GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

Azadi Ka Amrit Mahotsav

mygov मेरी सरकार

PREAMBLE TO THE CONSTITUTION

PREAMBLE

WE, THE PEOPLE OF INDIA,

having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC **REPUBLIC** and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

[redacted]

Signature

23-01-2022

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

("Deemed to be University u/s 3 of the UGC Act, 1956")

Accredited 'A+' Grade by NAAC

Agalakote, B.H.Road, Tumkur – 572 107.KARNATAKA, INDIA.

No. SSAHE/ACA-S&C/ 43/UG(BE)/2024 Date: 15/07/2024

N O T I F I C A T I O N

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Artificial Intelligence and Machine Learning)

Ref: Proceedings of the Academic Council meeting held on 10/07/2024 vide agenda No. SSAHE/AC/XXVIII-12/2024

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Artificial Intelligence and Machine Learning) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to

1) Office of the Chancellor, SSAHE, for kind information,
2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
3) All Officers of the Academy Examination Branch / Academic Section
4) Guard File / Office copy.

S.S.A.H.E TUMKUR

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY-TUMAKURU

(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)

Academic year 2024-2025

Department of Artificial Intelligence and Machine Learning

Vision of the Department

"To produce technically competent graduates in the field of Artificial Intelligence exhibiting etiquette and amenable for significant contributions to the society".

Mission of the Department

- To develop technical and professional skills to meet the industrial and societal needs
- To promote research culture among students enabling continuous learning.
- To inculcate ethical values and good leadership qualities.

Program Educational Objectives (PEOs)

- Develop intellectual software solutions by continuous learning and contribute to his/her career as an outstanding employee/entrepreneur.
- To keep running knowledge of advances in the field of intelligent technology and uphold research.
- Use Artificial Intelligence and Machine Learning models on data to develop software applications in emerging areas for better decision making.
- Acquire leadership qualities to work in team, contributing to the betterment of the humanity and society.

Program Outcomes (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU

(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)

Academic year 2024-2025

Scheme of Teaching and Examination-2022 (160 Credits Scheme, NEP)
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

V Semester B.E **Academic year: 2024-25**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	PC	22AM501	Fuzzy logic	AM	3	-	-	3	50	50	100	3
2	PC	22AM502	Database Management System	AM	3	-	2	4	50	50	100	3
3	PC	22AM503	Principles of AI	AM	3	-	2	4	50	50	100	3
4	PE	22AM5PE4x	Professional Elective-I	AM	3	-	-	3	50	50	100	3
5	OE	22AM5OE5x	Open Elective-I	AM	3	-	-	3	50	50	100	3
6	HS	22IE56x	Institutional Elective	AM	2	-	-	2	50	50	100	3
7	PC	22AM507	AIML Dept. Skill Lab-3 (Web Technology Lab)	AM	1	-	2	2	50	50	100	3
8	HS	22SK508	Skill Development-II	T&P	-	-	2	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**18**	**-**	**8**	**22**	**400**	**350**	**750**	--

Credits Distribution: Basic Science (BS)=08+08+3+3=22, Engineering Science (ES)=10+11=21, Humanities& Social Sciences (HS)=1+2+2+2=6, Program Core (PC)=02+16+16+15=49, Program Elective (PE)=03, Open Elective(OE)=03, Total Credits=20+20+21+21+23=105

Professional Elective-I	Open Elective-I	Institutional Elective
22AM5PE41:Agile Technologies	**22AM5OE51: Introduction to AI**	**22IE561: Research Methodology**
22AM5PE42:Computer Vision	**22AM5OE52: Web Technologies**	**22IE562:Management and Entrepreneurship**
22AM5PE43: Advanced IoT		**22IE563: Project Management**

Department: Artificial Intelligence & Machine Learning		**Semester:**	**5**
Subject: Fuzzy Logic			
Subject Code:	**22AM501**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Understand the fundamental difference between crisp set and fuzzy sets.
2	Transform crisp sets to fuzzy sets
3	Understand and Apply the subtle difference between classical and fuzzy logic
4	Use Python to IoT domain.
5	Apply fuzzy classification and clustering techniques.

Unit	Description	Hrs
I	Introduction: Uncertainty and Imprecision, Static and Random Processes, Uncertainty in information, Fuzzy sets and Classical sets, properties and mapping of fuzzy sets to function, Fuzzy set operations, properties. Sets as points in Hypercubes. Cartesian product, crisp relations, Fuzzy relations, Tolerance and equivalence relations, Fuzzy tolerance, Value assignments	**7**
II	Membership functions: Features of membership functions, standard forms and boundaries. Fuzzification, membership value assignment. Fuzzy to crisp conversions, Lamda cuts for fuzzy sets, Lamda cuts for fuzzy relations.	**7**
III	Defuzzification Methods, extension principle, crisp function, mapping and relations, practical considerations. Fuzzy numbers, interval analysis in arithmetic, approximate methods of extension, Fuzzy vectors. Classical logic and fuzzy logic, predicate logic, Fuzzy logic, approximate reasoning, Fuzzy tautologies, consideration, equivalence and logical proofs.	**10**
IV	Fuzzy rule based systems, natural language, linguistic hedges, Rule based systems, canonical rule forms, Decomposition of compound rules, likelihood and truth qualification, aggregation of fuzzy rules, graphical techniques.	**8**
V	Fuzzy classification by equivalence relations, crisp relations, Fuzzy relations cluster analysis, cluster validity, C-means clustering, HCM and LCM, Classification metric, Hardening the fuzzy C-Partition, Similarity relations from clustering.	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Apply the knowledge of crisp sets and fuzzy sets to solve problems.
CO2	Apply the concept of fuzzification and fuzzy to crisp conversion to solve problem
CO3	Apply the concept of Defuzzification to solve simple problems and Illustrate the application of fuzzy sets to develop fuzzy rule-based systems.
CO4	Apply fuzzy sets to classification and clustering problems.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	3			3										
CO2	3	2	2											
CO3		3												
CO4			1	3										

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fuzzy Logic with Engineering Applications	Thimoty J Ross	Third Edition, John Wiley & Sons Ltd. Publications.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Principles of Soft Computing	Dr. Shivanandam and Deepa	Third Edition, Wiley Publication, 2019. ISBN: 978-81-265- 7713-2.

Department: Artificial Intelligence & Machine Learning		**Semester:**	**5**
Subject: Database Management Systems			
Subject Code:	**22AM502**	**L–T– P-C:**	**3-0-2-4**

Sl. No	**Course Objectives**
1	Knowledge of the architecture and functioning of Database Management Systems.
2	Apply the principles of data modeling using Entity Relationship and develop a good database design.
3	Understand the use of Structured Query Language (SQL) and NoSQL
4	Apply normalization techniques to normalize a database and understand the need of database transaction.

Unit	**Description**	**Hrs**
I	**Databases and Database Users:** Introduction with an example, Characteristics of Database approach, Actors on the scene, Workers behind the scene, Advantages of using DBMS approach, when not to use a DBMS. **Database System Concepts and Architecture**: Data models, schemas and instances, Three schema architecture and data independence, Database languages and interfaces, The database system environment, Centralized and client-server architectures. **(Text 1:** 1.1 to 1.8) **(Text 1:** 2.1 to 2.5)	**8**
II	**Data Modeling using the Entity-Relationship (ER) Model:** Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Example of other notation, Relationship types of degree higher than two, Another example. **(Text 1: 3.1 to 3.10)**	**8**
III	**Basic SQL :** Data Definition and Data Types, Specifying constraints in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL. More complex SQL Queries, Specifying Constraints as Assertions and Actions as Triggers Views (Virtual Tables) in SQL, Schema change statements in SQL. **(Text 1:** 6.1 to 6.4) **(Text 1:** 7.1 to 7.4)	**8**
IV	**Database Design:** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys. **Transaction Processing:**Introduction to transaction processing, transaction and system concept, desirable properties of transactions. **(Text 1:** 14.1 to 14.3) **(Text 1:** 20.1 to 20.3)	**8**
V	**Strategies for Query Processing:** Translating SQL Queries into Relational Algebra and Other Operators, Algorithms for External Sorting, Algorithms for SELECT Operation, Implementing the JOIN Operation, Algorithms for PROJECT and Set Operations, Implementing Aggregate Operations and Different Types of JOINs, Combining Operations Using Pipelining, Parallel Algorithms for Query Processing. **(Text1:** 18.1 to 18.8)	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Explain the concepts of database management system. (L2)
CO2	Design database using conceptual and relational model. (L3)
CO3	Illustrate various DBMS commands using SQL and NoSQL. (L3)
CO4	Apply normalization for Relational schema and Design a database for various applications. (L3)

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	1													
CO2		3	2	2										
CO3			2	3	3									
CO4	2	2	2	1										

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Database Systems	Elmasri and Navathe	7th Edition, Pearson Education, 2017, ISBN-13: 978-9332582705.
2	Big data And Analytics	SeemaAcharya, SubhashiniChellappan, Infosys Limited	Publication Wiley India Private Limited,1st Edition 2015. ISBN:978- 81- 265-5478-2

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke	3rd Edition, McGraw-Hill, 2014, ISBN-13:978-9339213114.
2	An Introduction to Database Systems	C.J. Date, A. Kannan, S. Swamynatham	8th Edition, Pearson education, 2017, ISBN-13:978-817585568.

Lab Content:

1. Consider the following schema for a Library Database:
   BOOK(Book_id, Title, Publisher_Name, Pub_Year)
   BOOK_AUTHORS(Book_id, Author_Name)
   PUBLISHER(Name, Address, Phone)
   BOOK_COPIES(Book_id, Programme_id, No-of_Copies)
   BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)
   LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)

   Write SQL queries to
   i) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
   ii) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
   iii) Delete a book in BOOK table. Update the contents of other tables to reflect this data Manipulation operation.
   iv) Partition the BOOK table based on year of publication. Demonstrate its working with a simplequery.
   v) Create a view of all books and its number of copies that are currently available in the Library.

