6TH SEMESTER

SYLLABUS

BIG DATA ANALYTICS			
Course code:	**PCC21IS61**	**Credits:**	3
L:T:P:S	2:2:0:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	Understand the big data platform and its use cases.
2.	Explore the techniques of managing big data using NoSQL, Hadoop
3.	Use ETL tools for developing business case studies in big data analytics.
4.	Develop the process of map-reduce analytics using Hadoop and related tools.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Apply Big Data concepts of Hadoop framework in engineering and societal problems.
CO2	Apply the model of NoSQL using Cassandra for Big Data processing.
CO3	Analyze appropriate analytics methods based on the nature of the problem, the characteristics of the data, and the desired outcomes.
CO4	Design appropriate solution for the applications using Hadoop tools.

Mapping of Course outcomes to Program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3														
CO2	3														
CO3		3													
CO4			2	2	3	2		3	2	2	2	3	3	3	2

Module	Module Contents	Hours
1.	**Introduction to Big Data Analytics:** Introduction, Big Data, Scalability and Parallel Processing, Designing Data Architecture, Data Sources, Quality, Pre-Processing and Storing, Data Storage and Analysis, Big Data Analytics Applications and Case Studies.	**8**
2.	**Introduction to Hadoop:** Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools - Hive, pig.	**8**
3.	**NoSQL Big Data Management, Cassandra:** Introduction, NoSQL Data Store, NoSQL Data Architecture Patterns, NoSQL to Manage Big Data, Shared-Nothing Architecture for Big Data Tasks, MongoDB, Cassandra Databases.	**8**
4.	**MapReduce, Hive:** Introduction, MapReduce Map Tasks, Reduce Tasks and MapReduce Execution, Composing MapReduce for Calculations and Algorithms, Hive, HiveQL. **Spark and Big Data Analytics:** Introduction, Spark, Introduction to Data Analysis with Spark, Downloading Spark and Programming using RDD and MLIB, Data ETL process, Introduction to Analytics reporting and Visualizing.	**8**
5	**Machine Learning Algorithms for Big Data Analytics:** Introduction, Estimating the relationships, Outliers, Variances, Probability Distributions, and Correlations, Regression analysis, (Finding Similar Items, Similarity of Sets and Collaborative Filtering, Frequent Item sets and Association Rule Mining, Recommendation Systems.	**8**

TEXT BOOKS:	
TB No.	**Author / Edition / Publication / Year**
1.	Raj Kamal and Preeti Saxena, "Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966

REFERENCE BOOKS:	
RB No.	**Author / Edition / Publication / Year**
1.	Tom White, "Hadoop: The Definitive Guide", 4th Edition, O"Reilly Media, 2015.ISBN-13: 978- 9352130672 Eric Sammer, "Hadoop Operations: A Guide for Developers and Administrators",1stEdition, O'Reilly Media, 2012.ISBN-13: 978-9350239261
2.	Arshdeep Bahga, Vijay Madisetti, "Big Data Analytics: A Hands-On Approach", 1stEdition, VPT Publications, 2018. ISBN-13: 978-0996025577

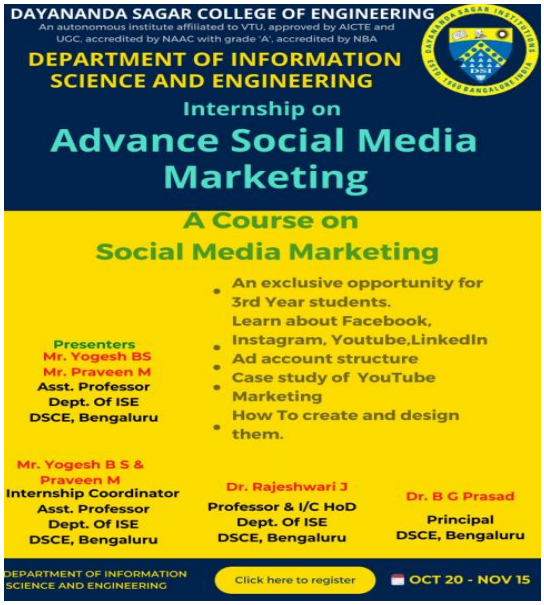
FULL STACK DEVELOPMENT			
Course code:	**IPCC21IS62**	**Credits:**	4
L:T:P:S	3:0:2:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	Develop front end application using HTML and CSS
2.	Proficiency to connect with frontend application and accomplish required task using JavaScript and ReactJS
3.	Use Nodejs and REST API features to connect between client and server side technologies.
4.	Develop web application using HTML, CSS, JAVASCRIPT, REACT, Nodejs and database

