

# **Eklavya University**

**SESSION** 

2023-24

# M.C.A. III SEMESTER SYLLABUS

OF

Computer Application And Information Technology Department

School of Basic and Applied Sciences

**EKLAVYA UNIVERSITY, DAMOH (M.P.)** 

Scheme of Examination MCA III SEM

/For batch admitted in Academic Session 2023-24/

and corresponding credits and corresponding credits

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S.No.	Subject	Subject Name	edesi Sica	Theory Slot	Per week	Pract	ical Slot	Total		Per wee	k	Total Credit
S.NO.	Code	Subject Name	End Sem.	Tests	Quiz/ Assignment/ Attendance	End Sem	Lab Work/ sessional	Marks	L	Т	P	Total Credits
1	MCAPL20S301	Data Mining	60	30	10			100	3	1	0	4
2	MCAPL20S302	Artificial Intelligence	60	30	10	-	-	100	3	1	-	4
3	MCAPL20S303	Elective – I	60	30	10	-	-	100	3	1	-	4
4	MCAPL20S304	Elective – II	60	30	10	1 -	- N- IV	100	3	1	-	4
5	MCAPL20S305	Elective – III	60	30	10	112	- 1	100	3	1	-	4
6	MCAPL20S306	Minor Project		50 -   .	-	100	50	150	-	/-/	6	6
7	MCAPL20S307	Elective -1 Lab	+ =0	100 -		60	40	100	-	1=	4	4
at la	169   757/15	Total	300	75-150	50	160	90	750	15	5	10	30

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiencey Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

Elective - I

A. Python

B. Web Technology

C. Introduction to data Science and big data

Elective-II

A. Machine Learning

**B. Soft Computing** 

C. Internet of Things

Elective-III

A. Computer Ethics

**B.** Advanced Databases

C. Distributed Systems

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Cla	Class			Master of Computer Application (MCA) II YEAR				
Se	Semester/Year Subject & Subject Code Max. Marks		Year	III Semester  Data Mining - MCAPL20S301				
Su			Subject Code					
Ma			S	60 (ETE) + 40 (IA) = 100				
C	Cred	lit	Total Credits					
L	Т	Р	4	References Books				
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### Course Objectives:

- 1. Introduce the Basic Concepts of Data Base, Data Warehouse and Data Mining.
- 2. Understand the Concept of Knowledge Discovery.
- 3. Understand the process of deriving Information from data with Different Perspectives.
- 4. Understand and apply Preprocessing Methods on Raw Data.
- 5. Discover Interesting and Useful Patterns and associations, Analyze Supervised and Unsupervised Models.

### Course Outcome:

- 1. Demonstrate an Understanding and knowledge of the Data Warehousing and Data Mining
- 2. Explain the Data Analysis and Knowledge Delivery Stages.
- 3. Organize and Prepare the Data Needed for Data Mining Using Pre Preprocessing Techniques.
- 4. Implement the Appropriate Data Mining Methods Like Association, Classification, Clustering

### Student Learning Outcomes (SLO):

- 1. Understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted.
- 2. Explain major Issues in data mining.
- 3. Identify what kinds of technologies are used for different application.

Unit	Syllabus	Periods
UNIT - I	Motivation, importance, Data type for Data Mining: relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.	8
UNIT - II	Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data arehouse Architecture, Data Warehouse Implementation, Data Cube Technology.	8
UNIT - III	Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.	8

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	Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.	8
UNIT - V	Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.	8

- J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Pub.
- 2 Berson "Dataware housing, Data Mining & DLAP, @004, TMH.
- 3 W.H. Inmon "Building the Datawarehouse, 3ed, Wiley India.
- 4 Anahory, "Data Warehousing in Real World", Pearson Education.
- 5 Adriaans, "Data Mining", Pearson Education.

6 S.K. Pujari, "Data Mining Techniques", University Press, Hyderabad

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Cla	SS			Master of Computer Application (MCA) II YEAR
Sen	nest	er/Ye	ear .	III Semester
Sub	oject	& S	ubject Code	Artificial Intelligence - MCAPL20S302
Max	x. Ma	arks		60 (ETE) + 40 (IA) = 100
(	Cred	it	Total Credits	Probabilistic Research and Unostaling Perseaulity Preseaucy.
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### Course Objectives:

- 1.To Understand the Concepts of Artificial Intelligence and Machine Learning such as supervised and unsupervised learning, knowledge representation, Possibility and probability theory and also get update about current and futuristic trends of AI problems and solutions.
- 2.To Gain Knowledge of search space and search strategies, different algorithms of Supervised and Unsupervised Learning.
- 3. Understand the various architectures and activation functions, training and testing approach used in Artificial Neural Network and also acquire knowledge of expert systems.
- 4. Understand the concepts of Fuzzy Logic, Genetic Algorithms, and applythem to solve the real-life problems.

### Course Outcome:

- 1. Demonstrate Artificial Intelligence Techniques, Various Types of Production Systems, and Characteristics of Production Systems.
- 2. Design and implement Neural Networks .usinglayers, various activation functions and Various Algorithms to solve real life problems.
- 3. Analyze fuzzy nature problem and Design, implement and test the Fuzzy Inference Systems for vague nature real life problem
- 4. Explain Genetic Algorithms theory, Design and validate the Genetic Algorithms based systems for search space driven problems.

### Student Learning Outcomes (SLO):

- 1.Design user interfaces to improve human-Al interaction and real-time decision-making.
- 2. Evaluate the advantages, disadvantages, challenges, and ramifications of human-Al augmentation.
- 3. Design and evaluate conversational interfaces for different users and contexts of use.
- 4.Design and develop symbiotic human—AI systems that balance the information processing power of computational systems with human intelligence and decision making.

Unit	Syllabus	Periods
UNIT - I	General Issues and Overview of AI The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteraction and recursion, property lists and arrays.	8
UNIT - II	Problem Solving, Search and Control Strategies General problem solving, production systems, control strategies forward and backward chaining, exhausive searches depth first breadth first search. Heuristic Search Techniques Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.	8

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UNIT - III	Knowledge Representations First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.	8
UNIT - IV	Natural Language processing Parsing techniques, context free grammer, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammers, symantic analysis. Game playing Minimax search procedure, alpha-beta cutoffs, additional refinments. Planning Overview an example domain the block word, component of planning systems, goal stack planning, non linear planning.	8
UNIT - V	Probabilistic Reasoning and Uncertainty Probability theory, bayes theorem and bayesian networks, certainty factor.  Expert Systems Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN.Learning Rote learning, learning by induction, explanation based learning	8

- 1 Elaine Rich and Kevin Knight "Artifical Intelligence" Tata McGraw Hill.
- 2 Artifical Intelligence" 4 ed. Pearson
- Dan W. Patterson "Introduction to Artifical Intelligence and Expert Systems", Prentice India.
- Nils J. Nilson "Principles of Artifical Intelligence", Narosa Publishing House.
- Clocksin & C.S.Melish "Programming in PROLOG", Narosa Publishing House.

M. Sasikumar, S. Ramani etc. "Rule-based Expert System", Narosa Publishing House

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Class			Master of Computer Application (MCA) II YEAR				
Ser	nest	er/Y	ear	III Semester			
Elective Paper Subject & Subject Code		per	Elective - I  PYTHON PROGRAMMING - MCAPL20S303				
		ubject Code					
Max	x. Ma	arks	perkal - por	60 (ETE) + 40 (IA) = 100			
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### Course Objectives:

- 1. Introduce Python Programming Language and its Features and Applications.
- 2. Learn Installing Python.
- 3. Practice Basic Language Features of Python.
- 4. To Implement Oops Concepts Using Python.
- 5. To Work with Files in Python

### Course Outcome:

- 1.Install and use Python on Various Platform.
- 2. Understand and Explain the features of Python language.
- 3. Build package and modules in Python with object-oriented concept.
- 4 Design and Develop Python applications for data analysis.
- 5. Write programs for Reading and Writing files in Python.

### Student Learning Outcomes (SLO):

Students will learn the concepts like Basics of Python programming, Decision Making and Functions in Python, Object Oriented Programming using Python, Files Handling in Python, GUI Programming and Databases operations in Python, Multithreading and Exception Handling. And Student will be able to understand the syntax and semantics of Python Programming.

Unit	Syllabus	Periods
UNIT - I	Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.	8 .
UNIT - II	Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.	8
UNIT - III	Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing — list comprehension; Illustrative programs: Sorting and Searching	8
UNIT - IV	Classes and Inheritance: Object Oriented Programming, Class Instances, Methods Classes Examples, Why OOP, Hierarchies, Your Own Types – An Extended Example: Building a Class, Visualizing the Hierarchy, Adding another Class, Using Inherited Methods.	8

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Files and exception: text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

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### References Books:

- ReemaThareja, "Python Programming using Problem Solving Approach", Oxford University Press, 2017
- Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", SecondEdition, Shroff O'Reilly Publishers, 2016

Guido van Rossum, Fred L. Drake Jr., "An Introduction to Python - Revised andUpdated forPython 3.2, Network Theory Ltd., Edition2011

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Cla	SS			Master of Computer Application (MCA) II YEAR
Ser	emester/Year		ear	III Semester
Ele	ctive	Рар	er	Elective - I
Sul	bject	& St	ubject Code	Web Technology - MCAPL20S304
Ma	x. Ma	arks		60 (ETE) + 40 (IA) = 100
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### Course Objectives:

- 1.Learn to Design and Develop a Web Page.
- 2.Design and Develop a Web Site Using Text, Images, Links, Lists, and Tables for Navigation and Layout.
- 3. Style Your Page Using CSS, Internal Style Sheets, and External Style Sheets.
- 4. Learn to use JavaScript & XML in Web Design.
- Learn How to use Database in Web Design.

### Course Outcome:

- 1. Describe the Concepts of WWW Including Browser and HTTP Protocol.
- 2. List the Various HTML Tags and usethem to develop the user friendly web Pages.
- 3. Define the CSSwithits Types and usethemtoprovide the Styles to the web pages at Various Levels.
- 4. Use the JavaScript to Develop the Dynamic Web Pages.
- 5 Develop the Modern Web Pages Using the HTML and CSS Features with Different Layouts as per Need of Applications.

### Student Learning Outcomes (SLO):

- 1. Create an Information Architecture document for a web site.
- 2. Construct a web site that conforms to the web standards of today and includes e-commerce and web marketing
- Publish the website to a remote server using FTP.
- 4. Perform regular web site maintenance (test, repair and change).

Unit	Syllabus	Periods
UNIT - I	Concept of Internet: Client/Server model,Internet and WWW, IP, URL, ISP, DNS; Web Design: Principals of effective Web Design, Page layout and linking, designing effective navigation for your website, planning and publishing websites, Responsive web design: Responsive vs adaptive web design	8
UNIT - II	HTML and Style Sheets: Working with HTML - Formatting and Fonts, Basic Tags, Hyperlinks, Tables, Images, Forms, XHTML, Meta tags. Style Sheets (CSS): Introduction, Need, basic syntax and structure, class, id, background*Images, Colors and Properties, Manipulating Texts, Margins, Positioning.	8
UNIT - III	Javascript: Client side scripting with JavaScript, Data Types and Variables, Expressions, Operators and Statements, Objects and Arrays, Functions, loops, Classes, Modules, DOM, Forms and Validations.	8
UNIT - IV	XML: Introduction, Features, Anatomy, Declaration, Uses, Key Components, DTD and Schema, Markup Elements and Attributes, XML Objects, XML Scripting, Using XML with application, Transforming XML using XSL and XSLT, XPATH - Template Based Transformations.	8

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UNIT - V

Introduction to AJAX: AJAX Components, The XMLHttpRequest Object, Using XSLT with AJAX; Webservices: Web Service architecture, introduction to webservices, Web Services VS other technologies, Web Services Benefits

### References Books:

- 1 Web Design, Joel Sklar, Cengage Learning
- Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
- 3 Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
- 4 Web Technologies, Black Book, dreamtech Press
- 5 Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.

6 Kogent Learning Web Technologies: HTML, Javascript Wiley India



Class			Master of Computer Application (MCA) II YEAR			
Ser	mest	ter/Y	ear	III Semester		
Elective Paper		er	Elective - I			
Sul	Subject & Subject Code		ubject Code	Introduction to Data Science and Big Data (3C) - MCAPL20S305		
Ma	x. M	arks		60 (ETE) + 40 (IA) = 100		
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### Course Objectives:

- 1. Familiarize the students with most important information technologies used in manipulating, storing, and analyzing big data
- 2. This course gives students all around learning of the big data framework using Hadoop and spark, including yarn, HDFS and MapReduce
- 3. It provide an overview of approaches facilitating data analytics on huge datasets.

### Course Outcome:

- 1. Ability to identify the characteristics of datasets and compare the trivial data andbig data for various applications
- 2.Demonstrate an ability to useHadoopframeworkto efficiently store retrieve and process Big Data for
- 3. Implement several Data Intensive tasks using the MapReduce Paradigm.

### Student Learning Outcomes (SLO):

- 1. Understand what Big Data is and why we want to look at it.
- 2. BE able to describe the testing and validation process.
- 3. Understand how bias and variance can effect your result.
- 4. Be able to describe the crross-validation process.

Unit	Syllabus	Periods
UNIT - I	Introduction to Data Science – Data Science Process – Exploratory Data analysis – Big data:Definition, Risks of Big Data, Structure of Big Data – Web Data: The Original Big Data –Evolution Of Analytic Scalability – Analytic Processes and Tools – Analysis versus Reporting –Core Analytics versus Advanced Analytics – Modern Data Analytic Tools – Statistical Concepts:Sampling Distributions – Re-Sampling – Statistical Inference – Introduction to Data Visualization.	8
UNIT - II	Univariate Analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis – Bivariate Analysis: Correlation – Regression Modeling: Linear and Logistic Regression – Multivariate Analysis – Graphical representation of Univariate, Bivariate and Multivariate Analysis in R: Bar Plot, Histogram, Box Plot, Line Plot, Scatter Plot, Lattice Plot, Regression Line, Two-Way cross Tabulation.	8
UNIT - III	Bayesian Modeling – Support Vector and Kernel Methods – Neuro – Fuzzy Modeling Principal Component Analysis – Introduction to NoSQL: CAP Theorem, MongoDB: RDBMS VsMongoDB, Mongo DB Database Model, Data Types and Sharding – Data Modeling in HBase: Defining Schema – CRUD Operations. Introduction to Kernel and its types	8

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	MapReduce – Introduction to HBase: HBase Architecture, HLog and HFile, Data Replication – Introduction to Hive, Spark and Apache Sqoop.  Introduction To Streams Concepts – Stream Data Model and Architecture	
UNIT - V	Introduction To Streams Concepts – Stream Data Model and Architecture Stream Computing – Sampling Data in a Stream – Filtering Streams Counting Distinct Elements in a Stream Estimating Moments – Counting Oneness in a Window – Decaying Window.	8

Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons

2 Rachel Schutt, Cathy O'Neil, "Doing Data Science", O'Reilly

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Class			Master of Computer Application (MCA) II YEAR		
Ser	nest	ter/Ye	ear	III Semester	24
Elective Paper		er	Elective - II	\$	
Subject & Subject Code		ubject Code	Machine Learning (4A) - MCAPL20S306		
Ma	x. M	arks	*	60 (ETE) + 40 (IA) = 100	References
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LTP			Techniques to Build intelligent Systems" fortuit		
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### Course Objectives:

The main goal of this course is to help students learn, understand, and practice big data machine learning approaches, which include the study of modern computing big data technologies and scaling up machine learning techniques focusing on industry applications. Mainly the course objectives are: conceptualization and summarization of big data and machine learning, trivial data versus big data, big data computing technologies, machine learning techniques, and scaling up machine learning approaches.

### Course Outcome:

- 1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- 2. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- 3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

### Student Learning Outcomes (SLO):

- 1. Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
- 2. Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
- 3. Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
- 4. Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

Unit	Syllabus	Periods
UNIT - I	Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.	8
UNIT - II	Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization,training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.	8
UNIT - III	Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception, network, input channels,transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.	8

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UNIT - IV	Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA	8
UNIT - V	Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition	8

- Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems", Shroff/O'Reilly, First edition (2017).
- Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
- Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer-Verlag New York Inc., 2nd Edition, 2011.

Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition, 2017. 3. Ian Good/fellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016

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Class				Master of Computer Application (MCA) II YEAR	
Semester/Year		ear	III Semester		
Elective Paper		er	Elective - II		
Sul	Subject & Subject Code		ubject Code	SOFT COMPUTING (4B) - MCAPL20S307	
Ma	Max. Marks			60 (ETE) + 40 (IA) = 100	
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### Course Objectives:

- 1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory
- 2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective
- 3. Provide the mathematical background for carrying out the optimization associated with neural network learning.
- 4.Provide the mathematical background for carrying out the optimization associated with neural network learning

### Course Outcome:

- 1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- 2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
- 3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
- 4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
- 5. Reveal different applications of these models to solve engineering and other problems

### Student Learning Outcomes (SLO):

- 1. Describe human intelligence and Al
- 2. Explain how intelligent system works.
- 3. Apply basics of Fuzzy logic and neural networks.
- 4. Discuss the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- 5. Relate with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems

Unit	Syllabus	Periods
UNIT - I	Overview of Soft Computing, Difference between Soft and Hard computing, Brief descriptions of different components of soft computing including Artificial intelligence systems Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks Vs Biological neural networks, ANN architecture, Basic building block of an artificial neuron, Activation functions, Introduction to Early ANN architectures (basics only)-McCulloch & Pitts model, Perceptron, ADALINE, MADALINE. Architecture of CyberSpace.	8
UNIT - II	Artificial Neural Networks: Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network.	8

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UNIT - III	Artificial Neural Networks: Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self-Organizing Computational Maps: Kohonen Network.	8
UNIT - IV	Fuzzy Logic Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller.	8
UNIT - V	Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA,Applications of GA case studies. Introduction to genetic programming- basic concepts.	8

- R. Rajasekaran and G. A and Vijayalakshmi Pa, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, Prentice Hall of India
- D. E. Goldberg, Genetic Algorithms in Search, Optimisation, and Machine Learning, Addison-Wesley
- 3 L. Fausett, Fundamentals of Neural Networks, Prentice Hall

4 T. Ross, Fuzzy Logic with Engineering Applications, Tata McGraw Hill

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Class			Master of Computer Application (MCA) II YEAR	
Semester/Year Elective Paper		ear	III Semester Elective - II	
		er		
Subject & Subject Code		ubject Code	Internet of Things (4C) - MCAPL20S308	
Max	Max. Marks		Maria Marka Talahar Na Matantakan dan	60 (ETE) + 40 (IA) = 100
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### Course Objectives:

- 1.To impart necessary and practical knowledge of components of Internet of Things
- 2. To introduce the latest microcontrollers with application development, productdesign and prototyping.
- 3. Learn and Understand Various Protocols used in Wireless Sensor Network.
- 4. Develop skills required to build real-life IoT based projects.

### Course Outcome:

- 1. Understand the Concepts of Internet of Things and the Application Areas of IoT
- 2 .Understand IOT's hardware and software components .
- 3. Interface I/O devices, sensors & communication modules.
- 4. Remotely monitor data and control devices.
- 5. Develop real life IoT based projects.

### Student Learning Outcomes (SLO):

- 1 Describe what IoT is and how it works today.
- 2. Recognise the factors that contributed to the emergence of IoT.
- 3. Design and program IoT devices.
- 4. Use real IoT protocols for communication.
- 5. Secure the elements of an IoT device.
- 6. Design an IoT device to work with a Cloud Computing infrastructure.

Unit	Syllabus	Periods
UNIT - I	Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.	8
	Machine-to-machine (M2M), SDN (software defined networking) and NFV	
UNIT - II	(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.	8
UNIT - III	Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Accesscontrol.	8
UNIT - IV	Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.	8

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IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi &arduino devices IOT Case studies: smart city streetlights control & monitoring.

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### References Books: administration of the expension of the administration of the second

- 1 Rajkamal,"Internet of Things", Tata McGraw Hill publication
- Vijay Madisetti and ArshdeepBahga, "Internet of things(AHand- on-Approach)" 1st Edition .UniversalPress
- 3 HakimaChaouchi "The Internet of Things: Connecting Objects", Wiley publication.
- 4 Charless Bell "MySQL for the Internet of things", Apresspublications.

Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and 5 BeagleBone Black", McGraw Hillpublication.

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Class			Master of Computer Application (MCA) II YEAR	
Semester/Year		ear	III Semester	
Elective Paper		er	Elective - III amelando dado consett annel vimpona	
Subject & Subject Code		ubject Code	Computer Ethics (5A) - MCAPL20S309	
Max	x. M	arks	Abunda sunn	60 (ETE) + 40 (IA) = 100
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### Course Objectives:

- 1.Students should acquire a broad perspective on the social and ethical impacts and implications of information technology.
- 2. Students should acquire specific knowledge about major issues in several different areas of the field of Computer Ethics.
- 3.Students should acquire in-depth knowledge of at least one significant ethical issue generated by information technology.
- 4.Students should develop skills in clarifying and ethically analyzing realistic cases that involve information technology.
- 5. Students should exercise and improve their skills in critical and analytical writing.

### Course Outcome:

- 1. Discuss what ethics is and what constitutes an ethical issue
- 2.Identify and discuss ethical issues that arise in the media, in routine conversations and, in particular, in personal everyday professional practice
- 3. Discuss the role of emotions in ethical deliberations
- 4. Discuss how negotiation might resolve apparent ethical differences
- 5.Identify and discuss the ethical issues presented and rhetorical styles used in play and dialogue excerpts, with focus on explaining how language is used to alter other people's ethical perceptions and convince them of specific points.

### Student Learning Outcomes (SLO):

- 1. Identify ethical issues in different enterprise computing settings.
- 2. Review real-life ethical cases and be able to develop ethical resolutions and policies.
- 3. Understand laws and regulations related to ethics.
- 4. Understand the consequences of ignoring and non-compliance with ethical imperatives.
- 5. Learn about the best ethical practices and models.
- 6. Develop a sound methodology in resolving ethical conflicts and crisis

Unit	Syllabus	Periods
	An Overview of Ethics: Ethics: Definition of Ethics, The Importance of	A - HMO
	Integrity, The Difference between Morals, Ethics, and Laws. Ethics in the	
	Business World: Why Fostering Good Business Ethics is Important,	
	Improving Corporate Ethics, Creating an Ethical Work Environment, Including Ethical Considerations in Decision Making. Ethics in Information	
LINUT	Technology Ethics for IT Workers and IT Users: IT Technicians, IT	
UNIT - I	Professionals: Are IT Workers Professionals, The Changing Professional	8
	Services Industry, Professional Relationships That Must Be Managed,	
	Professional Codes of Ethics, Professional Organizations, Certification,	
1	Government Licensing, IT Professional Malpractice. IT Users, Common	
1	Ethical Issues for IT Users, Supporting the Ethical Practices of IT Users.	Well of a
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UNIT - II	Computer and Internet Crime, IT Security Incidents: A Major Concern, Why Computer Incidents Are So Prevalent, Types of Exploits, Types of Perpetrators, Federal Laws for Prosecuting Computer Attacks, Implementing Trustworthy Computing: Risk Assessment, Establishing a Security Policy, Educating Employees, Contractors, and Part-Time Workers, Prevention, Detection, Response. Privacy: Privacy Concerns Abound with New IRS Systems, Privacy Protection and the Law: Information Privacy, Privacy Laws, Applications, and Court Rulings. Key Privacy and Anonymity Issues: Identity Theft, Consumer Profiling, TreatingConsumer Data Responsibly, Workplace Monitoring, Advanced Surveillance Technology.	8 10 minutes 2 m
UNIT - III	Freedom of Expression: First Amendment Rights, Obscene Speech, Defamation, Freedom of Expression: Key Issues, Controlling Access to Information on the Internet, Anonymity on the Internet, Defamation and Hate Speech, Corporate Blogging, Pornography.  Intellectual Property: What Is Intellectual Property? Copyrights: Copyright Term, Eligible Works, Fair Use Doctrine, Software Copyright Protection, The Prioritizing Resources and Organization for Intellectual Property (PRO-IP) Act of 2008, General Agreement on Tariffs and Trade (GATT), The WTO and the WTO TRIPS Agreement (1994), The World Intellectual Property Organization (WIPO) Copyright Treaty (1996), The Digital Millennium Copyright Act (1998), Patents: Software Patents, Software Cross-Licensing Agreements, Defensive Publishing and Patent Trolls, Submarine Patents and Patent Farming. Trade Secrets: Trade Secret Laws, Employees and Trade Secrets, Key Intellectual Property Issues: Plagiarism, Reverse Engineering, Open Source Code, Competitive Intelligence, Cybersquatting	
UNIT - IV	Software Development: Strategies for Engineering Quality Software,:The Importance of Software Quality, Software Product Liability, Software Development Process, Capability Maturity Model Integration. Key Issues in Software Development, Development of Safety-Critical Systems, Quality Management Standards The Impact of Information Technology on Productivity and Quality of Life: The Impact of IT on the Standard of Living and Worker Productivity, IT Investment and Productivity, The Digital Divide, The Impact of IT on Healthcare Costs, Electronic Health Records, Use of Mobile and Wireless Technology in the Healthcare Industry, Telemedicine, Medical Information Web Sites for Laypeople	8
UNIT - V	Social Networking: What Is a Social Networking Web Site? Business Applications of Online Social Networking, Social Network Advertising, The Use of Social Networks in the Hiring Process, Social Shopping Web Sites, Social Networking Ethical Issues, Cyberbullying, Cyberstalking, Encounters with Sexual Predators, Uploading of Inappropriate Material, Online Virtual Worlds, Crime in Virtual Worlds, Educational and Business Uses of Virtual Worlds.  Ethics of IT Organizations: Key Ethical Issues for Organizations, The Need for Nontraditional Workers, Contingent Workers, Advantages of Using Contingent Workers, Disadvantages of Using Contingent Workers, Deciding When to Use Contingent, Outsourcing, Offshore Outsourcing, Pros and Cons of Offshore Outsourcing, Strategies for Successful Offshore Outsourcing, Whistle-Blowing, Protection for Whistle-Blowers, Whistle-Blowing Protection for Private-Sector Workers, Dealing with a Whistle-Blowing Situation, Green Computing, ICT Industry Code of Conduct.	

