SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

M.Tech- Information Technology

(Dept of Information Technology)

CURRICULUM and SYLLABI

[For students admitted in 2024-2025]

PG Regulations 2023

Approved by BOS and Academic Council meetings

IT

Sona College of Technology, Salem
(An Autonomous Institution)

Courses of Study for M.TECH Semester I under Regulations 2023(CBCS)
Branch: M.Tech -Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type
Theory Courses										
1	P23MAT101D	Mathematics for Data Analytics	3	1	0	0	4	FC	60	T
2	P23MIT101	Full Stack Development	3	0	0	0	3	PC	45	T
3	P23MIT102	Advanced Data Structures	3	0	0	0	3	PC	45	T
4	P23GE101	Research Methodology and IPR	3	0	0	0	3	PC	45	T
5	P23MIT515	**Elective :** Agile Software Development	3	0	0	0	3	PE	45	T
6	P23GE701	**Audit Course –** English for Research Paper Writing	2	0	0	0	0	AC	30	T
Practical Courses										
7	P23MIT103	Advanced Data Structures Laboratory	0	0	4	0	2	PC	60	L
8	P23MIT104	Full Stack Development Laboratory	0	0	4	2	3	PC	90	LP
						Total Credits	**21**			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/, First Semester M.E, M Tech Students and Staff, COE

M.Tech IT
II

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M. Tech Semester II under Regulations 2023(CBCS)
Branch: M. Tech -Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type
Theory Courses										
1	P23MIT201	Machine Learning	3	0	0	0	3	PC	45	T
2	P23MIT202	Cyber Security	3	0	0	0	3	PC	45	T
3	P23MIT203	Big Data Technologies	3	0	0	0	3	PC	45	T
4	P23MIT506	**Elective** Deep Learning	3	0	0	0	3	PE	45	T
	P23MIT505	Predictive Analytics								
	P23MIT517	Adhoc & Wireless Networks								
5	P23MIT501	**Elective** Internet of Things	3	0	0	0	3	PE	45	T
	P23MIT502	Soft Computing								
	P23MIT507	Swarm Intelligence								
	P23MIT513	Natural Language Computing								
6	P23GE702	**Audit Course** – Stress Management by Yoga	2	0	0	0	0	AC	30	T
Practical Courses										
7	P23MIT204	Machine Learning Laboratory	0	0	4	2	3	PC	90	LP
8	P23MIT205	Big Data Technologies Laboratory	0	0	4	0	2	PC	60	L
						Total Credits	**20**			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/IT, Second Semester ,M. Tech Students, and Staff, COE

M.Tech-IT
III

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	P23MIT502	Elective- Soft Computing	3	0	0	0	3	PE	45	T
	P23MIT505	Elective- Predictive Analytics								
	P23MIT507	Elective- Swarm Intelligence								
	P23MIT506	Elective- Deep Learning								
2.	P23MIT510	Elective- Cloud Computing	3	0	2	0	4	PE	75	T L
Practical courses										
3.	P23MIT301	Project Work - I	0	0	0	16	8	PC	240	PC
		Total Credits					**15**			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P- Project

Approved By

17/6/25	20/6/25	24/6/25	
Chairperson – IT BoS	**Member Secretary/ Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ IT, Third Semester M. Tech IT Students and Staff, COE

IT

Sona College of Technology, Salem
(An Autonomous Institution)

Courses of Study for M.TECH Semester I under Regulations 2023(CBCS)
Branch: M.Tech -Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type
Theory Courses										
1	P23MAT101D	Mathematics for Data Analytics	3	1	0	0	4	FC	60	T
2	P23MIT101	Full Stack Development	3	0	0	0	3	PC	45	T
3	P23MIT102	Advanced Data Structures	3	0	0	0	3	PC	45	T
4	P23GE101	Research Methodology and IPR	3	0	0	0	3	PC	45	T
5	P23MIT515	**Elective :** Agile Software Development	3	0	0	0	3	PE	45	T
6	P23GE701	**Audit Course –** English for Research Paper Writing	2	0	0	0	0	AC	30	T
Practical Courses										
7	P23MIT103	Advanced Data Structures Laboratory	0	0	4	0	2	PC	60	L
8	P23MIT104	Full Stack Development Laboratory	0	0	4	2	3	PC	90	LP
						Total Credits	**21**			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/, First Semester M.E, M Tech Students and Staff, COE

INFORMATION TECHNOLOGY						
M. Tech. / INFORMATION TECHNOLOGY						
SEMESTER - I	**MATHEMATICS FOR DATA ANALYTICS**	**L**	**T**	**P**	**J**	**C**
P23MAT101D		**3**	**1**	**0**	**0**	**4**

Course Outcomes

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

CO1:	apply the concept of correlation, fit suitable curve to the given data and analyse the result.
CO2:	apply the concepts of probability, random variable, moments, moment generating function and their properties to solve the problems.
CO3:	analyse the characteristics of the estimators, find the estimate of the parameters using maximum likelihood estimation and method of moments.
CO4:	test the hypothesis about the population using Z, t, F and χ^2-test statistics.
CO5:	apply the multivariate analysis concept to analyse the given set of data which involves more than one variable.

Pre-requisites:

- Basics of elementary algebra
- Basics of calculus
- Basics of geometry
- Basics of statistics and probability

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	2	3	3
CO3	3	3	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3

Course assessment methods [Theory]

Direct		Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) Assignment / Problem- solving / Seminar (10)	Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey

Unit 01	**CORRELATION, CURVE FITTING AND REGRESSION**	**12 Hours**

Simple and rank correlations – multiple and partial correlations – curve fitting – principle of least squares – fitting a straight line – fitting a parabola – fitting an exponential curve – fitting a curve of the form $y = ax^b$ – linear regression – multiple and partial regressions.

Unit 02	**PROBABILITY AND RANDOM VARIABLE**	**12 Hours**

Axioms of probability – conditional probability – total probability – Baye's theorem – random variable – probability mass function, probability density function, moments, moment generating function and their properties.

Unit 03	ESTIMATION THEORY	12 Hours
Estimators – unbiasedness, consistency, efficiency and sufficiency (definitions and simple problems only) – maximum likelihood estimation – method of moments.		
Unit 04	**TESTING OF SIGNIFICANCE**	**12 Hours**
Parameter and statistic – null and alternative hypothesis – errors in sampling, critical region and level of significance – one tailed and two tailed tests – large sample tests for proportions, mean, difference between means, standard deviation – t-test for single mean, difference between means – Paired t-test – χ^2-test for independence of attributes, goodness of fit – F-test.		
Unit 05	**MULTIVARIATE ANALYSIS**	**12 Hours**
Random vectors and matrices – mean vectors and covariance matrices – multivariate normal density and its properties – principal components: population components from standardized variables.		

Theory: 45 Hrs	Tutorial: - 15 Hrs	Practical:	Project:--	Total Hours: 60 Hrs

TEXT BOOKS:

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition (Reprint), 2019.
2. R. A. Johnson and D. W. Wichern, "Applied Multivariate Statistical Analysis", Pearson Publishers, 6th Edition, 2015.

REFERENCE BOOKS:

1. J. L. Devore, "Probability and Statistics for Engineering and the Sciences", Thomson and Duxbury Publishers, 9th Edition, 2015.
2. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.

Dr. S. JAYABHARATHI
ASSOCIATE PROFESSOR & HEAD
DEPARTMENT OF MATHEMATICS,
SONA COLLEGE OF TECHNOLOGY,
SALEM-636 005. Tamilnadu.
Ph: 0427 - 4099999.

HoD / Mathematics

Dr. M.RENUGA,
Professor & Head,
Department of Humanities & Languages,
Sona College of Technology,
SALEM - 636 005.

BoS – Chairperson / Science and Humanities

M.Tech-IT
I-Sem

P23MIT101	FULL STACK DEVELOPMENT	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Design a front end of web application using HTML and CSS.
CO2:	Write a JavaScript code to validate the user data and asynchronously invoke backend application.
CO3:	Design a front end of web application using Bootstrap.
CO4:	Develop a front end of web application using a React JS library and make a call to server-side programs.
CO5:	Develop a back end of web application using Node JS, Express framework, and Mongo DB with CRUD operations in MongoDB and deploy web application in Cloud.

Pre-requisite: HTML, CSS, and JavaScript

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1		2	2	3	2		1
CO2	2	3	3	3			2
CO3		2	2	2	3		1
CO4		3	3	3	3		2
CO5	2	3	3	3	2	1	2

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

Unit 01: HTML and CSS — **9 Hours**

Introduction to www, HTML: Tags, Lists, Images, Forms, Links, Tables, iframes, videos, anchors, HTML Divs – CSS: Inline, Internal, External, CSS Display, CSS Backgrounds, Borders, Margins, Padding, CSS Font Styling, Stylings Lists, Tables, Forms.