Course Outcomes: At the end of the course, student will be able to:	
CO1	Analyze front-end coding languages to develop HTML web pages and modify contents as per the requirements
CO2	Develop responsive web pages using front-end technologies such as HTML, CSS and Javascript
CO3	Design interactive web sites using Nodejs and REST API features
CO4	Develop applications using full stack technology (HTML, CSS, JS, React, Nodejs & DB)

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3														
CO2	3	3	3		3			2					2		
CO3	3	3	3		3			2					2		
CO4	3	3	3		3			2					2		

Module	Module Contents	Hours
1.	**Introduction:** What is Full Stack Web Development, Layers of Full Stack Web Development, Who is a Full Stack Web Developer, Concepts of the Web every Developer needs to Know, Understanding Web Technology Stacks, Front-End: Client-side Technology Stack, Back-End: Server-side Technology Stack, Understand how websites work and how HTML,CSS and JavaScript contribute, Understand how the internet works. **Front-end Development:** A Simple HTML Document, Learn the anatomy of HTML Syntax to structure your websites, Structure text in HTML, Structure HTML lists.	**8**
2.	Insert images using HTML, Create hyperlinks using anchor tags, Use HTML tables for content, HTML best practices, HTML forms. Git hub{Headings, paragraph, file structure, insert images from website and local drive , HTML Boiler Plate, Mini Project Create Birthday Party Study Planner Template.	**8**
3.	Understand CSS and how you can use them to style your websites, CSS Selectors and properties, Learn how to use inline, internal, and external CSS, Understand CSS best practices, Website design fundamentals. Advance CSS (Display, Float, Create Responsive web site), Flexbox, Grid, Boostrap	**8**
4.	**JavaScript:** Fundamentals of Java Script The fundamentals of code, Applying JavaScript, Starting code with alerts and prompts, Variables and Data types, Working with Strings and Numbers, Functions and invocation patterns, JS expressions. **Intermediate Java Script:** Control Statements, Control loops and working with arrays. **Document Object Model:** Selecting HTML elements with Javascript, Text Manipulation and Manipulating HTML attributes. **React_JS:** Understand when and how to use REACT components, React props and State.	**8**
5.	**Backend Technology:** Working with Database Schemas, CRUD operations. **Node JS:** What is NODE JS, Features, Creating NODE JS Application, Server-side Vs. Client side JavaScript. **APIs:** How do APIs Work? REST APIs, HTTP in depth, using HTTP in Web Frameworks and Libraries.	**8**

Expt. No	Contents of the experiment	Hours
1.	Develop a HTML program to display (i) Welcome Full Stack Web Development & Own paragraph about why learning of Full stack web development course. (ii) Create a Course Registration form using HTML	**2**
2.	Create following Card using HTML  Note: Color can vary.	**2**
3.	For the above Card display/any other card perform formatting using CSS.	**2**
4.	Develop a JavaScript program that implements a "form" validation that displays an error message if a required field is left empty when (i) While moving to next filed (ii) Submitting the form {if it is the last field}	**2**
5.	Create a Git repository and execute Git commands or commits. Publish a website in a git repository and access from different locations. Modify, Update, Delete contents of the website.	**2**
6.	Develop a JavaScript program to sort a list of elements using the Alpha Numerical sorting algorithm.	**2**
7	Design and develop an Online Voting website using HTML CSS, JavaScript and reactjs	**2**
8.	Design and develop a login web page with strong password validation using react js.	**2**
9.	Develop a node.js program to get files or directories of a directory in JSON format.	**2**

10.	Design and Develop Screen Shot Generator Web application and Debug a website using REST API.	**2**

TEXT BOOKS:		
TB No.	**Author / Edition / Publication / Year**	**Chapters**
1.	Sammie Smith, "FULL STACK WEB DEVELOPMENT: Everything Beginners to Expert Guide on Modern Full-Stack Web Development Using Modern Web Development Tools", 2022	1, 2, 3, 5, 8, 11, 12, 14, 16

REFERENCE BOOKS:	
RB No.	**Author / Edition / Publication / Year**
1.	Modern Full-Stack Development: Using Typescript, React, Node.js, Frank Zammetti, Apress.
2.	Full-Stack React Projects: Learn Mern Stack Development, Shama Hoque, Packt Publishing Limited.
3.	Reference Link: https://fullstackopen.com/en/
4.	Reference Link: https://katiekodes.com/git-github-beginner-exercises/
5.	MDN Web Docs https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model