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Class			Master of Computer Application (MCA) II YEAR	
Semester/Year		ear	III Semester	
Elective Paper		oer	Elective - III	
Subject & Subject Code		ubject Code	Advanced DBMS (5B) - MCAPL20S310	
Max	Max. Marks		trees, Corrent	60 (ETE) + 40 (IA) = 100
Credit		it	Total Credits	marr. U. Jand Topological Relationalists, Multiplical Data Fernatu
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### Course Objectives:

- 1. To provide a strong foundation in advanced database concepts from an industry perspective.
- 2. To covers advanced data modeling concepts like OOD Modeling and ORD Modeling
- 3. To learn query processing and transaction management concepts for object-relational database and distributed database.

### Course Outcome:

- Students get practical knowledge on designing and creating relational database systems.
- 2. Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
- 3.Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
- 4. Students will be able to design and implement database applications on their ow.

### Student Learning Outcomes (SLO):

- 1. Identify advance database concepts and database models.
- 2. Apply and analyze various terms related to transaction management in centralized and distributed
- 3. Produce data modeling and database development process for object -oriented DBMS.
- 4. Analyze and Implement the concept of object- relational database in development of various real time
- 5. Examine the issues related to multimedia and mobile database performance.

Unit	Syllabus	Periods
UNIT - I	Objected Oriented and Object Relational Databases Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity and its implementation, Clustering, Equality and Object Reference, Architecture of Object Oriented and Object Relational databases, Persistent Programming Languages, Cache Coherence. Case Studies: Gemstone, O2, Object Store, SQL3, Oracle xxi, DB2.	8
UNIT - II	Deductive Databases Data log and Recursion, Evaluation of Data log program, Recursive queries with negation. Parallel and Distributed Databases Parallel architectures, shared nothing/shared disk/shared memory based architectures, Data partitioning, Intraoperator parallelism, pipelining.  Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.	8

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UNIT - III	Advanced Transaction Processing Advanced transaction models: Savepoints, Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors, Shared disk systems.	8
UNIT - IV	Active Database and Real Time Databases Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Recursive query processing, Compensation and Databases Recovery, multi-level recovery.	<b>9</b> 8
UNIT - V	Image and Multimedia Databases Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS). WEB Database Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems – Oracle xxi, DB2.	8 8

- 1 Elmarsi, "Fundamentals of Database Systems", 4 th Edition, Pearson Education
- 2 R. Ramakrishnan, "Database Management Systems", 1998, McGraw Hill International Editions
- 3 Transaction Processing, Concepts and Techniques, J. Gray and A. Reuter, Morgan Kauffman...
- Abiteboul, R. hull and V. Vianu, "Foundations of Databases", 1995, Addison Wesley Publishing Co., Reading Massachusetts
- 5 W. Kim, "Modern Database Systems", 1995, ACM Press, Addison Wesley.

D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville,

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Class			Master of Computer Application (MCA) II YEAR	
Semester/Year		ear	III Semester	
Elective Paper		er	Elective - III	
Subject & Subject Code		ubject Code	Distributed Systems (5C) - MCAPL20S311	
Max	Max. Marks			60 (ETE) + 40 (IA) = 100
(	Cred	it	Total Credits	A Business replies permitten of burnsulfors, uttain flugs. 8
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### Course Objectives:

- 1.To provide hardware and software issues in modern distributed systems.
- 2.To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

### Course Outcome:

- 1. To provide hardware and software issues in modern distributed systems.
- 2. To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- 3. To know about Shared Memory Techniques.
- 4. Have Sufficient knowledge about file access.
- 5. Have knowledge of Synchronization and Deadlock.

