Books:
1.Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas Antonopoulos, O'Reilly.
2.Blockchain Blueprint for a New Economy, Melanie Swan, O'Reilly.
3.Mastering Bitcoin: Programming the Open Blockchain, Antonopoulos, Andreas M. O'Reilly.
4.Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3204	**Data Mining and Data Warehousing Lab**	**3**	**0**	**0**	**3**

Course Objectives:
- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and Anunsupervised setting.
- Handling a small data mining project for a given practical domain.

Course Outcomes:

1. The data mining process and important issues around data cleaning, pre-processing and integration.

2. The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction..

System/Software Requirements:

  Intel based desktop PC

  WEKA TOOL

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori
4. algorithm
5. Demonstration of Association rule process on dataset test.arff using apriori algorithm
6. Demonstration of classification rule process on dataset student.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
8. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
9. Demonstration of classification rule process on dataset employee.arff using naïve bayes
10. algorithm
11. Demonstration of clustering rule process on dataset iris.arff using simple k-means
12. Demonstration of clustering rule process on dataset student.arff using simple k- means.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3205	**Web Technology Lab**	**3**	**0**	**0**	**3**

Course Objectives:
• To acquire knowledge of XHTML, Java Script and XML to develop web applications
• Ability to develop dynamic web content using Java Servlets and JSP
• To understand JDBC connections and Java Mail API
• To understand the design and development process of a complete web application

Course Outcomes:
1. Students will be able to develop static web sites using XHTML and Java Scripts
2. To implement XML and XSLT for web
3. Develop Dynamic web content using Java Servlets and JSP
4. To develop JDBC connections and implement a complete Dynamic web application

1. Design the following static web pages required for an online book store web site.
1) HOME PAGE:
The static home page must contain three frames.
Top frame: Logo and the college name and links to Home page, Login page, Registration page,
Catalogue page and Cart page (the description of these pages will be given below).
Left frame: At least four links for navigat
links.
For e.g.: When you click the link "MCA" the catalogue for MCABooks should be displayed in
the Right frame.
Right frame: The pages to the links in the left frame must be loaded here. Initially this
contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
mca mba BCA	Description of the Web Site			

2)login page

Logo	Web Site Name			
Home	<mark>Login</mark>	Registration	Catalogue	Cart
MCA MBA BCA	Login : `11a51f0003` Password: `******` Submit Reset			

3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	<mark>Catalogue</mark>	Cart
MCA MBA BCA	XML Bible	Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
	Artificial Intelligence	Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
	Java2	Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
	HTML 4	Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

4. REGISTRATION PAGE:

Create a "registration form "with the following fields

1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)

7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)
5. Design a web page using CSS (Cascading Style Sheets) which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

6. 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
Write a Document Type Definition (DTD) to validate the above XML file.

7. Example PHP program for cotactus page.

8. User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and
pwd4 respectively. Write a PHP 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.

9. Example PHP program for registering users of a website and login

10. Install a database(Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id,
phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display
them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the
submit button in the registration page (week2).

11. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using
Registration form. Authenticate the user when he submits the login form using the user name and
Password from the database (similar to week8 instead of cookies).

12. Create tables in the database which contain the details of items (books in our case like Book
name , Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in
such a way that you should connect to the database and extract data from the tables and display
them in the catalogue page using PHP

Subject Code	Subject Name	L	T	P	C
R20CSS-PC3206	**Compiler Design Lab**	3	0	0	3

Course Objectives:

The objective of this course is to acquire knowledge on the
i. Implementation of a compiler for a basic language
ii. Lex/Yacc specifications for designing frontend of a compiler

Course Outcomes: The students should be able to:

- Understand the different phases of compilation and the working of compilers like gcc, Clangetc
- Implement lexical analyzer for anylanguage
- Implement parser for anylanguage
- Implement 3-address code generator for simple programmingconstructs

List of experiments
1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar.
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL (1) parser for an expression
6. Design predictive parser for the given language
7. Implementation of shift reduce parsing algorithm.
8. Design a LALR bottom-up parser for the given language.
9. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
10. Write a program to perform loop unrolling.
11. Convert the BNF rules into YACC form and write code to generate abstract syntax tree
12. Generate a 3-address code from theAbstract Syntax Tree.
13. Write a program for constant propagation.