CYBER SECURITY & DIGITAL FORENSICS			
Course code:	**PCC21IS63**	**Credits:**	3
L:T:P:S	2:2:0:0	**CIE Marks:**	50
Exam Hours:	3 hrs	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	Understand the fundamentals of cyber security and cyber crimes
2.	To apply the tools and methods of cyber security and cyber crimes.
3.	Understand the basic concepts and techniques of Cyber forensics.
4.	To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Apply the basic concepts of cyber security and cyber crimes and evaluate the cyber security risks.
CO2	Analyze to Take measures for self-cyber-protection as well as societal cyber-protection.
CO3	Design and evaluate existing legal framework and laws on cyber security using tools.
CO4	Interpret and explore security loopholes (vulnerabilities) and their exploitation techniques.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1		3						3							3
CO2		3					3	3							
CO3			3		3	2	1	3							3
CO4				3	3	2	1	3							3

Module	Module Contents	Hours
1.	**INTRODUCTION TO CYBERCRIME:** **Cybercrime** – Definition and Origins of the Word Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyberoffenses: How Criminals Plan Them: How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.	**8**
2.	**TOOLS AND METHODS USED IN CYBERCRIME:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS At-tacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.	**8**
3.	**ETHICAL HACKING:** Introduction to hacking, Types of hacking, Methodologies of hacking, Keylogger activity hacking, website hacking, techniques of basic info gathering, RAT-remote administration tool and its usage and batch virus, Introduction to kali Linux and it's installation methods, Introduction to vulnerability analysis by info gathering using tools, man in the middle attack using ettercap and Wireshark, Encryption and decryption of files, Password cracking of files, creating malwares and binding.	**8**
4.	**UNDERSTANDING COMPUTER FORENSICS:** Introduction, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements of Computer Forensics.	**8**

5.	**CYBER FORENSICS:** Hands on experience with cyber forensics, Introduction to IPC, Cpc, CrPc, IT act 2000 and 2008 and national Cs policy 2013, Landmark judgements in cyber security, Introduction to law enforcement, Introduction to 65b certification, Primary investigation of cyber crimes, Faraday bag and box handling during crime scenario, Write protection of devices, Imaging and cloning of devices, First responder tool kit, Deleted data recovery, Tracing IP addresses, CDR analysis, Rooting and jailbreaking, audio / video forensics, Speaker identification, email authentication, Data authentication, Image authentication, CCTV, footage authentication, Banking fraud detection, Transcript certificate, cyber auditing and VAPT, Introduction to crypto currency, Introduction to darknet and deep web.	**8**

TEXT BOOKS	
TB No.	**Author / Edition / Publication / Year**
1	Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2014
2	ETHICAL HACKING WITH KALI LINUX: Learn How to Hack, by Aiken Graves , publisher notion Press, ISBN-13, 979-8888338919,October- 2022.
3	Practical Guide to Digital Forensics Investigations, A (Pearson IT Cybersecurity Curriculum), Darren Hayes, 2nd edition. Originally published: 2019

REFERENCE BOOKS:	
RB No.	**Author / Edition / Publication / Year**
1	Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing, and 2. Investigating Intrusions", Copyright © 2014 by John Wiley & Sons, Inc. ISBN: 978-1-118-84965-1.
2	James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", CRC Press, 15-Dec 2014 Anti- Hacker Tool Kit (Indian Edition) by Mike Shema, McGraw-Hill Publication.
3	Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, KLSI. "Introduction to Information Security and Cyber Laws". Dreamtech Press. ISBN: 9789351194736, 2015.

INFORMATION RETRIEVAL			
Course code:	**PEC21IS641**	**Credits:**	03
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	Explore the various Information Retrieval Strategies.
2.	Understand the various retrieval utilities to improve the results of retrieval strategies.
3.	Evaluate information retrieval algorithms for document indexing, relevance ranking, Web search, query processing, recommender systems
4.	Analyze performance of textual document indexing, relevance ranking and Web Search.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Apply the concepts of data storage to understand how documents are stored and retrieved from Information systems
CO2	Apply the concepts of retrieval strategies to understand the working of search engines
CO3	Analyze how information is indexed and searched in storage systems
CO4	Design search engines by applying the concepts of information storage, retrieval and web crawler

