CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

M.Sc Computer Science

Those who have joined in the Academic year 2023-24 onwards

1. **Preamble**

To Develop the Post Graduates in **Computer Science** withdeepknowledgeoftheoreticalComputerSciencesubjectswhocanbeemployedinresearchanddevelopmentunitsofindustriesandacademicinstitutions.

2. ***General Graduate Attributes***

***GA1:*ApplyMathematicalKnowledge**

Graduates will be able to apply mathematics, and statistics to the design and development of software systems.

GA2: Develop Softwares based on Software Engineering principles

Graduates will be able to design and develop computer software systems based on the acquired knowledge in Programming Languages and based on Software Engineering.

GA3:Develop Research skills

Graduates will be able to exhibit the research skills invariousareas and update their skills based on recent advances in research field.

GA4:Understanding of Profession Ethics

Graduates will exhibit an understanding of professional ethics and the roles of regulations and guidelines in the profession.

GA5:Solve computer science problems

Bee quipped with arrange off un damental principles of Computer Science that will provide the basis for future learning and enablethemtoadapttotheconstantrapiddevelopmentofthefield.Beabletoapplymathematics,logic,andstatisticstothedesign,development,andanalysisofsoftwaresystems.

GA 6:To apply algorithmic principles

To identify the key intellectual themes of the field in algorithmmich inking, information representation, and computer programs.GA7:

GA 7 :To acquire the latest technical skills

To enable the students to acquire the latest technical skills and build their carrier on the basis of continuous learning and adaptability.

GA8:Leadership, initiative and team work:

To inculcate the Ability to work effectively in a team and lead in multi disciplinary environment.

GA9:Kindle Creativity

To demonstrate critical thinking, imagination an intellectual a gility and strive to be innovative and experimental in advancing knowledge and in creating solutions.

GA10:Enhance the knowledge in Specialization area:

To enhance the knowledge in their specialist area and apply Analytical approach to identify and resolve problems.

GA11:PersuadeIntellectualRigour

An ability to think clearly and deeply with rigour when faced with new knowledge and arguments and demonstrate the ability to apply research results to solve problems.

GA12:Communication and socialskills

To impart good communication and social skills to widen the ability to listen to, as well as clearly express, information back to others in a variety of ways: oral, written, and visual - using a range of technologies.

3. Programme Specific Qualification Attributes

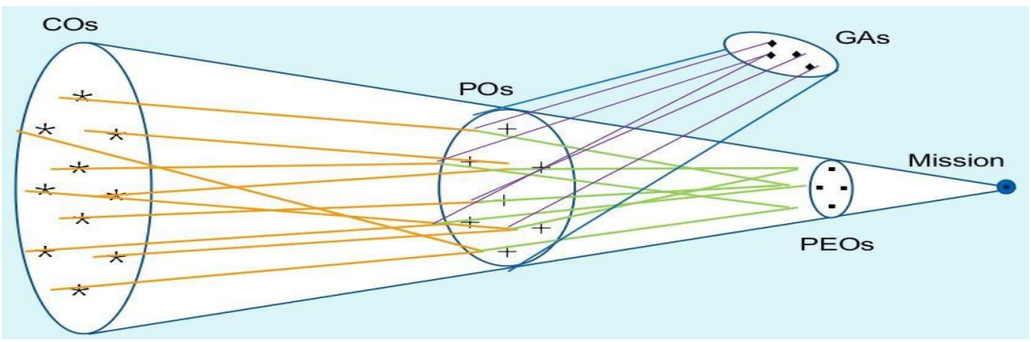
Mention the program-specific qualification attributes achieved through courses in the programme in terms of

- **Knowledge and understanding level(K1andK2)**
  - Remember or recognize a term or a basic concept
  - Select an explanation for a statement related to the question topic
  - Understand the existing problems
- **Application level(K3)**
  - Be able to solve the problems using computing techniques.
- **Analytical level(K4)**
  - Be able to separate information related to a procedure or technique into its constituent parts for better understanding and can distinguish between facts and inferences.
- **Evaluation capability level(K5)**
  - Be able to make judgments based on criteria and standards. Detectsinconsistenciesorfallacieswithinaprocessorproduct,determineswhether a process or product has internal consistency and detects the effectiveness of a procedure as it is being implemented.
- **Scientific or synthesis level(K6)**
  - A scientific way to analyze and solve the problems.

4. Vision

AchievingexcellenceinInformationTechnologyEnabledServicesthroughTeaching,Research,ExtensionandConsultancy.

It must be linked like this



MissionistheProgrammeSpecificObjectives,GAs–Graduateattributes(general)

5. Programme Objectives and Outcomes

SpeltthePEOs(ProgrammeEducationalObjectives),ProgrammeSpecificObjectives(PSOs)andProgrammeOutcomes(POs)

Programme Educational Outcomes (PEOs) for M.Sc Computer Science are as follows

PEO1: Apply algorithmic, mathematical and scientific reasoning to a variety of computational problems

PEO2: Implement software systems that meet specified design and performance requirements.

PEO3: Work effectively in teams to design and implement solutions to computational problems.

PEO4: Communicate effectively, both orally and in writing. Design, correctlyimplementanddocumentsolutionstosignificantcomputationalproblems

ProgrammeSpecificOutcomes(PSOs)forM.ScComputerScienceareasfollows:

PSO1: An ability to apply profound knowledge to analyze and design software and systems containing hardware and software components of varying complexity.

PSO2: An ability to apply mathematical model, algorithmic principles, and computer science theory in the design of real-time applications.

Programme Outcomes(POs)for M.ScComputer Science are as follows

PO1:ComputationalKnowledge

Gain knowledge in the theoretical foundations of Computer Science, Computing Fundamentals, and Basic Mathematics.

PO2: Problem Analysis

To analyze and identify the customer requirements in multidisciplinary domains, create high-level design, and implement robust software applications using latest technological skills

PO3:DesignandDevelopment

Design and develop solutions for complex problems in various domains. Serve as the programmers or the software engineers with the sound knowledge of practical and theoretical concepts for developing software.

PO4:ResearchActivity

To understand the fundamentals of research and inculcate the ability to undertake original research at the cutting edge of computer science & its related areas. Produce researchers who can investigate problems in different application domains and creatively develop and evaluate computational solutions.

PO5:Softwaretoolusage
To adapt and apply modern computing skills and tools to solve problems with software development tools, software systems, and modern computing platforms.

PO6:Professionalethics

To understand professional ethics and cyber regulations and develop youth with social commitments.

PO7: Personality development

To understand management principles and apply them to develop software as a team member and manage projects efficiently for multidisciplinary environments.