Unit 02: JAVA SCRIPT AND jQuery — **9 Hours**

Introduction to Javascript, Variables, scoping, Data type, Strings, Numbers, Operators, Loops, Functions, Objects, Events, Working with DOM, AJAX, ES5 vs ES6 Vs ES7, jQuery – Introduction to jQuery, Syntax, Selectors, Events, Effects, Traversing, and jQuery AJAX.

Unit 03: BOOTSTRAP — **9 Hours**

Introduction to Bootstrap, Bootstrap Basics – Container, Color, Table, Images, Alerts, Buttons, Badges, Bars, Spinner, Cards, Pagination, Drop down, Carousel, Bootstrap Grids, Bootstrap Themes, Bootstrap CSS, Bootstrap JS.

Unit 04: REACT JS — **9 Hours**

Introduction to React, Install node, JSX, Virtual DOMs, Single Page Apps, React Lifecycle, States, Class Component Vs Function Component, Event Handling, Props, Routes, Hooks, Conditional rendering, Pure

J. Akilandeswari

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

Components, High order components, Controlled Vs uncontrolled components, Redux, Babel, webpack, Axios.				
Unit 05: NODE.JS, EXPRESS, MONGO DB AND APPLICATION DEPLOYMENT IN CLOUD				**9 Hours**
Introduction, Environmental setup, Simple Server, Response Type – HTML, JSON, Routing, Express Introduction, Express params and query string, Express Middleware, API Authentication, SQL Vs NO SQL, Mongo DB overview, Installation, connecting and performing CRUD operations - Introduction to Cloud – Deploy a web application using IBM Cloud and AWS cloud.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Eric Bush, "Node.Js, Mongodb,React, React native Full Stack Fundamentals and Beyond", Blue sky productions, 2019.
2.	B. Jakobus, J.Maraj, " Mastering Bootstrap 4", Packt publisher, 2016.
3.	Kirupa Chinnathambi, "Learning React", Addison-Wesley Professional, 2018.
4.	Marc Wandschneider, "Learning Node.js:A Hands-on guide to building web applications in javascript",2nd edition, 2018.

J. Dhanu

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT102	ADVANCED DATA STRUCTURES	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Design data structures and algorithms to solve computing problems.
CO2:	Implement and analysis of hierarchical data structures and algorithms.
CO3:	Design algorithms using graph structure and various string matching algorithms to solve real-life problems.
CO4:	Apply suitable design strategy for problem solving.
CO5:	Implement approximation algorithms.

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	
CO1	1		1	1		3	1	
CO2	2	1	1	2		3	1	
CO3	3	2	1	3	1	3	1	
CO4	2	1	1	3	1	3	1	
CO5	1	1	2	2	2		1	

Course Assessment methods

Direct	Indirect
CIE test I (10) ,CIE test II (10),CIE test III (10) Assignment/Problem-solving/seminar (10) Total CIE Marks: 40, Semester End Examination Marks: 60	Course end survey

Unit 01: ROLE OF ALGORITHMS IN COMPUTING — **9 Hours**

Algorithms – Algorithms as a Technology- Insertion Sort – Analyzing Algorithms – Designing Algorithms- Growth of Functions: Asymptotic Notation – Standard Notations –Divide and Conquer- Maximum-subarray problem- Strassen's algorithm- Common Functions- Recurrences: The Substitution Method – The Recursion-Tree Method-The Master method.

Unit 02: HIERARCHICAL DATA STRUCTURES — **9 Hours**

Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion- Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion- B-Trees: Definition of B trees – Basic operations on B-Trees – Deleting a key from a B-Tree- Fibonacci Heaps: Structure – Heap operations – Decreasing a key and deleting a node – Bounding the maximum degree.

Unit 03: GRAPHS — **9 Hours**

Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

Search – Topological Sort – Strongly Connected Components- Minimum Spanning Trees: Growing a Minimum Spanning Tree – Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm – Single-Source Shortest paths in Directed Acyclic Graphs – Dijkstra's Algorithm; All Pairs Shortest Paths: Shortest Paths and Matrix Multiplication – The Floyd-Warshall Algorithm.				
Unit 04: ALGORITHM DESIGN TECHNIQUES				**9 Hours**
Dynamic Programming: Matrix-Chain Multiplication – Elements of Dynamic Programming – Longest Common Subsequence- Greedy Algorithms: An Activity-Selection Problem – Elements of the Greedy Strategy – Huffman Codes **NP COMPLETENESS AND APPROXIMATION ALGORITHMS.**				
Unit 05: NP COMPLETENESS AND APPROXIMATION ALGORITHMS				**9 Hours**
NP-Completeness: Polynomial Time – Polynomial-Time Verification – NP-Completeness and Reducability – NP-Completeness Proofs – NP-Complete Problems- Approximation Algorithms: Vertex-Cover problem- Travelling-Salesman problem – Subset-sum problem.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 4th Edition, MIT Press, 2022.
2.	Robert Sedgewick and Kevin Wayne, "Algorithms", 4th Edition, Pearson Education, 2011. .
3.	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", 1st edition, Pearson Education.
4.	Donald E Knuth, "Art of Computer Programming-Volume I- Fundamental Algorithms", 3rd edition, Addison Wesley, 2022.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT103	ADVANCED DATA STRUCTURES LABORATORY	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1:	Implement the tree data structure
CO2:	Implement graph algorithms
CO3:	Implement problems in greedy and approximation approach

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	
CO1	3	1	1	1	2	1	1	
CO2	3	2	1	1	3	2	1	
CO3	3	1	3	2	1	2	2	

Course Assessment methods

Direct	Indirect
CIE test I (20) ,Quiz I- (5) ,CIE test II (20),Quiz II- (5),RTPS (10) Total CIE: 60 marks , Semester End Examination (40 marks)	Course end survey

LIST OF EXPERIMENTS

1. Implementation of Binary Search Tree
2. Implementation of Fibonacci Heaps
3. Implementation of Red-Black tree
4. Implementation of Spanning Tree
5. Implementation of Shortest Path Algorithms
6. Implementation of Graph Traversals
7. Implementation of Greedy Algorithms
8. Implementation of Approximation Algorithms

Theory: --	Tutorial: --	Practical: 60 Hrs	Project: --	Total Hours: 60 Hrs

J. Akilandeswari

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT104	FULL STACK DEVELOPMENT LABORATORY	L	T	P	J	C
		0	0	4	2	3

Course Outcomes

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

CO1:	Design a Front End of application using HTML, CSS, BOOTSTRAP.
CO2:	Write programs to validate data and initiate a call to backend using JavaScript code and jQuery.
CO3:	Develop a Full Stack application using React JS, Node JS and Mongo DB and Deploy it in Cloud.

Pre-requisite: HTML, CSS, and JavaScript

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	
CO1		2	2	2	2		1	
CO2	2	3	3	2	3		2	
CO3	2	3	3	3	2	1	2	

Course Assessment methods

Direct	Indirect
CIE test I (10),Quiz-1 (5),CIE test II (10),Quiz-2 (5),CIE test III (Project) (10) Record (10),Total CIE: 50 marks , Semester End Examination (50 marks),SEE:Laboratory	Course end survey

LIST OF EXPERIMENTS

1. Study of most popular full stack such as MEAN, PERN, LAMP and MERN.
2. Create your own Blog page using HTML/CSS.
3. Create a home page of your website using Bootstrap.
4. Add a functionality to your Blog using JavaScript and jQuery.
5. Create a front end of online assessment pages using React JS.
6. Build a Node.js server to say a given string is palindrome or not (Explore a node server with only API).

   input: localhost:8080/is_palindrome?text=madam
   output: true/false
7. Node.js with MONGO DB (NodeJS with DB access).

   a) Create a database and insert the given data into the table.

   b) Fetch the record based by

   - joining the tables
   - Search criteria
   - recent data order
   - Limit first 5 records

7. a) Whenever a user is logged in set the email in the MongoDB.

   b) Write a NodeJS script to pull the MongoDB email value which is set and provide as an API end

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

	point. 8. Email a) Build a script in NodeJS to send an email with a default content. b) Use task '7-b' and integrate the task '8-a' to send an email to the user that they have logged in from this IP. 9. Create a back end of backend of online assessment using Node JS and Mongo DB. 10. Create a full stack application comprising React JS, Node JS, and Mongo DB to manage information of employees working in the organization. Admin of the application should able to perform CRUD operation on the employee database. 11. Deploy a Full Stack based web application into IBM Cloud. 12. Deploy a Full Stack based web application into AWS Cloud.