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2										1		1	
CO2	3	2	2									1		1	
CO3	3	2	2									1		1	
CO4	3	2	2									1		1	

Module	Module Contents	Hours
1.	**Introduction to IRS:** Static Document Collection, Document Routing. **Retrieval Strategies:** Vector Space Model; Probabilistic Retrieval strategies Language Models, Boolean Indexing ,Inference Networks.	**8**
2.	**Retrieval Utilities:** Relevance feedback; Clustering; Passage-Based Retrieval; N-Grams; Regression Analysis; Thesauri; Semantic Networks; Parsing.	**8**
3.	**Indexing and Searching:** Introduction; Inverted Files; Other indices for text; Boolean queries; Sequential searching; Pattern matching; Structural queries; Compression.	**8**
4.	**Cross-Language Information Retrieval and Efficiency:** Introduction; Crossing the language barrier; Cross-Language retrieval strategies; Cross language utilities. Duplicate Document Detection.	**8**
5.	**Integrating Structured Data and Text:** Review of the relational model; A historical progression; Information retrieval as a relational application; Semi structured search using a relational schema; Multi-dimensional data model. **Web Crawling:** Features a crawler must provide, Crawling, Crawler architecture	**8**

TEXT BOOKS:	
T B No.	**Author / Edition / Publication / Year**
1.	David A. Grossman Ophir Frieder, "Information Retrieval- Algorithm and Heuristics", 2nd Edition, ISBN 1-4020-3003-7 (HB) Springer International Edition, 2004
2.	Ricardo Baeza-Yates, Berthier Ribeiro-Neto, "Modern information retrieval", 1st edition, Addison Wesley Longman Publishing co. INC, 2009, ISBN-10:0321416910, 2011

	REFERENCE BOOKS:
R B No.	**Author / Edition / Publication / Year**
1.	Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze: "An Introduction to Information retrieval", Cambridge University press, England, Online Edition, 2008. ISBN 13:9780521865715

5G AND INTERNET OF THINGS			
Course code:	**PEC21IS642**	**Credits:**	3
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	To understand the evolution of Cellular Technology and the IOT architecture
2.	To understand the significance of Software Engineering in IOT
3.	To understand wireless connectivity design principles for IoT devices, sensor technology and its applications
4.	Understand the integration of computing technologies like dockers and containers with Internet of Things

Course Outcomes: At the end of the course, student will be able to:	
CO1	Analyze the advances in Cellular technology and the functions of each layer in IoT architecture
CO2	Analyze how the software projects are developed and tested applying the principles of SDLC
CO3	Apply the concepts of data analytics to understand how data acquired through IoT devices are captured and realized
CO4	Design simple applications using sensors and actuators

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2		2									1	
CO2	3	2	2		2									1	
CO3	3	2	2		2									1	
CO4	3	2	2		2									1	

Module	**Module Contents**	**Hours**
1.	**Wireless Connectivity Technology Options:** LTE - Introduction to LTE Architecture and protocol, LTE - Advance, 5G: General introduction and IoT specific features Communication, M2M and IoT World Forum standardized architecture.	**8**
2.	**Software Engineering:** Software Development Life Cycle , Software Testing **WIFI:** WIFI Technology.	**8**
3.	**IoT: Introduction and end to end architecture:** LoRA & SigFox, WIFI, ZigBee, GSMR , Cellular IoT – 1, Cellular IoT – 2 **Security**: Security in IOT	**8**
4.	**Cloud and IoT Platforms:** Cloud and Virtualization: Kubernetics and Dockers **Cloud, Virtualization, Analytics:** Analytics: Tool and Technologies and IoT use case, Application and Analytics layer, Key design consideration.	**8**
5.	**Sensors, Participatory Sensing, RFID's and Wireless Sensor Networks** **Introduction**, Sensor Technology, Actuators, Sensor Data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Networks Technology.	**8**

TEXT BOOKS:		
TB No.	**Author / Edition/ Publication / Year**	**Chapters**
1.	Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)	1, 2, 3, 4,7, 10
2.	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.	