PO8: Communication and Presentation Efficacy
Communicate effectively with computing society in both verbal and written form. Improve communication and presentation skills, especially in providing technical support.

PO9: Social Responsibility
To access social and environmental issues for local and global needs and give relevant solutions for them. Gained the analytical ability to analyze the literature and social issues to appreciate the strength and to suggest improvements for better results.

PO10: Entrepreneurship
Discover the opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.

PO11:Algorithmic principles and theory
An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the trade-offs involved in design choices.

PO12: Team work
Solve the problems (programming, networking, database, and web design) in the Information Technology environment. Function effectively on teams to accomplish a common goal and demonstrate professional behavior.

CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

M.Sc Computer Science

Part		Course	Code	Cr.	Hrs
SEMESTER I					
A	CC – 1	Discrete Mathematics	232504101	4	4
	CC – 2	Linux and Shell Programming	232504102	4	4
	CC – 3	Python Programming	232504103	4	4
	EC – I T	Theory of Computation	232504104	2	4
	EC – I P	Linux and shell programming - Lab	232504105	1	3
	EC II – T	.Net technology	232504106	2	4
	EC II P	Python Programming Lab	232504107	1	2
B	SEC I	.Net Technology Lab	232504108	2	3
	AECC 1	Soft Skill Development Lab	232504109	2	2
	Total			**22**	**30**
SEMESTER II					
A	CC – 4	Design and Analysis of algorithms	232504201	4	5
	CC – 5	Big Data Analytics	232504202	4	5
	CC – 6	Design and Analysis of Algorithms Lab	232504203	4	5
	EC – III	Big Data Analytics Lab	232504204	3	5
		Mini Project	232504205		
	EC - IV	Fundamentals of Human Rights	232504206	3	5
		Cryptography and Network Security	232504207		
B	SEC - II	Office Automation and ICT Tools Lab	232504208	2	3
	AECC II	Leadership and Personality Development	232504209	2	2
				22	**30**
SEMESTER III					
A	CC 7	Advanced Java Programming	232504301	4	5
	CC 8	Web Technology	232504302	4	5
	CC 9	Web Technology Lab	232504303	4	5
	EC – V	Advanced Java Programming – Lab	232504304	3	5
	Core Industry module	Advanced Machine Learning Techniques	232504305	3	4
B	SEC III	Computer Networking	232504306	2	4
	AECC III	Data Visualization Techniques Lab	232504307	2	2
	*Internship	**Internship / Industrial Activity**	232504308	2	-
				24	**30**
SEMESTER IV					
A	CC – 10	Natural Language Processing	232504401	4	5
	CC – 11	Advanced Machine Learning - Lab	232504402	4	5
	CC -12	Advanced Software Engineering	232504403	4	5
	CC - 13	Project Viva	232504404	3	4
	EC - 6	1.Blockchain Technologies Lab	232504405	3	5
		2.Cyber Security Lab	232504406		
B	SEC Professional Competency Skill Enhancement	Digital Image Processing using MAT LAB	232504407	2	4
	AECC – IV	Documentation and Interview skill for software Engineering	232504408	2	2
C	EA	Extension Activity	232504409	1	-
	Total			**23**	**30**

* Internship will be carried out during the summer vacation of the first year and marks will be included in the Third Semester Marks Statement.

Title of the Course		**ADVANCED JAVA PROGRAMMING**						
Category	Core 7	**Year**	II	**Credits**	4	**Course Code**	**232504301**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	-	--	5	25	75	100

Learning Objectives

- ✍ To gain knowledge of Object Oriented Programming Concept in Java
- ✍ To understand usages of String functions in Java
- ✍ To familiarize with the applet and swing
- ✍ To grasp the concepts on Java Beans
- ✍ To comprehend the connection between Relational Database and Java.

UNIT	**Details**	**No. of Periods for the Unit**
I	An Overview of Java: Object Oriented Programming- Data Types, Variables, and Arrays: Primitive Types-Literals Variables - Type Conversion and Casting- Arrays-Operators: Control Statements-Classes and Methods – Inheritance- Exception Handling.	15
II	String Handling: The String Constructors - String Length - Special String Operations - Character Extraction - String Comparison - Searching Strings - Modifying a String - Input/Output: The I/O Classes and Interfaces – File - Byte Streams - Character Streams.	15
III	The Applet Class: Basic Architecture - Applet Skeleton - Display methods - Status Window – Passing Parameters. Introducing GUI Programming with Swing– Introducing Swing - Swing Is Built on the AWT- Two Key Swing Features - The MVC Connection - Components and Containers - The Swing Packages - A Simple Swing Application - Exploring Swing.	15
IV	Java Beans: Introduction - Advantages of Beans – Introspection - The JavaBeans API - A Bean Example. Servlets: Life Cycle Simple Servlet-Servlet API-Packages-Cookies session tracking.	15
V	Network Programming: Working with URLs- Working with Sockets - Remote Method Invocation. Introduction to Database Management Systems - Tables, Rows, and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables - Creating a New Database with JDBC - Scrollable Result Sets.	15

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Understand the Object Oriented Program including classes and methods; inheritance and exception handling
CO2	Complete comprehension of String functions and I/O Streams
CO3	Creation of graphical representation using Applet
CO4	Application of Servlets for designing Web based applications
CO5	Usage of JDBC connectivity and implementation of the concept to get desired results from database

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Herbert Schildt, "Java the Complete Reference", 10th edition, McGraw Hill Publishing Company Ltd, New Delhi, 2017.
2.	Tony Goddis, "Starting out with Java from Control Structures Through Objects" 6th Edition, Pearson Education Limited, 2016

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction" TMGH Publishing Company Ltd, New Delhi, 2013
2.	John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problen Solving Approach", TMGH Publishing Company Ltd, New Delhi,2012.

Web Resources

1. https://www.javatpoint.com/what-is-advance-java
2. https://www.edureka.co/blog/advanced-java-tutorial
3. https://www.tutorialspoint.com/what-is-advanced-java

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	-	M	S	-	-	-	S	M	-
CO2	S	S	S	-	M	S	-	-	-	L	M	-
CO3	S	S	M	-	L	S	-	-	-	M	M	-
CO4	M	S	M	-	S	S	-	-	-	M	S	-
CO5	S	M	M	-	M	L	-	-	-	M	M	-

S- Strong; M-Medium; L-Low

Title of the Course		**WEB TECHNOLOGY**						
Category	Core 8	**Year**	II	**Credits**	4	**Course Code**	**232504302**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	-	--	5	25	75	100

Learning Objectives

- ✍ Explore the back bone of web page creation by developing .NET skill.
- ✍ Enrich knowledge about XHTML control and Cascading Style Sheets.
- ✍ Provide in- depth knowledge about Java script.
- ✍ Understand the need of usability, evaluation methods for web services.
- ✍ Provide in- depth knowledge about PHP, Angular JS, Jquery.

UNIT	**Details**	**No. of Periods for the Unit**
I	**INTRODUCTION TO XHTML AND CSS:** Basic syntax, Standard structure, Basic text-markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML-Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**15**
II	**THE BASICS OF JAVASCRIPT:** Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts. **JAVASCRIPT AND XHTML DOCUMENTS**: The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model	**15**
III	**DYNAMIC DOCUMENTS WITH JAVASCRIPT AND XML**: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Color and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements. Introduction to XML, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT Style Sheets, Web services.	**15**
IV	**PHP** Introduction to PHP: Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Pattern Matching - Form Handling - Cookies - Session Tracking.	**15**
V	**ANGULAR JS AND JQUERY** Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS. Introduction to Angular JS, Directives, Expressions, Controllers, Filters, Services, Events, Forms, Validations, Examples.	**15**

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	Design dynamic web pages using Java script, Jquery and Angular Java script
CO2	Develop Web pages using HTML, CSS and XML
CO3	Create web application using PHP and MySQL
CO4	To design dynamic web pages using Angular java script
CO5	Develop interactive web pages using Jquery

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Robert W. Sebesta: Programming the World Wide Web, Eighth Edition, Pearson education, 2015. **UNITS:** 1,2,3,4
2.	Dayley Brad, Dayley Brendan ,"AngularJS, JavaScript, and jQuery All in One", Sams Teach Yourself 1st Edition, Kindle Edition, 2015. **UNIT**: 5
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	M. Srinivasan: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
2.	Jeffrey C. Jackson: Web Technologies-A Computer Science Perspective, Pearson Education,7th Impression,2012.
3	Chris Bates: Web Technology Theory and Practice, Pearson Education, 2012.
4	Raj Kamal: Internet and Web Technologies, McGraw Hill Education.
Web Resources	
1. https://www.geeksforgeeks.org/web-technology/ 2. https://www.linkedin.com/pulse/web-technology-sandhiya-m 3. https://www.scaler.com/topics/web-technology/	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	S	M	M	S	M	M	S	S
CO2	S	S	M	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	M	M	S	M	M	S
CO4	S	S	S	M	S	M	M	S	S	M	S	M
CO5	S	S	S	M	S	S	M	S	M	S	S	M

S- Strong; M-Medium; L-Low

Title of the Course		**WEB TECHNOLOGY LAB**						
Category	Core 9	**Year**	II	**Credits**	4	**Course Code**	**232504303**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		--	1	4	5	25	75	100

Learning Objectives

- ✍ Learn how to create web pages using HTML, CSS and Javascript.
- ✍ Implement dynamic web pages using Javascript, Jquery and Angular Java script
- ✍ To create web applications using PHP and MySQL
- ✍ Create web pages using XML and Cascading Style Sheets
- ✍ Create XML documents and Schemas

Implement the following problems

1. Develop a web page to display your education details in a tabular format.
2. Develop a web page to display your CV on a web page.
3. Design a Homepage having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Design a web page to demonstrate the usage of inline CSS, internal CSS and external CSS.
5. Design an XML document and create a style sheet in CSS & display the document in the browser.
6. Develop a web page to Create image maps.
7. Design a web page to perform input validation using Angular Javascript.
8. Develop a web page in PHP to fetch details from the database.
9. Design a web page to hide paragraph using JQuery
10. Create a web page and add Java script to handle mouse events and form Events.

Course Outcomes

Course Outcomes	On completion of this course, students will be able
CO1	Design dynamic web pages using Javascript, Jquery and Angular Java script
CO2	Develop Web pages using HTML, CSS and XML
CO3	Create web application using PHP and MySQL
CO4	Develop interactive web pages using Jquery
CO5	To design dynamic web pages using Angular javascript

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping With Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO**	**PO8**	**PO9**	**PO10**	**PO11**	**PO1**
CO1	M	S	S	S	S	M	M	S	M	M	S	M
CO2	S	S	M	S	S	S	M	S	S	S	M	S
CO3	S	S	S	M	M	S	M	M	S	M	M	S
CO4	S	M	S	M	S	M	M	S	S	M	S	M
CO5	M	M	S	M	S	S	M	S	M	M	S	M

S- Strong; M-Medium; L-Low

Title of the Course		**ADVANCED JAVA PROGRAMMING LAB**					
Category	Elective 5 Practical	**Year**	II	**Credits**	3	**Course Code**	**232504304**
		Semester	III				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
	--	1	4	5	25	75	100

Objectives

- ✍ To implement object oriented concepts in JAVA
- ✍ Develop the program using concepts Network programme
- ✍ Learn how to create a program in java beans.
- ✍ Learn how to connect relational database to Java
- ✍ Develop the program using concepts Applet

List of Experiments

1. Implementation of an Exception handling concepts with different types of Exceptions.
2. Build a Swing application to implement metric conversion.
3. Use Grid Layout to design a calculator and simulate the functions of simple calculator.
4. Create a Color palette with a matrix of buttons using Applet.
5. To invoke a servlet from HTML forms.
6. To invoke servlet from Applets.
7. To invoke servlet from JSP.
8. Implement message communication using Network Programming.
9. Write a program to connect databases using JDBC.
10. Implementation of Java Beans.

Course Outcomes

Course Outcomes	On completion of this course, students will be able
CO1	Implement classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
CO2	Apply Applets and Swing programs
CO3	Develop Servlets and JSP for creating Web based applications using JDBC

References Books

(Latest editions, and the style as given below must be strictly adhered to)

1.	Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction" TMGH Publishing Company Ltd, New Delhi, 2013
2.	John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", TMGH Publishing Company Ltd, New Delhi,2012.

Title of the Course		**ADVANCED MACHINE LEARNING TECHNIQUES**						
Category	Core Industry Model	**Year**	II	**Credits**	3	**Course Code**		**232504305**
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	-	4	25	75	100

- ✍ To understand the concepts of Machine Learning.
- ✍ To understand the theoretical and practical aspects of types of machine learning
- ✍ To teach and get familiarized with supervised learning and their applications.
- ✍ To teach and get familiarized with the concepts and algorithms of unsupervised learning.
- ✍ To appreciate the concepts and algorithms of deep learning.

UNITS	Details	Hrs.
I	Introducing Machine Learning: The Origins of Machine Learning, Uses and Abuses of Machine Learning _ Basics of Machine Learning Algorithm Model Works - Steps to apply Machine Learning - Choosing a Machine Learning Algorithm - Using Machine Learning concepts. Managing and Understanding Data: Data Structures, Vectors And Factors: Lists, Data frames, Matrixes and arrays - Managing Data - Exploring and Understanding Data: Exploring the Structure of Data, Exploring Numeric variables - Exploring Categorical Variables- Exploring Relationships between Variables.	15
II	Lazy Learning – Classification Using Nearest Neighbors:The kNN Algorithm- Diagnosing Breast Cancer with the kNN Algorithm- Probabilistic Learning – Classification Using Naive Bayes: Basic concepts of Bayesian Methods- The Naïve Bayes Algorithm- Example – filtering Mobile Phone Spam with the Naive Bayes Algorithm. Divide and Conquer – Classification Using Decision Trees and Rules: Understanding Decision Trees- Example – Identifying Risky Bank Loans using C5.0 Decision Trees- Understanding Classification Rules- Example – Identifying Poisonous Mushrooms with Rule Learners.	15
III	Forecasting Numeric Data – Regression Methods: Understanding Regression- Example – Predicting Medical Expenses using Linear Regression- Understanding Regression Trees and Model Trees- Example – Estimating the Quality of Wines with Regression Trees and Model Trees. Black Box Methods Neural Networks and Support Vector Machines: Understanding Neural Networks, from Biological to Artificial Neurons, Activation Functions, Network Topology, Training Neural Networks with Backpropagation - Modelling the Strength of Concrete with ANNs- Understanding Support Vector Machines- Performing OCR with SVMs- Finding Patterns – Market Basket Analysis Using Association Rules: Understanding Association Rules- Example – Identifying Frequently Purchased Groceries with Association Rules.	15
IV	Finding Groups of Data – Clustering with K-Means: Understanding Clustering- The k-means Algorithm for clustering- Finding teen market segments using k-means Clustering- Evaluating Model Performance: Measuring Performance for Classification- Beyond Accuracy – other Measures of Performance, Visualizing Performance Tradeoffs.	15

V	Introduction to Deep Learning: Introduction to Deep Learning, Single Layer Perceptron Model (SLP), Multilayer Perceptron Model (MLP), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs),Restricted Boltzmann Machines (RBMs). Convolutional Neural Networks (CNNs): Structure and Properties of CNNs - Components of CNN Architectures- Convolutional Layer, Pooling Layer, Rectified Linear Units (ReLU) Layer, Fully Connected (FC) Layer, Loss Layer - Tuning Parameters ,Notable CNN Architectures, Regularization- Recurrent Neural Networks (RNNs): Fully Recurrent Networks, Training RNNs with Back-Propagation Through Time (BPPT)- Elman Neural Networks, Neural History Compressor, Long Short-Term Memory (LSTM), Traditional and Training LSTMs - Structural Damping Within RNNs, Tuning Parameter Update Algorithm.	15

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To understand, impart and analyze the concepts and of Machine Learning Techniques and types of data
CO2	To comprehend, apply and evaluate the classification techniques for real-world applications
CO3	To understand, use and perform evaluation of Regression methods
CO4	To recognize, implement and analyse the unsupervised techniques for real-world applications
CO5	To understand, identify, implement and review the deep learning techniques for real-time applications

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Brett Lantz, "Machine Learning with R", Addison-Wesley Packt Publishing, 2013.
2.	Taweh Beysolow, "Introduction to Deep Learning Using R: A Step-by-Step Guide to Learning and Implementing Deep Learning Models Using R", San Francisco, California, USA, 2017.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Daniel T. Larose, Chantal D. Larose, "Data mining and Predictive analytics", Second Ed., Wiley Publication, 2015.
2.	Jason Bell, "Machine Learning: Hands-On for Developers and Technical Professionals", Wiley Publication,2015.
3	Bertt Lantz, "Machine Learning with R: Expert techniques for predictive modeling", 3rd Edition, April 15,2019,
Web Resources	
1. https://www.hindawi.com/journals/cin/si/310785/ 2.https://www.boardinfinity.com/blog/advanced-machine-learning-techniques/ 3.https://link.springer.com/book/10.1007/978-3-030-69717-4	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	-	-	S	L	-	S	-	-	-	-
CO2	S	S	M	-	S	L	-	S	-	-	-	-
CO3	S	S	S	-	S	L	-	S	-	S	S	S
CO4	S	S	M	-	S	L	-	S	-	-	-	-
CO5	S	S	S	-	S	L	-	S	-	S	S	S

S- Strong; M-Medium; L-Low

Title of the Course		**COMPUTER NETWORKING**						
Category	SEC III	**Year**	II	**Credits**	2	**Course Code**	**232504306**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	--	4	25	75	100

Learning Objectives

- ✍ Exploeb page creation by developing .NET skill.
- ✍ Enrich knowledge about XHTML control and Cascading Style Sheets.
- ✍ Provide in- depth knowledge about Java script.
- ✍ Understand the need of usability, evaluation methods for web services.
- ✍ Provide in- depth knowledge about PHP, Angular JS, Jquery.

UNITS	**Details**	**Hrs**
I	Introduction: A Brief History – Applications – Computer Networks – Categories of Networks – Standards and Standards Organizations – Network Architecture – Open Systems and OSI Model – TCP/IP Architecture. Communication Media and Data Transmission: Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing. Error Detection and Correction: Types of Errors – Error Detection – Error Correction.	12
II	Local Area Networks: Types of Networks and Topology –LAN Transmission Equipment – LAN Installation and Performance. Ethernet: IEEE Standard 802.3 Token Bus: IEEE Standard 802.4 Token Ring: IEEE Standard 802.5 – Fiber Distributed Data Interface (FDDI) – Distributed Queue Dual Bus (DQDB): IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies. Wide Area Networks: WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipments – WAN Design and Multicast Considerations – WAN Protocols	12
III	Integrated Services and Routing Protocols: Integrating Services – ISDN Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN, ATM and Frame Relay.	12
IV	Wireless LANS: WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Services. Internet Working: Principles of Internet Working – Routing Principles – Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation..	12
V	TCP Reliable Transport Service: Transport Protocols – The Service TCP Provides to Applications – End –to-End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol. Network Applications: Client-Server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File access – Electronic Mail – World WideWeb (WWW)	12

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To understand and analyse different network model ,transmission and protocols
CO2	To understand ,apply the concept of different types of networks
CO3	To undersatandIntegrated Services and Routing protocols, Wireless LANS: Designing the Wireless LAN Layout
CO4	To learn and evaluate the Internet Workingprinciples, Internetwork Protocols . TCP Reliable Transport Service: Transport Protocols
CO5	To learn, understand andanalyzeNetwork Applications, Client-Server Model ,Domain Name System ,Electronic Mail,World Wide Web and Network Management Standards

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Data Communications and Computer Networks, BrijendraSingh ,Second Edition, PHI, 2006
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Computer Networks, Andrew S Tanenbaum, 4th Ed, Prentice Hall of India, 2006.
2.	Data Communications and Computer Networks , Prakash C. Gupta, Prentice Hall of India, 2005.
3	Data and Computer Communications, William Stallings, PHI, 2007.
4	Data Communication and Networking ,Behrouz A. Forouzan, TMH, 2005.
Web Resources	
1. https://www.netacad.com/ 2. https://www.comptia.org/ 3. https://www.networkworld.com/	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	M	M	S	S	M	M	S	S
CO2	S	S	M	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	M	M	S	M	S	M	M	S
CO4	M	M	S	M	S	M	M	S	S	M	S	M
CO5	S	S	S	M	S	S	M	S	M	S	S	M

S- Strong; M-Medium; L-Low

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="8">DATA VISUALIZATION TECHNIQUES LAB</td></tr>
<tr><td colspan="2"></td><td colspan="8"></td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">AECC III</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2" colspan="2">232504307</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td>Lab Practice</td><td>Total</td><td>CIA</td><td colspan="2">External</td><td>Total</td></tr>
<tr><td>-</td><td>-</td><td>2</td><td>2</td><td>25</td><td colspan="2">75</td><td>100</td></tr>
<tr><td colspan="10">Objectives</td></tr>
<tr><td colspan="10">✍ Creating foundational to advanced visualizations
✍ Working with data in Tableau
✍ Moving from Foundational to Advanced Visualizations
✍ Using row-level and aggregate calculations
✍ Formatting a visualization for appearance
✍ Adding value to analysis</td></tr>
<tr><td colspan="10">Implement the following problems</td></tr>
<tr><td colspan="10">• To implement Connection to a data source
• To Import Excel file in Tableau
• For cleaning data in Tableau
• To Join databases
• For Data Blending
• Replacing Data source
• To Split the text to columns
• For Displaying data in Worksheet
• To Create Visualization
• To Change the order in visualization
• To Change the summary
• To Implement Operators, IF Function in Tableau, Aggregate Functions in Tableau
• To Implement Logical Functions in Tableau
• Case Function in Tableau
• Highlight Tables in Tableau
• Quick Table Calculation in Tableau
• For Filtering in Visualization in Tableau
• For Grouping in Visualization in Tableau
• For Manual Sorting of Visualization in Tableau
• For Sorting by Data Source order in Visualization in Tableau
• For Sorting by field in Visualization in Tableau
• To Implement Line graph in Tableau
• To Implement Bar Chart in Tableau
• To Implement Histogram in Tableau
• To Implement Geographical plot in Tableau
• Create a Dashboard in Tableau
• To Text Object on Dashboard in Tableau</td></tr>
</table>

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To demonstrate a solid understanding of Tableau's interface and functionality
CO2	To be proficient in creating various types of visualizations, such as bas charts, line charts, scatter plots, and dashboards.
CO3	to be able to import, clean and prepare data for visualization within Tableau
CO4	To choose appropriate visualization types based on the nature of the data and the insights they want to convey.
CO5	to be expected to explore and apply advanced features of tableau.

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	The Tableau workshop: A practical guide to the art of data visualization with tableau, packt publishing, 1st Edition, Apr.2022.
2.	Learning Tableau 2022, fifth edition, Joshua N.Milligan, O'Reilly media publication, fifty edition.
3.	Tableau your Data Nov.2013, Wiley publication, Daniel G. Murray, with the interworks team.

Core Subject **INTERNSHIP / INDUSTRIAL ACTIVITY** **Code: 232504308**

SEMESTER III **Credit 2**

The Students will undergo minimum 7 days of summer internship/industrial activity training in subject related organization after their second semester for PG and Fourth semester for UG examinations (Summer Vacation).

The student will be allotted a faculty for guiding the internship/industrial activity. After the completion of the internship/industrial activity, he/she has to document the work, and submit the report along with the Certificate from the concern organization (2 copies – one to the Controller's Office, one to the Department Library)

The External viva voce examination will be conducted on or before last working day of the Third semester for PG and Fifth semester for UG.

Evaluation of internship/industrial activity

	Internal	External	Total
Internship Report	15	50	65
Viva	10	25	35
Total	25	75	100

Title of the Course		**NATURAL LANGUAGE PROCESSING**						
Category	Core 10	**Year**	II	**Credits**	4	**Course Code**	**232504401**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	-	-	5	25	75	100

- ✍ To understand the NLP techniques.
- ✍ To be familiarized with the data structures and algorithms used in NLP.
- ✍ To understand and process raw text and apply categorizing tagging words for classification.
- ✍ To understand and apply text analytics grammar approaches.
- ✍ To know the basics of first order logic and propositional logic

UNITS	Details	Hrs.
I	**LANGUAGE PROCESSING AND PYTHON**: Computing with Language: Texts and Words - A Closer Look at Python: Texts as Lists of Words -Computing with Language: Simple Statistics - Back to Python: Making Decisions and Taking Control -Automatic Natural Language Understanding- Accessing Text Corpora and Lexical Resources: Accessing Text Corpora- Conditional Frequency Distributions -More Python: Reusing Code - Lexical Resources –Word Net	15
II	**PROCESSING RAW TEXT** Accessing Text from the Web and from Disk - Strings: Text Processing at the Lowest Level- Text Processing with Unicode- Regular Expressions for Detecting Word Patterns- Useful Applications of Regular Expressions - Normalizing Text - Regular Expressions for Tokenizing Text - Segmentation –Formatting: From Lists to Strings - Writing Structured Programs : Back to the Basics- Sequences- Questions of Style - Functions: The Foundation of Structured Programming - Doing More with Functions- Program Development- Algorithm Design-A Sample of Python Libraries	15
III	**CATEGORIZING AND TAGGING WORDS**: Using a Tagger-Tagged Corpora- Mapping Words to Properties Using Python Dictionaries-Automatic Tagging- N-Gram Tagging- Transformation-Based Tagging- How to Determine the Category of a Word- Learning to Classify Text: Supervised Classification-Further Examples of Supervised Classification-Evaluation-Decision Trees-Naive Bayes Classifiers- Maximum Entropy Classifiers-Modeling Linguistic Patterns.	15
IV	**EXTRACTING INFORMATION FROM TEXT:** Information Extraction- Chunking-Developing and Evaluating Chunkers- Recursion in Linguistic Structure- Named Entity Recognition- Relation Extraction- Analyzing Sentence Structure: Some Grammatical Dilemmas-What's the Use of Syntax? -Context-Free Grammar-Parsing with Context-Free Grammar-Dependencies and Dependency Grammar- Grammar Development.	15
V	**BUILDING FEATURE-BASED GRAMMARS**- Grammatical Features-Processing Feature Structures-Extending a Feature-Based Grammar-Analyzing the Meaning of Sentences: Natural Language Understanding-Propositional Logic- First-Order Logic- The Semantics of English Sentences- Discourse Semantics.	15

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To understand how key concepts from NLP and linguistics are used to describe and analyze language.
CO2	To Learn about the data structures and algorithms used in NLP.
CO3	To Analyze data stored in standard formats.
CO4	To get familiar with the methods and algorithms used to process different types of textual data.
CO5	To know how to extract grammatical features and to understand the basics of first order logic and propositional logic.

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing witl Python‖, First Edition, O_Reilly Media, 2009. **UNIT I:** Chapter 1: 1.1,1.2,1.3,1.4,1.5,2.1,2.2,2.3,2.4,2.5 **UNIT II:** Chapter 2: 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8 **UNIT III:** Chapter 3: 5.1,5.2,5.3,5.4,5.5,5.6,5.7,6.1,6.2,6.3,6.4,6.5,6.6,6.7 **UNIT IV:** Chapter 4: 7.1,7.2,7.3,7.4,7.5,7.6,8.1,8.2,8.3,8.4,8.5,8.6 **UNIT V:** Chapter 5: 9.1,9.2,9.3,10.1,10.2,10.3,10.4,10.5
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.
2.	Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, "Natural Language Processing – A Paninian Prespective", Prentice Hall of India, 2004
3	Clark, A., Fox, C., & Lappin, S. (Eds.). (2012). The handbook of computational linguistics and natural language processing (Vol. 118). John Wiley & Sons.
4	Bender, E. M., & Lascarides, A. (2019). Linguistic fundamentals for natural language processing ii: 100 essentials from semantics and pragmatics. Synthesis Lectures on Human Language Technologies, 12(3),1-268.
5	Hapke, H. M., Lane, H., & Howard, C. (2019). Natural language processing in action.
6	Indurkhya, N., &Damerau, F. J. (2010). Handbook of natural language processing. Chapman and Hall/CRC.
7	James Allen, Natural Language Understanding, Pearson Education, 3rd edt., 2005.
Web Resources	
1.https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP 2.https://en.wikipedia.org/wiki/Natural_language_processing 3.https://www.geeksforgeeks.org/natural-language-processing-overview/	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M	S	M	S	M	S	M	S	M	S
CO2	S	M	S	M	S	S	M	M	M	M	S	M
CO3	M	M	S	S	M	M	S	S	S	S	S	M
CO4	S	M	S	M	S	M	M	S	S	M	S	M
CO5	S	S	M	M	S	S	M	S	M	M	S	M

S- Strong; M-Medium; L-Low

Title of the Course		**ADVANCED MACHINE LEARNING LAB**						
Category	Core 11	**Year**	II	**Credits**	3	**Course Code**	**232504402**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		-	-	4	4	25	75	100

Objectives

- ✍ To formulate machine learning problems corresponding to different applications.
- ✍ To understand a range of machine learning algorithms along with their strengths and weaknesses.
- ✍ To apply machine learning algorithms to solve problems of moderate complexity.
- ✍ To apply CNN to solve problems of moderate complexity.
- ✍ To apply LSTM and RNN to solve problems.

Implement the following problems

1. Write a program to compute the Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Implement a Linear Regression and Multiple Linear Regression with a Real Dataset
3. Implementation of Logistic Regression using sklearn
4. Implement a binary classification model.
5. Classification with Nearest Neighbours and NavieBaye Algorithm
6. Implementation Decision tree for classification using sklearn and its parameter tuning
7. Implement the k-means algorithm.
8. Implement an Image Classifier using CNN.
9. Implement an Auto encoder.
10. Implement a Simple LSTM.

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To understand and implement the mathematical and statistical prospective of machine learning algorithms through python programming
CO2	To recognize and develop the machine learning models through python in built functions
CO3	To understand, impart and develop the machine learning models for real-time dataset
CO4	To comprehend , impart and implement the deep learning models for real-time applications
CO5	To identify and evaluate the performance machine learning models for real-time dataset

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	Daniel T. Larose, Chantal D. Larose, "Data mining and Predictive analytics", Second Ed., Wiley Publication, 2015.
2.	Bertt Lantz, "Machine Learning with R: Expert techniques for predictive modeling", 3rd Edition, April 15,2019.
3.	Jason Bell, "Machine Learning: Hands-On for Developers and Technical Professionals", Wiley Publication,2015.

Title of the Course		**ADVANCED SOFTWARE ENGINEERING**						
Category	Core 12	**Year**	II	**Credits**	4	**Course Code**	**232504403**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	-	-	5	25	75	100

- ✍ Understand object-oriented analysis and design basics.
- ✍ Be able to distinguish between problems and solutions and know how to map object oriented analysis to object oriented design.
- ✍ Employ fundamental design principles and patterns in the development of a software system and its supporting documents.
- ✍ Analyze architectural factors and use design mechanisms to select appropriate design technique and design patterns.
- ✍ Be introduced to the Service Oriented Architecture (SOA) and the Microservices.

UNITS	Details	Hrs.
I	Software and Software Engineering: The nature of software – Software Engineering – Software Myths. Process Models: A generic process model – Process assessment and improvement – Prescriptive process models – The unified process. Agile Development: What is Agility? – What is an Agile process? – Extreme programming.	15
II	Modeling: Principles that guide each framework activity – Understanding Requirement: Requirement engineering – Eliciting requirements – Negotiating requirements – Validating requirements. Requirement Modeling: Scenarios, Information, and Analysis Classes: Requirement Analysis – Scenario-based modeling – UML models that supplement the use case – Data modeling concepts Class-based modeling.	15
III	Design Concepts: The design process - Design concepts – Architectural design: Software Architecture – Architecture design – Component level design: What is component? Designing class based components - User Interface design: User Interface analysis & design Interface Analysis – Interface Design steps.	15
IV	Quality Management: What is quality? Software quality – Achieving software quality – Software quality assurance; Elements of software quality assurance – SQA tasks, Goals & metrics - Software reliability.	15
V	Software Testing strategies: A strategic approach to software testing – Testing strategies for conventional software – Test strategies for object-oriented software – Software testing. Software configuration Management-SCM.	15

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To understand, illustrate and evaluate the concepts that implications of software reuse
CO2	To collaborate, apply and review software development process in real time
CO3	Understand full life-cycle design, implementation and testing of applications built using the service-oriented methodology.
CO4	To understand and review to Present software engineering concepts in a concise manner to an audience
CO5	To illustrate, develop and review the concepts to Perform in depended research on a topic and present it to the audience

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Software Engineering: A Practitioner Approach, Roger S. Pressman, Seventh edition, McGrawHill, 2015. UNIT I : Chapters 1.1,1.3,1.6; 2.1,2.2,2.3,2.5;3.1,3.3,3.4 UNIT II : Chapters 4.3;,5.1,5.3,5.6,5.7; 6.1 to 6.5 UNIT III: Chapters 8.2,8.3;9.1,9.4;10.1,10.2;11,2,11,4 UNIT IV: Chapters 14.1,14.2,14.4; 16.2,16.3,16.6 UNIT V: Chapters 17.1,17.3,17.4,17.7;22.1
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Richard E. Fairley, Software Engineering – A practitioner's approach, McGraw Hill,2008
2.	Martin L Shooman, Software Engineering – Design, Reliability and Management McGraw Hill,1983
3	Software Engineering - Ian SommervillAddison Wesley Publishing company,2004.
4	An Integrated approach to Software Engineering Pankaj Jalote, Third Edition, Springer Verlag, 2005.
Web Resources	
1.https://www.tutorialride.com/software-engineering/advanced-software-engineering.htm 2.https://www.javatpoint.com/software-engineering	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	-	-	-	-	L	-	-	-	-	-	-
CO2	S	-	M	-	M	L	-	-	-	-	-	-
CO3	S	-	S	-	S	L	-	-	-	S	S	S
CO4	S	-	S	-	S	L	-	-	-	S	S	S
CO5	S	-	S	-	S	L	-	-	-	S	S	S

S- Strong; M-Medium; L-Low

Core **PROJECT WITH VIVA – VOCE** **Code: 232504404**

5Hrs/ Credits: 3

(In Institution)

A Project work shall be carried out by every student for a period of three months. It will demonstrate the capabilities of the student for some original approach in the application of computers. The Project work shall be carried out in the fourth semester at the Institution.

A final report on the project shall be submitted by each candidate at the end of the fourth semester on or before a last date which will be specified by the head of the department.

On submission of final report a viva-voce will be held with external examiners.

	Internal	External	Total
Project	15	50	65
Viva	10	25	35
Total	25	75	100

Title of the Course		**BLOCK CHAIN TECHNOLOGIES LAB**						
Category	EC – 6	**Year**	II	**Credits**	3	**Course Code**	**232504405**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		-	-	5	5	25	75	100

- ✍ To learn the basics of Blockchain and apply cryptographic algorithms
- ✍ To design, build, and deploy smart contracts and distributed applications,
- ✍ To deploy Private Blockchain and smart contracts on Ethereum.
- ✍ To understand and deploy crypto currencies and their functions in applications
- ✍ To implement Blockchain for various use cases.

Implement the following

1. Create a Public Ledger and Private Ledger with the various attributes like Access Network Actors, Native token, Security, Speed and examples.
2. Building and Deploying MultiChain private Blockchain
3. Write Hello World smart contract in a higher programming language (Solidity)
4. Construct the Naïve block chain
5. Construct and deploy your contract (Use deploy method)
6. Set up a Regtest environment
7. Build a payment request URI
8. Hashcash implementation
9. Develop a toy application using Blockchain
10. Create simple wallet transaction from one account to another account using Metamask

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	Enable to setup your own private Blockchain and deploy smart contracts on Ethereum.
CO2	Gains familiarity and implement with cryptography and Consensus algorithms.
CO3	Create and deploy projects using Web3j.
CO4	Recall and deploy the structure and mechanism of Bitcoin, Ethereum, Hyperledger
CO5	Implement Blockchain for various use cases

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Mastering Blockchain Technology, Imran Bashir ,30 march 2018
2.	Building Decentralized Blockchain application ,ShahidShaikh,January 2021
3	Blockchain quick reference :A guide to exploring decentralized blockchain application development ,Samanya Chopra Brenn Hill Paul Valencourt ,1January 2018
Web Resources	
1. .https://en.wikipedia.org/wiki/Blockchain 2.https://builtin.com/blockchain 3.https://www.javatpoint.com/blockchain-tutorial	

Title of the Course		**CYBER SECURITY LAB**						
Category	EC – 6.2	**Year**	II	**Credits**	3	**Course Code**	**232504406**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		-	-	--	5	25	75	100

Objectives

- ✍ To learn and implement to Change the wireless device mode as monitor mode
- ✍ To develop in multiple vulnerabilities web server
- ✍ To understand and implement the open ports in the network
- ✍ To acquire programming skills in Implement various wireless device modes
- ✍ To comprehend related to find the sub domains of webpage

Implement the following using any cyber security tools

1. Install virtual box (kali Linux)
2. Generate a secure password using keepass
3. Change the wireless device mode as monitor mode
4. Find the known and open vulnerabilities of system using metaspolit
5. Identify the multiple vulnerabilities webserver using nikto tool
6. Identify the open ports in the network using nmap tools
7. List all the network around us and display the information about the networks
8. Sniff and capture the packet sent over HTTP requests
9. Find the owners of internet resources using Whois Lookup tool
10. Find the sub domains of webpage using knock tool

Course Outcomes

Course Outcomes	On completion of this course, students will be able
CO1	Comprehend the programming skills in Change the wireless device mode as monito mode
CO2	Understand and implement multiple vulnerabilities web server
CO3	Evaluate the use of different wireless device modes
CO4	Design to Solve related to find the sub domains of webpage
CO5	Create and apply open ports in the network

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

References Books
(Latest editions, and the style as given below must be strictly adhered to)

1.	Mastering Blockchain Technology, Imran Bashir ,30 march 2018
2.	Building Decentralized Blockchain application ,ShahidShaikh,January 2021
3	Blockchain quick reference :A guide to exploring decentralized blockchain application development ,Samanya Chopra Brenn Hill Paul Valencourt ,1January 2018

Web Resources

1. https://www.techtarget.com/searchsecurity/definition/cybersecurity
2.https://en.wikipedia.org/wiki/Computer_security
3.https://www.simplilearn.com/tutorials/cyber-security-tutorial/

Title of the Course		**DIGITAL IMAGE PROCESSING USING MAT LAB**						
		Professional competency skill enhancement						
Category	SEC – 4	**Year**	II	**Credits**	2	**Course Code**	**232504407**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		-	-	4	4	25	75	100

Objectives

- To understand the basics of Digital Image Processing fundamentals, image enhancement and image restoration techniques
- To enable the students to learn the fundamentals of image compression and segmentation
- To understand Image Restoration & Filtering Techniques
- Implementation of the above using MATLAB

List of Programs

1. Implement Image enhancementTechnique.
2. Histogram Equalization
3. ImageRestoration.
4. Implement ImageFiltering.
5. Edge detection using Operators (Roberts, Prewitts and Sobelsoperators)
6. Implement image compression.
7. Image Subtraction
8. Boundary Extraction using morphology.
9. Image Segmentation

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	To write programs in MATLAB for image processing using the techniques
CO2	To able to implement Image Enhancements & Restoration techniques
CO3	Capable of using Compression techniques in an Image
CO4	To apply boundary extraction techniques and morphology
CO5	Must be able to manipulate the image and Segment it

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Second Edition, PHI/Pearson Education. 2.
2.	Nick Efford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.

Web Resources

1.https://www.geeksforgeeks.org/digital-image-processing-basics/
2. https://en.wikipedia.org/wiki/Digital_image_processing

Title of the Course		**DOCUMENTATION AND INTERVIEW SKILL FOR SOFTWARE ENGINEERING**						
		Ability Enhancement compulsory course						
Category	AECC - 4	**Year**	II	**Credits**	2	**Course Code**	**232504408**	
		Semester	IV					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		2	-	--	2	25	75	100

Objectives

- To Ensure and understand what the job involves, what are the necessary skills
- To Make sure one whole heartedly want to work for the company
- To Check that the philosophy/values of the company match their personal requirements
- To Find out more about the job, training, career structure etc.

UNITS	Details	Hrs.
	JobInterviews: The Gateway to the Job Market Types of Interviews - Groundwork Before the Interview - Abide by the Dress Code -Importance of Body Language in Interviews - Need for Proper Articulation – **Probable Interview Questions**: Tell Us about Yourself-Would You Call Yourself a Team Player?-**Few Tricky Questions and Possible Answers:** Why Should We Employ You? - Do You Have Offers from Other Companies? - What Salary are You Expecting? - How Much do You ink You are Worth? - What Kind of a Culture are You Comfortable with? - What is More Important to You—Salary or Growth Opportunities? –What do You Know about Our Company?-Tell Us about Your Strengths andWeaknesses-WheredoYouSeeYourselfin5 or10Years?-What are Your Plans for Higher Studies?-When Leading a Team, How Will You Motivate Your Team Members and Resolve Any Differences between them? -What Has Been the Biggest Challenge You Have Faced, and How Did You Handle It? -What Do You ink are the Essential Qualities of a Good Employee? - You Claim to be Computer-savvy. Can You Mention Any Innovative Way to Enhance the Sales of the Company Using Your Computer Knowledge and Skills? — Concluding an Interview - TelephonicorVideoInterview—AGrowingTrend-DisadvantagesofTelephonicorVideoInterview	6
II	Body Language **A Mock Interview:** Why did the Interview Team Select Vikram?-Why did the Interview Team not Select Chandra and Amit? Emotions Displayed by Body Language: Aggressive - Submissive - Attentive - Nervous -Upset - Bored - Relaxed - Power - Defensive—Handshake—The Most Common Body Language— Eyes— A Powerful Reflection of One's Inner Self	6
III	**Reveals Your Inner Self and Personality** Entry to My Space—Personal Zones May Vary: Intimate Zone - Personal Zone - Social Zone - Public Zone -Typical Body Language when Zones are Intruded — Body Language Exhibited During Different Professional Interactions -Interview - Manager's Discussions with a Sub ordinate Employee - Discussions with Supervisor - Presentation to a Large Audience – Group Discussions-Video-conference	6

IV	**Enhance Your Writing Skill to Create an Impression** Fifteen Principles to Increase Clarity of Communication - Use Short, Simple and Clear Words - Use Short Sentences - Do not Cram Di erent Points into One Sentence - UsingCompact Substitutes for Wordy Phrases - Remove Redundant Words and Expressions -Avoid Use of Mixed Metaphors - Avoid Hackneyed and Stilted Phrases - Avoid Verbosityin the Use of Common Prepositions - Do not Twist the Word Order - Present Similar Ideasin a Sentence with Same Structural and Grammatical Form - Make Positive StatementsWithout Being Hesitant or Non-committal - e Statements Without Being Hesitant or Non-committal - Avoid Pompous Words and Phrases - Use Active Instead of Passive Voice -EnsureCorrectSpellingandGrammarintheText-SubstituteEasily-understood Words for Words Imported from Other Fields - Edit-Edit-Edit - The Reader's Perspective - Clarity of hought - Clarity of Text-Example of Poorly and Well-written Texts	6
V	**Fog Index: Provides Guidance for Proper Writing** FogIndexorClarityIndex-Examples of Passages with High and Low Fog Index-Infogineering Clarity Rating - Flesch Kincaid Reading Ease Index - Other Read ability Indices - Checking Grammar, Spelling and Voice-Clarity of Verbal Communication	6

Course Outcomes	
Course Outcomes	On completion of this course, students will be able
CO1	Understand the purpose of interviews
CO2	Details about Mock Interviews
CO3	Be aware of the processes involved in different types of interviews
CO4	Know how to prepare for interview
CO5	Be clear about the importance of self presentation

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Text Books (Latest Editions)	
1.	Personality Development and SOFT SKILLS, BARUNK. MITRA, Oxford University Press
References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	**C**ommunicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2.	CommunicationTechniquesandSkillsbyR.K.Chadha;DhanpatRaiPublications,New Delhi.
Web Resources	
1.http://www.mindtools.com 2. http://www.letstalk.com.in 3. http://www.englishlearning.com 4. http://learnenglish.britishcouncil.org/en/ 5. http://swayam.gov.in	

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	M	S	S	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S
CO3	S	M	S	S	M	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	M	M	S

S- Strong; M-Medium; L-Low

EXTENSION ACTIVITY

Course Code: 232504409

Credit: 1

The Students should undergo any of the following activities during the period of the program (Two Years) outside the college or in any other institutions. This Extension Activity will be evaluated through the certificate (minimum one) submitted by the students. As per the norms, students must carry out any one of the activity for obtaining the PG Degree. The concern Head of the Department will evaluate the students and submit the report to the Controller of Examinations at the end of the IV semester.

List of Extension Activity:

a) Conducting rally, awareness program etc.

b) Seed ball, tree plantation, cleaning work etc.

c) Blood donation, medical camp, organ donation etc.

d) Assisting school children, tribals, and illiterate in learning.

e) Giving assistance to orphanages and old age homes and patients.

f) Awareness program on financial literacy, gender equality, women education etc.

Any other activities which are relevant to develop nearby localities.