Textbooks:
1. flex & bison by John Levine Released August 2009 Publisher(s): O'Reilly Media,Inc.
2. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman,Pearson.
References:
1. LLVM Cookbook, Mayur pandey
E-resources:
1. https://llvm.org/
2. https://gcc.gnu.org

SubjectCode	SubjectName	L	T	P	C
	CONSTITUTIONOFINDIA	2	0	0	0

CourseObjectives:

- Comprehend theawarenessofhistoryofIndiaandimportanceofconstitution.(L2)
- Inculcatethebasicknowledgeofstructureofuniongovernmentandrolesa ndresponsibilitiesexecutivebodies.(L2)
- Knowthestructureofstategovernmentanditsadministrationinvarious levels.(L1)
- Examinethelocalgovernmentstructureandrolesoftheauthorizedbodiesf romthegrassrootsofdemocracy.(L3)
- Identifytheimportanceofelectioncommissionsandother welfarecommissionsinthestate as welluniongovernments.(L1)

CourseOutcomes:Attheendofthesemester/course, thestudentwillbeabletohaveaclearknowledge onthefollowing:

- Knowthesources,featuresandprinciplesofIndianConstitution.(L1)
- LearnaboutUnionGovernmentroleandresponsibilitiesanditsstructure(L2)
- Comprehendthestategovernmentanditsadministration.(L2)
- GetacquaintedwithLocaladministrationandPachayatiRaj.(L2)
- Gainknowledgeonrolesandfunctioning ofElectionCommission(L1)

UNIT-I

IntroductiontoIndianConstitution:IndianConstitutionmeaning,featuresandSources-Citizenship, Preamble, FundamentalRightsandDuties, DirectivePrinciplesofStatePolicy.

LearningOutcomes:
Aftercompletionofthisunitstudentwill beableto
- Understandtheconcept ofIndianconstitution(L2)
- Applytheknowledge ondirective principle ofstate policy(L3)
- AnalyzetheHistory,featuresofIndianconstitution(L3)
- EvaluatePreambleFundamentalRightsandDuties(L2)

Application:
Applicationofthefundamentalrightsandfundamentalduties inpresentscenario.

UNIT-II

Union Government and its Administration: Structure of the Indian Union: Federalism,President: Role, power and position, PM and Council of ministers, LokSabha, RajyaSabha,The Supreme CourtandHighCourt:Powers andFunctions;

LearningOutcomes:-
Aftercompletionofthisunitstudentwill beableto
- UnderstandthestructureofIndiangovernment(L2)
- Differentiatebetweenthestateand centralgovernment(L2)
- Knowthe Structureofsupreme court andHighcourt(L2)

Application: Role play mock parliament in the class room to understand LokSabha andRajyaSabha.

UNIT-III

State Government and its Administration: Governor - Role and Position - CM and Councilofministers,State Secretariat:Organization,Structure andFunctions

LearningOutcomes:-

Aftercompletionofthisunitstudentwill beableto

- Understandthestructureofstategovernment(L2)
- AnalyzetheroleGovernorandChiefMinister(L3)
- ExplaintheroleofstateSecretariat(L2)
- Differentiatebetweenstructureandfunctionsofstatesecretariat(L3)

Application:

- Studythelienofthehierarchyofministriesandlist-out currentministers.

UNIT-IV

ALocalAdministration-District'sAdministrationHead-RoleandImportance,Municipalities -Mayor and role of Elected Representative -PachayatiRaj: Functions PRI:Zilla Panchayat, Block level Organizational Hierarchy - Village level - Importance of grassrootdemocracy

LearningOutcomes:-

Aftercompletionofthisunitstudentwill beableto

- UnderstandthelocalAdministration(L2)
- Compareandcontrastdistrictadministrationroleand importance(L2)
- AnalyzetheroleofMayor andelectedrepresentativesofMunicipalities(L2)
- EvaluateZillapanchayatblocklevelorganization(L3)

Application:

- CompareandcontrastthefunctionalitiesoftwomayorsoftwoMunicipal Corporations.

UNIT-V

Election Commission:Election Commission-Roleof Chief Election Commissioner-StateElectionCommission.

LearningOutcomes:-

Aftercompletionofthisunitstudentwill beableto

- KnowtheroleofElectionCommissionapplyknowledge(L3)
- Analyzeroleof Central and stateelectioncommission(L3)

Application:

- Makea surveyofthe votersforlocalelectionsinyourarea.

TextBooks:

1. DurgaDasBasu,IntroductiontotheConstitutionofIndia,Prentice–HallofIndiaPvt.Ltd..NewDelhi
2. SubashKashyap,IndianConstitution, NationalBookTrust
3. J.A.Siwach, DynamicsofIndianGovernment&Politics
4. D.C.Gupta,IndianGovernmentandPolitics

References:

1.H.M.Sreevai,ConstitutionalLawofIndia,4theditionin3volumes(UniversalLawPublication)
2. J.C.Johari,IndianGovernmentandPoliticsHans

3. J.RajIndianGovernmentandPolitics

4.M.V.Pylee,IndianConstitutionDurgaDasBasu,
   HumanRightsinConstitutionalLaw,Prentice–HallofIndia
   Pvt.Ltd..NewDelhi

5.Noorani,A.G., (South Asia Human Rights Documentation Centre), Challenges toCivil
Right), Challenges to Civil Rights Guarantees in India, Oxford University Press2012

E-Resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution