Course Structure and Syllabus of

B. Tech III Year (I & II Semesters)

Computer Science and Engineering

R20 Regulations

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B.TECH III YEAR I SEM **(5T+3L) +1 MC**

S. No	Course Code	Category	Course	Hours per week			Credits
				L	T	P	
1		PCC	Computer Networks	3	0	0	3
2		PCC	Operating Systems	3	0	0	3
3		PCC	Fundamentals of Artificial Intelligence	3	0	0	3
4		PCC	Web Technologies	3	0	0	3
5		OEC-1	1.English for Professionals 2.Essential English and Employability Skills 3.Intellectual Property Rights 4.Number Theory 5.Entrepreneurship Development 6.The Power of Data Story telling	3	0	0	3
6		ESC-Lab	Quantitative Aptitude and Reasoning	0	0	3	1.5
7		PCC-Lab	Operating Systems & Computer Networks Lab	0	0	3	1.5
8		PCC-Lab	Web Technologies Lab	0	0	4	2
9		MC	NSS/NSO	0	0	2	0
TOTAL							20

B.TECH III YEAR II SEM **[5 T +3L]**

S. No	Course Code	Category	Course				Credits
				L	T	P	
1		PCC	Machine Learning	3	0	0	3
2		PCC	Compiler Design	3	1	0	4
3		PCC	Software Engineering	3	0	0	3
4		PEC–I	1. R Programming 2. Internet of Things 3. Fundamentals of Digital Image Processing 4. Object Oriented Modeling	2	0	0	2
5		PEC–II	1. Big data 2. Principles of Cryptography 3. Principles of Distributed System 4. Information Storage and Retrieval	3	0	0	3
6		ESC	Skill Integrated Lab	0	0	3	1.5
7		PEC I – Lab	1.R Programming Lab 2. Internet of Things Lab 3. Fundamentals of Digital Image Processing Lab 4. Object Oriented Modeling Lab	0	0	3	1.5
8		PCC-Lab	Machine Learning Lab	0	0	4	2
TOTAL							20

COMPUTER NETWORKS

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisites:

C Programming Language and Data Structures.

Course Objectives:

1. Elaborate on the fundamental concepts of computer networks and network models.
2. Know about the error and flow control mechanisms in the data link layer.
3. Explore the knowledge of various routing algorithms.
4. Describe the transport layer functionalities.
5. Illustrate different application layer functionalities.

Course Outcomes:

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

1. Illustrate the functionalities of various network models and Data link Layer.
2. Analyze error and flow control mechanisms in the data link layer
3. Examine various Routing Protocols.
4. Compare various congestion control mechanisms to improve the QoS of networking.
5. Identify the suitable Application layer protocols for specific applications.

UNIT - I:

Network Models: Layered Tasks, OSI model, Layers in the OSI model, TCP/IP protocol Suite, Addressing.

Data Link Control: Error detection and Correction- Introduction, Hamming Distance, CRC, Checksum.

UNIT - II:

Data Link Layer: Responsibilities of Data Link Layer: Framing, Flow and Error Control, Noiseless Channels - Simplest Protocol, Stop-and-Wait protocol Noisy Channels - Stop-and-Wait Automatic Repeat Request, Go-Back-N Automatic Repeat request, Selective Repeat Automatic Repeat Request, High-Level Data link Control.

Multiple Access: Random Access, ALOHA,CSMA, CSMA/CD,CSMA/CA,Controlled Access - Reservation, Polling, Token Passing, Channelization - FDMA,TDMA,CDMA.

UNIT- III:

Network Layer: Responsibilities of Network Layer, Delivery, Direct Versus Indirect Delivery, Forwarding, Forwarding Techniques, Forwarding process, Types of Routing tables **Unicast Routing protocols:** Optimization, Intra- and Interdomain routing ,Distance Vector Routing, Link State Routing, Path Vector Routing,IPV4 Addressing, Address space, Classful Addressing, Classless Addressing, Frame format of IPV4,IPV6.

UNIT- IV:

Transport Layer: Responsibilities of Transport Layer, Process-to-Process delivery, User Datagram Protocol, Transmission Control Protocol, Congestion Control - Open-Loop Congestion, Closed-Loop Congestion Control, Quality of Service, Techniques to improve QoS - Scheduling, Traffic Shaping, Resource Reservation, Admission Control.

UNIT-V:

Application Layer: Responsibilities of Application Layer Domain Name Space, Distribution of Name Space, DNS in Internet, Generic Domain, Country Domain, Inverse Domain Resolution, Domain Name Space (DNS) Messages, Electronic mail, File Transfer Protocol.

Text books:

1) Behrouz A Forouzan ,Data Communications and Networking,4th Edition, McGraw-Hill.

Reference Books:

1) Andrew S. Tanenbaum, Computer Networks, Third Edition.
2) William Stallings, Data Communications, Eight Edition. Pearson Publishers.
3) http://highered.mheducation.com/sites/0072967757/student_view0/index.html

OPERATING SYSTEMS

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisites :

Computer Organization, Data Structures

Course Objectives:

1. Introduce basic concepts of operating system and process management
2. Discuss various CPU scheduling algorithms and problems of process synchronization.
3. Demonstrate different methods for handling deadlock.
4. Describe about memory management Techniques.
5. Explore the File system, system security and protection mechanisms.

Course Outcomes:

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

1. Summarize operating system and process management concepts.
2. Apply process scheduling and synchronization related issues.
3. Outline Deadlock Prevention, Avoidance, Detection and recovery mechanisms.
4. Analyze effectively memory management concepts.
5. Illustrate various protection and security measures.

UNIT I

Operating Systems Overview

Introduction -What operating system do, Operating system structure (uni-programmed and multi programmed), Operating system operations, Operating system services, System calls, Types of System calls, Operating system structure.

UNIT II

Process Management and Process Scheduling

Process Management- Process concepts, Process scheduling, Operations on processes, Inter process communication. Multithreading models. Process Scheduling – Basic concepts, scheduling criteria, scheduling algorithms.

UNIT III

Process Synchronization and Deadlocks

Process coordination: Synchronization – Background, The critical section problem, Peterson's solution, Synchronization hardware, Semaphore, Classical problems of synchronization, Monitors.

System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Detection and avoidance, Recovery from deadlock.

UNIT IV

Memory Management

Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual memory management - Demand paging, copy-on-write, page-replacement, Thrashing.

UNIT – V

File system, system protection and security

Storage management – File concept, Access methods, Directory and disk structure, File-system mounting. System protection- Goals of protection, principles of protection, Domain of protection, Access matrix. System Security – Security problem, Program threats, System and Network threats.

Text Books

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th edition ,John Wiley, 2016.

Suggested / Reference Books

1. D.M. Dharmdhere, Operating Systems – A Concept based Approach, 2nd Edition. TMH, 2007.
2. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, PHI, 2008.
3. Behrouz A. Forouzan, Richard F. Gilberg, Unix and shell programming, cengage Learning 2009.

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Pre-requisite:

Programming Knowledge, Computer Organization

Course Objectives:

1. To introduce the basic concepts of artificial intelligence, its foundations
2. To analyze various search strategies in intelligent systems
3. To apply search algorithms in games
4. To learn various representations of logic and knowledge
5. To understand production systems and its components

Course Outcomes:

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

1. Understand Strong AI and Weak AI and identify problems applicable to AI
2. Compare and contrast various uninformed and informed search algorithms to find an optimal solution for a given problem
3. Apply appropriate search algorithms for winning games
4. Learn various representations applicable to logic and knowledge useful in reasoning
5. Learn to apply appropriate inference methods in production or expert systems

Unit I:

Overview of Artificial Intelligence:

Introduction. The Turing Test, Strong AI versus Weak AI, Heuristics, Identifying Problems Suitable for AI, Applications and Methods, Early History of AI, Recent History of AI to the Present, AI In the New Millennium

Unit II :

Uninformed Search:

Introduction: Search in Intelligent Systems, State-Space Graphs, Generate-and-Test Paradigm, Blind Search Algorithms, Implementing and Comparing Blind Search Algorithms **Informed Search:** Introduction, Heuristics, Informed Search Algorithms – Finding Any Solution, The Best-First Search, The Beam Search, Additional Metrics for Search Algorithms, Informed Search – Finding An Optimal Solution,

Unit III:

Search Using Games:

Introduction, Game Trees and Minimax Evaluation, Minimax With Alpha-Beta Pruning, Variations and Improvements To Minimax, Games of Chance and the Expect minimax Algorithm

Unit IV:

Logic in Artificial Intelligence:

Introduction, Logic and Representation, Propositional Logic, Predicate Logic – Introduction, Several Other Logics, Uncertainty and Probability **Knowledge Representation:** Introduction, Graphical Sketches and the Human Window, Graphsand the Bridges of Königsberg Problem, Search Trees, Representational Choices, ProductionSystems, Object Orientation, Frames, Semantic Networks

Unit V:

Production Systems:

Introduction, Background, Production Systems and Inference Methods, Production Systems and Cellular Automata, Stochastic Processes and Markov Chains, Basic Features and Examples of Expert Systems

Text Books:

1. Stephen Lucci, Danny Kopec. Artificial Intelligence in the 21st Century. A Living Introduction.Mercury Learning and Information. 2nd Edition. 2016

Reference Books:

1. Russell, Norvig: Artificial Intelligence, A Modern Approach, Pearson Education, SecondEdition. 2004
2. Rich, Knight, Nair: Artificial Intelligence, Tata McGraw Hill, Third Edition 2009
3. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011

WEB TECHNOLOGIES

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Pre-requisites:

Basics of Object Oriented programming, Java

Course Objectives:

1. To provide knowledge on web architecture, web services.
2. Client side scripting technologies to focus on the development of web-based information systems and web services.
3. To provide skills to design interactive and dynamic web sites.
4. To provide knowledge for implementing web applications with database connection

Course Outcomes:

Student will be able to:

1. Design static web pages and provide client side authentication.(L6)
2. Prepare Static Web pages With Validations.(L6)
3. Develop new tag sets using XML mechanism.(L5)
4. Design and develop web applications using JSP and MVC architecture.(L6)
5. Understand database connectivity and retrieving data using client/server database.(L2)

UNIT I:

INTRODUCTION TO WEB: Understanding Internet and Web, Web Architecture, Web servers, protocols: HTTP, Introduction HTML: History of HTML, WWW, HTML Basics: Elements, Attributes, Tags, Tables, Forms, Frames.div and span tags.HTML5

UNIT II:

CSS: Introduction to cascading style sheet, Types of style sheets, page layout, selectors, pseudo classes and elements.CSS3

JAVA SCRIPT: Introduction to scripting, control structures, conditional statements, Arrays functions, objects. JS framework(ReactJS)

HTML DOM: Predefined object (Window, Location, History, Navigator). Events, DOM Node methods, Navigation, creating nodes, adding nodes, inserting nodes, removing & Replaces Nodes, Form object and Elements, DHTML with Java Script. front end frameworks(bootstrap),

UNIT III:

XML: Basics of XML, Elements, Attributes, validation, Name space.
XML Scheme Languages: Introduction to DTD, internal and external DTD, Elements of DTD, DTD Limitations, XML Schema, Schema structure, Elements, parsing XML: XML DOM, Document node, element node, Text node, Java and DOM, Navigating DOM Tree.

UNIT IV:

AJAX: Introduction, Environment, Asynchronous communication, process steps, sending and Retrieving Information, Ajax with XML.
Servlets : Introduction, Lifecycle, Generic and HTTP servlet, passing parameters to servlet, HTTP servlet Request & Response interfaces, Deploying web Applications, Session Tracking: Hidden form fields, cookies, URL- Rewriting, session.

UNIT V:

JSP: Introduction, Difference Between servlets & JSP, Anatomy of JSP page, JSP elements: Directives, comments, Expressions, scriptlets, Declaration, Implicit JSP objects, using Action elements.
JDBC: Introduction, JDBC Drivers, Loading Driver, establishing connection, Executing SQL statement in JSP pages, MVC architecture.

Text Book:

1. Uttam K. Roy, Web Technologies, 8th Impression, Oxford Publication, 2014.

Reference Books:

1. Thomas Powell, “The Complete Reference HTML and CSS”, 5th Edition, Tata McGraw Hill, 2010.
2. Thomas Powell, Fritz Schneider, “The Complete Reference JavaScript 2.0”, 3rd Edition, Tata McGraw Hill, 2012.

ENGLISH FOR PROFESSIONALS

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Introduction:

The course aims at preparing the students with the tools needed for successful communication at the professional front. It is designed to improve students' academic and professional skills which the employers are currently looking for.

Objective:

To prepare the students to use the language effectively in all professional pursuits

Course Outcomes:

The students will be able to:

1. Analyze the language use in communicative process
2. Describe the process and product
3. Interpret the ideas in group activities
4. Apply different approaches to comprehend the written text
5. Write any technical and official correspondence within the framework

UNIT-I

Essentials of Communication:

Essentials of Grammar **-** Rudiments of Communications Skills (Listening, Speaking, Reading, and Writing) - Applied Grammar and Usage - Non-Verbal Communication

UNIT-II

Listening Skills:

Art of Listening - Developing Effective Listening Skills - Process of Listening, Intensive & Extensive Listening Podcasts, Vodcasts (ICT enabled) - Five steps to Active Listening - Effective and Ineffective Listening Skills -Listening & Note-Taking

UNIT-III

Speaking Skills:

Dynamics of Effective Speaking - Group Discussion - Simulated Presentations, Process & Product Descriptions - Proxemics, Paralinguistic Features

UNIT-IV

Reading Skills:

The Art of Effective Reading - Basic steps to Effective Reading - Extensive and Intensive Reading -Approaches to Efficient Reading - Reading Comprehension

UNIT-V

Writing Skills:

Art of Condensation - Descriptive Writing Techniques - Writing & Answering Memos, Circulars - Inter & Intra Official Communication - Writing Minutes of Meeting - Netiquette - E-mail & Blog Writing - Note-Making

PRESCRIBED TEXTBOOK:

1. Business Communication (Second Edition) by Meenakshi Raman & Prakash Singh. Oxford University Press. 2012.

REFERENCES:

1. Communicating at Work (Seventh edition) by Adlar, Ronarld.B. McGrawHill. 2004.
2. Cambridge English for Engineering Professionals by Mark Ibbotson. Cambridge University. 2008.
3. Professional Communication by Aruna Koneru. McGrawHill. 2017.
4. The Effective Communicator by Adair John. Jaico Publishing House. 1995.
5. Oxford English for Careers by Oxford University Press.

ESSENTIAL ENGLISH & EMPLOYABILITY SKILLS

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	Category	Hours / Week			Credits	Marks		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

1. To enable students to develop their personality, infuse confidence and increase employability skills in any chosen career.
2. To provide the students hands-on experience to cope with the demands of the world of recruiters.
3. To help the students acquire the job skills essential for employment.

Course Outcomes:

1. Enhancement of employability skills and professional etiquette.
2. Acquisition of productive knowledge, competent learning and innovative thinking skills.
3. Implementation of verbal and non-verbal communication competencies in work place.

UNIT-I

Six Sigma: Dabbawala from English for Employability
Personality Development: A Must for Leadership and Career Growth from Personality Development and Soft Skills
Introduction - Learning about Personality Development from 3 Cases - Personality Analysis - Freudian analysis of Personality Development - Swami Vivekananda's Concept of Personality Development - Personality Begets Leadership Qualities

UNIT-II

Yet I am not defeated! from English for Employability
Interpersonal skills from Personality Development and Soft Skills
The Personality Attribute of Taking Bold Decisions - Personality Types and Leadership Qualities - Personality Tests

UNIT-III

Patricia Narayanan: An Entrepreneur by accident, from English for Employability
Soft Skills: Demanded by Every Employer from Personality Development and Soft Skills
Introduction to Soft Skills - Lessons from the 3 Case Studies - Change in Today's Workplace - Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft Skills

UNIT-IV

Satya Nadella: CEO of Microsoft from English for Employability
Interview Skills from Personality Development and Soft Skills

UNIT-V

Body Language Reveals Your Inner self and Personality from Personality Development and Soft Skills
Introduction - Emotions Displayed by Body Language – Handshake -The Most Common Body Language - Eyes - A Powerful Reflection of One's Inner self - Entry to My Space - Personal Zones may vary - Body Language exhibited during different Professional Interactions.

Textbooks:

1. Purushotham, K. *English for Employability.* Orient Black Swan, Hyderabad.
2. Mitra, K. Barun. *Personality Development and Soft Skills*. Oxford University Press.

References:

1. *Enhancing English and Employability Skills.* State Board of Technical Education and Training. Hyderabad: Orient Black swan Private Limited, 2012.
2. Rao, M. S. *Soft Skills Enhancing Employability.* New Delhi: I. K. Publishing House, 2010.
3. Rao, Nageshwar. *Communication Skills.* New Delhi: Himalaya Publishing House Pvt. Ltd, 2008.
4. Sharma, T. K. *Enhancing Employability in Education.* India: Patridge Publishing House. 2015.
5. Yadav, Shalini. *Communication Technique.* New Delhi: University Science Press, 2010.