Theory: --	**Tutorial: --**	**Practical: 60Hrs**		**Project: 30Hrs**	**Total Hours: 90 Hrs**

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM - 636 005

P23MIT515	AGILE SOFTWARE DEVELOPMENT	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Explain the genesis of Agile and driving forces for choosing Agile techniques.
CO2:	Comprehend the Agile Scrum framework and development practices.
CO3:	Assess the software product using Agile testing methodologies and perform testing activities within an Agile project.
CO4:	Apply software design principles and refactoring techniques to achieve agility.
CO5:	Evaluate the Agile approach impact on cutting-edge technologies and also realize the business value of adopting agile software development.

Pre-requisite: Software Engineering Process Models, Fundamentals of Programming Skills

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	P04	PO5	PSO1	PSO2
CO1	2	2	2	2	2		2
CO2	2	2	1	3	1		
CO3	2	2	2	2	1	2	2
CO4	3	3	3	1	1	2	3
CO5	3	3	2	2	1	2	3

Course Assessment methods

Direct	Indirect
CIE test I (10),CIE test II (10),CIE test III (10),Assignment/Problem-solving/seminar (10),Total CIE Marks: 40,Semester End Examination Marks: 60	Course end survey

Unit 01: FUNDAMENTALS OF AGILE	**9 Hours**
The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools	
Unit 02: AGILE SCRUM FRAMEWORK	**9 Hours**
Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management	
Unit 03: AGILE TESTING	**9 Hours**
The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester	
Unit 04: AGILE SOFTWARE DESIGN AND DEVELOPMENT	**9 Hours**

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
KONA COLLEGE OF TECHNOLOGY
SALEM - 636 005

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.	
Unit 05: INDUSTRY TRENDS	**9 Hours**
Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

REFERENCES

1.	Ken Schwaber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 2019.
2.	Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices" Pearson, 2013.
3.	Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams" Addison Wesley, 2008.
4.	Alistair Cockburn," Agile Software Development: The Cooperative Game" Addison Wesley, second Edition, 2006.
5.	Mike Cohn," User Stories Applied: For Agile Software" Addison Wesley, 2004.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM - 636 005

P23GE101 **RESEARCH METHODOLOGY AND IPR** **3 0 0 0 3**
(Common to all M.E /M.Tech Programmes)

COURSE OUTCOMES:

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

1. Review the literature of the research problem
2. Choose appropriate data collection and sampling method according to the research problem.
3. Interpret the results of research and communicate effectively with their peers
4. Explain the Importance of intellectual property rights
5. Evaluate trade mark, develop and register patents.

CO/PO, PSO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak COs Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
COs	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	3	3	3	3
CO3	2	3	3	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory)	Assignment / Problem –Solving /Seminar (10) Total CIE: **40 Marks** Semester End Examination : **60 Marks**	Course end survey

UNIT I INTRODUCTION TO RESEARCH METHODS 9

Definition and Objective of Research, Various steps in Scientific Research, Types of Research, Criteria for Good Research, Defining Research Problem, Research Design , Case Study Collection of Primary and Secondary Data, Collection Methods: Observation, Interview, Questionnaires, Schedules,

UNIT II SAMPLING DESIGN AND HYPOTHESIS TESTING 9

steps in Sampling Design, Types of Sample Designs, Measurements and Scaling Techniques -Testing of hypotheses concerning means (one mean and difference between two means -one tailed and two tailed tests), concerning variance — one tailed Chi-square test.

UNIT II INTERPRETATION AND REPORT WRITING 9

Techniques of Interpretation, Precaution in Interpretation, Layout of Research Report, Types of Reports, Oral Presentation, Mechanics of Writing Research Report

UNIT IV INTRODUCTION TO INTELLECTUAL PROPERTY 9

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights, Innovations and Inventions trade related intellectual property rights.

Dr.S.PADMA, M.E., Ph.D.,
Professor and Head,
Department of EEE,
Sona College of Technology
Salem-636 005. Tamil Nadu.

UNIT V TRADE MARKS, COPY RIGHTS AND PATENTS 9

Purpose and function of trade marks, acquisition of trade mark rights, trade mark registration processes, trademark claims —trademark Litigations- International trademark law Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Lecture: 45, Tutorial: 0, Total: 45 Hours

TEXT BOOKS

1. C.R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques An Edition, New Age International Publishers, 2019.
2. Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets", Delmar Cengage Learning, 4" Edition, 2012.
3. Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata Mc Graw Hill Education, 1" Edition, 2008.

REFERENCE BOOKS

1. Panneerselvam, R., Research Methodology, Second Edition, Prentice-Hall of India, New Delhi, 2013.
2. Ranjith Kumar, Research Methodology — A step by step Guide for Begineers, 4" edition, Sage publisher, 2014.
3. D Llewelyn & T Aplin W Cornish, "Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights", Sweet and Maxwell, 1" Edition, 2016.
4. Ananth Padmanabhan, "Intellectual Property Rights-Infringement and Remedies", Lexis Nexis, 1" Edition, 2012.
5. Ramakrishna B and Anil Kumar H.S, "Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers", Notion Press, 1" Edition, 2017.
6. M.Ashok Kumar and Mohd. Iqbal Ali :"Intellectual Property Rights" Serials Pub

S. Padma 4.8.23

Dr.S.PADMA, M.E., Ph.D.,
Professor and Head,
Department of EEE,
Sona College of Technology
Salem-636 005. Tamil Nadu.

P23GE701	English for Research Paper Writing	L	T	P	J	C
		2	0	0	0	0

Course Outcomes

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

CO1:	Demonstrate research writing skills both for research articles and thesis
CO2:	Frame suitable title and captions as sub-headings for articles and thesis
CO3:	Write each section in a research paper and thesis coherently
CO4:	Use language appropriately and proficiently for effective written communication
CO5:	Exhibit professional proof-reading skills to make the writing error free

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**6 Hours**
Planning and preparation, word order, breaking up long sentences, organising ideas into paragraphs and sentences, being concise and avoiding redundancy, ambiguity and vagueness	
Unit 02:	**6 Hours**
Interpreting research findings, understanding and avoiding plagiarism, paraphrasing sections of a paper/ abstract.	
Unit 03:	**6 Hours**
Key skills to frame a title, to draft an abstract, to give an introduction	
Unit 04:	**6 Hours**
Skills required to organise review of literature, methods, results, discussion and conclusions	
Unit 05:	**6 Hours**
Usage of appropriate phrases and key terms to make the writing effective - proof-reading to ensure error-free writing	

Theory: 30 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 30 Hrs

TEXT BOOKS

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Highman N , Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book, 1998
3. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press, 2006.
4. Goldbort R, Writing for Science, Yale University Press, 2006. (available on Google Books)

REFERENCES

1. Martin Cutts, Oxford Guide to Plain English, Oxford University Press, Second Edition, 2006

HOD

Dr. M.RENUGA,
Professor & Head,
Department of Humanities & Languages,
Sona College of Technology,
SALEM - 6

M.Tech IT
II

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M. Tech Semester II under Regulations 2023(CBCS)
Branch: M. Tech -Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type
Theory Courses										
1	P23MIT201	Machine Learning	3	0	0	0	3	PC	45	T
2	P23MIT202	Cyber Security	3	0	0	0	3	PC	45	T
3	P23MIT203	Big Data Technologies	3	0	0	0	3	PC	45	T
4	P23MIT506	**Elective** Deep Learning	3	0	0	0	3	PE	45	T
	P23MIT505	Predictive Analytics								
	P23MIT517	Adhoc & Wireless Networks								
5	P23MIT501	**Elective** Internet of Things	3	0	0	0	3	PE	45	T
	P23MIT502	Soft Computing								
	P23MIT507	Swarm Intelligence								
	P23MIT513	Natural Language Computing								
6	P23GE702	**Audit Course** – Stress Management by Yoga	2	0	0	0	0	AC	30	T
Practical Courses										
7	P23MIT204	Machine Learning Laboratory	0	0	4	2	3	PC	90	LP
8	P23MIT205	Big Data Technologies Laboratory	0	0	4	0	2	PC	60	L
						Total Credits	**20**			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

Chairperson, Information Technology BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/IT, Second Semester ,M. Tech Students, and Staff, COE

P23MIT201	MACHINE LEARNING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Describe the concepts of different types of learning and apply linear regression for appropriate real world problems
CO2	Demonstrate the concepts of logistic regression and implement the same.
CO3	Explain and apply the concepts of Neural networks and support vector machines
CO4	Evaluate the hypothesis based on factors like bias and variance
CO5	Analyze the concepts of clustering, dimensionality reduction and anomaly detection.

Pre-requisite: -

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	3	1	3	2	3	
CO2	3	1	3	3	3	
CO3	3	1	3	3	3	
CO4	3	1	3	2	3	
CO5	3	1	3	3	3	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I: INTRODUCTION AND LINEAR REGRESSION — **9 Hours**

What is machine learning? — Supervised Learning — unsupervised learning — Linear Regression — cost function — gradient descent algorithm — implementation - Gradient descent for multiple variables — feature scaling — learning rate — polynomial regression

UNIT II : LOGISTIC REGRESSION — **9 Hours**

Hypothesis representation — decision boundary — nonlinear decision boundaries — cost function — gradient descent — advanced optimizations — multi class classification problems— Regularization - Problem of overfitting — cost function optimization for regularization — regularized linear regression — regularized logistic regression

UNIT III : NEURAL NETWORKS AND SUPPORT VECTOR MACHINES — **9 Hours**

Overview and summary — neurons and brain — model representation — artificial neural networks representation — example — multiclass classification — cost function — back propagation algorithm — gradient checking — random initialization — Support vector machines — optimization objective — cost function — large margin intuition — decision boundary — kernels — adapting to nonlinear classifiers

UNIT IV: ADVICE FOR APPLYING MACHINE LEARNING — **9 Hours**

Debugging a learning algorithm — evaluating a hypothesis — model selection and training, validation test sets — bias Vs variance — regularization and bias/variance — learning curves machine learning system design

UNIT V : UNSUPERVISED ALGORITHMS				9 Hours
Unsupervised learning — k-means algorithm — optimization objective — choosing number of clusters - Dimensionality reduction — principle component analysis - Anomaly detection — algorithm — developing and evaluating the algorithm — anomaly detection Vs supervised algorithm -Case study — recommender system — collaborative filtering - Large scale machine learning — online learning — map reduce and parallelism.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Stanford's machine learning course presented by Professor Andrew Ng — online resource - http://www.holehouse.org/mlclass/
2.	James, G., Witten, D., Hastie, T., Tibshirani, R, "An Introduction to Statistical Learning with Applications in R", Springer, 2013.
3.	Ethem Alpaydin, "Introduction to Machine Learning", The MIT Press, 4th edition, 2020.
4.	Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2016.
5.	Sebastianraschka, "Python Machine Learning", Packt Publishing Ltd., 3rd Edition, 2019.

J. Dilond

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT202	CYBER SECURITY	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Describe the importance of cyber security and its essentials through various examples of cybercrimes in the world.
CO2	Analyse possible vulnerablites in e mail, web applications and operating ssytems the
CO3	Describe spoofing and hijacking methods used in cybersecurity and its prevention.
CO4	Apply the tools and methods used by cyber criminals and various techniques to protect against the cyber-attack.
CO5	Apply the suitable tools and techniques for analysing and validating forensics data .

Pre-requisite: -

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1	2	1	3	3	
CO2	3	3	3	3	3	
CO3	2	3	2	3	2	
CO4	3	2	1	3	2	
CO5	3	1	3	3	3	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I : INTRODUCTION — **9 Hours**

Cyber Security Concepts- layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT II: VULNERABILITIES IN EMAIL AND WEB APPLICATIONS — **9 Hours**

Mail Vulnerabilities – Major Mail Protocols: SMTP, POP, IMAP- Email attacks: List linking ,Email Bombing, Email Spamming, Email sniffing and Spoofing , 419s, phishing- Browser Based Vulnerabilities- Email security countermeasures. Web application vulnerabilities-Webserver Vulnerabilities- Weakness in administration tools, Weakness in application or Protocol design, Protection against web application Vulnerabilities.

UNIT III: SPOOFING AND HIJACKING — **9 Hours**

Spoofing –Process of IP Spoofing attack –Types of Spoofing : Blind Spoofing, Active Spoofing, IP Spoofing, ARP Spoofing, Web Spoofing, DNS Spoofing – Spoofing Tools : Mausezahn, Ettercap, ARPspoof – Prevention and Mitigation. Session Hijacking – TCP Session Hijacking –Session Hijacking Tool: Hunt- UDP Hijacking - Prevention and Mitigation

UNIT IV: NETWORK SCANNING TOOLS — **9 Hours**

Introduction- Types of scanning- TCP connect scanning, Half open scanning, UDP scanning, IP scanning, Ping scanning, Stealth scanning – Scanning phases and Tools. Sniffers – Sniffers Types – Sniffer operation- Sniffer

Programs: Wireshark, tcpdump, Snort, Network monitor, Cain and Abel- Detecting a sniffer- Protection against Sniffer.				
UNIT V: COMPUTER FORENSICS				**9 Hours**
Need for Computer Forensics - Cyberforensics 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 - Computer Forensics and Steganography -· Forensics and Social Networking Sites: The Security/Privacy Threats - Computer Forensics from Compliance Perspective - Challenges in Computer Forensics.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Cyber Security and Cyber Laws- Alfred Basta, Nadine Basta, Mary Brown, Ravinderkumar Cengage Publishers,2018
2.	MarjieT.Britz, —"Computer Forensics and Cyber Crime: An Introduction", 3rd Edition, Prentice Hall, 2015.
3.	Sagar Rahalkar, "Network Vulnerability Assessment", Birmingham, UK : Packt Publishing, 2018
4.	Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short "Cyber Security Essentials" Wiley India Publications, Oct 2019.
5.	Nina Godbole, Sunit Belapur "Cyber Security"- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives –, Wiley India Publications Released: April 2015

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT203	BIG DATA TECHNOLOGIES	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Explain the need and challenges of Big data and analytics.
CO2	Apply and write jobs in Hadoop and map reduce framework and configure Hadoop eco systems and work with tools that are handling big data.
CO3	Create NoSQL database and apply CRUD operations in MongoDB.
CO4	Create database and apply CRUD operations in Cassandra and Hive.
CO5	Write PigLatin scripts for database maintenance and Perform statistical based analysis and describe the data using various graphical methods.

Pre-requisite: -

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1	2	2	1	1	
CO2	3	3	3	2	2	
CO3	2	2	2	3	1	
CO4	2	3	3	1	2	
CO5	2	3	3	1	2	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I : INTRODUCTION — **9 Hours**

Types of Digital Data – Introduction to Big Data - Big Data Analytics - classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Why is Big Data Analytics Important? - Data Science - Terminologies Used in Big Data Environment - Few Top Analytics Tools

UNIT II: TECHNOLOGIES, HADOOP AND MAP REDUCE — **9 Hours**

The big data technology landscape – NoSQL – Hadoop - Introduction to Hadoop - RDBMS versus Hadoop - RDBMS versus Hadoop - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem – Introduction to Map reduce Programming

UNIT III: MONGODB — **9 Hours**

Introduction to MongoDB - What is MongoDB? - Why MongoDB? - RDBMS and MongoDB - Data Types in MongoDB – MongoDB Query Language.

UNIT IV: CASSANDRA AND HIVE — **9 Hours**

Introduction to Cassandra - Features of Cassandra - CQL Data Types – CQLSH – Keyspaces - CRUD – Collections – Alter - Import and Export – querying system tables Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language- RCFile Implementation – SerDe – User Defined Functions

UNIT V: PIG AND RECENT TRENDS				9 Hours
Introduction to Pig -_The Anatomy of Pig - Pig on Hadoop - Pig Latin Overview - Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational operators - Eval Function - Complex Data Type - User Defined Function - parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig versus Hive - Reporting tool – Trends – Case study				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publication, first edition. Reprint in 2016.
2.	DT Editorial Services, "Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)", Dream tech Press edition 2016.
3.	Radha Shankarmani, M Vijayalakshmi, "Big Data Analytics", Wiley Publications, First Edition 2016.
4.	Chuck lam, "Hadoop in action", Dream tech Press-2016 reprint edition.
5.	O'Reilly Media, Big Data now: Current Perspective from O'Reilly Media, 2013 Edition.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT204	MACHINE LEARNING LABORATORY	L	T	P	J	C
		0	0	4	2	3

Course Outcomes

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

CO1	Apply data preprocessing and visualization techniques required for implementing ML algorithms
CO2	Make use of Data sets in implementing machine learning algorithms
CO3	Implement the machine learning concepts and algorithms

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1		2	2		2	
CO2	2	3	3		3	
CO3	2	3	3		3	

Course Assessment methods

Direct	Indirect
CIE test I (10) Laboratory, Quiz-1 (5) CIE test II (10) – Laboratory ,Quiz-2 (5),CIE test III (10) Project, Record (10) Total CIE: 50 marks , Semester End Examination (50 Marks),SEE:Laboratory	Course end survey

LIST OF EXPERIMENTS

1. Write a program to perform simple computations on the given dataset using numpy and pandas.

   Sample Exercises:

   Write a Python program to load the data from a given csv file into a dataframe and print the shape of the data, type of the data, first 3 rows, number of rows-columns, feature names and missing values.

   Write a Python program to view basic statistical details like percentile, mean, std etc. of given dataset.

   Write a Python program to access first four cells from a given Dataframe using the index and column labels.

2. Write a program to visualize the data and features in the given dataset using matplotlib and pyplot.

   Sample Exercise:

   Write a Python program to create a plot to get a general Statistics of the given dataset. Draw box plot, joinplot, scatterplot, pairplot, kernel density estimate plot(using seaborn) to explore the frequency of data in the dataset.

3. Write a program to implement simple linear regression to minimize the cost function.

   Sample Exercise: In AB Company, there is a salary distribution table based on Year of experience. *You* are a HR officer and you got a candidate with 5 years of experience. Plot the given data. and find the best salary to offer the candidate.

4. Write a program to implement multivariate linear regression.

   Sample Exercise:
   Consider a housing price data set with 2 variables (size of the house in square feet and number of bedrooms) and a target (price of the house). Write a program to normalize the features and predict the price of a new house (given the size and the number of bedrooms) by minimizing the cost function.

5. Build a logistic regression model to classify the data in the given dataset.

Sample Exercise: Suppose that you are the administrator of a university department and you want to determine each applicant's chance of admission based on their results on two exams. You have historical data from previous applicants that you can use as a training set. For each training example, you have the applicant's scores on two exams and the admissions decision. Write a program to build a classification model (logistic regression) that estimates the probability of admission based on the exam scores.

6. Write a program to fit a logistic regression model with regularization to avoid overfitting of the given dataset.
7. Write a program to implement a Neural Network model to classify the data in the given dataset.
8. Implement a ML model for the given datasets using Support Vector Machines(SVM).

   Sample Exercise: Classify emails as spam or not spam using SVM classifier.
9. Load the given dataset, split it into train and test sets, then estimate the mean squared error (MSE) for a linear regression as well as the bias and variance for the model error over 100 bootstrap samples.
10. Apply K means algorithm to cluster a set of data stored in a .CSV file and plot the clusters.

Project:

Real time use cases will be provided to the students and students will carry out the project based on the use cases.

Theory: --	Tutorial: --	Practical: 60 Hrs	Project: -30	Total Hours: 90 Hrs

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT205	BIG DATA TECHNOLOGIES LABORATORY	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1:	Create applications for Big Data analytics.
CO2:	Apply data modelling techniques to large data sets.
CO3:	Prepare for data summarization, query, and analysis.

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1		2	2	2	1	
CO2	2	3	3	1	2	
CO3	2	3	3	1	2	

Course Assessment methods

Direct	Indirect
CIE test I (20), Quiz-1 (5) CIE test II (20) ,Quiz-2 (5),RTPS (10) Total CIE: 60 marks , Semester End Examination: 40 Marks	Course end survey

LIST OF EXPERIMENTS

1. (i) Perform setting up and Installing Hadoop in its two operating modes:
   - Pseudo distributed,
   - Fully distributed.

   (ii) Use web based tools to monitor your Hadoop setup.
2. (i) Implement the following file management tasks in Hadoop:
   - Adding files and directories • Retrieving files • Deleting files

   ii) Benchmark and stress test an Apache Hadoop cluster
3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
   - Find the number of occurrence of each word appearing in the input file(s)
   - Performing a MapReduce Job for word search count (look for specific keywords in a file)
4. Stop word elimination problem:
   - Input: A large textual file containing one sentence per line

     A small file containing a set of stop words (One stop word per line)
   - Output:

     A textual file containing the same sentences of the large input file without the words appearing in the small file.
5. Write a Map Reduce program that mines weather data.

   Data available at: https://github.com/tomwhite/hadoopbook/tree/master/input/ncdc/all.

- Find average, max and min temperature for each year in NCDC data set?
- Filter the readings of a set based on value of the measurement, Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.

6. Purchases.txt Dataset
    a. Instead of breaking the sales down by store, give us a sales breakdown by product category across all of our stores
    b. What is the value of total sales for the following categories? ♣ Toys ♣ Consumer Electronics
    c. Find the monetary value for the highest individual sale for each separate store
    d. What are the values for the following stores? ♣ Reno ♣ Toledo ♣ Chandler
    e. Find the total sales value across all the stores, and the total number of sales.
7. Install and Run MongoDB then use MongoDB to create, alter, and drop databases, tables, views, functions, and indexes
8. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
9. Write a Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooks available at: Project Gutenberg)
10. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

Theory: --	Tutorial: --	Practical: 60 Hrs	Project: --	Total Hours: 60 Hrs

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT506	DEEP LEARNING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO2	Implement, train, and validate their own neural network.
CO3	Learn the fundamentals of deep learning, and the main research activities in this field.
CO4	Implement deep learning algorithms and solve real-world problems.
CO5	Demonstrate the models with tools.

Pre-requisite: Machine learning

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1	1	2	1		
CO2	2	1	3	1		
CO3	1	2	2			
CO4	1	1	3		2	
CO5	2	2	3		2	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I: INTRODUCTION — **9 Hours**

Introduction to Deep Learning – Deep Learning Architectures - History Of Deep Learning - Linear Algebra, Probability And Information Theory - Perspectives And Issues in Deep Learning Framework, Review Of Fundamental Learning Techniques - Basics of Machine Learning.

UNIT II: MODERN PRACTICAL DEEP NETWORKS — **9 Hours**

Deep feed forward networks, regularization of deep learning, optimization for training deep models, convolutional networks, recurrent networks, applications - long short term memory networks (LSTM) – convolutional neural networks (CNN) – recurrent neural networks (RNN) – hyper parameter tuning - thresholding logic, perceptrons-perceptron learning algorithm – clustering methods - decision trees.

UNIT III: LINEAR MODELS — **9 Hours**

Multi-layer perceptron – Going forwards – Going backwards: Back propagation error – multilayer perceptron in practice – examples of using the MLP – Overview – Deriving Back propagation – Radial Basis Functions and splines – concepts – RBF network – curse of dimensionality – Interpolations and Basis functions – Support Vector Machines.

UNIT IV: DEEP CONVOLUTIONAL MODELS: CASE STUDIES	9 Hours
Object detection: object localization, landmark detection, object detection, yolo algorithm. NLP: introduction to NLP and Deep Learning - Simple word vector representations: word2vec, GloVe -advanced word vector representations: language models, softmax, single layer networks - Neural networks and back propagation for named entity recognition.	
UNIT V: DEEP LEARNING TOOLS	**9 Hours**
Tools: caffe, theano, torch, tensor flow. Getting started with tensorflow, data input and preprocessing with tensorflow, prediction with tensorflow, monitoring and evaluating models using tensorboard.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

REFERENCES

1.	Ian Goodfellow,Yoshua Bengio and Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series)", The MIT Press, 2016.
2.	Yoav Goldberg, "Neural Network Models in Natural Language Processing" , Morgan & Claypool, 2017.
3.	Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
4.	Gene H. Golub, Charles F. Van Loan, "Matrix Computations", JHU Press, 2013.
5.	Li Deng, Dong Yu, "Deep Learning: Methods and Applications", Now Publishers, 2014.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT505	PREDICTIVE ANALYTICS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Identify the modelling techniques which are more appropriate for regression.
CO2	Implement supervised and unsupervised learning and classification.
CO3	Learn the fundamentals of objective segmentation and its activities in this field.
CO4	Implement time series methods to solve real-world problems.
CO5	Demonstrate the models with tools.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	3	2	3	2	3	
CO2	3	1	2	3	2	
CO3	3	2	3	3	3	
CO4	2	2	3	2	3	
CO5	2	1	2	3	2	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT – I INTRODUCTION TO PREDICTIVE ANALYTICS & LINEAR REGRESSION — **9 Hours**

What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling. Regression — Concepts, Blue property-assumptions-Least Square Estimation. Variable Rationalization, and Model Building etc.

UNIT – II LOGISTIC REGRESSION — **9 Hours**

Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc – Logical Model – Estimating the regression coefficients – Making Predictions – Multiple Logical Regression – Multinomial Logistic Regression.

UNIT – III OBJECTIVE SEGMENTATION — **9 Hours**

Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity, Multiple Decision Trees etc. Develop Knowledge, Skill and Competences - Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.

UNIT – IV TIME SERIES METHODS IFORECASTING, FEATURE EXTRACTION — **9 Hours**

Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyse for prediction. Project

UNIT – V WORKING WITH DOCUMENTS				9 Hours
Standard Operating Procedures for documentation and knowledge sharing. Defining purpose and scope documents, Understanding structure of documents — case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools — Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base. Peer review and feedback.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Gareth James , Daniela Witten , Trevor Hastie Robert Tibshirani, " An Introduction to Statistical Learning with Applications in R", Springer Publication , 2nd edition – 2021.
2.	Eric Seigel, "Predictive Analytics", Wiley Publications, 2nd edition – 2016.
3.	Dean Abott, "Applied Predictive Analytics", Wiley, 2014
4.	John D Kelleher, Brian Mac Namee, "Fundamentals of machine learning for Predictive Analytics", 2nd Edition, MIT press, 2020
5.	Max Kuhn, Kjell Johnson,"Applied Predictive Modelling", Springer , 1st Edition, 2013.

J. Akilandeswari

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT517	ADHOC & WIRELESS NETWORKS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Comprehend the design challenges of Ad Hoc and Wireless Sensor networks.
CO2	Analyze the protocols used at the MAC layer and scheduling mechanism of Ad Hoc networks.
CO3	Compare and analyze the routing protocols of Ad Hoc networks.
CO4	Design wireless sensor networks with required MAC protocols.
CO5	Evaluate the QoS related performance measurements of sensor networks.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	3	3	3	2	3	
CO2	1	1	3	3	2	
CO3	1	2	2	3	2	
CO4	3	2	2	2	3	
CO5	3	1	3	3	3	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I INTRODUCTION TO AD HOC AND WIRELESS NETWORKS — **9 Hours**

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel - Mobile AdHoc networks (MANETs) and Wireless Sensor Networks (WSNs): concepts and architectures- Applications of AdHoc and Sensor networks-Design Challenges in AdHoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR ADHOC WIRELESS NETWORKS — **9 Hours**

Introduction – Issues in designing a MAC protocol for Ad hoc wireless Network - Classification of MAC Protocols - Contention based protocols- Contention based protocols with Reservation Mechanisms - Contention based protocols with Scheduling Mechanisms – Multi channel MAC- IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN ADHOC WIRELESS NETWORKS — **9 Hours**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing , hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV PHYSICAL AND DATA LINK LAYER OF WSN — **9 Hours**

Design Principles-Short range radio communication standards - Physical layer and Transceiver Design Considerations - MAC protocols – Error control – Naming and Addressing –Content based and Geographical Addressing.

UNIT V WSN ROUTING, LOCALIZATION AND QOS				9 Hours
Routing protocols – Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR – QOS in WSN-Energy Efficient Design				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	C.Siva Ram Murthy,B.S. Manoj, "Adhoc wireless networks-Architectures and protocols" Pearson Education, 2017.
2.	Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2015.
3.	Prasant Mohapatra and Sriramamurthy, "Ad Hoc Networks: Technologies and Protocols", Springer International Edition, 2015
4.	Holger Karl and Andreas Willing, "Protocols and Architecture for Wireless Sensor Network", John Wiley & Sons, 2016.
5.	Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2017

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT501	INTERNET OF THINGS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Explain the concept of IoT and identify the functions of different actuators and sensors.
CO2	Analyze various protocols for IoT
CO3	Design an IoT system using Rasperry Pi/Arduino
CO4	Implement web based services on IoT devices
CO5	Analyze applications of IoT in real time scenario

Pre-requisite: No

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	2	2	2	2	2	
CO2	3	3	3	3	3	
CO3	3	3	3	3	3	
CO4	3	3	3	3	3	
CO5	3	3	3	3	3	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I: FUNDAMENTALS OF IoT — **9 Hours**

Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack – Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II: IoT PROTOCOLS — **9 Hours**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III: DESIGN AND DEVELOPMENT — **9 Hours**

Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming

UNIT IV: IoT PHYSICAL SERVERS AND CLOUD OFFERINGS — **9 Hours**

Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API

UNIT V: CASE STUDIES/INDUSTRIAL APPLICATIONS				9 Hours
Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Arshdeep Bahga, Vijay Madisetti, —Internet of Things – A hands-on approach, Universities Press, 2015
2.	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
3.	Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2).
4.	Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
5.	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
6.	Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT502	SOFT COMPUTING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Design an efficient Fuzzy inference system and choose a fuzzy model specific to the problem
CO2	Apply the different derivative based optimization techniques to solve optimization problem.
CO3	Design a supervised and unsupervised learning system.
CO4	Design a different type of neuro fuzzy system models.
CO5	Apply the computation intelligence for printed character recognition and Color Recipe Prediction.

Pre-requisite: Machine learningz

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1		3		3	
CO2	1		3	3	1	
CO3	2	2	3			
CO4	1	2	3		2	
CO5	2	2		2	3	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I FUZZY SET THEORY — **9 Hours**

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION — **9 Hours**

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS — **9 Hours**

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING — **9 Hours**

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V	**APPLICATIONS OF COMPUTATIONAL INTELLIGENCE**	**9 Hours**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2015.
2.	Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 2011.
3.	James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2007.
4.	S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
5.	R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 2006.
6.	S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2016.
7.	S.N.Sivanandam, S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2017.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT507	SWARM INTELLIGENCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Explain the concept of swarm intelligence and optimization techniques.
CO2	Apply the Evolutionary Programming steps to the various optimization problems
CO3	Explain Bee's foraging and Mating approach.
CO4	Apply the Bee's Foraging and Mating intelligence to wired and wireless networks
CO5	Analyze ACO applications in real time scenario.

Pre-requisite: Machine learningz

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PSO1	PSO2
CO1	2	2	2	2	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I: FUNDAMENTALS — **9 Hours**

Swarm Intelligence Vs Artificial Intelligence, Cellular Automata and the edge of chaos, artificial life in computer programs –Intelligence in people –Intelligence in Machines, Binary optimization.

UNIT II: EVOLUTIONARY COMPUTATION THEORY AND PARADIGMS — **9 Hours**

Evolutionary Computation History, Genetic Algorithms: An Overview -A Simple GA Example Problem –Schemata and the Schema Theorem, Evolutionary Programming, Evolution Strategies.

UNIT III: PATICLE SWARM AND BEE INTELLIGENCE — **9 Hours**

Particle Swarm and Particle Swarm Intelligence –Honeybee's Intelligence: Bee's Mating Intelligence – Bee's Foraging Intelligence.

UNIT IV: APPLICATIONS OF BEE'S INTELLIGENCE — **9 Hours**

Energy minimization in wireless Sensor Networks using Bee's Mating Intelligence, Band width estimation using Bee's Foraging Intelligence, Online recommendation system using Bee's Foraging Intelligence, Determination of traverse path of Mobile sink node in WSN using Bee's Foraging Intelligence.

UNIT V: ANT COLONY OPTIMIZATION				9 Hours
Introduction to Ant Systems, Ant Colony Optimization Technique, Pheromones and its Density as Deciding Factor, Applications of Ant Colony Optimization in Travelling Salesman Problem and Routing. Comparison between ACO and PSO swarm intelligence models.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Andries P. Engelbrecht, "Fundamentals of Computational Swarm Intelligence", Wiley, 2008.
2.	James Kennedy, Russell C. Eberhart, with Yuhui Shi, "Swarm Intelligence", Morgan Kaufmann, 2010.
3.	Andries P. Engelbrecht, "Computational Swarm Intelligence ", John Wiley, & Sons, 2017
4.	Eric Bonabeau, Marco Dorigo, and Guy Theraulaz, "Swarm Intelligence: From Natural to Artificial Systems", Oxford University Press, 2009.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT513	NATURAL LANGUAGE COMPUTING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Identify the Process of text data at syntactic and semantic level.
CO2:	Explain and apply the operations of text such as Wordnet and POS.
CO3:	Explore the methods and techniques to retrieve the key information from text data.
CO4:	Analyze the text content to provide predictions related to a specific domain using language models.
CO5:	Discuss the tools and applications related to NLP and Text.

Pre-requisite: Machine learning

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1					
CO2	1	1		1		
CO3	2	1	1	2		
CO4	3		2	2		
CO5	1		3		1	

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: *60*	Course end survey

UNIT I: INTRODUCTION — **9 Hours**

Natural Language Processing – Linguistic Background –- Mathematical Foundations - Morphological Analysis - Tokenization -Stemming- Lemmatization - Boundary Determination.

UNIT II: DATA REPRESENATATION — **9 Hours**

Reading unstructured data – Representing text data - Part of speech tagging - Syntactic representation - Text similarity - WordNet based similarity- Shallow parsing - Semantic representation.

UNIT III: INFORMATION RETRIEVAL & EXTRACTION — **9 Hours**

Information retrieval and Information extraction - Named Entity Recognition - Relation Identification-Template filling.

UNIT IV: LANGUAGE MODEL FOR TEXT DATA — **9 Hours**

Language model - Probabilistic Models - n-gram language models- Hidden Markov Model- Topic Modeling - Graph Models -Feature Selection and classifiers -Rule-based Classifiers - Maximum entropy classifier – Clustering-Word and Phrase-based Clustering.

UNIT V: TOOLS AND APPLICATIONS — **9 Hours**

Tools – Natural Language Tool kit, Apache OpenNLP. Applications of Text Analytics – Applications in Social media - Life science - Legal Text–Visualization -Case studies.

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

REFERENCES

1.	Christoper D.Manning and Hinrich Schutze,"Foundation of statistical Natural Lanuage Processing",MIT Press 2019.
2.	Steven Struhl, "Practical Text Analytics: Interpreting Text and Unstructured Data for Business Intelligence", Kogan Page, 2015.
3.	Matthew A. Russell, "Mining the Social Web", O'Reilly Media, 2013.
4.	Steven Bird,Ewan Kien and Edward Loper,"Natural Language Processing with python",1st Edision,O'Reilly Media,2009.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23GE702	Stress Management by Yoga	L	T	P	J	C
		2	0	0	0	0

Course Outcomes

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

CO1:	Develop physical and mental health thus improving social health
CO2:	Increase immunity power of the body and prevent diseases
CO3:	Accelerate memory power
CO4:	Achieve the set goal with confidence and determination
CO5:	Improve stability of mind, pleasing personality and work with awakened wisdom

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**6 Hours**
Yoga-Introduction - Astanga Yoga- 8 parts-Yam and Niyam etc.- Do`s and Don'ts in life-Benefits of Yoga and Asana- Yoga Exercise- and benefits- Pranayam Yoga- Nadi suthi, Practice and Spinal Sclearance Practice-Regularization of breathing techniques and its effects-Practice and kapalapathy practice.	
Unit 02:	**6 Hours**
Neuromuscular breathing exercise and Practice- Magarasa Yoga, 14 points Acupressure techniques and practice-Body relaxation practice and its benefits- Raja Yoga- 1.Agna –explanation and practice- Activation of Pituitary- Raja Yoga- 2. Santhi Yoga-Practice-Balancing of physical and mental power.	
Unit 03:	**6 Hours**
Raja Yoga- 3. Sagasrathara yoga –practice- Activation of dormant brain cells-Kayakalpa-theory- Kayakalpa –practice-Yogic exercise to improve physical and mental health and practice-Asanas –explanation-Practice-benefits	
Unit 04:	**6 Hours**
Sun namaskar- 12 poses-explanation and practice-Yoga –Asana-Padmasana, vajrasana,chakrasana, viruchasana etc-Stress management with Yoga-Role of women and Yoga Equality, nonviolence, Humanity, Self- control- Food and yoga Aware of self-destructive habits Avoid fault thinking (thought analysis-Practice)-Yoga Free from ANGER (Neutralization of anger)& practice	
Unit 05:	**6 Hours**
Moralisation of Desire & practice- Punctuality-Love-Kindness-Compassion Eradication of worries-Practice - Personality development, positive thinking-Good characters to lead a moral life How to clear the polluted mind- Benefits of blessing- Five- fold culture –explanation- Karma Yoga Practice In Geetha- Sense of duty-Devotion, self- reliance, confidence, concentration, truthfulness, cleanliness.	

Theory: 30 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 30 Hrs**

REFERENCES

1	'Yogic Asanas for Group Tarining-Part-I" Janardan Swami Yogabhyasi Mandal, Nagpur
2	"Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

HOD
Dr. M.RENUGA,
Professor & Head,
Department of Humanities & Languages,
Sona College of Technology,
SALEM - 636 005.

M.Tech-IT
III

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Information Technology

S. No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	P23MIT502	Elective- Soft Computing	3	0	0	0	3	PE	45	T
	P23MIT505	Elective- Predictive Analytics								
	P23MIT507	Elective- Swarm Intelligence								
	P23MIT506	Elective- Deep Learning								
2.	P23MIT510	Elective- Cloud Computing	3	0	2	0	4	PE	75	T L
Practical courses										
3.	P23MIT301	Project Work - I	0	0	0	16	8	PC	240	PC
						Total Credits	15			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P- Project

Approved By

J. Akila 17/6/25	16/6/25	R. Akila 24/6/25	
Chairperson – IT BoS	**Member Secretary/ Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ IT, Third Semester M. Tech IT Students and Staff, COE

P23MIT502	SOFT COMPUTING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Design an efficient Fuzzy inference system and choose a fuzzy model specific to the problem
CO2	Apply the different derivative-based optimization techniques to solve optimization problem.
CO3	Design a supervised and unsupervised learning system.
CO4	Design a different type of neuro fuzzy system models.
CO5	Apply the computation intelligence for printed character recognition and Color Recipe Prediction.

Pre-requisite: Machine learning

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PSO1	PSO2
CO1	1		3		3
CO2	1		3	3	1
CO3	2	2	3		
CO4	1	2	3		2
CO5	2	2		2	3

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I	FUZZY SET THEORY	9 Hours

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II	OPTIMIZATION	9 Hours

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III	NEURAL NETWORKS	9 Hours

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.				
UNIT IV	**NEURO FUZZY MODELING**			**9 Hours**
Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.				
UNIT V	**APPLICATIONS OF COMPUTATIONAL INTELLIGENCE**			**9 Hours**
Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2015.
2.	Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 2011.
3.	James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2007.
4.	S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
5.	R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 2006.
6.	S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2016.
7.	S.N.Sivanandam, S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2017.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT505	PREDICTIVE ANALYTICS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Identify the modelling techniques which are more appropriate for regression.
CO2	Implement supervised and unsupervised learning and classification.
CO3	Learn the fundamentals of objective segmentation and its activities in this field.
CO4	Implement time series methods to solve real-world problems.
CO5	Demonstrate the models with tools.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PSO1	PSO2
CO1	3	2	3	2	3
CO2	3	1	2	3	2
CO3	3	2	3	3	3
CO4	2	2	3	2	3
CO5	2	1	2	3	2

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT – I	INTRODUCTION TO PREDICTIVE ANALYTICS & LINEAR REGRESSION	9 Hours

What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling. Regression — Concepts, Blue property-assumptions-Least Square Estimation. Variable Rationalization, and Model Building etc.

UNIT – II	LOGISTIC REGRESSION	9 Hours

Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc – Logical Model – Estimating the regression coefficients – Making Predictions – Multiple Logical Regression – Multinomial Logistic Regression.

UNIT – III	OBJECTIVE SEGMENTATION	9 Hours

Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity, Multiple Decision Trees etc. Develop Knowledge, Skill and Competences - Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.		
UNIT – IV	**TIME SERIES METHODS IFORECASTING, FEATURE EXTRACTION**	**9 Hours**
Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyse for prediction. Project		
UNIT – V	**WORKING WITH DOCUMENTS**	**9 Hours**
Standard Operating Procedures for documentation and knowledge sharing. Defining purpose and scope documents, Understanding structure of documents — case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools — Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base. Peer review and feedback.		

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

REFERENCES

1.	Gareth James , Daniela Witten , Trevor Hastie Robert Tibshirani, " An Introduction to Statistical Learning with Applications in R", Springer Publication , 2nd edition – 2021.
2.	Eric Seigel, "Predictive Analytics", Wiley Publications, 2nd edition – 2016.
3.	Dean Abott, "Applied Predictive Analytics", Wiley, 2014
4.	John D Kelleher, Brian Mac Namee, "Fundamentals of machine learning for Predictive Analytics", 2nd Edition, MIT press, 2020
5.	Max Kuhn, Kjell Johnson,"Applied Predictive Modelling", Springer , 1st Edition, 2013.

J. Akland

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM - 636 005

P23MIT507	SWARM INTELLIGENCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Explain the concept of swarm intelligence and optimization techniques.
CO2	Apply the Evolutionary Programming steps to the various optimization problems
CO3	Explain Bee's foraging and Mating approach.
CO4	Apply the Bee's Foraging and Mating intelligence to wired and wireless networks
CO5	Analyze ACO applications in real time scenario.

Pre-requisite: Machine learning

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PSO1	PSO2
CO1	2	2	2	2	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Course Assessment methods

Direct	Indirect
CIE test I (10) , CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10) , Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I	FUNDAMENTALS	9 Hours

Swarm Intelligence Vs Artificial Intelligence, Cellular Automata and the edge of chaos, artificial life in computer programs –Intelligence in people –Intelligence in Machines, Binary optimization.