2. Consider the following schema for Order Database:
   SALESMAN(Salesman_id, Name, City, Commission)
   CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)
   ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

   Write SQL queries to
   i) Count the customers with grades above Bangalore's average.
   ii) Find the name and numbers of all salesman who had more than one customer.
   iii) List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.)
   iv) Create a view that finds the salesman who has the customer with the highest order of a day.
   v) Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

3. Consider the schema for Movie Database:
   ACTOR(Act_id, Act_Name, Act_Gender)
   DIRECTOR(Dir_id, Dir_Name, Dir_Phone)
   MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)

MOVIE_CAST(Act_id, Mov_id, Role)
RATING(Mov_id, Rev_Stars)

Write SQL queries to

i) List the titles of all movies directed by 'Hitchcock'.
ii) Find the movie names where one or more actors acted in two or more movies.
iii) List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
iv) Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5.

4. Consider the schema for College Database:

STUDENT(USN, SName, Address, Phone, Gender)

SEMSEC(SSID, Sem, Sec)
CLASS(USN, SSID)
COURSE(Subcode, Title, Sem, Credits)
IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

i) List all the student details studying in fourth semester 'C' section.
ii) Compute the total number of male and female students in each semester and in each section.
iii) Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
iv) Calculate the FinalIA (average of best two test marks) and update the corresponding table for allstudents.
v) Categorize students based on the following criterion:

If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA< 12 then CAT = 'Weak'

Give these details only for 8th semester A, B, and C section students.

5. Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo,DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

Write SQL queries to

i) Make a list of all project numbers for projects that involve an employee whose last name is Scott', either as a worker or as a manager of the department that controls the project.

ii) Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.

iii) Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

iv) Retrieve the name of each employee who works on all the projects controlled by department number

v) (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Department: Artificial Intelligence & Machine Learning		Semester:	5
Subject: Principles of AI			
Subject Code:	22AM503	L–T– P-C:	3-0-2-4

Sl.No	Course Objectives
1	Gain a historical perspective of AI and its foundations
2	Introduce problem solving and search engines
3	Introduce First order logic
4	Become familiar with basic principles of uncertain knowledge and reasoning

Unit	Description	Hrs
I	**Introduction:** What is AI? Foundations and History of AI Intelligence, State of the Art. **Intelligent Agents:** Agents and environments, Good Behavior: Concept of Rationality, The Nature of Environment. Text book 1: Chapter 1- 1.1, 1.2, 1.3, 1.4 Chapter 2- 2.1, 2.2, 2.3	**8**
II	**Problem-solving:** Problem-solving agents, Example problems, Searching for Solutions Uninformed Search Strategies: Breadth First search, Uniform Cost search, Depth First Search, Depth-limited search, Iterative deepening depth first search, Bidirectional search. Text book 1: Chapter 3- 3.1, 3.2, 3.3, 3.4	**8**
III	**Informed Search Strategies:** Heuristic functions, Greedy best-first search, A*search, Heuristic Functions **Logical Agents:** Knowledge–based agents, The Wumpus world, Logic, Propositional logic, Propositional Theorem Proving Text book 1: Chapter 3-3.5.1, 3.5.2,3.6 Chapter 7- 7.1, 7.2, 7.3, 7.4, 7.5	**8**
IV	**First Order Logic:** Representation Revisited, Syntax and Semantics of First Order logic. **Inference in First Order Logic:** Propositional Versus First Order Inference, Unification and lifting, Forward Chaining, Backward Chaining. Text book 1: Chapter 8- 8.1, 8.2 Chapter 9- 9.1, 9.2, 9.3, 9.4.	**8**
V	**Uncertain Knowledge and Reasoning:** Quantifying Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference using Full Joint Distributions, Independence, Baye's Rule and its use. Wumpus World Revisited Text Book 1: Chapter 13-13.1, 13.2, 13.3, 13.4, 13.5, 13.6	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Apply knowledge of agent architecture. (L2)
CO2	Explain the concepts of problem-solving.(L3)
CO3	Develop knowledge on first order logic.(L3)
CO4	Identify searching and reasoning techniques for different applications. (L3)

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	1													
CO2	3	2			1	2								
CO3	2	2	3		1									
CO4	2					2								

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Artificial Intelligence	Stuart J. Russell and Peter Norvig	3rd Edition, Pearson,2015
2	Artificial Intelligence	Elaine Rich, Kevin Knight	3rd Edition,Tata McGraw Hill,2013

Reference Books:

Sl No	Title	Author	Volume and Year of Edition
1	Artificial Intelligence Structure and Strategies for Complex Problem Solving	George F Lugar	Pearson Education, 5th Edition, 2011
2	Principles of Artificial Intelligence	Nils J. Nilsson	Elsevier, 1980
3	Artificial Intelligence	Saroj Kaushik	Cengage learning, 2014

LAB COMPONENT

1. Implement and Demonstrate Depth First Search Algorithm on Water Jug Problem.
2. Implement and Demonstrate Best First Search Algorithm on Missionaries-Cannibals Problems using Python.
3. Implement A* Search algorithm.
4. Implement AO* Search algorithm.
5. Solve 8-Queens Problem with suitable assumptions.
6. Implementation of TSP using heuristic approach.
7. Implementation of the problem solving strategies: either using Forward Chaining or Backward Chaining.
8. Implement Tic-Tac-Toe game using Python .

Department: Artificial Intelligence & Machine Learning		Semester:	5
Subject: Agile Technologies			
Subject Code:	**22AM5PE41**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Understand the background and driving forces for taking an Agile approach to software development.
2	Understand the business value of adopting Agile approaches and the Agile development practices.
3	Learn design principles, refactoring, automated build tools, version Control and continuous integration.
4	Understand testing activities within an Agile project.

Unit	Description	Hrs
I	**Fundamentals of Agile:** 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, Continuous Integration, Refactoring, Pair Programming, Simple Design.	8
II	**Agile Scrum Framework:** Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User Stories, Characteristics and content of user stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Key challenges to implementing Agile Development and Project management Frame works	8
III	**Agile Software Design and Development:** Agile design practices, Difference between Agile and Traditional Approach, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Dependency Inversion Principle in Agile Design, Interface Segregation Principles, Refactoring Techniques, Automated build tools, Version control.	8
IV	**Agile Testing:** Agile Testing, How is Agile Testing Different, Ten Principles for Agile Testers, Agile Testing Quadrants, Test-Driven Development(TDD), TDD Lifecycle, Acceptance tests, Managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Why Automation, Tools to support the Agile tester.	8

V	**Industry Trends:** Agile Marketing, Challenges in Enterprise adoption of Agile methods, Agile ALM, Roles in an Agile project, Agile applicability framework, Agile in Distributed teams, Challenges in Agile, Agile methodology with cloud computing, Balancing Agility with Discipline, Agile rapid Application development technologies.	8

Course Outcomes:

Course outcome	Descriptions
CO1	Interpret the business values of adopting Agile approaches to Software Development.
CO2	Apply agile development practices, design principles and Refactoring to achieve agility.
CO3	Deploy automated build tools, version control and continuous integration
CO4	Perform various testing activities within an Agile project.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			3	3						3	3			
CO2		2	3	3	2							3	2	
CO3		3	3	3	3	3	3						1	
CO4					3		3	3	3	3	2			

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Agile Software Development with Scrum.	Ken Schawber, Mike Beedle	1st Edition, PrenticeHall, 2001, ISBN:0130676349, 9780130676344
2	Agile Testing: A Practical Guide for Testers and Agile Teams.	Lisa Crispin, Janet Gregory	1st Edition, PearsonEducation, 2010, ISBN:9788131730683
3	Agile Software Development, Principles, Patterns and Practices.	Robert C. Martin	1st Edition, Pearson, 2011, ISBN:9780132760584, 0132760584

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Agile Software Development: The Cooperative Game	Alistair Cockburn	2nd Edition,AddisonWesley, 2006,ISBN:9780321630070, 0321630076
2	User Stories Applied: For Agile Software	Mike Cohn	1st Edition, Addison Wesley,2004,ISBN:9780321205681,0321205685

Department: Artificial Intelligence & Machine Learning		Semester:	5
Subject : Computer Vision			
Subject Code:	22AM5PE42	L–T– P-C:	3-0-0-3

Sl.No	Course Objectives
1	Understand the basic concepts of image formation.
2	Understand the concepts of one image and multiple images.
3	Illustrate segmentation by clustering.
4	Apply the techniques for detecting objects in Images.

Unit	Description	hours
I	Introduction: What is computer vision? A brief history. Image Formation: Pinhole Perspective, Weak Perspective, Cameras with Lenses, The Human Eye, Intrinsic Parameters and Extrinsic Parameters, Geometric Camera Calibration. **T1: Chapter 1.1-1.2** **T2: Chapter 1**	08
II	Early Vision – One Image: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates Local Image Features: Computing the Image Gradient, Representing the Image Gradient, Finding Corners and Building Neighborhoods, Describing Neighborhoods with SIFT and HOG Features, Computing Local Features in Practice. **T2: Chapter 4.1-4.5, 5**	08
III	Early Vision – Multiple Images: Stereopsis: Binocular Camera Geometry and the Epipolar Constraint, Binocular Reconstruction, Human Stereopsis, Local Methods for Binocular Fusion, Global Methods for Binocular Fusion, Using More Cameras, Application: Robot Navigation. Structure from Motion: Internally Calibrated Perspective Cameras, Uncalibrated Weak-Perspective Cameras, Uncalibrated Perspective Cameras. **T2: Chapter 7,8**	08
IV	Mid-level Vision: Segmentation by Clustering: Human Vision: Grouping and Gestalt, Important Applications, Image Segmentation by Clustering Pixels, Segmentation, Clustering, and Graphs. **T2: Chapter 9.1-9.4**	08
V	Detecting objects in images: the sliding window method, detecting deformable objects, the state of the art object detection. **T2: Chapter 17**	08

Course outcomes	Descriptions
CO1	Understand Image formation process.
CO2	Acquire the knowledge of one image and multiple images.
CO3	Explain Segmentation by clustering.
CO4	Illustrate the techniques for detecting objects in Images.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3									1				
CO3		3		2										
CO4			3		3	2			1		1			

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Computer Vision: Algorithms and Applications (CVAA)	Richard Szeliski	Springer, 2nd edition, 2020, http://szeliski.org/Book/
2	Computer Vision – A modern approach	D. Forsyth and J. Ponce	Prentice Hall, 2nd edition, 2012

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Computer Vision	D. H. Ballard, C. M. Brown	Prentice-Hall, Englewood Cliffs, 1982
2	Digital Image Processing	R. C. Gonzalez, R. E. Woods	Addison Wesley Longman, Inc., 1992.

Department: Artificial Intelligence & Machine Learning		**Semester:**	**5**
Subject: Advanced IoT			
Subject Code:	**22AM5PE43**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	To understand the vision and introduction of IoT.
2	To learn the concepts of IOT in market perspective
3	To Learn Data and Knowledge Management and use of Devices in IoT Technology
4	To Understand the IoT Reference Models ,Real World Design Constraints and Asset Management

Unit	Description	Hrs
I	**M2M to IoT - The Vision:** Introduction, From M2M to IoT - A brief background, M2M communication, IoT, M2M towards IoT-the global context - Game changers, General technology and scientific trends, Trends in information and communications technologies, , A use case example, Differing Characteristics.	**8**
II	**M2M to IoT- A Market Perspective:** Introduction - Information marketplaces, Some Definitions - Global value chains, Ecosystems vs. value chains, Industrial structure, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT - The information-driven global value chain.	**8**
III	**M2M and IoT Technology Fundamentals** : Devices and gateways - Introduction, Basic devices, Gateways, Data management - Introduction, Managing M2M data, Considerations for M2M data, Business processes in IoT - Introduction, IoT integration with enterprise systems, Distributed business processes in IoT, Knowledge Management - Data, information, and knowledge, A knowledge management reference architecture.Retrival Layer	**8**
IV	**Architecture Reference Model:** Introduction, Reference Model and architecture, IoT Reference Model - IoT domain model, Information model, Functional model, Communication model, Safety, privacy, trust, security model.	**8**
V	**Real-World Design Constraints**: Introduction, Technical Design constraints hardware is popular again - Devices and networks, Data representation and visualization, Interaction and remote control. **Asset Management:** Introduction, Expected benefits, -Maintenance in the M2M Era, Hazardous goods management in the M2M Era	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Interpret the vision of IoT from a global context and determine the market perspective of IoT
CO2	Analyze usage of devices, data, assets and knowledge management in M2M and IoT technologies.
CO3	Develop the Reference models for designing IoT and M2M technologies
CO4	Illustrate the applications of IoT and M2M Technologies and identify real world design constraints and Design IoT System For Real Time Applications.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	2	2					2			
CO2	2	3	3	2					1		1			
CO3	1	3	3	2					1					
CO4		2		1	2	2				3	1			

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence	Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle	1st Edition, Academic Press, 2014. (ISBN-13: 978-0124076846)

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and Arshdeep Bahga	1st Edition, VPT, 2014 (ISBN-13: 978-8173719547)
2	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",	Francis da Costa	1st Edition, A press Publications, 2013 (ISBN-13: 978-1430257400)

Department: Artificial Intelligence & Machine Learning		Semester:	5
Subject: Introduction to Artificial Intelligence			
Subject Code:	**22AM5OE51**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Review the historical perspective of AI and its foundations.
2	Understand the basic principles of AI towards problem solving.
3	Learn the approaches of Logic programming and knowledge representation.
4	Study expert systems.

Unit	Description	Hrs
I	**Introduction to AI**: Introduction, History, Intelligent systems, Foundation and Sub areas of AI, Applications. **Problem solving:** Introduction, General problem solving, Characteristics of problem. Text 1: Ch1-1.1 to1.7, Ch 2-2.1 to 2.3	**8**
II	**Problem Reduction and Game Playing:** Introduction, Problem reduction, Game playing, Bounded look-ahead strategy and use of Evaluation Functions, Alpha-Beta pruning, Two player perfect information games. Text 1: Ch 3 -3.1 to 3.6	**8**
III	**Logic Concepts and Logic Programming:** Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiotic system, Semantic Tableau System, Resolution Refutation. Text 1:Ch 4-4.1 to 4.7	**8**
IV	**Knowledge Representation :** Introduction, Approaches to Knowledge Representation, Knowledge Representation Using Semantic Network, Extended Semantic Networks For KR ,Knowledge Representation Using Frames. Text 1:Ch 7-7.1 to 7.5	**8**
V	**Expert System and Applications:** Introduction, Phases in Building Expert System, Expert System Architecture, Expert System Versus Traditional Systems, Rule-Based Expert Systems, Black Board Systems, Truth Maintenance Systems, Applications of Expert Systems, List of Shells and Tools. Text 1:Ch 8-8.1 to 8.9	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Demonstrate fundamental understanding of the history of artificial intelligence and its foundations. (L1)
CO2	Apply AI knowledge for problem reduction and logic programming.(L2)
CO3	Outline knowledge representation and expert system.(L2)
CO4	Solve real-world problems by applying critical thinking and problem-solving.(L3)

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2	2	1	2											
CO3	2	1	2											
CO4	3	2	3	2		2								

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Artificial Intelligence	Saroj Kaushik	Cengage learning,2014

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Artificial Intelligence	Elaine Rich, Kevin Knight	Tata McGrawHill,2014
2	Principles of AI	NilsJ.Nilsson,Elsevier	Morgan Kaufman Publishers,2014
3	Artificial Intelligence: A Modern Approach	Staurt Russel, Peter Norvig, Pearson Education	3rdEdition, 2009
4	Artificial Intelligence Structure and Strategies for Complex Problem Solving	George FLugar	Pearson Education, 5th Edition,2011

Department: Artificial Intelligence and Machine Learning			Semester:	5
Subject: Web Technologies				
Subject Code:	22AM5OE52		L – T – P - C:	3–0–0–3

Sl. No	Course Objectives
1	To introduce the fundamentals of the Internet, and the principles of web design.
2	To construct basic websites using HTML and Cascading Style Sheets.
3	To build dynamic web pages with validation using Java Script, JQuery objects and by applying different event handling mechanisms.
4	To develop modern interactive web applications using JAVA

Unit	Description	Hrs
I	**How web works:** Definitions and history, The client server model,(till 1.3.5)where is the internet?, Domain Name system, Uniform Resource locators, **Introduction to HTML:** what is HTML? and where did it come from, HTML syntax, Semantic Markup, structure of HTML documents, Quick tour of HTML elements, HTML5 Semantic structure elements. **HTML Tables and forms**: Introducing Tables, styling Tables, Introducing forms, form control elements, Table and form accessibility, Microformats.	**08**
II	**Introduction to CSS:** What is CSS?, CSS syntax, Location of styles, Selectors, The cascade: how styles interact, The Box model, CSS text styling. **JavaScript: Client side scripting:** What is JavaScript and what can it do, JavaScript design Principles. Where does JavaScript go, syntax, JavaScript objects, The Document Object model (DOM), JavaScript events, Forms, jquery foundations (15.2).	**08**
III	**Web Frameworks: Introducing Bootstrap 4**:Aadvantages, Implementing frame work files, Inserting the JavaScript files, starter template, Normalizing and Rebooting, Taking the starter template further, Using a static site generator, Converting the base template to a generator, Setting up the layout, **Working with layouts:** layouts, containers, creating a three column layout, **Working with content:**Reboot defaults and basics, how to style images, coding tables, **Playing with components:** Buttons, outlines, checkbox, radio	**08**
IV	**JDBC:** The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC /ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.	**08**
V	**Servlet:** Background; The Life Cycle of a Servlet; Servlet Development Options, Using Tomcat; A simple Servlet; The Servlet API; The javax.servlet Package; Reading Servlet Parameter; The javax .servlet. http package; Handling HTTP Requests and Responses, Using Cookies, Session Tracking.	**08**

Course Outcomes:

Course outcome	Descriptions
CO1	Explain the fundamentals of web Technologies.
CO2	Design and validate webpages using style sheets or frameworks.
CO3	Apply the JDBC APIs for accessing databases.
CO4	Illustrate the use of servlet APIs and JSP scriplets and Design the single page websites.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1												
CO2	3	2			3									
CO3	2	1	1	2	3									
CO4	2	1	1		1									

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Web Development	Randy Connollyy, Ricardo Hoar	2nd edition, Pearson, 2017, ISBN 13: 978-0-13-340715-0
2	Learning Bootstrap 4	Matt Lambert	2nd edition, PACKT Publishing(open source), 2016, ISBN 978-1-78588-100-8
3	Java - The Complete Reference	Herbert Schildt	9th Edition, Tata McGraw Hill, 2014 ISBN: 978-1-25-900659-3
4	J2EE - The Complete Reference	Jim Keogh	Enterprise Edition, Tata McGraw Hill, ISBN-13:978-0-07-052912-0ISBN-10: 0-07-052912-4

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Programming the World Wide Web	Robert. W. Sebesta	8th edition, Pearson,2015, ISBN-13: 978-0-13-377598-3
2	Introduction to Java Programming	Y Daniel Liang	10th edition, PHI ISBN-13: 978-0133761313 ISBN-10: 0133761312
3	The Java® Language Specification	James GoslingBill Joy Guy SteeleGiladBracha Alex Buckley	Java SE 7 Edition ISBN-13: 978-0133260229 ISBN-10: 0133260224

Department: Humanities and Sciences		**Semester:**	**5**
Subject: Research Methodology			
Subject Code:	**22IE561**	**L – T – P - C:**	**2 – 0 – 0 – 2**

Sl. No	Course Objectives
1	To give an overview of the research methodology and explain the technique of defining a research problem.
2	To explain carrying out a literature search, its review and to explain various research designs and their characteristics.
3	To explain the details of sampling designs, and also different methods of data collections.
4	To develop theoretical, conceptual frameworks, writing a review, to explain the art of interpretation and the art of writing research reports.

COURSE TOPICS: The course has 28 lecture hours in 5 Units. 2- Lecture hours per week of 1-hour duration.

Unit	Description	Hrs
I	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India. **Defining the Research Problem:** Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	6
II	**Reviewing the literature:** Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	5
III	**Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.**Design of Sample Surveys:** Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding.	7

IV	**Data Collection**: Experimental and Surveys, Collection of Primary and Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. **Hypothesis**- Basic concepts, types of hypothesis, Formulation of hypothesis, testing of hypothesis, Analysis of data, **Interpretation of data-** Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Editing, classification and tabulation. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding.	6
V	**Report Writing:** Significance of Report Writing, Different Steps in Writing Report, Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports. Research ethics, Citations, Similarity check. **Bloom'sTaxonomy Level:**L_1 – Remembering, L_2 – Understanding, L_3 – Applying, L_4 – Analyzing.	**4**

Course Outcomes:

Course outcome	Descriptions
CO1	Discuss research methodology and the technique of defining a research problem
CO2	Explain the functions of the literature review in research, carrying out a literature search
CO3	Developing theoretical and conceptual frameworks and writing a review
CO4	Explain various research designs, their characteristics. explain the art of interpretation and the art of writing research reports

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1	3	2	1	2	2	1	1	3	3	2	3		
CO2	1	1	2	2	1	1	1	1	1	1	1	2		
CO3	3	3	3	3	1	2	2	1	3	3	2	3		
CO4	1	3	2	1	1	2	2	3	3	2	3	3		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Research Methodology: Methods and Techniques	C.R. Kothari, Gaurav Garg	New Age International4th Edition, 2018
2	Research Methodology a step-by-step guide for beginners. (For the topic Reviewing the literature under module 2	Ranjit Kumar	SAGE Publications Ltd. 3rd Edition, 2011

Reference Books:

Sl	Reference Book Title	Author	Volume and Year of Edition
1	Research Methods: the concise knowledge base	Trochim	Atomic Dog Publishing2005
2	Conducting Research Literature Reviews: From the Internet to Paper	Fink A	Sage Publications 2009

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Department: Humanities and Sciences		Semester:	5
Subject: Management and Entrepreneurship			
Subject Code:	22IE562	L – T – P -	2 – 0 – 0 – 2

Sl. No	Course Objectives
1	Explain fundamentals of management, functions of a manager. Also explain planning, organizing, and staffing, decision making processes and explain the organizational structure
2	Describe the understanding of motivation and different control systems in management, leadership process, understanding of Entrepreneurship and its development process
3	Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur and summarize the preparation of project report, need significance of report. Also to explain about industrial ownership
4	To explain various forms of the intellectual property, its relevance and business impact in the changing global business environment and to discuss leading International Instruments concerning Intellectual Property Rights

COURSE TOPICS: The course has 28 lecture hours in 5 Units, 2- Lecture hours per week of 1-hour duration.

Unit	Description	Hrs
I	**Introduction** - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, **Planning-** Nature, importance, types of plans, steps in planning, **Organizing**- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection. **Directing and controlling**- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	**6**
II	**Entrepreneur** – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	**5**
III	**Preparation of project and ERP (Enterprise resource planning)** - meaning	**5**

	of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	
IV	**Micro and Small Enterprises**: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India indusial policy 2007 on micro and small enterprises, case studies in respective domains. Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	**6**
V	**Intellectual Property:** Introduction to IP**:** Importance of IPR, International conventions / agreements / treaties, Origin of IP law and history, laws related to IP in India: Indian Patent Act 1970, WIPO. **Patents:** Criteria for patentability,patentable and non-Patentable Matters, introduction to Prior Art Search, types of patent application: ordinary, convention, PCT, divisional and Patent of addition, filing procedure, drafting complete specification and claims. **Copyright:** Criteria, filing procedure, Copyright Infringement, rights of authorship and ownership, Fair Use, first sale doctrine, moral rights and economic rights. **Trademarks:** definition, eligibility Criteria, types of patents, filing procedure, Classification of Trademarks and well-known mark **Geographical Indications:** Definitions, importance, filing procedure, GI ecosystem in India and case laws**Industrial design:** eligibility criteria, Non-Protectable Industrial Designs India, Procedure for Registration, importance of design registration. **Bloom'sTaxonomy Level:** L_1 – Remembering, L_2 – Understanding.	**6**

Course Outcomes:

Course outcome	Descriptions
CO1	Explain management functions of a manager. Also explain planning and decision making processes. Organizational structure, staffing and leadership processes
CO2	Describe the understanding of motivation and different control systems in management and understanding of Entrepreneurships and its development process
CO3	Illustrate Small Scale Industries, various types of supporting agencies and financing available for an entrepreneur. Summarize the preparation of project report, need significance of report

CO4	Shall get an adequate knowledge on patent and copyright for their innovative research works and provide further the way for developing their idea for innovations

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	2	1	3	2	3	3	3	2	2		
CO2	1	1	2	2	1	2	1	3	3	3	3	1		
CO3	1	2	3	2	1	3	2	3	3	3	3	1		
CO4	1	1	2	1	1	2	2	2	2	2	1	2		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Principles of Management	P. C. Tripathi, P. N. Reddy	Tata McGraw Hill, 4th / 6th Edition, 2010
2	Intellectual property rights - Unleashing the knowledge economy	PmbuddhaGanguli	Tata MccrawHiU Publishing Company Ltd

Reference Books:

Sl No	Reference Book Title	Author	Volume and Year of Edition
1	Management and Entrepreneurship	KanishkaBedi	Oxford University Press-2017
2	Entrepreneurship Development	S S Khanka	S Chand & Co.
3	Dynamics of Entrepreneurial Development & Management -	Vasant Desai	Himalaya Publishing House

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Department: Humanities and Sciences		Semester:	5
Subject: Project Management			
Subject Code:	22IE563	L – T – P - C:	2 – 0 – 0 – 2

Sl. No	Course Objectives
1	To understand the scope, timing and quality of the project, and toanalyze the project goals, constraints, deliverables, performance criteria, control needs and resource requirement in consultation with stake holders
2	To implement the process of project management, life cycle and the embodied concepts, tools and techniques in order to achieve project success
3	To understand the team efforts and stakeholders in professional manner, respecting differences, to ensure a collaborative project environment
4	To apply project management practices to new programs, initiatives, products, services and events relative to the needs of stakeholders

COURSE TOPICS: The course has 28 lecture hours in 5 Units, 2- Lecture hours per week of 1-hour duration.

Unit	Description	Hrs
I	**Introduction:** Project, Program, and portfolio, Operations management, Product life cycle, Project life cycle, Project management life cycle, Role of project manager and office, Ten Project Knowledge areas with their associated processes **Project Integration Management**: Develop project charter, Develop project management plan, Direct & manage project work, Monitor control project, Perform integrated change control, Close project / phase. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding. L3-Analyzing	6
II	**Project scope management:**Plan scope management, Collect requirements, Define scope, Create WBS(Work Breakdown Structure), Validate Scope, Control scope. **Project Schedule management**: **Plan Schedule management** Define activities, Sequence activities, Estimate activity durations, Develop schedule, and Control schedule. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding. L3-Analyzing	5
III	**Project cost management:** Plan cost management, Estimate cost, Determine budget, and Control costs.	6

	Project quality management: Plan quality management, Manage quality and Control quality **Project resource management:** Plan resource management, Estimate activity resources, Acquire resources, Develop team, Manage team and Control resources. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding. L3-Analyzing	
IV	**Project communication management:** Plan communication management, Manage communications and Monitor communications **Project risk management:** Plan risk management, Identify risks, Perform qualitative risk analysis, Perform quantitative risk analysis, Plan risk responses, Implement risk responses and Monitor risks. **Project Procurement management:** Planprocurement management, Conduct procurement, Control procurements. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding. L3-Analyzing	**6**
V	**Project stake holder management:** Identify stake holders, Plan stake holder management, Manage stake holder engagement, and Monitor stake holder engagement. A case study relevant to the domain knowledge of the department is taken up to explain the principles of the project management as brought out above. **Bloom's Taxonomy Level:** L_1 – Remembering, L_2 – Understanding. L3-Analyzing	**5**

Course Outcomes:

Course outcome	Descriptions
CO1	Outline the procedure for analyzing a project and define the rational of work break structure
CO2	Illustrate the use of network techniques for successful project implementation
CO3	Design the procedure for overall financial analysis of the project alongside the resources requirement and ideal quality
CO4	Identify the sources and process for communication, risk management and procurement and build a comprehensive plan for the stake holder management.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	2	1	2	2	3	3	3	2		
CO2	1	2	2	3	1	3	2	3	3	3	3	1		
CO3	1	3	2	1	1	2	1	3	3	3	3	1		
CO4	1	1	2	3	1	2	2	3	3	3	3	2		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Project Management	Book of Knowledge	6th Edition, PMI, USA
2	Project Management	Dennis Lock	Taylor & Francis 10th Edition-2013

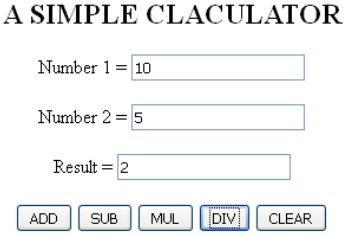
Reference Books:

Sl No	Reference Books Title	Author	Volume and Year of Edition
1	Project Planning: Analysis, Selection,	Prasanna Chandra	MC-GrawHill Education, 8th Edition, 2017
2	Project Management-a system approach to planning, scheduling & controlling	Harold Kerzner	CBS publications and Distributions,2002

Question paper pattern: The question paper will have TEN questions. There will be TWO questions from each unit. Each question will have questions covering all the topics under a unit. The students will have to answer FIVE full questions, selecting ONE full question from each unit.

