MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

M.Tech – Computer Science and Engineering

Scheme

2024-25

I Semester

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)

M.Tech in CSE

Scheme of Teaching and Examinations–2024

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024)

Sem: I

S.No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week			Credits	Examination			
					Theory Lecture	Practical	T/SDA		Duration in Hours	CIE Marks	SEE Marks	Total Marks
					L	P	S					
1.	PCC	P24MTC101	Artificial Intelligence	CSE	3	0	0	3	3	50	50	100
2.	PCC	P24MTC102	Data Science and Management	CSE	3	0	2	4	3	50	50	100
3.	PCC	P24MTC103	Data Structures & Algorithms for Problem Solving	CSE	3	0	0	3	3	50	50	100
4.	PCC	P24MTC104	Advanced Software Engineering	CSE	3	0	0	3	3	50	50	100
5.	IPCC	P24MTC105	Internet of Things	CSE	3	2	0	4	3	50	50	100
6.	PCCL	P24MTC106	Algorithms & AI Lab	CSE	0	2	0	1	3	50	50	100
7.	NCMC	P24MTC107	Research Methodology and IPR (Online)	CSE	Online courses (online.vtu.ac.in)			PP				
				TOTAL	15	4	2	18	18	300	300	600

Note: BSC-Basic Science Courses, PCC: Professional core, IPCC-Integrated Professional Core Courses, PCC(PB): Professional Core Courses (Project Based), PCCL-Professional Core Course lab ,NCMC- None Credit Mandatory Course, ,L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities(Hours are for Interaction between faculty and students) MRM119- Research Methodology and IPR (Online) for the students who have not studied this course in the Undergraduate level. This course is not counted for vertical progression, Students have to qualify for the award of the master's degree

Name &Signature
BOE Chairperson

Dean- Academics

Principal

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution Under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru - 560074

M.Tech – Computer Science and Engineering

Syllabus

2024-25

I Semester

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Semester I					
Artificial Intelligence Category: PCC Stream: Computer Science & Engineering (M.Tech) (Theory)					
Course Code	:	**P24MTC101**	CIE	:	50 Marks
Teaching Hours L : P : SDA	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45 Hours	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Objectives	
1	Define the foundational concepts of artificial intelligence and key problem-solving techniques
2	Explain the knowledge representation and reasoning techniques to solve complex problems in AI systems.
3	Use machine learning algorithms to evaluate their performance in real-world applications
4	Build the applications of natural language processing and robotics to enhance human-computer interaction.
5	Explore the ethical considerations and societal implications of AI technologies.

Module 1	**No. of Hrs.**
Module 1:Introduction to Artificial Intelligence and Problem Solving, Definition and scope of AI, History and evolution of AI, Types of AI: Narrow AI vs. General AI, Problem formulation and problem-solving techniques, Search algorithms: Uninformed and informed search strategies, Heuristic search and constraint satisfaction problems.	9
Module 2	**No. of Hrs.**
Module 2: Knowledge Representation and Reasoning, Types of knowledge representation, Propositional logic and first-order logic ,Semantic networks and frames, Ontologies and their applications, Deductive and inductive reasoning, Rule-based systems and non-monotonic reasoning, Probabilistic reasoning and Bayesian networks.	9
Module 3	**No. of Hrs.**
Module 3: Machine Learning, Introduction to machine learning, Supervised, unsupervised, and reinforcement learning, Common algorithms: Decision trees, SVM, neural networks Evaluation metrics for machine learning models ,Practical applications of machine learning in AI systems.	9
Module 4	**No. of Hrs.**
Module 4: Natural Language Processing and Robotics, Basics of natural language processing (NLP), Text processing and language models, Sentiment analysis and language generation, Robotics fundamentals and sensor technologies, Robot kinematics, control, and applications of AI in robotics.	9
Module 5	**No. of Hrs.**
Module 5: Ethical and Societal Implications of AI, Ethical considerations in AI development ,AI and job displacement ,Privacy concerns and data security, Bias and fairness in AI algorithms, Accountability and transparency in AI systems, The role of government and regulation in AI, Public perception and trust in AI technologies, Future of AI and its impact on society	9

Course Outcomes: At the end of the course, the students will be able to		Blooms Level
CO1	Explain the foundational concepts of artificial intelligence, including its history, t problem-solving techniques	L2
CO2	Apply knowledge representation and reasoning techniques to solve complex problems in AI systems.	L3
CO3	Implement machine learning algorithms and evaluate their performance in real-world applications	L2
CO4	Explore the principles and applications of natural language processing and robotics to enhance human-computer interaction.	L4

Text Books	
1	Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, 4th Edition (2021)
2	"Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville third Edition.
Reference Text Books	
1	"Pattern Recognition and Machine Learning" by Christopher M. Bishop Edition: fourth Edition (2020) "Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth Edition: third Edition (2021).

Web links and Video Lectures (e-Resources):

https://cs221.stanford.edu
https://www.kaggle.com/learn/machine-learning
https://www.youtube.com/playlist?list=PLkDaE6sXhPqQ5s2cW2g1iGgC4eD9W6xZ2
https://www.youtube.com/playlist?list=PLD6B6F0A3B1D4D3D8A7E3C5E8A7B2E0C

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X			X								
CO2			X		X							
CO3		X										
CO4	X											

3 credit Courses: (L:P:SDA 3:0:0)

Component	Evaluation Criteria	Marks Allocation
CIE - Theory Component (50 Marks)		
Internal Assessment Test 1	Covers 30% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 2	Covers 70% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 3	Covers 100% of the syllabus (50 marks, 1.5-hour duration)	50
a. Total Internal Assessment (**Scaled Down)**	Best of 2 and Average of 2 Test	30
b. Seminar Presentation	Seminar presentation 1 & 2 - Average of 2 Presentation (Each 10 marks)	10
c. Assignment	Assignments 1,2 – Average of 2 assignments (Each 10 marks)	10
Total a+b+c	Sum of Tests + Assignment+ Seminar	**50**

Minimum passing marks	50% (25/50) of the maximum marks of CIE	
SEE - Theory Component (50 Marks)		
Minimum passing marks	40% of the maximum marks of SEE. (**Scaled Down to 50 :** Minimum marks : 20/50 **)**	100
Passing Criteria for CIE +SEE (Theory)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	

Semester I					
Data Science and Management Category: PCC Stream: Computer Science and Engineering (M.Tech) (Theory)					
Course Code	:	**P24MTC102**	CIE	:	50 Marks
Teaching Hours L : P :T: SDA	:	3:0:2:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs

Course Objectives	
1	Explore the foundational concepts of data science, history, significance, and process
2	Apply statistical methods and data analysis techniques to interpret and develop insights from complex datasets.
3	Implement various machine learning algorithms and assess their performance using appropriate evaluation metrics in real-world scenarios.
4	Utilize data visualization tools and techniques to effectively communicate findings and insights to diverse audiences

Module - 1	**No. of Hrs**
Module 1: Introduction: Big Data and Data Science Hype Getting Past the Hype Datafication. The Current Landscape, Data Science Jobs, A Data Science Profile, Statistical Inference, Exploratory Data Analysis, and the Data Science Process, Statistical Thinking in the Age of Big Data, Statistical Inference, Populations and Samples, Populations and Samples of Big Data, Big Data Can Mean Big Assumptions. Modeling, Exploratory Data Analysis, Philosophy of Exploratory Data Analysis, Exercise: EDA, The Data Science Process, A Data Scientist's Role in This Process.	9
Module - 2	**No. of Hrs**
Module 2: Algorithms, Machine Learning Algorithms, Three Basic Algorithms, Linear Regression, k-Nearest Neighbors (k-NN),k-means, Naive Bayes, Bayes Law, A Spam Filter for Individual Words, A Spam Filter That Combines Words: Naive Bayes Exercise Basic Machine Learning Algorithms, Spam Filters, Naive Bayes, and Wrangling, Logistic Regression Thought Experiments Classifiers, Logistic Regression Case Study, Estimating α and β, Newton's Method, Stochastic Gradient Descent, Implementation, Evaluation, Sample R Code	9
Module - 3	**No. of Hrs**
Module 3: Time Stamps and Financial Modeling, Kyle Teague and GetGlue,Timestamps, Exploratory Data Analysis (EDA), Metrics and New Variables or Features, Financial Modeling In-Sample, Out-of-Sample, and Causality, Preparing Financial Data, Log Returns	9
Module - 4	**No. of Hrs**
Module 4: Extracting Meaning from Data, Background: Data Science Competitions, Background Crowdsourcing, The Kaggle Model,A Single Contestant, Their Customers, Data Visualization and Fraud Detection, Data Visualization History, A Sample of Data Visualization Projects, Mark's Data Visualization, Data Science and Risk About Square, The Risk Challenge, The Trouble with Performance Estimation, Model Building Tips.	9
Module - 5	**No. of Hrs**
Module 5: Data Engineering: MapReduce, Pregel, and Hadoop, MapReduce, Word Frequency Problem. Enter MapReduce. Other Examples of MapReduce,Pregel, Thought Experiment, On Being a Data Scientist, Data Abundanceversus Data Scarcity, Designing Models, Economic Interlude: Hadoop. A Brief Introduction in Hadoop, Cloudera, Next Generation Data Scientists, Hubris, and Ethics.	9

Course Outcomes: At the end of the course, the students will be able to		**Blooms Level**
CO1	Explore the foundational concepts of data science, history, significance, and process	L3
CO2	Apply statistical methods and data analysis techniques to interpret and develop insights from complex datasets.	L3
CO3	Implement various machine learning algorithms and assess their performance using appropriate evaluation metrics in real-world scenarios.	L2
CO4	Utilize data visualization tools and techniques to effectively communicate findings and insights to diverse audiences	L4

Text Books	
1	Doing Data Science. Straight talk from the Frontline", Rachel Schutt& Cathy O'Neil 2014, Orielly publication
2	Data Science from Scratch: First Principles with Python' by Joel Cirus, 2nd Edition (2019)

Reference Books	
1	"The Elements of Statistical Learning" by Trevor Hastie, Robert Toshigami, and Jerome Friedman, 2nd Edition (2009)

Web links and Video Lectures (e-Resources):	
	• https://www.coursera.org/specializations/jhu-data-science • https://www.kaggle.com/learn/data-science • https://www.edx.org/professional-certificate/harvards-data-science • https://www.youtube.com/playlist?list=PLAcUxeGkcC9g1s4L6G8p8Fq5XK6Pq7b1k

4 credit Courses: (L:P:T:SDA 3:0:2:0)

Component	**Evaluation Criteria**	**Marks Allocation**
CIE - Theory Component (50 Marks)		
Internal Assessment Test 1	Covers 30% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 2	Covers 70% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 3	Covers 100% of the syllabus (50 marks, 1.5-hour duration)	50
a. Total Internal Assessment (**Scaled Down)**	Best of 2 and Average of 2 Test	30

b. Seminar Presentation	Seminar presentation 1 & 2 - Average of 2 Presentation (Each 10 marks)	10
c. Assignment	Assignments 1,2 – Average of 2 assignments (Each 10 marks)	10
Total a+b+c	Sum of Tests + Assignment+ Seminar	**50**
Minimum passing marks	50% (25/50) of the maximum marks of CIE	
SEE - Theory Component (50 Marks)		
Minimum passing marks	40% of the maximum marks of SEE. (**Scaled Down to 50 :** Minimum marks : 20/50 **)**	100
Passing Criteria for CIE +SEE (Theory)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	

Program outcome of this course:

Sl.No	Description	POs
1	Demonstrate the ability to independently conduct research and development work to address practical engineering problems.	PO1
2	Develop and deliver comprehensive technical presentations that effectively convey complex information to diverse audiences	PO2
3	Exhibit mastery in the specialized study area, surpassing the requirements of a relevant bachelor's program	PO3
4	Analyze engineering problems critically and apply appropriate techniques, skills, and modern tools to develop innovative solutions.	PO4

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X			X								
CO2			X									
CO3		X										
CO4												

Semester I					
Data Structures & Algorithms for Problem Solving Category: PCC Stream: Computer Science and Engineering (M.Tech) (Theory)					
Course Code	:	**P24MTC103**	CIE	:	50 Marks
Teaching Hours L:P: SDA	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs.

Course Objectives	
1	To reduce development time and the resources required to maintain existing applications.
2	To increase code reuse and provide a competitive advantage through effective use of data structures and algorithms.

Module - 1	**No. of Hrs.**
Search Trees: Two Models of Search Trees. General Properties and Transformations. Height of a Search Tree. Basic Find, Insert, and Delete. Returning from Leaf to Root. Dealing with Non unique Keys. Queries for the Keys in an Interval. Building Optimal Search Trees. Converting Trees into Lists. Removing a Tree. Balanced Search Trees: Height-Balanced Trees. Weight-Balanced Trees. (a, b)- And B-Trees. Red-Black Trees and Trees of Almost Optimal Height. Top-Down Rebalancing for Red-Black Trees.	**9**
Module - 2	**No. of Hrs.**
Tree Structures for Sets of Intervals. Interval Trees. Segment Trees. Trees for the Union of Intervals. Trees for Sums of Weighted Interval. Trees for Interval-Restricted Maximum Sum Queries. Orthogonal Range Trees. Higher-Dimensional Segment Trees. Other Systems of Building Blocks. Range-Counting and the Semigroup Model. Kd-Trees and Related Structures.	9
Module - 3	**No. of Hrs.**
Heaps: Balanced Search Trees as Heaps. Array-Based Heaps. Heap-Ordered Trees and Half Ordered Trees. Leftist Heaps. Skew Heaps. Binomial Heaps. Changing Keys in Heaps. Fibonacci Heaps. Heaps of Optimal Complexity. Double-Ended Heap Structures and Multidimensional Heaps. Heap-Related Structures with Constant-Time Updates	9
Module - 4	**No. of Hrs.**
Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching. Polynomials and the FFT: Representation of polynomials; The DFT and FFT; Efficient implementation of FFT	9
Module - 5	**No. of Hrs.**
String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms	9

Course Outcomes: At the end of the course, the students will be able to		Blooms Level
CO1	Analyze and apply fundamental data structures and algorithms to solve complex computational problems effectively	L4
CO2	Evaluate and implement various searching, sorting to optimize algorithm performance.	L5
CO3	Design and analyze advanced tree and graph algorithms, including balanced search trees and graph traversal methods, to address real-world applications	L5

Text Books	
1	Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2	Kenneth A. Berman. Algorithms. Cengage Learning. 2002.
3	T. H Cormen, C E Leiserson, R L Rivest and C Stein. Introduction to Algorithms. PHI, 3rd Edition, 2010
Reference Text Books	
1	Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, 4 th Edition, 2014, Pearson
2	Data structures with Java, Ford and Topp, Pearson Education.
3	Ellis Horowitz, SartajSahni, S.Rajasekharan. Fundamentals of Computer Algorithms. Universities press. 2nd Edition, 2007
4	Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.

Web links and Video lectures (e-Resources)
https://www.coursera.org/learn/advanced-data-structures https://nptel.ac.in/courses/106106133 https://pages.cs.wisc.edu/~shuchi/courses/787-F07/about.html https://www.youtube.com/watch?v=0JUN9aDxVmI&list=PL2SOU6wwxB0uP4rJgf5ayhHWgw7akUWSf

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X			X								
CO2			X		X							
CO3		X										
CO4					X							

3 credit Courses: (L:T:SDA 3:0:0)

Component	**Evaluation Criteria**	**Marks Allocation**
CIE - Theory Component (50 Marks)		
Internal Assessment Test 1	Covers 30% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 2	Covers 70% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 3	Covers 100% of the syllabus (50 marks, 1.5-hour duration)	50
a. Total Internal Assessment (**Scaled Down)**	Best of 2 and Average of 2 Test	30
b. Seminar Presentation	Seminar presentation 1 & 2 - Average of 2 Presentation (Each 10 marks)	10
c. Assignment	Assignments 1,2 – Average of 2 assignments (Each 10 marks)	10
Total a+b+c	Sum of Tests + Assignment+ Seminar	**50**

Minimum passing marks	50% (25/50) of the maximum marks of CIE	
SEE - Theory Component (50 Marks)		
Minimum passing marks	40% of the maximum marks of SEE. **(Scaled Down to 50 :** Minimum marks : 20/50 **)**	100
Passing Criteria for CIE +SEE (Theory)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	

Semester I					
Advanced Software Engineering Category: PCC Stream: Computer Science and Engineering (M.Tech) (Theory)					
Course Code	:	**P24MTC104**	CIE	:	50 Marks
Teaching Hours L:P:SDA	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits		3	SEE Duration	:	3 Hrs.