UNIT II	EVOLUTIONARY COMPUTATION THEORY AND PARADIGMS	9 Hours

Evolutionary Computation History, Genetic Algorithms: An Overview -A Simple GA Example Problem – Schemata and the Schema Theorem, Evolutionary Programming, Evolution Strategies.

UNIT III	PATICLE SWARM AND BEE INTELLIGENCE	9 Hours

Particle Swarm and Particle Swarm Intelligence –Honeybee's Intelligence: Bee's Mating Intelligence – Bee's Foraging Intelligence.

UNIT IV	APPLICATIONS OF BEE'S INTELLIGENCE	9 Hours
Energy minimization in wireless Sensor Networks using Bee's Mating Intelligence, Band width estimation using Bee's Foraging Intelligence, Online recommendation system using Bee's Foraging Intelligence, Determination of traverse path of Mobile sink node in WSN using Bee's Foraging Intelligence.		
UNIT V	**ANT COLONY OPTIMIZATION**	**9 Hours**
Introduction to Ant Systems, Ant Colony Optimization Technique, Pheromones and its Density as Deciding Factor, Applications of Ant Colony Optimization in Travelling Salesman Problem and Routing. Comparison between ACO and PSO swarm intelligence models.		

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

REFERENCES

1.	Andries P. Engelbrecht, "Fundamentals of Computational Swarm Intelligence", Wiley, 2008.
2.	James Kennedy, Russell C. Eberhart, with Yuhui Shi, "Swarm Intelligence", Morgan Kaufmann, 2010.
3.	Andries P. Engelbrecht, "Computational Swarm Intelligence ", John Wiley, & Sons, 2017
4.	Eric Bonabeau, Marco Dorigo, and Guy Theraulaz, "Swarm Intelligence: From Natural to Artificial Systems", Oxford University Press, 2009.

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT506	DEEP LEARNING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO2	Implement, train, and validate their own neural network.
CO3	Learn the fundamentals of deep learning, and the main research activities in this field.
CO4	Implement deep learning algorithms and solve real-world problems.
CO5	Demonstrate the models with tools.

Pre-requisite: Machine learning

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	
CO1	1	1	2	1		
CO2	2	1	3	1		
CO3	1	2	2			
CO4	1	1	3		2	
CO5	2	2	3		2	

Course Assessment methods

Direct	Indirect
CIE test I (10), CIE test II (10), CIE test III (10), Assignment/Problem-solving/seminar (10), Total CIE Marks: 40 Semester End Examination Marks: 60	Course end survey

UNIT I	INTRODUCTION	9 Hours

Introduction to Deep Learning – Deep Learning Architectures - History Of Deep Learning - Linear Algebra, Probability And Information Theory - Perspectives And Issues in Deep Learning Framework, Review Of Fundamental Learning Techniques - Basics of Machine Learning.

UNIT II	MODERN PRACTICAL DEEP NETWORKS	9 Hours

Deep feed forward networks, regularization of deep learning, optimization for training deep models, convolutional networks, recurrent networks, applications - long short term memory networks (LSTM) – convolutional neural networks (CNN) – recurrent neural networks (RNN) – hyper parameter tuning - thresholding logic, perceptrons- perceptron learning algorithm – clustering methods - decision trees.

UNIT III	LINEAR MODELS	9 Hours

Multi-layer perceptron – Going forwards – Going backwards: Back propagation error – multilayer perceptron in practice – examples of using the MLP – Overview – Deriving Back propagation – Radial Basis Functions and splines – concepts – RBF network – curse of dimensionality – Interpolations and Basis functions – Support Vector Machines.		
UNIT IV	**DEEP CONVOLUTIONAL MODELS: CASE STUDIES**	**9 Hours**
Object detection: object localization, landmark detection, object detection, yolo algorithm. NLP: introduction to NLP and Deep Learning - Simple word vector representations: word2vec, GloVe - advanced word vector representations: language models, softmax, single layer networks - Neural networks and back propagation for named entity recognition.		
UNIT V	**DEEP LEARNING TOOLS**	**9 Hours**
Tools: caffe, theano, torch, tensor flow. Getting started with tensorflow, data input and preprocessing with tensorflow, prediction with tensorflow, monitoring and evaluating models using tensorboard.		

Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

REFERENCES

1.	Ian Goodfellow,Yoshua Bengio and Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series)", The MIT Press, 2016.
2.	Yoav Goldberg, "Neural Network Models in Natural Language Processing" , Morgan & Claypool, 2017.
3.	Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
4.	Gene H. Golub, Charles F. Van Loan, "Matrix Computations", JHU Press, 2013.
5.	Li Deng, Dong Yu, "Deep Learning: Methods and Applications", Now Publishers, 2014.

J. Akilandeswari

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT510	CLOUD COMPUTING	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1	Describe the architecture of Cloud computing and the applications can be deployed.
CO2	Select suitable deployment models and services from the cloud providers.
CO3	Identify the suitable technology for networking and storage in the cloud environment.
CO4	Discuss the various virtualization technologies chosen by the cloud service providers.
CO5	Examine the network and security issues in cloud computing.

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PSO1	PSO2
CO1	2	2	2		1
CO2	2		3	1	3
CO3	1		2		1
CO4	3	2	2	3	1
CO5	3	1	1	1	1

Course Assessment methods

Direct	Indirect
CIE test I (10)Theory, CIE test II (10) Theory, CIE test III (10) Theory, CIE test IV(10) - Laboratory Assignment/Quiz/Seminar/Miniproject (10), Total CIE Marks: 50 Semester End Examination Marks: 50 (SEE-Theory -35 marks, Lab – 15 marks)	Course end survey

UNIT I	INTRODUCTION TO CLOUD COMPUTING	9 Hours

Introduction to Cloud Computing: Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Challenges and Risks, Assessing the role of Open Standards.

UNIT II	CLOUD ARCHITECTURE, SERVICES AND APPLICATIONS	9 Hours

Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Using PaaS Application Frameworks, Software as a Service, Saas vs. Paas, Identity as a Service, Compliance as a Service

UNIT III	ABSTRACTION AND VIRTUALIZATION	9 Hours

Introduction to SAN, Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action

UNIT IV	MANAGING & SECURING THE CLOUD	9 Hours

Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards, Securing the Cloud, Securing Data, Establishing Identity and Presence

UNIT V	CASE STUDIES	9 Hours

Case study in Open Stack, Google Cloud, Amazon Web Services, Salesforce.

LIST OF EXPERIMENTS

1. Creating Type-1 and Type-2 virtualizations and deploy a service.
2. Installing and Configuring required platform for Google App Engine.
3. Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles, and presentations, respectively.
4. Register with Amazon AWS and create a windows/linux instance and connect with RDP and create S3 buckets.
5. Running Hadoop Map reduce
6. Installing and Configuring Dockers in local host and running multiple images on a Docker Platform.
7. Create docker image using dockerfile and run container based on that image to deploy a web application.
8. Deploy an application in Kubernetes cluster using a deployment manifest and verify its functionality within the cluster.

Theory: 45 Hrs	Tutorial: --	Practical: 30 Hrs	Project:--	Total Hours: 75 Hrs

REFERENCES

1.	Sosinsky B., "Cloud Computing Bible", Wiley India Pvt Ltd, 2017.
2.	Buyya R., Broberg J., Goscinski A.,"Cloud Computing : Principles and Paradigm", Wiley, 2013.
3.	Shroff G., "Enterprise Cloud Computing", Cambridge University Press, 2010.
4.	Smooth S., Tan N., "Private Cloud Computing", 1st Edition, Morgan Kauffman, 2011.
5.	Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005

P23MIT301	PROJECT WORK - I	L	T	P	J	C
		0	0	0	16	8

Course Outcomes

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

CO1:	Apply the relevant knowledge and skills acquired within the technical area to a given project.
CO2:	Design and develop a software system that captures the user and system requirements.
CO3:	Demonstrate leadership, effective communication, ethical sense and teamwork.

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	
CO2	3	3	3	1	1	
CO3	1	1	1	2	1	1

Course Assessment methods

Direct		Indirect
Review I : 5 Marks Review II: 10 Marks Review III: 15 Marks Final Project Report : 10 Marks	Internal Assessment: 40 Marks Semester End Examination: 60 Marks	Course end survey

The Project Work - I is introduced to develop practical skills to solve real-time problems in the field of Information Technology. This course provides an opportunity to do research in the technology field.

Theory: --	Tutorial: --	Practical: --	Project: 240 Hrs	Total Hours: 240 Hrs

Dr. J. AKILANDESWARI
PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005