Department: Artificial Intelligence & Machine Learning		Semester:	5
Subject: AIML Department Skill Lab-3 (Web Technology Lab)			
Subject Code:	22AM507	L–T– P-C:	1-0-2-2

Sl. No	Course Objectives
1	Design and develop web pages using HTML,CSS and Javascript.
2	To provide the ability to design console based, GUI based and web based applications.
3	Integrate Servlets and Databases in J2EE application.
4	Develop a mini project using web based applications.

Sl. No	Descriptions
1.	Design a student registration and Log-in form with using HTML5 tags and CSS .
2.	Develop static pages (using only HTML) of an online book store, the pages should resemble: www.amazon.com, the website should consist the following pages, home page, registration and user login, user profile page, books catalog, shopping cart, payment by credit card, order confirmation.
3.	Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).
4.	Develop a simple calculator to perform arithmetic (addition, subtraction, multiplication and division) operations on given two numbers. Use an html tag that allows the user to input two numbers and to display the result of arithmetic operation. Write suitable HTML and JavaScript and CSS to your simple calculator. The following figure show sample document display. 
5.	a) Develop and demonstrate, using Javascript script, a HTML document that collects the USN (the validformat is: A two digits f followed by two upper-case characters followed by three digits no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected. b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8)
6.	a) Develop and demonstrate, using Javascript script, a HTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it

	should rise to the top to become completely visible. b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.
7.	Write a java Servlet Program to implement a dynamic HTML using Servlet (username and Password should be accepted using HTML and displayed using a Servlet).
8.	Write a java Servlet Program to implement and demonstrate GET and POST methods(Using HTTP Servlet Class).
9.	Write a java program to connect to a database using JDBC and insert values into it .
10.	Write a java program to connect to a database using JDBC and delete values from it .
	PART B
1.	As a part of Mini project, all the students must carry out the following activities: 1. Students should form a group to carry out their project. The team should consist of maximum of 4 in a group. 2. The groups will be attached to one Internal Guide by the Department. 3. Students have to carry out a detailed survey on the Topic on which they are interested to carry out the Mini-Project work. Students are expected to submit the Synopsis. 4. Based on survey identify the Problem statement in concerned with guide and prepare the squire specification report. 5. Implement the project work within the timeline. 6. Prepare and Give the presentation on time. 7. Prepare Project document and demonstrating their work.
2.	**Procedure for Guide allotment** Collecting the area of interest both from Students and as well as the staff and then we match the area of each other and allocate the guides.
3.	**Mini Project Work Evaluation Scheme Evaluation Scheme:** Continuous evaluation will be done by respective Project Guides based on the following points: Regularity, Technical Knowledge and Competence, Programming Skills, Communication Skills, Demonstration skills, Technical Competence, presentation, Team Work and Documentation Skills of the students.
4.	The team must submit a brief project report (25-30 pages) that must include the following: • Introduction • Literature survey • Hardware & Software Requirements • System Design Architecture • Implementation (screenshots to be included) • Testing • Conclusion • Future enhancements. • Bibliography

Course Outcomes:

Course outcome	Descriptions
CO1	Apply HTML tags for designing static web pages and forms using Cascading Style Sheet.
CO2	Design and Validate web based applications using JavaScript.
CO3	Design and build maintainable web applications by creating dynamic web pages with Servlets and database connection using JDBC.
CO4	Analyze, discuss and design the technical aspects of the choose mini project with a comprehensive and systematic approach.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1		1										
CO2	2	2	1		1									
CO3	3	2	3		3									
CO4	1		1		2									

Note:

- **CIE Marks Distribution - Part A carries 25 Marks and Part B carries 25 Marks.**
- **In Practical examination student has to execute one question out of 10 questions from Part A. This is evaluated for 25 Marks.**
- **A team of maximum two students must demonstrate the project individually (Part B). This is evaluated for 25 Marks.**

Department: Humanities and Sciences			Semester:	5
Subject: SKILL DEVELOPMENT-II (APTITUDE SKILLS)				
Subject Code:	22SK508		L – T – P - C:	0-0-2-1

Course Objectives:

Sl. No	This course will enable the students to
1	Develop Critical Thinking and Reasoning Skills
2	Master Seating and Arrangement Techniques
3	Enhance Analytical and Mathematical Reasoning
4	Apply Advanced Problem-Solving Strategies

COURSE TOPICS: The course has 28 lecture hours in 5 Units, 2- lecture hours per week of 1-hour duration.

Unit	Description	Hrs
I	**Logical Aptitude** - Syllogism, Venn-diagram method, Three statement syllogism, Deductive and inductive reasoning. Introduction to puzzle and games organizing information, parts of an argument, common flaws, arguments and assumptions. **Linear Seating Arrangement** Single or Double rows facing each other or away from each other in the same direction **Circular Seating Arrangement** · Uni- & Bi-directional problems on · Circular, Square, Rectangular, Hexagonal tables **Coding Decoding:** Letter Coding, Number Coding, symbol coding **Crypt arithmetic**: Basic concepts , addition , subtraction, multiplication of coded alphabets, Types of cryptarithm, Clocks and Calendar **Reasoning** – a. Verbal - Blood Relation, Sense of Direction, Arithmetic & Alphabet. Non- Verbal reasoning - Visual Sequence, Visual analogy and classification. Analytical Reasoning - Single & Multiple comparisons, Linear Sequencing.	6
II	**Permutation and Combination**: Understanding the difference between the permutation and combination, Rules of Counting-rule of addition, rule of multiplication, factorial function, Concept of step arrangement, Permutation of things when some of them are identical, Concept of 2n, Arrangement in a circle. **Probability**: Single event probability, multi event probability, independent events and dependent events, mutually exclusive events, non-mutually exclusive events, combination method for finding the outcomes.	6
III	**Number System** · Divisibility & Remainder, · Multiples & Factors,· Integers,· LCM & HCF,· Complete a number Series,· Find the Missing Term and Wrong Term **Simplification**	6

	· BODMAS Rule, · Approximation, · Decimals, · Fractions, · Surds & Indices **Percentage** Calculation-oriented basic percentage, Profit and Loss, Successive Selling type, Discount & MP, Dishonest Dealings, Partnerships Interest : Simple Interest, Compound Interest, Mixed Interest, Instalments. **Data Interpretation**: Approach to interpretation - simple arithmetic, rules for comparing fractions, Calculating (approximation) fractions, short cut ways to find the percentages, Classification of data– Tables, Bar graph, line graph, Cumulative bar graph, Pie graph, Combination of graphs. Combination of table and graphs	
IV	**Averages and Allegations mixtures**: Average: relevance of average, meaning of average, properties of average, deviation method, concept of weighted average. Allegation method: a situation where allegation technique, general representation of allegations, the straight line approach, application of weighted average and allegation method in problems involving mixtures. Application of allegation on situations other than mixtures problems. **Data Sufficiency**: Questions based on> Quantitative aptitude, > Reasoning aptitude > Puzzles	4
V	**Ratio and Proportion** · Simple Ratios, · Compound Ratios, · Comprehend and Dividend · Direct & Indirect Proportions, · Problems on ages,· Mixtures & Allegation **Speed, Time and Distance** · Relative Speed, · Average Speed, · Problems on Train, · Boat & Stream. **Time and Work** · Work Efficiency, · Work & Wages, Pipes & Cisterns	6

Course Outcomes:

Course outcome	At the end of the course students will be able to
CO1	Enhanced Logical and Analytical Thinking
CO2	Proficiency in Advanced Arrangement and Sequencing Problems
CO3	Strong Numerical and Mathematical Aptitude
CO4	Effective Data Interpretation and Quantitative Analysis

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					2		3	3	3				
CO2	1					2		3	3	3				
CO3	1					2		3	3	3				
CO4	1					2		3	3	3				

Text Books:

Sl	Text Book title	Author	Volume and Year of
1	How to Prepare for Logical Reasoning for CAT" by Arun	Arun Sharma	• ISBN-10: 9352602280 • ISBN-13: 978-
2	A Modern Approach to Verbal & Non-Verbal Reasoning" by	R.S. Aggarwal	• ISBN-10: 8121924987 • ISBN-13: 978-

Reference Books:

Sl	Text Book title	Author	Volume and Year of
1	Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal	R.S. Aggarwal	□ ISBN-10: 9352534026 □ ISBN-13: 978-9352534021
2	Logical Reasoning and Data Interpretation for the CAT" by Nishit K. Sinha	Nishit K. Sinha	□ ISBN-10: 933922269X □ ISBN-13: 978-9339222694

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU

(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)

Academic year 2024-2025

Scheme of Teaching and Examination-2022 (160 Credits Scheme, NEP)
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

VI Semester B.E **Academic year: 2024-25**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	PC	22AM601	Advanced AI	AM	3	-	-	3	50	50	100	3
2	PC	22AM602	Computer Networks	AM	3	-	2	4	50	50	100	3
3	PC	22AM603	Machine Learning Techniques	AM	3	-	2	4	50	50	100	3
4	PE	22AM6PE4X	Professional Elective-II	AM	3	-	-	3	50	50	100	3
5	OE	22AM6OE5X	Open Elective-II	AM	3	-	-	3	50	50	100	3
6	PC	22AM66X	Online course: NPTEL/MOOC/SWAYAM	AM	2	-	-	2	50	-	50	-
7	PW	22AMMP607	Mini Project	AM	-	-	4	2	50	50	100	3
8	HS	22SK608	Preplacement Training	T&P	-	-	2	1	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				Total	17	-	10	22	400	300	700	-

Credits Distribution: Basic Science (BS)=08+08+3+3=22, Engineering Science (ES)=10+11=21, Humanities & Social Sciences (HS)=1+2+2+1+3=09, Program Core (PC)=02+16+16+15+11=58, Program Elective (PE)=03+03=06, Open Elective(OE)=03+03=06, Project work (PW)=02, Total Credits=20+20+21+21+23+22=127 . Total 80 AICTE Activity points need to earn by each regular student and Total 55 AICTE Activity points need to earn by each Lateral entry student at the end of 3rd Year BE.