REFERENCE BOOKS:	
RB No.	**Author / Edition/ Publication / Year**
1.	Practical Internet of Things Security by Brian Russel and Drew Van Duren; PACKT publishing, 2016
2.	Designing the Internet of Thingsby Adrian McEwen and Hakim Cassimally, Wiley publication, 2014.
3.	Security of Things – An implementers guide to Cyber-Security for Internet of Things, Ollie Lighthouse, NCC Group, 2014.
4.	Handbook of Modern Sensors – Physics, Designs and Applications; by Jacob Fraden; Springer publication, 3rd edition

USER INTERFACE DESIGN			
Course code:	**PEC21IS643**	**Credits:**	03
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	03	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	To acquire the knowledge of need & importance GUI, WUI.
2.	To understand the components of UI – Menus, Windows, Lists, controls.
3.	To study about various problems in windows design with colour, text, graphics.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Apply the principles of UI to interaction design for an application.
CO2	Design UI with menus, windows and controls for a given problem.
CO3	Analyze learn aspects of internationalization, multimedia and coloring in various applications.
CO4	Demonstrate the UI design for an application with various tolls.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	-	2	3	2	-	-	-	-	-	2	-	-	-	-	3
CO4	-	2	3	2	-	-	-	-	-	2	-	-	-	-	3

Module	Contents of the Module	Hours
1.	**Introduction:** Importance – Human – Computer interface – characteristics of graphics interface, Direct manipulation graphical system – web user interface – popularity characteristic & principles.	**8**
2.	User interface design process – obstacles – usability – human characteristics in design – Human interaction speed – business functions – requirement analysis – Direct – Indirect methods – basic business functions – Design standards – system timings Human consideration in screen design – structures of menus – functions of menus – contents of menu – formatting – phrasing the menu – selecting menu choice navigating menus – graphical menus.	**8**
3.	**Windows:** Characteristics – components – presentation styles – types – managements organizations – operations – web systems – device – based controls. Characteristics – Screen – based controls: operate control – textboxes – selection control combination control – custom control – presentation control.	**8**
4.	Text for web pages – effective feedback – guidance& assistance – Internationalization – accessibility – Icons – Image – Multimedia – coloring.	**8**
5.	**Windows layout – test:** Prototypes – kinds of tests – retest – Information search – visualization – Hypermedia – www – Software tools.	**8**

TEXT BOOKS:	
TB No.	**Author / Edition / Publication / Year**
1.	Wilbent. O. Galitz,"The Essential Guide to User Interface Design", John Wiley& Sons, 3rd Edition, 2012

REFERENCE BOOKS:	
RB No.	**Author / Edition / Publication / Year**
1.	Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.
2.	Alan Cooper, "The Essential of User Interface Design", Wiley - Dream Tech Ltd.,2007

ADVANCED JAVA PROGRAMMING			
Course code:	**PEC21IS644**	**Credits:**	03
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	To understand the fundamentals of java and object oriented concepts.
2.	To learn servlet and JSP programming.
3.	To analyze and use exception handling in java.
4.	A better understanding of Spring Framework in java.

	Course Outcomes: At the end of the course, student will be able to:
CO1	Articulate classes, its members and the relationships among them needed for a specific problem.
CO2	Apply the concepts of J2EE and socket programing in java.
CO3	Create and use servlets, exception handling and JDBC in Java programs.
CO4	Design and develop web based application using JSP and Spring Framework

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	1									1	2	1	
CO2	3	2	2									1	3	2	
CO3	3	2	2		2			1				2	3	1	
CO4	2	2	3		2			1				2	3	1	1

Module	Module Contents	Hours
1.	**Introduction**: Creation of Java, Byte code, Java Buzzwords, Object Oriented Programming, A simple program, Type conversion and casting, Arrays. **Classes:** Class fundamentals, declaring Objects, assigning object reference variables. **A Closer Look at Methods and Classes:** Introducing methods, constructors, this keyword, the finalize () method. Overloading methods, introducing access control, understanding static, introducing final. **Inheritance** and its types. **Interfaces:** Defining an Interface, Implementing Interface.	**10**
2.	**Introduction to J2EE Architecture**, advantages, disadvantages and its types. Java Networking- URL Class and Connections, classes for Client Server communication, client socket, server socket, Data Input Stream and Data Output Stream, Demonstration of communication between client and server using program.	**7**
3.	**JDBC:** Steps for database connection, types of JDBC driver, insert, update, delete and select query execution using java program. **Servlets:** Servlet Structure, Servlet packaging, HTML building utilities, Lifecycle, Single Thread model interface, Handling Client Request: Form Data.	**7**
4.	**Servlets:** Generating server Response: HTTP Status codes, Generating server Response: Handling Cookies, Session Tracking. **JSP:** Overview of JSP Technology, Need of JSP, Benefits of JSP, Basic syntax, creating Template Text, using JSP expressions, comparing servlets and JSP, writing scriptlets.	**8**
5.	**Spring Framework:** What is spring? Initializing a Spring application, writing a Spring application, Surveying the Spring landscape. Developing web applications – Displaying information, Processing form submission, Validating form input. Working with view controllers, Choosing a view template library.	**8**

TEXT BOOKS:		
T B No.	**Author / Edition / Publication / Year**	**Chapters**
1.	Herbert Schildt: Java The Complete Reference, 13th Edition, Tata McGraw Hill, 2023	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15
2.	Craig Walls, "Springin Action", 6th Edition, Manning Publications, 2022	1, 2
3.	J2EE - The Complete Reference – Jim Keogh, Tata McGraw Hill, 2017	1, 2, 5

REFERENCE BOOKS:	
R B No.	**Author / Edition / Publication / Year**
1.	Y. Daniel Liang: Introduction to JAVA Programming, 11th Ed, Pearson Education, 2017.

INTRODUCTION TO DATA STRUCTURES			
Course code:	**OEC21IS651**	**Credits:**	3
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	3	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	To provide the knowledge of basic data structures and their implementations.
2.	Understand importance of data structures in context of writing efficient programs.
3.	Develop skill to apply appropriate data structures in problem solving.
4.	Understand and design efficient algorithms for sorting and searching.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Describe the basic concept of C Programming Language.
CO2	Summarize the various types of data structure with their operations.
CO3	Comprehend linear and Non linear data structures.
CO4	Interpret various searching and sorting techniques.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2				2			2	2		2	3	2	1
CO2	3	2							2	2		2	3	2	1
CO3	3	2							2	2		2	3	2	1
CO4	2	2				2			2	2		2	3	2	1

Module	Module Contents	Hours
1.	**C Recap-I:** Introduction to Problem Solving, Overview of C, Sample Program Constants, Variables, Data Types, Input Output Operations, Operators And Expressions, **C Recap-II:** Control Statements, Arrays, Strings, Built-In Functions, User Defined Functions, Structures, Unions and Pointer. Text Book 1: Chapter 1 and 2	**8**
2.	**Introduction to Algorithm and Data Structures**: Types of Data Structures, Data Structure Operations. **Arrays:** Introduction, Types of Arrays, Representation of one-dimensional array in memory. Array Traversal, Representation of Multi-Dimensional array in memory Text Book 1: Chapter 3, and 4	**8**
3.	**Stacks:** Introduction to Stacks, Stacks Operations, Stack Implementation. **Queues:** Introduction to Queues, Queue Operations, Queue Implementation. Text Book 1: Chapter 6, and 7	**8**
4.	**Linked Lists:** Introduction to Linked Lists – Basic Concept, Linked List Implementation. Types of Linked List. Text Book 1: Chapter 5	**8**
5.	**Sorting and Searching**: Introduction, Sorting Techniques, Selection Sort, Insertion Sort, Bubble Sort Searching Techniques , Linear Search, Binary Search Text Book 1: Chapter 10	**8**

TEXT BOOKS:		
TB No.	**Author / Edition/ Publication / Year**	**Chapters**
1.	Data Structures Using C, E Balaguruswamy, 1st Edition, Copyright 2013, McGraw Hill Education (India) Private Limited	1-7, 10

REFERENCE BOOKS:	
RB No.	**Author / Edition/ Publication / Year**
1.	Systematic approach to Data structures using C, A M Padma Reddy, 9th Revised Edition 2009, Sri Nandi Publications.
2.	Ellis Horowitz & Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2009.

INTRODUCTION TO JAVA			
Course code:	**OEC21IS652**	**Credits:**	03
L:T:P:S	3:0:0:0	**CIE Marks:**	50
Exam Hours:	03	**SEE Marks:**	100
Total Hours:	40		

Course Objectives:	
1.	To provide an introduction to java and object oriented concepts.
2.	Understand the use and creation of packages and interfaces.
3.	Analyze and use exception handling in java.
4.	A better understanding of string libraries.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Apply the basic concepts of object oriented programming in writing java programs.
CO2	Create and use packages, interfaces in Java programs.
CO3	Analyze and implement exception handling in Java.
CO4	Design and implement programs using String libraries.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	1	2	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	1	3	-	-	2	-	-	-	2	3	3	3
CO3	2	3	3	2	2	-	-	2	-	-	1	3	3	3	3
CO4	3	3	3	1	2	-	-	1	-	-	-	3	3	3	3