INTELLECTUAL PROPERTY RIGHTS

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objective:

The course aims to help the student understand the concept of Intellectual Property Rights and helps the student to appreciate the purpose and function of a trademark and the process involved in getting copyright, patent and related issues. The student is introduced to the importance of trade Secret and Geographical Indications.

Course Outcomes:

At the end of the course student will be able to

1. Explain the concepts of intellectual property rights and related agencies.
2. Describe the purpose and functions of a trademark in a competitive environment.
3. Analyze the process of copyright and procedure.
4. Understand the process of patent and patent issues.
5. Explore the trade secret and geographical indications of its protection from unfair practices.

Unit I:

Introduction to IPR

Concept of intellectual property rights, importance of intellectual property rights. Types of intellectual property, international agencies, and treaties.

Unit II:

Trademarks:

Concept of trademarks, purpose, and function of trademarks. Acquisition of trademark rights, protectable matter, selecting and evaluating trademark, trademark registration processes.

Unit III:

Law of copyrights:

Concept of copyright right, fundamentals of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration.

Unit IV:

Law of patents:

Introduction to patent, foundation of patent law, patent searching process, ownership rights and transfer.

Unit V:

Trade Secrets & Geographical Indication:

Law pertaining to trade secrets, determination of trade secrets. Trade secret litigation. Unfair competitions. Geographical Indication, concept of geographical indication, importance of geographical indication, new development of intellectual property rights.

Textbooks:

1. Deborah. E. Bouchoux,Intellectual property right, 5/e,2018,cengage learning.
2. Neeraj Pandey, Intellectual property right, PHI, 2019.

Reference Books:

1. Ramakrishna Chintakunta and M. Geethavani, Kindle e 2021
2. Prabuddha Ganguli,Intellectual Property Right:Unleashing the Knowledge Economy, 2/e, 2017 Tata Mc Graw Hill Publishing company Ltd.

NUMBER THEORY

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	Category	Hours / Week			Credits	Marks		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

1. Explain the concepts of divisibility, prime number, congruence and number theorems
2. Demonstrate knowledge of elementary relationships involving integers through explanation.
3. To understand the multiplicative functions.
4. Understand basic concepts on number theory and their related algorithms
5. This unit will help students to understand the basic idea of finite fields and quadratic residues.

Course Outcomes:

1. Students will be able to compute to time complexity of an algorithm. This unit will also help students to understands basics of number theory
2. Students able to understand arithmetic functions, additive and multiplicative functions.
3. Apply the properties of multiplicative functions to solve problems involving the number- theoretic functions.
4. Apply various algorithms and residues to solve problems on number theory
5. Use the properties of quadratic residues to determine whether certain quadratic congruence's are solvable.

UNIT-I:

The Fundamental Theorem of arithmetic: Divisibility, GCD, Prime Numbers, Fundamental theorem of Arithemtic, the series of reciprocal of the Primes, The Euclidean Algorithm.

UNIT-II:

Arithmetic function and Dirichlet Multiplication, the functions φ(n), μ(n) and a relation connecting them, Product formulae for φ(n), Dirichlet Product, Dirichlet inverse and Mobius inversion formula and Mangoldt function Λ(n),

UNIT-III:

Multiplication function, multiplication function and Dirichlet multiplication, Inverse of a completely multiplication function, Liouville's function λ(n), the divisor function is σ_α(n)

UNIT-IV:

Congruences, Properties of congruences, Residue Classes and complete residue system, linear congruences conversion, reduced residue system and Euler Fermat theorem, polynomial congruence modulo P, Lagrange's theorem, Application of

Lagrange's theorem, Chinese remainder theorem and its application, polynomial congruences with prime power moduli

UNIT-V:

Quadratic residue and quadratic reciprocity law, Quadratic residues, Legendre's symbol and its properties, evaluation of (−1/p) and (2/p), Gauss Lemma, the quadratic reciprocity law and its applications.

Text Book:

Introduction to analytic Number Theory by Tom M. Apostol. Chapters 1, 2, 5, 9.

References:

[1] Number Theory by Joseph H. Silverman.

[2] Theory of Numbers by K.Ramchandra.

[3] Elementary Number Theory by James K Strayer.

[4] Elementary Number Theory by James Tattusall.

[5] Thomas Koshy, Elementary Number Theory with Applications.

ENTREPRENEURSHIP DEVELOPMENT

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	Category	Hours / Week			Credits	Marks		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

The objective of this course is to familiarize the student with entrepreneurship, the issues involved in it, the potential of entrepreneurship and intrapreneurship, the legal environment and statutory issues and explore various funding opportunities.

Course Outcomes At the end of the course the student will be able to

1. Interpret the concepts of Entrepreneurship and Intrapreneurship.
2. Apply the opportunity identification techniques
3. Differentiate needs of different segments
4. Develop business model and MVP
5. Recognize organizational forms, IPR concerns and funding opportunities for startups.

Unit – I:

Introduction to Entrepreneurship: Entrepreneurship and Intrapreneurship, Business Incubators, Rural entrepreneurship, Social Entrepreneurship, women entrepreneurs, Role of entrepreneurs in economic development, Types of entrepreneurs. Entrepreneurial mind set and stress, Causes of failure.

Unit – II:

Opportunity identification: Myths and realities of entrepreneurship, Opportunity identification, Problem worth solving, idea generation techniques, Design thinking.

Unit – III:

Customer analysis: Market segmentation, consumer persona, Product market fit, Unique Value proposition.

Unit – IV:

Business model and MVP: Business model canvas, MVP, Risks and assumptions, Importance of financial planning.

Unit – V:

Organizational forms Funding Opportunities: Organizational forms - Partnership, Sole proprietorship, Corporation. Intellectual Property Rights- Copyrights, Trademarks, Patents. Law Vs. Ethics, Informal capital- Friends and Family, Angels, Venture Capitalists, Idea/ Patent, Growth strategies

Text Books:

1. Vasant Desai, YayatiNayak, Entrerpreneurship, Himalaya Publishing House,2018
2. D.F.Kuratko and T.V.Rao Entrepreneurship- Cengage Learning,2012

References:

1. Dhruv Nath, Sushanto Mitra, Funding Your Startup: And Other Nightmares, 2020
2. Rajeev Roy, Entrepreneurship, Oxford University Press, 2/e, 2012
3. V Srinivasa Rao, Lean Digital Thinking: Digitalizing Businesses in a New World Order, Bloomsbury India, 2021
4. S.K.Mohanty, Fundamentals of Entrepreneurship, PHI, 1/e,2005
5. MOOCS by Wadhwani Foundation

The Power of Data Storytelling

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	OE-I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Introduction:

This course will cover the fundamentals of effective data-driven storytelling. Story telling can put a human perspective on the increasingly complex and rapidly changing world of the digital era. Students will learn how to interpret and analyse the data and will learn to articulate the stories with data sets and communicate data findings in visual, oral, and written contexts.

Course Objectives:

1. Develop the skills necessary to be effective data storytellers.
2. Locate relevant datasets, extract insights from that data and present their findings in myriad formats.
3. Learn how to interpret data and to present it in different formatsto different audiences.

Course Outcomes:

1. Identify the stories within datasets and extract insights from that data.
2. Explain the importance of communication skills and competencies for individuals who serve as data storytellers.
3. Act as a data-driven visual storyteller for optimal presentation of trends, patterns, and insights.
4. make effective client presentations of their work using infographic visualizations.
5. learn tools and concepts which can be put to immediate use to transform data into stories.

Unit I:

Introduction

We are all storytellers- Stories Bring Data to Life- The Essence of Data Storytelling

Unit II:

Dynamics of Data Storytelling

Getting to the Core- Planning is Everything- The Quick Fix- Application of Story elements

Unit III:

Crafting the Data Story

The Psychology of Storytelling- The narrative Techniques - Making Good stories Great! – Writer to Storyteller

Unit IV:

Data Visualization

Use Visuals to Advantage: Data Presentation Skills- Infographics Visualizations

Unit V:

Anatomy of Data Story

Rudiments of Grammar - Parts of Speech - Concord Rules - Academic and Technical Vocabulary - Data Interpretation - Case Studies

Textbook:

1.Vora , Sejal (2019).*The Power of Data Storytelling*, Sage Publications India pvt Ltd.