Professional Elective-II	Open Elective-II	Online course
22AM6PE41: Data Mining and Business Intelligence	**22AM6OE51: Introduction to Machine learning**	**22NP661: NPTEL**
22AM6PE42: Digital Image Processing	**22AM6OE52: Soft and Evolutionary computing**	**22MC662:MOOC**
22AM6PE43: Cloud computing		**22SW663:SWAYAM**

SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU

(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)
Academic year 2024-2025

Department:Artificial Intelligence & Machine Learning		**Semester:**	**6**
Subject: Advanced Artificial Intelligence			
Subject Code:	**22AM601**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Demonstrate the fundamentals of ordering
2	To know the concept of Decision Tree.
3	Explore Artificial Neural Networks
4	Illustrate use of Bayesian Learning and Instance-Based Learning

Unit	Description	Hrs
I	**Concept Learning And The General-To-Specific ordering:** Introduction, A Concept Learning Task, Concept Learning as Search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate-Elimination Algorithm, Remarks on Version Spaces and Candidate-Elimination, Inductive Bias (Text1: 2.1 to 2.7)	**8**
II	**Decision Tree Learning:** Introduction, Decision Tree Representation, Appropriate Problems For Decision Tree Learning, The Basic Decision Tree Learning Algorithm, Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning **(Text1:** 3.1 to 3.7)	**8**
III	**Artificial Neural Networks:** Introduction, Neural Network Representations, Appropriate Problems For Neural Network Learning, Perceptrons, Multilayer Networks and the Backpropagation Algorithm, Remarks on the Backpropagation Algorithm, An Illustrative Example: Face Recognition. **(Text1:** 4.1 to 4.7)	**8**
IV	**Bayesian Learning:** Introduction, Bayes Theorem - An Example, Bayes Theorem and Concept Learning, - Brute-Force Bayes Concept Learning, Map Hypotheses and Consistent Learners, Maximum Likelihood And Least-Squared Error Hypotheses, Maximum Likelihood Hypotheses For Predicting Probabilities - Gradient Search to Maximize Likelihood in a Neural Net. **(Text1:** 6.1 to 6.5)	**8**
V	**Instance-Based Learning:** Introduction, K-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks On Lazy and Eager Learning. **Analytical Learning:**Introduction,Inductive and Analytical Learning Problem, Learning With Perfect Domain Theories: Prolog-Ebg. **(Text1:** 8.1 to 8.6) **(Text1:**11.1 to 11.2)	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Analyze the concept of fundamentals of ordering.(L2)
CO2	Illustrate Decision Tree Learning. (L2)
CO3	Explore Artificial Neural Networks.(L3)
CO4	Apply effectively Bayesian Learning, Instance-Based Learning and Analytical Learning. (L3)

Course Articulation Matrix:

PO & PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		2											
CO2	3	2	2											
CO3	2		2											
CO4	2	1	3		3									

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Machine Learning	Tom M. Mitchell	McGraw-Hill Education, 2013
2	Machine Learning	Anuradha Srinivasaraghavan, Vincy Joseph,	Wiley 2019
3	Machine Learning using Python	Manaranjan Pradhan, U Dinesh Kumar	Wiley 2019

Reference Books:

Sl No	Title	Author	Volume and Year of Edition
1	Artificial Intelligence	Elaine Rich, Kevin Knight	Tata McGrawHill,2014
2	Principles of AI	Nils J.Nilsson, Elsevier	Morgan Kaufman Publishers,2014
3	Artificial Intelligence: A Modern Approach	Staurt Russel, Peter Norvig, Pearson Education	3rdEdition, 2009
4	Artificial Intelligence Structure and Strategies for Complex Problem Solving	George FLugar	Pearson Education, 5th Edition,2011

Department: Artificial Intelligence and Machine Learning			**Semester:**	**6**
Subject: Computer Networks				
Subject Code:	**22AM602**		**L – T – P - C:**	**3 – 0 – 2 – 4**

Sl. No	Course Objectives
1	Understand the working of different layers of OSI model & TCP/IP model.
2	Study the various routing algorithms.
3	Know the concept of data transfer between nodes.
4	Learn the functions and services of each layer

Unit	Description	Hrs
I	**Data Communications:** Introduction, Components, Representations, Data Flow, Networks: Physical Structures, Network Types: LAN, WAN, Switching, The Internet. **Network Models:** Protocol Layering: Scenarios, Principles of protocol layering, TCP/IP Protocol Suite: Layered Architecture, Encapsulation and De-capsulation, Addressing, Multiplexing and De-multiplexing. The OSI Model: OSI versus TCP/IP. **Data-Link Layer:** Introduction, Nodes and Links, Services, Categories of link, sub layers, Link Layer addressing: Types of addresses, ARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple protocol, Stop and wait protocol (Text 1: 1.1 to 1.4,2.1,2.2, 2.3, 9.1,9.2, 11.1, 11.2.1,11.2.2)	**08**
II	**Media Access Control:** Introduction. Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access: Reservation, Polling, Token Passing. Channelization: FDMA, TDMA, CDMA. **Wired and Wireless LANs:** Ethernet: Ethernet Protocol: IEEE802, Ethernet Evolution, Standard Ethernet: Characteristics, Efficiency. **Wireless LANs:** Introduction: Characteristics, IEEE802.11: Architecture, MAC Sub layer, Bluetooth: Architecture. (Text1: 12.1.1 to 12.1.3, 12.2.1 to 12.2.3, 13.1to13.2.5, 15.1, 15.2,15.3.1)	**08**
III	**Connecting Devices:** Introduction, Hubs, link layer Switches, Virtual LANs: Membership, Configuration. **Network Layer:** Introduction, Network Layer services: Packetizing, Routing and Forwarding, Packet Switching: Datagram Approach, Virtual Circuit Approach. **IPV4Addresses:**AddressSpace,Classful Addressing, Classless Addressing, DHCP, Network Address Resolution. (Text 1:17.1 to 17.2.3,18.1.1,18.1.2, 18.2, 18.4)	**08**
IV	**Network Layer Protocols:** Introduction, Internet Protocol (IP): Datagram Format, Fragmentation, Security of IPv4 Datagram, Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP. **Next Generation IP:** IPV6 Addressing, Address Space, IPV6 Protocol-packet format, Transition fromIPv4 To IPv6. **Uni-cast Routing:** Introduction, Routing Algorithms: Distance Vector Routing, Link State Routing. (Text 1: 19.1, 19.3 , 20.1,20.2.1,20.2.2, 22.1, 22.1.1, 22.1.2, 22.2.1, 22.4)	**08**

V	**Transport Layer:** Introduction, Transport Layer Services, Connection less and Connection oriented Protocols, Transport Layer Protocols: Go-Back-N Protocol, Selective Repeat protocol. **Transport Layer Protocols in the Internet:** User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, Connection, State Transition diagram (Text 1: 23.1, 23.2.1 to 23.2.4, 24.2, 24.3.1 to 24.3.8)	**08**

LAB CONTENT

Sl. No	Experiment Description
1	Write a program to bit stuff and Destuff the frame.
2	Write a program to Character stuff and Destuff the frame
3	Write a program to Simulate Data Encryption and Decryption using Substitution Method
4	For the given data, use CRC-CCITT polynomial to obtain CRC code. Verify the program for the cases: a. Without error b. With error
5	Implementation of Stop and Wait Protocol and Sliding Window Protocol
6	Simulate a four-node point to point network with duplex links between them and set the queue size to vary bandwidth and to find the number of packets dropped.
7	Simulate different types of internet traffic such as FTP and TELNET over a network to analyze the throughput.
8	Simulate Ethernet LAN using n nodes and set multiple traffic nodes to determine collision across different node.
9	Implementation of Link State Routing algorithm for a given graph.
10	Performing an initial Router configuration Cisco Packet Tracer.

Course Outcomes:

Course outcome	Descriptions
CO1	Identify the importance of network architectures, frame formats, addressing mechanisms and Wired & Wireless architectures used for different network applications.
CO2	Interpret the significance of basic concepts of computer networks which is the basis for Internet applications.
CO3	Design implement and assess computing based solution to meet the given network topologies, Protocol stack, Address space and bandwidth capacities of different data transmission standards.
CO4	Illustrate the essence of connecting devices require data different layers and Virtual LAN technology features, facilitating the flexible network design for users.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1	1									
CO2	1	1												
CO3			2		1								2	
CO4	2					2						2		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Data Communication and Networking	B Forouzan	McGraw Hill,2013, 5th Edition
2	Computer networks	Andrew S.Tenenbaum	Pearson Prentice hall, 2010, 4th Edition

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Computer Networks	James F.Kurose, Keith W.Ross	Pearson Edu., 2ndEdition, 2003
2	Introduction to Data Communication and Networking	Wayne Tomasi	Pearson Edu., 2007

Department: Artificial Intelligence and Machine Learning			**Semester:**	**6**
Subject: Advanced Machine Learning				
Subject Code:	**22AM603**		**L – T – P - C:**	**3–0–2–4**

Sl. No	Course Objectives
1	To understand the basic concepts of machine learning.
2	To acquire the knowledge and build supervised learning models.
3	Analyze the basic concepts of learning and decision trees and working principles of neural networks models.
4	Apply the concepts of the instant based learning, genetic algorithms and reinforcement learning.

Unit	Description	Hrs
I	**Concept learning:** Well Posed Learning problem, Perspectives and Issues in machine learning, A Concept Learning Task, Concepts Learning as Search, FIND-S: Finding a maximally specific Hypothesis, Version Spaces and Candidate Elimination Algorithm, Remarks on version space and Candidate Elimination. **Text Book 1: Chapter 1: 1.1, 1.3, Chapter 2: 2.2, 2.3,2.4,2.5,2.6**	**08**
II	**Support vector machines:** What Is a Support Vector Machine? Maximum Separability, Support Vectors, Formula for the Hyperplane, Using Scikit-learn for SVM, Plotting the Hyperplane and the Margins, Making Predictions, Kernel Trick, Adding a Third Dimension, Plotting the 3D Hyperplane, Using SVM for Real-Life Problems. **Text Book 2: Chapter 8**	**08**
III	**Decision tree learning:** Decision Tree Representation, The Basic Decision Tree Algorithm **Basics of neural networks:** Introduction, Neural Network Representations, Appropriate problems for Neural Networks, Perceptrons: Representational Power of Perceptrons, Training Rule, Gradient Descent and Delta Rule. **Text Book 1: Chapter 3: 3.2, 3.4, Chapter 4: 4.1,4.2, 4.3,4.4**	**08**
IV	**Bayesian learning:** Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and least squared error hypotheses, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, Bayesian Belief networks, EM Algorithm-General Statements of EM Algorithm. **Genetic algorithms:** Motivation, Genetic Algorithms, Hypothesis Space Search, Genetic Programming. **Text Book 1: Chapter 6: 6.1,6.2, 6.3, 6.4, 6.6, 6.7, 6.8, 6.9, 6.11, 6.12** **Chapter 9: 9.1,9.2, 9.4, 9.5**	**08**
V	**Reinforcement learning:** Introduction, Learning Task, Q-Learning, Nondeterministic Rewards and actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming. **Text Book 1: Chapter 13: 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7**	**08**

LAB CONTENT

Sl. No	Experiment Description
1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples
3	Implement concepts of classification in Support Vector Machines using Scikit learn.
4	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5	Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
6	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using *k*-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

Course Outcomes:

Course outcome	Descriptions
CO1	Apply concept learning to create models for classifying the given data.
CO2	Analyze the working principles of Support Vector Machines, decision trees and neural networks and effectively apply neural networks models to provide solution for the given applications.
CO3	Analyze the working of Bayesian models and apply the same to infer the observed data.
CO4	Apply genetic algorithms concepts and reinforcement learning concepts to solve the given machine learning applications.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2 2	1 1	2	2 1	31		3 1	1		1	1		
CO2	2	2	3	2	1	3		1				1		
CO3	2	2	3	2	1	3		1				1		

CO4	2	3	3	2	3	3		1				1		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Machine Learningǁ	Tom Mitchell	McGraw Hill, 3rd Edition, 1997. Machine Learning, McGraw-Hill Education (INDIAN EDITION), 2013.
2	Python Machine Learning	Wei-Meng Lee	WILEY Publications, 2019, ISBN: 978-1-119-54563-7ISBN: 978-1-119-54569-9 (ebk)

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to Machine Learning	Ethem Alpaydin	MIT Press, Fourth Edition, 2020.
2	An Introduction to Machine Learning	MiroslavKubat	2 nd Edition ,Springer, ISBN978-3-319-63913-0(eBook) ISBN978-3-319-63912-3

Department: Artificial Intelligence & Machine Learning		**Semester:**	**6**
Subject: **Data Mining and Business Intelligence**			
Subject Code:	**22AM6PE41**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Define multi-dimensional data models.
2	Explain rules related to association analysis.
3	Explain the Decision Support systems and Business Intelligence framework.
4	Illustrate the significance of computerized Decision Support, and understand the mathematical modeling behind decision support.

Unit	Description	Hrs
I	Data Mining: What is Data Mining? Motivating Challenges, The origins of data mining, Data Mining Tasks, Types of Data, Data Quality, Data Preprocessing **T1: Chapter 1, 2.1-2.3**	**8**
II	Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets. **T1: Chapter 6.1-6.3,6.5**	**8**
III	Classification: Rule Based Classifiers, How a rule based classifier works, Rule ordering schemes, How to build a rule based classifier, Direct methods for rule extraction, Indirect methods for rule extraction, Characteristics of rule based classifier. Nearest Neighbor Classifiers, Algorithm, characteristics. Bayesian Classifiers, Bayes theorem, using Bayes theorem for classification, Naïve Bayes classifier, Bayes error rate, Baysian belief networks. **T1: Chapter 5.1-5.3**	**8**
IV	Decision Support and Business Intelligence: Opening Vignette, Changing Business Environments and Computerized Decision Support, Managerial Decision Making, Information systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), A framework for Business Intelligence (BI), Business Analytics Overview. **T2: Chapter 1.1-1.8**	**8**
V	Foundations and Technologies for Decision Making: Introduction and Definitions Models, Phases of the Decision Making Process, The Intelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions Are Supported, Decision Support Systems: Capabilities, DSS Classifications, Components of Decision Support Systems. **T2: Chapter 2.2-2.11**	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Identify data mining problems and implement the data warehouse
CO2	Write association rules for a given data pattern
CO3	Apply the basics of data and business to understand Decision Support systems and Business Intelligence framework.
CO4	Describe the significance of computerized Decision Support, apply the basics of mathematics to understand the mathematical modelling behind decision support.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	2	3	2											
CO3	2			2		2		1		1	2	1		
CO4						2					2	1		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Pearson, First impression, 2014
2	Business Intelligence and Analytics: Systems for decision support	Ramesh Sharda, Dursun Delden, Efraim Turban	Pearson Tenth edition

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Mastering Data Mining	Michael .J. Berry, Gordon.S. Linoff	Wiley Edition, second edtion,2012.
2	Data Mining Techniques. For Marketing, Sales and Customer Relationship Management	Berry M.& Linoff G.	Wiley Publishing Inc 2004

Department: Artificial Intelligence & Machine Learning	Semester:	6

Subject: Digital Image Processing			
Subject Code:	**22AM6PE42**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Introduce the concepts of image processing and basic analytical methods in Image processing.
2	Acquire knowledge about various image processing techniques.
3	Expose to various image transformation techniques.
4	Familiarize with various image compression and transform techniques.

Unit	Description	Hrs
I	**DIGITAL IMAGE FUNDAMENTALS:** Digital Image Processing definition, fundamental steps in digital image processing, classification of digital images, image file formats, Applications of Digital Image Processing, Convolution and Correlation:2D convolution through graphical method, convolution through Z transform, 2D convolution, circular convolution, correlation through matrix analysis. (Text1:1.1to1.4,Text2:chapter1:1.9to1.10chapter3:3.1to3.7)	**8**
II	**ELEMENTS OF VISUAL PERCEPTION**: Structure of human eye, Image formation inan eye, Brightness adaptation and discrimination, Light and Electromagnetic spectrum, Images sensing and acquisition, Images ampling and quantization, Some basic Relationship between pixels: Neighbors of a pixel, Adjacency, connectivity, regions, and Boundaries, Distance Measures. (Text1:2.1to2.5)	**8**
III	**IMAGE TRANSFORMS:** Two dimensional orthogonal and Unitary transforms, Properties of Unitary transforms, two-dimensional discrete Fourier Transform, Discrete Cosine Transforms, Sine Transforms, Hadamard Transform, HaarTransform. (Text2: 4.1to4.12)	**8**
IV	**INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING:** Basic Intensity transformation functions: Image Negative, Log transformation, Power Law (gamma transformation) ,Piecewise -linear transformation functions Histogram Processing: Histogram Equalization, Histogram Matching, Linear gray level transformation, local or neighborhood operation, Median filter, Spatial domain high pass filtering or Image Sharpening, Bitplane slicing, Image enhancement in the Frequency domain, Homomorphic filter, zooming operation, Image Arithmetic.(Text1:3.1to3.4,Text2:5.1to5.15)	**9**
V	**IMAGE CODING AND COMPRESSION:** Redundancy in Images, Image compression scheme, Run length coding, Shannon Fano coding, Huffman coding, Arithmetic coding, Dictionary based compression, Transform based compression, Wavelet based image compression standard, Fractal image Compression, Block Truncation coding.(Text2: 9.1to 9.21)	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Mathematicallyrepresentthevarioustypesofimagesandanalyzethemandrevie w the fundamental concepts of image processing(L1)
CO2	Process the images for the enhancement and transform of certain Properties.(L3)
CO3	Analyze the Images using various Image transformation Techniques.(L4)
CO4	Interpret Image coding and Compression Standards.(L2)

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			2		2								
CO2		2												
CO3			1	2										
CO4	3					2								

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Digital Image Processing	Rafael C. Gonzalez, Richard E. Woods	Pearson Education Pvt.Ltd., 978-1-292-22304-9, 4th edition, 2018.
2	Digital Image Processing	Jayaraman	Tata McGraw-Hill Education, 3rdEdition2012, 9780070144798

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of Digital Image Processing	Anil Jain K	PHI LearningPvt.Ltd.,978-0-13-168728-8, 2011.
2	Digital Image Processing	William K .Pratt	John Wiley, 4thEdition, 2007

Department: Artificial Intelligence & Machine Learning		Semester:	6
Subject: Cloud Computing			
Subject Code:	22AM6PE43	L–T– P-C:	3-0-0-3

Sl.No	Course Objectives
1	Study cloud computing paradigm.
2	Classify various cloud services and their providers.
3	Study various cloud deployment models.
4	Analyze various types of computing environments and Identify enabling technologies of cloud computing.