Module	Module Contents	Hours
1.	**Introduction**: Creation of Java, Byte code, Java Buzzwords, Object Oriented Programming, A simple program, Type conversion and casting, Arrays. **Operators:** Arithmetic operators, Bitwise operators, Relational operators, the assignment operator, The ? Operator, operator precedence. Control Statements: Selection statements, iteration statements, Jump statements	**9**
2.	**Classes:** Class fundamentals, declaring Objects, assigning object reference variables, introducing methods, constructors, this keyword, garbage collection, the finalize() method. **A Closer Look at Methods and Classes:** Overloading methods, using objects as parameters, returning objects, introducing access control, understanding static, introducing final.	**9**
3.	**Inheritance:** inheritance basics, using super, creating multilevel hierarchy, method overriding, using abstract classes, using final with inheritance. **Interfaces:** Defining an Interface, Implementing Interface. **Exception handling:** Fundamentals, Exception types, using try and catch, throw, throws, finally.	**8**
4.	**Input / Output:** I/O Basics, Reading Console Input, Writing Console Output. **Packages:** Defining a package, Access protection; importing packages	**7**
5.	**Multithreading -** Threads, Runnable Interface **String handling:** String Constructors, String Length, Special string operators, Character extraction, String comparison, Searching Strings, Modifying a string.	**7**

TEXT BOOKS:	
TB No.	**Author / Edition/ Publication / Year**
1	Herbert Schildt: Java The Complete Reference, 13th Edition, Tata McGraw Hill, 2023.

REFERENCE BOOKS:	
RB No.	**Author / Edition/ Publication / Year**
1	Y. Daniel Liang: Introduction to JAVA Programming, 10th Ed, Pearson Education, 2018

WEB TECHNOLOGY LAB			
Course code:	**PCC21ISL66**	**Credits:**	01
L:T:P:S	0:0:2:0	**CIE Marks:**	50
Exam Hours:	1.5	**SEE Marks:**	50
Total Hours:	15		

Course Objectives:	
1.	Develop web documents using the Extensible Hypertext Markup Language (XHTML).
2.	Use scripting language JavaScript, to create static and dynamic web pages with event.
3.	Use CGI programming languages PERL.
4.	Develop client-server mechanism programs.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Design web pages using HTML/XHTML, with the use of cascading style sheet on window/Linux OS platform.
CO2	Create dynamic web pages using scripting languages like JavaScript and illustrate event handling.
CO3	Implement CGI programs using Perl with the use of databases.
CO4	Develop web based application using Javascript, PERL and MySQL.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3		2					1		1	1	1	
CO2	2	2	3		1					1		1	1	1	1
CO3	3	3	3		2					1		1	1	1	
CO4	3	3	3		3				1	1	1	1	1	1	

PART A –Programs

Expt. No	Contents of the experiment	Hours
1.	Create a XHTML document to display a table, an image, hyperlink and different lists available in XHTML.	**2**
2.	Develop and demonstrate, using JavaScript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.	**2**
3.	Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient	**2**
4.	Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.	**2**
5.	Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt.	**2**
6.	Develop and demonstrate, using JavaScript, a XHTML document to make an image toggle on click of a button.	**2**
7.	Develop and demonstrate, using Java script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. When a paragraph is moved from the top stacking position, it should return to its original position.	**2**
8.	Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.	**2**
9.	Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table	**2**

PART B – Mini Project		
1.	Each student has to carry out a mini project on the problem identified individually or Batch of maximum 2 members. Following are the few sample problems Design a web portal for the following applications: i) Banking services ii) Ticket booking services (Ex: Railway Reservation, Bus Reservation, movie ticket booking) iii) Login Authentication iv) Gaming Application v) Search Engine Result page vi) Survey forms vii) Word counter viii) Address book ix) To-do web App x) Student Result Management System xi) Online Code Editor xii) Resume Builder Web Application	

Instructions:

In the examination, one exercise from Part A is to be asked for a total of 30 marks. The mini project developed under Part B has to be evaluated for a total of 20 marks

TEXT BOOKS:		
TB No.	**Author / Edition/ Publication / Year**	**Chapters**
1.	Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson Education, 2008.	1 to 9, 11 to 15

REFERENCE BOOKS:	
RB No.	**Author / Edition/ Publication / Year**
1.	M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004.
2.	Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2007.
3.	Xue Baietal: The web Warrior Guide to Web Programming, Cengage Learning, 2003.