Reference books:

1. Dykes, Brent (2020). *Effective Data Storytelling*: New Jersey, Wiley.
2. Knaflic, Cole Nussbaumer (2015).*Storytelling with Data: A Data Visualization Guide for Business Professionals,*https://www.amazon.com/Storytelling-Data-Visualization-Business-Professionals/dp/1119002257/
3. Morrow, Jordon (2021), *Be Data Literate- The Data Literacy Skills Everyone Needs to Succeed*, UK: Kogan Page Ltd.
4. Taylor, Scott (2021). *Telling your Data Story: Data storytelling for Time Management*, New Jersey: Technics Publications LLC.
5. https://www.amazon.com/Tableau-Your-Data-Analysis-Software/dp/1119001196/

Quantitative Aptitude and Reasoning

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	ESC	L	T	P	C	CIE	SEE	Total
		0	1	2	1.5	50	50	100

UNIT I

Number System: Speed Math's, Numbers, Factors, Prime and co primes, LCM & HCF, Divisibility rules, Finding the unit digit and applications, remainder theory.

Ratio and Proportion with Ages: Definition of ratio and Proportion, Finding the resultant ratio. Problems based on Ratios and ages.

Percentages: Introduction to percentages, Percentage Increase /Decrease, Results on Population, Results on Depreciation, Variations, Applications of Percentage.

Profit and Loss: Classification of Profit and Loss, Profit/ Loss Percentages, Successive Discount.

UNIT II

Time and Distance: Difference between the average, Relative and Effective speed, reaching the destination late and early, stoppage time per hour, problems based on Trains and problems based on Boats.

Time and Work: Calculating Efficiency, alternate days concept, work and wages, Chain rule, problems based on Pipes and cisterns.

Simple and Compound Interest: Simple interest, Principle, Rate, Amount, Applications of Simple interest, Compound interest, compounded annually, Compounded Half yearly, Compounded Quarterly, Difference between simple and compound interest.

UNIT III

Permutations and Combinations: Fundamental rules, Problems on Permutations and Combinations.

Probability: Definition, Notations and Problems based on Probability.

Mean, Median and Mode: Introduction and problems on Mean, Median and Mode.

Partnership: Relation between Partners, Period of Investments and Shares.

Averages: Average of different groups, change in average by adding, deleting and replacement of objects

Flow Charts: Introduction of symbols and problems on flow charts.

UNIT IV

Seating Arrangement: Circular, Row, Column, Square and Double row arrangement

Puzzles: Paragraph puzzles, incomplete puzzles and problems on them.

Number Series: Number, Alphabet and Letter Series.

Analogy: Simple, Double, Word and Number Analogy

Coding and Decoding: Classifications and Problems on Coding and Decoding.

UNIT V

Clocks: Relation between minute and hour hand, angle between hands of a clock, exceptional cases in clocks. Gaining and loosing of time.

Calendars: Classification of years, finding the day of any random calendar date, repetition of calendar years.

Direction Sense Test: Sort of directions in puzzle, distance between two points, Problems on shadows.

Blood Relations: Defining the various relations among the members of a family, solving blood relation puzzles by using symbols and notations. Problems on coded relations.

Text Books

1. R.S Agarwal, Verbal and Non-Verbal Reasoning, New Edition, S. Chand.
2. R.S Agarwal, Quantitative Aptitude, New Edition, S. Chand.

Reference Book

1. Abhijeet Guha, Quantitative Aptitude, New Edition, Mc Graw Hill.

OPERATING SYSTEM AND COMPUTER NETWORKS LAB

B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Course Objectives:

1. Analyze system calls that can offer operating system services
2. Demonstrate various operating system concepts
3. Understand and apply concepts of process synchronization
4. Understand the concept of Dead lock and its avoidance
5. Analyzing page replacement algorithms

Course Outcomes:

1. Understand system calls behavior and implement that can offer operating system services
2. Implement CPU scheduling algorithms multithreading
3. Implement the producer and consumer problem
4. Implement the dead lock avoidance using banker's algorithm
5. Implement page replacement algorithms

PART -A

1. Write a programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write a program to implement multithreading?
3. Give the list of processes, their CPU burst times and arrival times, display or print the Gantt chart for FCFS and SJF. For each of the scheduling policy compute and print the average waiting time and average turnaround time
4. Give the list of processes, their CPU burst times and arrival times, display or print the Gantt chart for Priority and Round Rabin. For each of the scheduling policy compute and print the average waiting time and average turnaround time.
5. Implement producer consumer problem using semaphore?
6. Write a program to implement Banker's algorithm for deadlock avoidance?
7. Write a program to implement page replacement algorithms (FCFS, Optimal, LRU)

PART - B

Course Objectives :

1. Understand data link layer framing methods.
2. Know about the various error detection methods.
3. Explore the knowledge of various routing algorithms.
4. Understand Traffic Analysis and Statistics in network.

Course Outcomes

1. Implement data link layer farming methods
2. Analyze error detection method
3. Analyze routing and congestion issues in network
4. Apply Traffic Analysis and Statistics in network

Programs:

1. Implement the data link layer framing method Bit stuffing.
2. Implement the data link layer framing method Character Stuffing.
3. Write a program to compute CRC 16.
4. Implement Dijkstra‘s algorithm to compute the Shortest path thru a graph.
5. Installation of Wireshark
6. Simulate Packet Capture Using Wire shark
7. Implement Viewing Captured Traffic Using Wire shark
8. Simulate Statistics & Filters Using Wire shark

WEB TECHNOLOGIES LAB								
B. Tech III Year I Semester					Dept. of Computer Science and Engineering			
Code	Category	Hours / Week			Credits	Marks		
	PCC	L	T	P	C	CIE	SEE	Total
		0	4	0	2	50	50	100

Course Objectives:

1. Client server architecture and able to develop static web application
2. Client-side data validation using java script
3. To create dynamic web application using server side technologies
4. To create fully functional web application with MVC architecture.

Course Outcomes:

Student will be able to:

1. Design static web pages and provide client side authentication.
2. Develop new tag sets using XML mechanism.
3. Understand database connectivity and retrieving data using client/server database.
4. Design dynamic web pages and develop web applications using MVC architecture.

Week-1:

Design the following static web pages required for an online book store web site.

1) HOME PAGE:

2) LOGIN PAGE:

Week -2:

Design the student REGISTRATION PAGE:

Week- 3:

Apply internal and external CSS (Cascading Style Sheets) for week1&2 pages.

Week -4:

VALIDATION:

Write JavaScript to validate the following fields of the above registration page.

Week -5:

Design the catalogue page.

Week -6:

Write an XML file which will display the Book information which includes the following: Write a Document Type Definition (DTD) to validate the above XML file.

Week -7:

Develop week(1-5) using bootstrap

Week -8:

Write a program to display the HELLO WORLD message using servlet.

Week -10:

Write a program to create cookies and retrieval using servlet.

Week -11:

Write a program to display the HELLO WORLD message using JSP

Week -12:

Convert all above static web pages into the JSP pages.

Week -13:

Using registration form. Authenticate the user when he submits the login form using the user name and password from the database

Week -14

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 4)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 JDBC.

Week -15

Implement week -10 in MVC architecture.

MACHINE LEARNING

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Pre-requisites:

Python Programming, Statistics

Course Objectives:

To understand the need for machine learning for various problem solving

1. To study the various supervised and unsupervised learning algorithms in machine learning
2. To understand the latest trends in machine learning
3. To design appropriate machine learning algorithms for problem solving

Course Outcomes:

Student will be able to:

1. Understand the Concepts of Machine Learning (L2)
2. Develop Simple Regression Models .(L3)
3. Build various classification algorithms (L3)
4. Analyze the need of ensemble learning and dimension reduction (L4)
5. Apply the Clustering algorithms for developing applications (L3)

UNIT I:

Introduction to Machine Learning

What is Machine Learning,Types of Machine Learning, Applications of Machine learning, Preparing to Model, Modeling and Evaluation .

UNIT II:

Supervised Learning: Regression

Introduction to Regression,Example of Regression,Simple Linear Regression,Multiple Linear Regression,Assumptions in Regression Analysis,Improving the accuracy of the Linear Regression Model, Ridge Regression, Lasso Regression.

UNIT III:

Supervised Learning: Classification

What is Classification,General Approach to Classification, K-Nearest Neighbor Algorithm, Logistic Regression, Decision Trees: Construction, classification and regression trees, example, Naive Bayesian Classifier, Support Vector Machines: Optimal Separation, Kernels, Algorithm

UNIT IV:

Unsupervised Learning and Dimensionality Reduction

Types of Unsupervised Learning, Challenges in Unsupervised Learning, Clustering Algorithms: K-Means, Agglomerative, DBSCAN, Comparing and Evaluating Clustering Algorithms.Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Component Analysis (PCA), Factor Analysis (FA).

UNIT V:

Ensemble Learning and Reinforcement Learning

Ensemble Methods: Bagging, Boosting & Random Forests, Reinforcement Learning: Overview, Example: Getting Lost, Markov Decision Process, Values, difference between SARSA and Q Learning, Uses of Reinforcement Learning

Text Books:

1. Machine Learning, Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, Pearson, 2018.
2. **Machine Learning: An Algorithmic Perspective by Stephen Marsland, CRC Press, 2009**
3. Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido, 2016,O'Reilly Media, Inc.

Reference Books:

1. Introduction to Machine Learning (Adaptive Computation and Machine Learning), Ethem Alpaydin, The MIT Press 2004.
2. **Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition Aurélien Géron, 2019, O'Reilly Media, Inc.**
3. Machine Learning, McGraw-Hill Education (India) Private Limited,Tom M. Mitchell, 2013.
4. **Pattern Recognition and Machine Learning. First Edition. ,C. M. Bishop. Springer, 2006.**

COMPILER DESIGN

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	1	0	4	40	60	100

Pre-requisites: Formal Languages and Automata Theory, Computer Organization

Course Objectives :

1. Describe the fundamental principles in compiler design.
2. Discuss CFG's and parsing techniques.
3. Predict the performance of different parsers.
4. Summarize the role of runtime environments and memory organization for implementation of typical programming languages.
5. Predict various techniques for code optimization and code generation.

Course Outcomes:

Student will be able to:

1. Analyze the phases of a typical compiler, including the front- and backend.(L3)
2. Apply the role of a parser in a compiler and relate the yield of a parse tree to a grammar derivation.(L3)
3. Design and implement a parser using a typical parser generator.(L6)
4. Implement an intermediate code generator based on given code patterns.(L3)
5. Apply the optimization techniques to have a better code for code generation.(L3)

UNIT I:

Introduction to Compilers: Structure of Compiler-Phases of Compiler, Symbol Table Management, Grouping of Phases into Passes, Compiler Vs Interpreter.

Lexical Analysis: Role and need of Lexical Analyzer, Input Buffering, Regular expressions for identifiers, Signed numbers etc.., A Language for specifying Lexical Analyzer, Lexical phase errors.

UNIT II:

Syntactic Specification: Context Free Grammars, Derivations and Parse Trees, Capabilities of Context Free Grammars, Syntactic Phase errors, Semantic errors.

Basic Parsing Techniques: Parsers, Shift-Reduce Parsing, Operator-Precedence parsing, Top-Down parsing, Predictive parsers.

UNIT III:

Construction of efficient Parsers: LR Parsers, Canonical collection of LR(0) items, Constructing SLR parsing tables, Constructing LR parsing tables, Constructing LALR parsing tables, using Ambiguous grammar, Comparison of SLR,LALR and CALR parsers, Comparison of Top down and Bottom up parsers.

UNIT IV:

Syntax Directed Translation: Syntax Directed Translation schemes, Intermediate codes, Postfix notation, Three Address code, Quadruples and triples.

Symbol table: Contents of Symbol table, Data Structures for symbol tables, representing scope information.

Run-Time Environments: Storage Organization, Stack allocation of space, Access to non data.

UNIT V:

Code Optimization: Principal sources of optimization, Loop optimization, Copy Propagation, Dead code elimination, Redundant sub expression elimination.

Code Generation: Object programs, problems in Code generation, A Machine Model, A Simple Code generator, Register allocation and assignment, Peephole optimization.

Text Book:

1. Alfred V Aho, Jeffrey D Ullman, Principles of Compiler Design, Pearson Education, 2001.

Reference Books:

1. J P Trembly and P G Sorenson, The Theory and practice of Compiler Writing, Mc Graw Hill, 2005.
2. Alfred V Aho, Ravi sethi ,Jeffrey D Ullman, Compilers-Principles , Techniques and Tools , Pearson Education, second edition.
3. Dick Grone, Henri E Bal, Ceriel J H Jacobs, Modern Compiler Design, Wiley Dreamtech, 2006.

SOFTWARE ENGINEERING

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisites:

Any programming language

Course objectives

1. Understand the framework activities for a given project.
2. Choose a process model for given project requirements.
3. Design various system models for a given scenario.
4. Design various testing techniques.
5. Understand metrics for Products.

Course Outcomes:

1. Outline the framework activities for a given project.
2. Apply Right process model for a given project.
3. Design various system models for a given Context.
4. Apply various testing techniques for a given project.
5. Identify various risks in project development.

UNIT -I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI),

Process models: The waterfall model, Incremental process models, Evolutionary process model.

[TB-1,Ch-1,2,3]

UNIT -II:

Agile process Model: Agile principles, Extreme programming, Dynamic System Development Methods, Feature Driven Development, Scrum framework, Sprint, Scrum master, Roles of Scrum Master, Implementing Scrum - A case study. [TB-1,Ch-4]

Software Requirements: Functional and non-functional requirements, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. [TB-2,Ch-6,7]

UNIT -III:

System models: Context Models, Behavioral models, Data models, Object models, structured methods. [TB-2,Ch-8]

Design Engineering: Design process and Design quality, Design concepts, the design model.Modeling component level design: design class based components, conducting component level design. Performing User interface design: Golden rules. [TB-1,Ch-9,11]

UNIT -IV:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing.

Product metrics : Software Quality, Metrics for Analysis Model- function based metrics, Metrics for Design Model-object oriented metrics, class oriented metrics, component design metrics, Metrics for source code, Metrics for maintenance. [TB-1,Ch-13,14,15]

UNIT -V:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Metrics for Software Quality, Software Reviews, Formal Technical Reviews, Software Reliability, The ISO 9000 quality standards.

[TB-1,Ch-25,26]

Text Books:

1. Roger S. Pressman, Software Engineering - A practitioner‘s Approach, 6th edition. McGraw Hill International Edition, 2005.
2. Somerville, Software Engineering, 7th edition, Pearson education, 2009.

Reference Books:

1. K.K. Agarwal & Yogesh Singh, Software Engineering, New Age International Publishers,3rd edition, 2008
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, 3rd edition 2005.
3. James F. Peters, Witold Pedrycz, Software Engineering - an Engineering approach, JohnWiely, 2007.
4. Waman S Jawadekar, Software Engineering Principles and Practice, The McGraw-Hill Companies, 2013.
5. https://nptel.ac.in/courses/106/105/106105182/
6. https://ff.tu-sofia.bg/~bogi/knigi/SE/Mcgraw%20Hill%20-%20Software%20Engineering%20-%20A%20Practitioner%27s%20Approach%20-%20Pressman%20(5Th%20Ed,2001,Bookmarked,Cover).pdf

R PROGRAMMING

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		2	0	0	2	40	60	100

Prerequisites :

Basics of Statistics, Machine Learning and
Basic knowledge in any Programming language

Course Objectives:

1. To provide an overview of a new language R used for data science.
2. To Familiarize students with R syntax
3. Understand the concepts of vector, Factors, Data Frames and data types
4. Get exposed to a few functions
5. To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R
6. To enable students to use R to conduct analytics on large real life datasets.

Course Outcomes:

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

1. Demonstrate vector and matrix operations using R.
2. Apply various operators on data frames and list.
3. Write functions using iterative programming
4. Analyze the data using R
5. Describe linear and multiple regression models for time series data & web data

UNIT I :

Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types, Vectors**:** Creating and Naming Vectors, Vector Arithmetic, Vector Sub setting, Matrices**:** Creating and Naming Matrices, Matrix Sub setting, Arrays, Class.

UNIT II

Factors and Data Frames : Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.
Lists: Introduction, Creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors, Conditionals and

Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

UNIT III :

Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List.

Functions in R: Introduction, Writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R, Cumulative Sums and Products, Calculus in R, Input and Output Operations.

UNIT IV :

Apply Family in R : Introduction, Using Apply in R, Using Lapply in R, Using Sapply, Using Tapply in R: Split Function, Using Mapply in R, Charts and Graphs : Introduction, Pie Chart: Chart Legend, 3D Pie Chart, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot.

UNIT V :

Data Interfaces: Introduction, CSV Files: Syntax, Importing a CSV File, Excel Files: Syntax, Importing an Excel file, Binary Files: Syntax, XML Files, Web Data, Databases.

Statistical Applications: Introduction, Basic Statistical Operations, Linear Regression Analysis, Chi-Squared Goodness of Fit Test, Chi-Squared Test of Independence, Multiple Regression, Time Series Analysis.

Text Books:

1. K G Srinivas ,G M Siddesh “Statistical programming in R”, Oxford Publications.
2. Gardener, M (2013), Beginning R, New Delhi: Wiley India

Reference Books

1. K Beginning R: The Statistical Programming Language,Mark Gardener,Wrox
2. Y. Anchang Zhao ,R and Data Mining: Examples and Case Studies . Elsevier in December 2012.
3. Avril Coghlan ,A Little Book of R For Time Series,Release 0.2

INTERNET OF THINGS

Pre-requisites:

Computer Networks, Python Programming

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		2	0	0	2	40	60	100

Course Objectives:

1. Differentiate Physical and Logical Design of IoT
2. Categorize pin configuration of Arduino Uno Board
3. Demonstrate Code in Node-RED
4. Identify communication between M2M
5. Develop an IoT Applications using Raspberry Pi board

Course Outcomes:

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

1. Identify physical and logical design of IoT
2. Understand Arduino Uno Board
3. Implement code in Node-RED
4. Develop an IoT Application using Arduino Uno board
5. Develop an IoT Applications using Raspberry Pi board

UNIT **- I**

Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs. (T1, Chapter 1)

Domain specific applications of IoT: Home automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and lifestyle. (T1, Chapter 2)

UNIT – II

Arduino Basics: Hardware Requirements, Software Requirements, Arduino Programming Lanugage References. (T2, Chapter 1)

Internet Connectivity: Arduino Uno Wired Connectivity(Ethrnet), Arduino Uno Wireless Connectivity(Wifi) (T2, Chapter 2)

UNIT - III

Communication Protocols: HTTP, MQTT (T2, Chapter 3)

Complex Flows: Node-RED: Hardware and Software Required, Circuit, Node-RED Flow, code (Arduino) (T2, Chapter 4)

UNIT - IV

Prototypes

IoT Patterns: Real-time Clients, Remote Control, On-Demand Clients, Web Apps, Location Aware, Machine to Human, Machine to Machine. (T2, Chapter 5-11)

UNIT - V

Using IOT for RFID and MQTT and the Raspberry Pi: Introduction to Raspberry Pi, RFID Technology, IoTRFID Hardware and Software, Building an MQTT Server on a Raspberry Pi, the Software on the Raspberry Pi, Building the IOTRFID Project (T3, Chapter 6)

TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things - A Hands-on Approach, Universities Press, 2015
2. Adeel Javed, Building Arduino Projects for the Internet of Things Experiments with Real-World Applications, Apress, 2016
3. John C. Shovic , Raspberry Pi IoT Projects, Prototyping Experiments for Makers, Apress, 2016

REFERENCE BOOKS:

1. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, (CRC Press)
2. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O’Reilly (SPD), 2014
3. R.K.Mittal and I J Nagrath, Robotics and Control, TMH, 2003

FUNDAMENTALS OF DIGITAL IMAGE PROCESSING

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		2	0	0	2	40	60	100

Pre requisite:

Basic Mathematics

Course Objectives:

1. Comprehend fundamental aspects of digital image processing
2. Understand the image noise models and enhancement methods
3. Evaluate the image segmentation methodologies
4. Understand the colour image processing techniques
5. Understand image morphological operations

Course Outcomes

At the end of the course the students will be able to:

1. Understand the fundamental concepts of digital image processing system.
2. Analyze the image noise models and enhancement techniques
3. Comprehend the different image segmentation and restoration methodologies.
4. Analyze the concepts of colour image processing.
5. Apply morphological operations on binary images

UNIT **I**

Introduction: Definition, Pixel, Digital image representation, Types of images, Fundamental steps in image processing, image processing applications. Digital image processing operations – Basic relationships and distance metrics, Classification of image processing operations- Arithmetic operations, Logical operations.

UNIT II

Image Enhancement and Restoration – Image quality and Need for image enhancement, image enhancement point operations, Histogram based techniques.Categories of Image Degradations- Image Restoration in the presence of noise only- Mean filters, order statistics filters.

UNIT III

Image Segmentation: Introduction, classification of image segmentation algorithms, detection of discontinuities, edge detection- stages in edge detection, types of edge detectors, First-order edge detection operators, second-order derivatives filters, edge operator performance, edge linking algorithms, principle of thresholding.

UNIT IV

Colour image processing: introduction, devices of colour imaging, colour image storage and processing, colour models-RGB Colour Model, HSI Colour Models, HSV Colour Model, Colour Quantization, Image filters for colour images.

UNIT V

Image Morphology: Need for morphological processing Morphological operators: Erosion, Dilation, Opening & Closing, Hit-or-Miss transform, Basic morphological algorithms, Gray-scale morphology

Text Books

1. S. Sridhar, Digital Image Processing, Oxford University Press, 2nd edition 2016.
2. D. Forsyth and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2nd Edition, 2015.
3. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer, 2011.
4. Gonzalez R.C., Woods R.E, Digital image processing, Pearson, Prentice-Hall of India Pvt.Ltd. New Delhi, 3rd Edition, 2018
5. Jan Erik Solem, Programming Computer Vision with Python, O'Reilly ,1st Edition, 2012

References

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision, 4th Edition, Cengage Learning, 2013
2. Fundamentals of Digital Image Processing, by Anil K. Jain, Prentice- Hall of India Pvt. Ltd,NewDelhi,2002
3. Prince, Simon JD. Computer Vision: Models, Learning and Inference, Cambridge UniversityPress,1stEdition,2012.

OBJECT ORIENTED MODELING

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		2	0	0	2	40	60	100

Prerequisites:

Any Programming Language

Course Objectives:

1. Introduce the basic concepts of UML.
2. Understand modelling of a real-word application by UML class diagram.
3. Describe the process of Interaction Diagrams.
4. Identify the importance of events, signal and state machines.
5. Demonstrate the component and deployment diagrams.

Course Outcomes:

Students will be able to:

1. Understand the concepts and principles of object-oriented programming in UML.
2. Compare the purposes, major components and key mechanisms of Class and Object Diagram.
3. Design the sequence and Collaboration Diagram for applications.
4. Construct the Start chart diagram for real world applications
5. Analyze the techniques for Component and Deployment Diagrams.

UNIT – I:

Introduction to UML: Importance of modeling, principles of modeling, object oriented Modeling, conceptual model of the UML, Architecture, Software Development Life Cycle. **Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams.

UNIT – II:

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages, Common modelling techniques.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams, Common modelling techniques.

UNIT – III:

Basic Behavioral Modeling-I: Interactions, Interaction diagrams

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams

UNIT – IV:

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams

UNIT-V

Architectural Modeling: Components, Deployment, Component diagrams and Deployment diagrams

Text Book:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, *The Unified Modeling Language User Guide*, 7th Impression, Pearson Education, 2008.

Reference Books:

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, *UML2 Toolkit,* 2nd Edition, WILEY-Dreamtech India Pvt. Ltd., 2012.
2. Meilir Page-Jones, *Fundamentals of Object Oriented Design in UML,* Illustrated Edition, Pearson Education, 2000.
3. Pascal Roques, *Modeling Software Systems Using UML2*, 1st edition, WILEY-Dreamtech India Pvt. Ltd., 2011.
4. Atul Kahate, *Object Oriented Analysis & Design,* 1st Edition, The McGraw-Hill Companies, 2007.
5. Mark Priestley, *Practical Object-Oriented Design with UML,* 2nd Edition, TATA McGrawHill, 2005.

BIG DATA

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-II	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisite:

Database management system, Java and Linux

Course Objectives:

1. Identify various tools and techniques in big data analytics
2. Distinguish Hadoop and related technologies.
3. Apply the development of applications using MapReduce, HDFS, YARN
4. Illustrate Enterprise Data Science and data visualization tools
5. Distinguish various NoSQL databases

Course Outcomes:

Students will be able to:

1. Identify need of big data and various analytical tools [L2]
2. Analyze various components HDFS [L4]
3. Apply several data intensive tasks using Map-Reduce paradigm [L3]
4. Demonstrate the applications of Enterprise Data Science and data visualization tools [L3]
5. Compare various NoSQL databases [L4]

Unit I:

Overview of Big Data Analytics: Introduction to Data Analytics and Big Data, Evolution of big data, Challenges with Traditional Large Scale Systems, characteristics (3 V's), types (structured, semi-structured and unstructured) and sources of Big Data, Distributed, Parallel Computing and Cloud Computing for big data. **Analytics Toolkit:** Components of the analytics toolkit, Analytical Sandbox: Internal, External and Hybrid.

Unit II:

Hadoop Distributed File System (HDFS): Hadoop Architecture: HDFS, MapReduce, YARN, **HDFS Architecture:** Name node, Data node, Secondary Name Node, Scaling Out – Block, Data Flow, Replica.

MapReduce: Phases (Mapper, Sort and Shuffle, Reducer), **YARN:** Combiner Functions, Streaming, HDFS, filesystems, Job Scheduling, I/O, Data Integrity, Compression, Serialization, File based Data Structures, Developing a MapReduce Application.

Unit III:

Hadoop Cluster and MapReduce: Hadoop Cluster specification and modes of operation, Hadoop installation and configuration, YARN configuration, Sample Map Reduce Application. HDFS Concepts-Interacting HDFS using command line-Interacting Java API.

Unit IV:

Introduction to data visualization: What is data visualization, Importance of data exploration and data visualization. Fundamentals: Design principles, Dashboards, Visualization tools, Data Visualization in Healthcare and Media & Entertainment.

Unit V:

Hadoop Ecosystem: Apache Spark, Zookeeper and Sqoop. Introduction to Languages and Databases: Pig, Hive. NOSQL Databases: Cassandra, Mongo, Cloudera, CouchDB, Hbase

Text Books:

1. Tom White, Hadoop: The Definitive Guide, 3rd Edition, O'Reilly, 2012.
2. Sridhar Alla, Big Data Analytics with Hadoop3, Packt Publication, 2018.
3. DT Editorial Services, Big Data: Black Book, 2016.

REFERENCES:

1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Web Resources:

1. https://cognitiveclass.ai/learn/big-data
2. https://hadoop.apache.org/
3. https://mschermann.github.io/data_viz_reader/

PRINCIPLES OF CRYPTOGRAPHY

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-II	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Course Objectives:

1. Understand fundamentals of cryptography and classic encryption techniques.
2. Compare and analyze encryption Algorithms
3. Learn various Authentication Functions using MAC & Hash
4. Know the Key Management and Distribution
5. Learn various web security protocols

Course Outcomes

Students will be able to

1. Describe fundamentals of cryptography and classic encryption techniques.(L2)
2. Analyze the symmetric encryption and Asymmetric encryption techniques (L4)
3. Summarize authentication functions using MAC & Hash (L2)
4. Illustrate Key Management and Distribution(L3)
5. Analyze the various methods and protocols to maintain E-mail security and web security(L4)

UNIT – 1

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, Substitution techniques-Caesar cipher, Mono alphabetic cipher, Poly alphabetic ciphers, onetime pad, transposition techniques, encryption and decryption, symmetric and Asymmetric key cryptography, steganography.

UNIT – II

Block ciphers

Symmetric key Ciphers**:** Block Cipher principles, Bloch cipher modes of operation, DES, AES, Blowfish, RC5 algorithms.

Public-key cryptography

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT – III

Hash functions and cryptographic applications

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-
512), Message authentication codes: Authentication requirements, HMAC, CMAC, and Digital Signatures, , Elgamal Digital Signature Scheme, Applications pertaining to Encryption using different ciphers and modes.

UNIT-IV

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

UNIT-V

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS.

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
https://www.garykessler.net/library/crypto.html
https://paragonie.com/blog/2019/03/definitive-2019-guide-cryptographic-key-sizes-and-algorithm-recommendations

PRINCIPLES OF DISTRIBUTED SYSTEMS

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-II	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Pre-Requisite:

Operating Systems, Computer Networks

Course Objectives:

1. Outline various models for processing and communication in distributed systems
2. Examine the file characteristics and Naming services
3. Explores the concept of clocks and distributed algorithms
4. Describes about transactions and their properties in distributed systems
5. To design and implement sample distributed systems.

Course Outcomes:

After completion of the course the students will be able to:

1. Identify the models for distributed processing and communication
2. Apply the knowledge in naming synchronization, consistency and replication
3. Predict the advantages and challenges in designing distributed Algorithms
4. Analyse distributed transactions and transaction recovery
5. Design Distributed Systems

UNIT I:

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges, Architectural model: Client Server model, Proxy Servers and Caches, Peer process model ,Fundamental model :Interaction model, Security model ,Failure model.

UNIT II:

Distributed file system: Characteristics of file systems, Distributed file system requirements, File service architecture. **Name Services:** Name space ,Name resolution , Domain Name System ,DNS name servers ,Directory services, discovery services in Jini

UNIT III:

Time and Global States: Clocks, events and Process states, Synchronizing physical clocks , logical clocks, distributed debugging. Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast communication.

UNIT IV:

Transactions and Concurrency control: Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. **Distributed Transactions**: Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT V:

Replication : System model , group communication ,Fault tolerant services ,Passive(primary-backup) replication,Active replication,Transactions with replicated data.**Designing Distributed Systems:Google Case Study** :Introducing the case study Google, physical model ,overall architecture and design philosophy ,Data storage and coordination services , Google file system, Chubby, BigTable ,Distributed computation services.

Text Books:

1. G Coulouris, J Dollimore, T Kindberg, Distributed Systems Concepts and Design, fifth Edition, Pearson Education.

Reference Books:

1. S.Mahajan and S.Shah, Distributed Computing, Oxford University Press.
2. PradeepK.Sinha, Distributed Operating Systems Concepts and Design, PHI.
3. M Singhal, N G Shivarathri, Advanced Concepts in Operating Systems, Tata McGraw-Hill Edition.
4. K.P.Birman, Reliable Distributed Systems, Springer.
5. A.S. Tanenbaum and M.V. Steen, Distributed Systems: Principles and Paradigms, Pearson Education.
6. R.Chow, T.Johnson, Distributed Operating Systems and Algorithm Analysis, Pearson.
7. A.S.Tanenbaum, Distributed Operating Systems, Pearson Education.

Web Resources:

https://www.cs.usfca.edu/~srollins/courses/cs682-s08/web/notes/models.html

INFORMATION STORAGE AND RETRIEVAL

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-II	L	T	P	C	CIE	SEE	Total
		3	0	0	3	40	60	100

Prerequisites:

Database management system

Course Objectives:

1. This course studies the basic principles and practical algorithms used for information retrieval and text mining
2. To understand the functions of Information retrieval
3. To provide exploration of information retrieval systems' evaluation tools
4. To provide hands-on experience in evaluating search engines to solve computational search problems.
5. To understand the complexity of Information Retrieval Systems.

Course Outcomes:

Student will be able to:

1. Acquire the knowledge of information retrieval system and its capabilities
2. Comprehend the knowledge of indexing and Data structure that can used for storing the data
3. Know the concept of indexing and clustering of the information
4. Understand the searching techniques and visualization
5. Have a handle on algorithms for text searching and multimedia retrieval

UNIT -1

Introduction to Information Retrieval Systems: Definition, Objectives, functional overview, Relation to Database Management system.
IRS capabilities: Search capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT –II

Cataloging and Indexing: History of objectives of Indexing, indexing process, automatic indexing
Data Structure: Introduction to Data structure, Stemming Algorithms, Invert file system, N-Gram Data structure, PAT data structure, Hypertext and XML data structure

UNIT- III

Automatic Indexing: Classes of Automatic indexing, Statistical indexing, Natural language, concept Indexing, Hypertext Linkage.

Document and Term Clustering: Introduction to clustering, Thesaurus Generation, Manual clustering, Automatic term clustering

UNIT –IV

User Search Techniques: Searching statement and binding, Similarity Measurement and Ranking, Relevance Feedback, Selective dissemination of information search, weighted searches of Boolean system.
Information Visualization: introduction to information visualization, Cognition and perception

UNIT –V

Text Search Algorithms:
Introduction to Text search techniques, Software text search algorithms, hardware text search system
Multimedia information retrieval: Spoken language audio retrieval, Non- speech audio retrieval, Graph Retrieval, Imagery retrieval, video retrieval

Text Book:

1. Gerald J.Kowalski, Mark T. Maybury,Information storage and retrieval systems, theory and implementation, 2nd Edition, Springer publications.

Reference Books:

1. Christopher D. Manning and Prabhakar, Raghavan, Introduction to information Retrieval, Cambridge University Press, 2008.
2. Ricardo baeza-Yates, Modern information retrieval, Pearson Education, 2007.
3. Robert Korthage, Information storage and Retrieval, John wiley& sons.

SKILL INTEGRATED LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	ESC	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Learning Objectives

1. To improve the students' fluency in English, through a well-developed vocabulary
2. To enable them to respond them appropriate socio-cultural and professional contexts.
3. They will be able to communicate their ideas relevantly and coherently in writing.

Course Outcomes

The students will be able to

1. make oral presentations effectively
2. participate in group discussions
3. develop vocabulary
4. write project/Business reports
5. take part in social and professional communication

Exercise I

Presentation Skills:

Oral presentations (individual and group) / JAM sessions/Seminar - Power point presentations - Body Language-kinesics - Haptics

Exercise II

Group Discussion:

Dynamics of Group Discussion - Dos and Don'ts – Intervention - Summarizing - Modulation of Voice - Relevance - Fluency and Coherence

Exercise III

Vocabulary Building:

synonyms and antonyms - Word Roots - One-Word Substitutes, - Prefixes and Suffixes - study of Word Origin- -Analogy -Idioms and Phrases

Exercise IV

Writing Skills:

Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose - Report Writing - Business Report Writing - Research Abilities/Data Collection/Organizing Data/Tools/Analysis

Exercise V

Interview Skills:

Concept and Process - Pre-Interview Planning - Opening Strategies - Answering Strategies - Interview through Telephone and Videoconferencing.

A mini project should be given for the students to work in teams and the Assessment is done.

References:

1. Dr. Rao, A. Ramakrishna., Dr. G. Natanam and Prof SA Sankaranarayana. *English Language Communication: A Reader cum Lab Manual. Chennai*: Anuradha Publications, 2008.
2. *English Vocabulary in Use series*. Cambridge University Press, 2008.
3. Nicholls, Anne. *Master Public Speaking.* JAICO Publishing House, 2006.
4. Sen, Leena. *Communication Skills.* New Delhi: PHI Learning Pvt Ltd, 2009.

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R PROGRAMMING LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Prerequisites :

Basics of Statistics, MachineLearning , Programming language C/C++

Course Outcomes:

1.Install and use R for simple programming tasks.
2.Explore R environment
3.Create loops and their own customized functions to solve different types of problems
4. Visualize data insights using charts and graphs

Week-1:
Installation and Environment set up R and Rstudio

Week-2:
Experiments on Vector Arithmetic operations

Week-3:
Experiments on Matrices operations

Week-4
Experiments on Arrays functions

Week-5:
Experiments on Factors

Week-6:
Experiments on Data Frames

Week-7:
Experiments on List operations

Week-8:
Write R scripts which demonstrate logical operations and Conditional Statements

Week-9:

Write R scripts which demonstrate Looping Over List

Week-10:

Write R scripts which demonstrate Nested Functions and
Function Scoping

Week-11:

Experiments on Mathematical Functions in R

Week-12:

Experiments on Calculus in R

Week13:

Experiments on Lapply, Sapply and Apply functions

Week-14:

Genarte different Charts and Graphs using R

INTERNET OF THINGS LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Week 1:

1. Study and Install IDE of Arduino and different types of Arduinos.
2. Write program using Arduino IDE for Blink LED.
3. Write Program for RGB LED using Arduino.

Week 2:

4. Write program for buzzer using Arduino.
5. Write program for LDR using Arduino.
6. Write program for IR Sensor using Arduino.

Week 3:

7. Study the Temperature sensor and Write Program for monitor temperature using Arduino.

Week 4:

8. Study and Implement RFID, NFC using Arduino.

Week 5:

9. Study and implement MQTT protocol using Arduino.

Week 6:

10. Study and Implement Arduino Uno with Ethernet Connection to Send data to a Cloud

Week 7:

11. Study and Implement Arduino Uno with ESP 32 Connection to Send data to a Cloud

Week 8:

12. Study and Configure Raspberry Pi.
13. Write program for LED blink using Raspberry Pi
14. Write program for RGB LED using Raspberry Pi

Week 9:

15. Implement Raspberry Pi based Automated Street Lighting System.
16. Write an Arduino program for Distance Measurement Using Ultrasonic Sensor and displaying on LCD.

Week 10:

17. Write program for Buzzer using Raspberry Pi
18. Write program for LDR using Raspberry Pi
19. Write program for IR Sensor using Raspberry Pi

Week 11:

20. Implement IoT based weather monitoring system using Raspberry Pi.

Week 12:

21. Study and Implement RFID, NFC using Raspberry Pi.

Week 13:

22. Study and Implement Raspberry Pi with Ethernet Connection to Send data to a Cloud

Week 14:

23. Study and Implement Raspberry Pi with Wifi Connection to Send data to a Cloud

Week 15:

24. Study and Implement Zigbee Protocol using Arduino.

Week 16:

25. Study and Implement Zigbee Protocol using Raspberry Pi.

FUNDAMENTALS OF DIGITAL IMAGE PROCESSING LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Course objectives

1. Understand the basic vector and matrix commands in SCI lab.
2. Use various commands for arithmetic and histogram manipulations.
3. Analyze various types of Noises and filters.
4. Understand various color conversion functions.
5. Learn image segmentation and morphological operations.

Course outcomes

1. Apply basic vector and matrix commands of SCI lab. (L4)
2. Apply various commands to implement arithmetic operations and histogram operations. (L4)
3. Apply different types of noises and masks to the images. (L4)
4. Apply various colour conversion methods. (L4)
5. Implement morphological operations. (L6)

List of experiments

Week-1 & 2

Installation of SCI lab and basic commands

Week-3

Write the programs for vector arithmetic operations

Week-4

Write the programs for matrix operations and divide the matrix into overlapped 3*3 sub matrices.

Week-5

Write a program for displaying an image and printing of its properties.

Week-6

Write a program to implement arithmetic operations on images.

Week-7

Write a program to implement histogram equalization and display the histogram.

Week-8

Write a program for adding different types of noises with different percentages.

Week-9

Write a program to apply different types of masks for detecting the edges.

Week-10

Write the programs to implement various color image conversion models.

Week-11

Write a program to read an RGB image and segment it using threshold method.

Week-12

Write a program for color image histogram manipulations?

Week-13

Write a Program for following morphology operations

i. Dilation ii. Erosion iii. Open iv. Close v. Hit-or-Miss transform

Week-14

Write a program to rotate the image in different angles.

Week-15

Review

OBJECT ORIENTED MODELING LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PEC-I	L	T	P	C	CIE	SEE	Total
		0	3	0	1.5	50	50	100

Course Objectives:

1. Understand object based view of the system
2. Learn the basic concepts of UML
3. Practice the notations for representing various UML diagrams
4. Analyze and design the problem by representing with UML diagrams.

Course Outcomes:

At the end of the course Students will be able to:

1. Understand the process to be followed in the software development life cycle
2. Design the usecase and class diagrams for real time applications.
3. Compare the interaction diagrams
4. Analyze the state chart diagrams
5. Construct the component and deployment diagrams

Case Studies:

1. ATM System
2. Railway Reservation System
3. Library Management System

Week 1-2 :

Model class diagrams for the above specified Case Studies.

Week 3-4 :

Model Use case diagrams for the above specified Case Studies.

Week 5-6:

Model activity diagrams for the above specified Case Studies.

Week 7-8 :

Model sequence and collaboration diagrams for the above Case Studies.

Week 9-10:

Model state chart diagrams for the above specified Case Studies.

Week 11-12:

Model component diagrams for the above specified Case Studies.

Week 13-14:

Model Deployment diagrams for the above specified Case Studies.

MACHINE LEARNING LAB

B. Tech III Year II Semester					Dept. of Computer Science and Engineering			
Code	**Category**	**Hours / Week**			**Credits**	**Marks**		
	PCC	L	T	P	C	CIE	SEE	Total
		0	4	0	2	50	50	100

Prerequisites:

Python Programming, Statistics

Course Objectives:

1. To study the way of classifying a new sample using machine learning algorithms.
2. To have an understanding of the strengths and weaknesses of many popular machine learning approaches
3. To appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised.
4. To implement various machine learning algorithms in a range of real-world applications.

Course Outcomes :

Student will able to

1. To Demonstrate the Python Framework and install ML packages
2. To Design python programs for various machine learning algorithms
3. To Use appropriate datasets to the machine learning algorithms
4. To Apply Machine Learning algorithms to solve real world problems

List of Programs:

Week 1 & 2:

installation of IDE, Demonstration of Packages .

Week 3:

Program to demonstrate different kinds of preprocessing

Week 4:

Program to demonstrate simple linear regression

Week 5 :

Program to demonstrate ridge regression and lasso regression

Week 6:

Program to demonstrate K-Nearest Neighbor Classification

Week 7:

Program to demonstrate Decision Tree -ID3 Algorithm

Week 8:

a. Program to demonstrate Naive Bayes Classifier

b. Program to demonstrate Logistic Regression

Week 9:

Program to demonstrate SVM based Classification

Week 10:

Program to demonstrate the Ensemble Learning Algorithms: Bagging & Boosting

Week 11:

Program to demonstrate Random Forest Algorithm

Week 12:

Program to demonstrate PCA on any dataset

Week 13 :

Program to demonstrate K-Means Clustering Algorithm

Week 14:

Program to demonstrate DBSCAN Clustering Algorithm

Week15:

Program to demonstrate Comparison and Evaluation of Clustering Algorithms