Unit	Description	Hrs
I	Introduction to Cloud Computing: Glance of computing, The vision of Cloud Computing, Defining a cloud, A closer look, Cloud computing reference model, Characteristics and benefits , Challenges ahead, Historical developments: Distributed systems, Virtualization, Web 2.0; Service oriented computing; Utility oriented computing	8
II	Principles of parallel and distributed computing: Parallel Vs Distributed computing , elements of parallel computing, Elements of distributed computing, Technologies for distributed computing	8
III	Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples: Xen: Para virtualization, VmWare.	8
IV	Cloud computing architecture: Introduction, Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.	8
V	Cloud Tools and Applications: Aneka-Framework overview, Anatomy of the Aneka container,Building Aneka clouds, Cloud programming and management.	8

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the concepts of Cloud computing paradigms and various levels of services that can be achieved by cloud.
CO2	Ability to understand the concepts of virtualization to increased availability of high-performance applications.
CO3	Analyze various cloud computing architectures and apply them to solve problems on the cloud.
CO4	Understand the Cloud platforms in industry to reduce implementation and maintenance costs.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	1			1				1		
CO2	1	3	2	3							1			
CO3	1	3	3	3	3			1				1		
CO4	1	2	2		2					1	2	2		

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Mastering Cloud Computing	RjkumarBuyya, Christian Vecchiola, ThamaraiSelci	Tata McGraw Hill, New Delhi, India, 2013 **ISBN: 978-0-12-411454-8**

Reference Books:

Sl No	Title	Author	Volume and Year of Edition
1	Cloud Computing for Dummies	Judith Hurwitz, R.Bloor, M. Kanfman, F.Halper	Wiley India Edition **ISBN: 978-0-470-48470-8**
2	Cloud Computing: A Practical Approach	J.Vette, Toby J. Vette, Robert Elsenpeter	Tata McGraw Hill **ISBN -978-0-07-16295-8**

Department: Artificial Intelligence & Machine Learning		**Semester:**	**6**
Subject: Introduction to Machine Learning			
Subject Code:	**22AM6OE51**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	To Explain Machine Learning and its applications.
2	To Describe a variety of learning paradigms, algorithm‘s theoretical results, and applications.
3	To study the basics of supervised and unsupervised learning.
4	To Illustrate ML algorithm and their use in appropriate applications.

Unit	Description	Hrs
I	Introduction to Machine Learning : What Is Machine Learning, What Problems Will Machine Learning Be Solving, Types of Machine Learning Algorithms, Extending Python Using NumPy: What Is NumPy? Creating NumPy Arrays , Array Indexing, Manipulating Tabular Data Using Pandas : What Is Pandas? Pandas Series, Pandas Data Frame, Creating a Data Frame ,Specifying the Index in a DataFrame, Data Visualization Using matplotlib: What Is matplotlib? Plotting Charts, Getting Started with Scikit-learn for Machine Learning: Introduction to Scikit-learn Getting Datasets.	**8**
II	Supervised Learning—Linear Regression: Types of Linear Regression, Linear Regression ,Using the Boston Dataset , Data Cleansing ,Feature Selection , Multiple Regression , Training the Model , Getting the Intercept and Coefficients , Plotting the 3D Hyperplane , Polynomial Regression , Formula for Polynomial Regression , Polynomial Regression in Scikit-learn , Understanding Bias and Variance.	**8**
III	Supervised Learning—Classification Using K-Nearest Neighbors (KNN): What Is K-Nearest Neighbors, Implementing KNN in Python , Plotting the Points , Calculating the Distance Between the Points , Implementing KNN , Making Predictions , Visualizing Different Values of K , Using Scikit-Learn‘s K Neighbors Classifier Class for KNN, Exploring Different Values of K , Cross Validation , Parameter-Tuning K , Finding the Optimal K.	**8**
IV	Unsupervised Learning—Clustering Using K-Means: What Is Unsupervised Learning, Unsupervised Learning Using K-Means, How Clustering in K-Means Works ,Implementing K-Means in Python, Using K Means in Scikit-learn , Importing the Data , Cleaning the Data , Plotting the Scatter Plot, Clustering Using K-Means , Finding the Optimal Size Classes.	**8**
V	Performance Evaluation Basic Performance Criteria, Precision and Recall, Other Ways to Measure Performance, Learning Curves and Computational Costs, Methodologies of Experimental Evaluation.	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Describe various supervised and unsupervised machine learning algorithms.
CO2	Illustrate the working of Machine Learning Algorithms.
CO3	Compare and analyze the performance of classifiers.
CO4	Apply variety of machine learning algorithms on datasets.

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2											
CO2	3	2	2	2	2									
CO3		2												
CO4	2	2	3	1	3									

Text Books:

Sl No	Text Book title	Author	Volume and Yearof Edition
1	Python Machine Learning	Wei-Meng Lee	WILEY Publications, 2019, ISBN: 978-1-119 54563-7ISBN: 978-1-119 54569-9 (ebk)
2	An Introduction to Machine Learning	MiroslavK ubat	2ndEdition,Springer, ISBN978-3-319-63913 0(eBook) ISBN978-3-319-63912-3

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Machine Learning	Tom M.Mitchell	IndiaEdition2013,McGraw Hill Education, ISBN:13:9780070428072
2	Machine Learning–An Algorithmic Perspective	Stephen Marslan D	2nd Edition, Chapmanand Hall/CRC,2014,ISBN-10:1466583282 ISBN-13:978-146583283

Department: Artificial Intelligence & Machine Learning		**Semester:**	**6**
Subject: Soft and Evolutionary Computing			
Subject Code:	**22AM6OE52**	**L–T– P-C:**	**3-0-0-3**

Sl.No	Course Objectives
1	Describe the basics of Soft computing
2	Explain the process Fuzzy &Genetic Algorithm to solve the optimization problem.
3	Analyze the Neuro Fuzzy system for clustering and classification.
4	Illustrate the process of swarm intelligence system to solve real world problems.

Unit	Description
I	Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. Introduction to classical sets and fuzzy sets: Classical relations and fuzzy relations, Membership functions.
II	Fuzzification, Fuzzy sets and numerical and Defuzzification , steps and numerical
III	Genetic algorithms: Introduction, Basic operations, Traditional algorithms, Simple GA General genetic algorithms, Operators, Stopping conditions for GA flow.
IV	Swarm Intelligence System: Introduction, background of SI, Ant colony system Working of ant colony optimization, ant colony for TSP.
V	Unit commitment problem, particle Swarm Intelligence system Artificial bee colony system, Cuckoo search system.

Course Outcomes:

Course outcome	Descriptions
CO1	Describe different soft computing techniques and its importance.
CO2	Interpret Fuzzification and Defuzzification concepts.
CO3	Illustrate Genetic algorithms and itys working
CO4	Develop swarm algorithms

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2											
CO2	3	2	1		2		2							
CO3	3	2					3							
CO4			3	2										

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Principles of Soft computing	Shivanandam, Deepa S. N	Wiley India, 2011/Reprint2014
2	Soft Computing with MATLAB Programming	N. P. Padhy, S.P. Simon	Oxford, 2015

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Neuro-fuzzy and soft computing	S.R. Jang, C.T. Sun, E. Mizutani	Phi (EEE edition), 2012
2	Soft Computing	Saroj Kaushik, Sunita Tiwari	Mc GrawHill, 2018

Department: Artificial Intelligence & Machine Learning		**Semester:**	**6**
Subject: Mini Project			
Subject Code:	**22AM607**	**L–T– P-C:**	**0-0-4-2**

Description
Guidelines for Student Mini Project Work: 1. **Group Formation:** o Students should form groups to work on their projects. o Each group must consist of a minimum of **1 student** and a maximum of **2 students**. 2. **Guidance and Attachment:** o The formed groups will be assigned to an **Internal Guide** by the Department. 3. **Topic Survey and Synopsis Submission:** o Students must conduct a detailed survey on the topic they are interested in for their Mini-Project. o After the survey, students are expected to submit a **Synopsis**. 4. **Problem Statement Identification:** o Based on the survey findings, students should identify the problem statement related to their chosen topic. o Prepare a concise **problem specification report** in consultation with the guide. 5. **Project Implementation:** o Students are required to implement their project work within the specified timeline. 6. **Presentation Preparation:** o Prepare and deliver a presentation on the project. 7. **Project Documentation and Demonstration:** o Create comprehensive project documentation. o Demonstrate the completed work.
Procedure for Guide allotment : Collecting the area of interest both from Students and as well as the staff and then we match the area of each other and allocate the guides'
Mini Project Work Evaluation Scheme: Continuous evaluation will be done by respective Project Guides based on the following points: Regularity, Technical Knowledge and Competence, Programming Skills, Communication Skills, Demonstration skills, Technical Competence, presentation, Team Work and Documentation Skills of the students.

Course Outcomes:

Course outcome	**Descriptions**
CO1	Apply the engineering knowledge to identify the problem in a specified area.
CO2	Analyze the problem and design the high level modules.
CO3	Design the suitable ecological algorithms / methodologies and plan to work with a

	team.
CO4	Execute the solutions by selecting suitable language / tools / platforms / frameworks.
CO5	Effectively Convey Information via Oral Presentations and Compile a Comprehensive Report Detailing the Project and Its Outcomes

Course Articulation Matrix

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											2		
CO2		2										2		
CO3		2	3						3			2		
CO4					3							2		
CO5										3	1			