MINI PROJECT			
Course code:	**21ISMP67**	**Credits:**	01
L:T:P:S	0:0:2:0	**CIE Marks:**	100
Exam Hours:	-	**SEE Marks:**	-

Course Objectives:	
1.	To develop skills to understand and identify problems in the field of computer science.
2.	To expand intellectual capacity to design solutions to the identified problem.
3.	To inspire independent and team working.
4.	To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Identify the problem to solve and meet its requirements.
CO2	Design the solution of the problem identified by using modern tools.
CO3	Demonstrate team work to achieve common goal.
CO4	Demonstrate the developed project and its outcome to the evaluators.

Mapping of Course outcomes to Program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3	-	2	-	-	-	-	1	-	1	3	3	3
CO2	2	2	3	-	1	-	-	-	-	1	-	1	3	3	3
CO3	2	2	3	-	1	-	-	-	-	1	-	1	3	3	3
CO4	3	3	3	-	2	-	-	-	-	1	-	1	3	3	3

Instructions:

Mini Project is a laboratory-oriented / hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems / applications etc. Based on the ability / abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini-project can be assigned to a group having not more than 4 students.

CIE procedure for Mini-project

1. **Single discipline**: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50 : 25 : 25. The marks awarded for the project report shall be the same for all the batch mates.
2. **Interdisciplinary:** Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

   The CIE marks awarded for the Mini-project shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

No SEE component for Mini-Project.

INTER/INTRA INSTITUTIONAL INTERNSHIP			
Course code:	**21INT68**	**Credits:**	03
		CIE Marks:	100
Exam Hours:	-	**SEE Marks:**	-

Course Objectives:	
1.	To understand and identify real world problems as an engineer.
2.	To expand intellectual capacity to design solutions to the identified problem using engineering knowledge.
3.	To inspire independent and team working and gain personal and professional development.
4.	To develop better written communication skills to reproduce the work carried ethically.

Course Outcomes: At the end of the course, student will be able to:	
CO1	Identify real life problem with societal importance and apply complex investigation to arrive at an amicable solution.
CO2	Plan the project timeline, detailed activities, with apt use of modern tools and ensure timely completion of the solution to solve the problem.
CO3	Exhibit professional practices by accepting responsibility, taking initiative and managing teams that showcase communication with team members to design and develop analytical or computing models with appropriate interpretation of results.
CO4	Develop quality documents that highlight the outcome of the project in terms of final report with an inclusive focus of legal and ethical issues.

Mapping of Course outcomes to Program outcomes:															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3	2	2	2	2	2	2	2	2	3	3	3	3
CO2	3	2	3	2	2	2	2	2	2	2	2	3	3	3	3
CO3	3	2	3	2	2	2	2	2	2	2	2	3	3	3	3
CO4	3	2	3	2	2	2	2	2	2	2	2	3	3	3	3

Instructions:

Internship should be completed during the intervening period of IV and V semesters.

Internship of 04 weeks during the intervening period of IV and V semesters to be completed on Innovation /Entrepreneurship / Societal based Internship.

1. All the students shall have to undergo a mandatory internship of 04 weeks during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the VI semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be considered under F (fail) grade and shall have to complete during subsequently after satisfying the internship requirements.
2. **Innovation / Entrepreneurship Internship** shall be carried out at industry, State and Central Government / Non-government organizations (NGOs), micro, small and medium enterprise (MSME), Innovation centres or Incubation centres. Innovation need not be a single major breakthrough; it can also be a series of small or incremental changes. Innovation of any kind can also happen outside of the business world. Entrepreneurship internships offers a chance to gain hands on experience in the world of entrepreneurship and helps to learn what it takes to run a small entrepreneurial business by performing intern duties with an established company. This experience can then be applied to future business endeavours. Start-ups and small companies are a preferred place to learn the business tack ticks for future entrepreneurs as learning how a small business operates will serve the intern well when he / she manages his / her own company. Entrepreneurship acts as a catalyst to open the minds to creativity and innovation. Entrepreneurship internship can be from several sectors, including technology, small and medium-sized, and the service sector.
3. **Societal or social internship.** Urbanization is increasing on a global scale; and yet, half the world's population still resides in rural areas and is devoid of many things that urban population enjoys. Rural internship, is a work-based activity in which students will have a chance to solve / reduce the problems of the rural place for better living. As proposed under the AICTE rural internship programme, activities under Societal or social internship, particularly in rural areas, shall be considered for 40 points under AICTE activity point programme.

No SEE component for Inter / Intra Institutional Internship.