### Student Learning Outcomes (SLO):

- 1. Apply knowledge of distributed systems techniques and methodologies.
- 2. Explain the design and development of distributed systems and distributed systems applications.
- 3. Use the application of fundamental Computer Science methods and algorithms in the development of distributed systems and distributed systems applications.
- 4. Discuss the design and testing of a large software system, and to be able to communicate that design to others

Unit	Syllabus	Periods
UNIT - I	Introduction to Distributed Systems: Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.	_8
UNIT - II	Process and synchronization in Distributed Systems: Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.	8
UNIT - III	Consistency, Replication, fault tolerance and security: Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.	8
UNIT - IV	Distributed Object Based and File Systems: CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system,.	8

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### UNIT - V

Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems: the world wide web, distributed co-ordination based systems: JINI Implementation: JAVA RMI, OLE, ActiveX, Orbix, Visbrokes, Object oriented programming with SOM

### References Books:

- 1 Lui "Distributed Computing Principles and Applications".
- 2 Harry Singh "Progressing to Distributed Multiprocessing" Prentice-Hall Inc.
- B.W. Lampson "Distributed Systems Architecture Design & Implementation", 1985 Springer Varlag.
- Andrew S. Tanenbaum, Maarten Van Steen "Distributed Systems Principles and Paradigms" PearsonEducation Inc. 2002.
- Parker Y. Verjies J. P. "Distributed computing Systems, Synchronization, control & Communications" PHI.

Robert J. & Thieranf "Distributed Processing Systems" 1978, Prentice Hall.

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Class			MASTER OF COMPUTER APPLICATION ( MCA)		
Se	Semester/Year		ear .	Semester - III	Mileten Vie
Su	Subject & Subject Code Max. Marks		Subject Code	Computer- Lab – MCAPL20S313	
Ma				60 (ETA) + 40 (IA) = 100	
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### LIST OF PRACTICAL (PYTHON PROGRAMMING)

- 1. Program to demonstrate basic data type in python
- 2. A cashier has currency notes of denominations 10, 50, and 100. If the amount to be withdrawn isinput through the keyboard using input() function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer
- 3. Program to demonstrate list and tuple in python.
- 4. Write a program in Python, A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
- 5. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs. 12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour.
- 6. Two numbers are entered through the keyboard, write a program to find the value of one numberraised to the power of another
- 7. Write a function that receives marks received by a student in 3 subjects and returns the averageand percentage of these marks. Call this function from main() and print the result in main
- 8. Write a program to read a file and display its contents
- 9. Write a program to demonstrate database connectivity in python

### LIST OF PRACTICAL (Web Technology)

- 1. Write an HTML page with Javascript that takes a number from one text field in the range 0999 and display it in other text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.
- 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
D	Registration and user Login
П	User profile page
	Books catalog
П	Shopping cart
11	Payment by credit card Order Conformation
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3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, lines and words in the text

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entered using an alert message. Words are separated with white space and lines are separated with new line character.

- 4. Create an XML document that contains 10 users information. Write a script which takes user id as input and returns the user details by taking the user information from XML document.
- 5. A simple calculator web application that takes 2 numbers and an operator (+, -, \*, /, %) from an HTML page and returns the result page with the operation performed on the operands.
- A web application shows a start time at the right top corner of the page and takes a name as inputand provides the logout button at bottom. On clicking logout button it should show a logout page with thank you message with the duration of Usage.
- 7. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "hello, and You are not authorized to visit this site" otherwise it should send "You are welcome to this site" message.
- 8. Write a web application in which the user is first served a login page which takes users name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions if name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match then serves password mismatch page. If name found in database, serves a registration page where users full name is asked and on submitting the name, it storesthe login name, password and full name in the database.

### LIST OF PRACTICAL (Internet of Things)

- Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
- To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ONLED for 1 sec after every 2 seconds.
- To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
- To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
- To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
- To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
- To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor datato smart phone using Bluetooth.
- To install MySQL database on Raspberry Pi and perform basic SQL queries.
- · Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.

Write a program to create UDP server on Arduino/Raspberry Pi and respond withhumiditydata to UDP
 client when requested.

client when requested.

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