Course Objectives	
1	Reduce the development time, and resources required to maintain existing applications
2	Increase code reuse, and provide a competitive advantage to organizations that uses it

Module - 1	**No. of Hrs**
INTRODUCTION: What is software engineering? Software Engineering Concepts, Development Activities, Managing Software Development, Modeling with UML, Project Organization and Communication	9
Module - 2	**No. of Hrs**
REQUIREMENT ELICITATION AND ANALYSIS: Requirements Elicitation: Requirements Elicitation Concepts, Requirements Elicitation Activities, Managing Requirements Elicitation, Analysis: Analysis Concepts, Analysis Activities, Managing Analysis.	9
Module - 3	**No. of Hrs**
SYSTEM DESIGN: System design-Decomposing the system: Overview of System Design, System Design Concepts, System Design Activities: Objects to Subsystems, System Design – Addressing design goals: Activities: An overview of system design actives, UML deployment diagrams, Addressing Design Goals, Managing System Design.	9
Module - 4	**No. of Hrs**
OBJECT DESIGN, IMPLEMENTATION AND TESTING : Object design-Reusing pattern solutions: An Overview of Object Design, Reuse Concepts: Design Patterns, Reuse Activities, Managing Reuse, Object design-Specifying interface: An overview of interface specification, Interfaces Specification Concepts, Interfaces Specification Activities, Managing Object Design, Mapping model to code: Mapping Models to Code Overview, Mapping Concepts, Mapping Activities, Managing Implementation, Testing: An overview of testing, Testing concepts, Managing testing.	9
Module - 5	**No. of Hrs**
SOFTWARE MAINTENANCE AND SOFTWARE CONFIGURATION MANAGEMENT: Software maintenance: What is Software Maintenance?, Factors that Mandate Change, Lehman's Laws of system evolution, Types of software maintenance, Software maintenance process and actives, Reverse Engineering, Software Re-engineering, Patterns for Software Maintenance, Tool support for Software Maintenance. Software Configuration Management: The baseline of Software Life Cycle, What is Software Configuration Management, Why Software Configuration Management, Software Configuration Management Functions, Software Configuration Management Tools.	9

Course Outcomes: At the end of the course, the students will be able to		Blooms Level
CO1	Apply Object Oriented Software Engineering approach in every aspect of software project	L3
CO2	Adapt appropriate object oriented design aspects in the development process	L4
CO3	Adapt the concepts and tools related to software configuration management	L4

Text Books	
1	Object-Oriented Software Engineering, Bernd Bruegge, Alan H Dutoit, Pearson Education, 3 rd edition, 2014.
2	Object oriented software engineering, David C. Kung, Tata McGraw Hill 2015.
Reference Text Books	
1	Object oriented software engineering, Stephan R. Schach, Tata McGraw Hill 2008.
2	Applying UML and Patterns, Craig Larman, Pearson Education 3rd ed, 2005

Web links and Video lectures (e-Resources)
1. https://medium.com/javarevisited/my-favorite-courses-to-learn-object-oriented-programming-and- designin-2019-197bab351733 2. https://www.youtube.com/watch?v=BqVqjJq7_vI

3 credit Courses: (L:T:SDA 3:0:0)

Component	Evaluation Criteria	Marks Allocation
CIE - Theory Component (50 Marks)		
Internal Assessment Test 1	Covers 30% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 2	Covers 70% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 3	Covers 100% of the syllabus (50 marks, 1.5-hour duration)	50
a. Total Internal Assessment (**Scaled Down)**	Best of 2 and Average of 2 Test	30
b. Seminar Presentation	Seminar presentation 1 & 2 - Average of 2 Presentation (Each 10 marks)	10
c. Assignment	Assignments 1,2 – Average of 2 assignments (Each 10 marks)	10
Total a+b+c	Sum of Tests + Assignment+ Seminar	**50**
Minimum passing marks	50% (25/50) of the maximum marks of CIE	
SEE - Theory Component (50 Marks)		
Minimum passing marks	40% of the maximum marks of SEE. (**Scaled Down to 50 :** Minimum marks : 20/50 **)**	100
Passing Criteria for CIE +SEE (Theory)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X					X						
CO2		X	X									
CO3			X		X							
CO4		X	X									

Semester I					
Internet of Things Category: IPCC Stream: Computer Science & Engineering (M.Tech) (Theory+Practical)					
Course Code	:	P24MTC105	CIE	:	50 Marks
Teaching Hours L:P:SDA	:	3:2:0	SEE	:	50 Marks
Total Hours	:	40+10	Total	:	100 Marks
Credits		4	SEE Duration	:	3 Hrs

Course Objectives	
1	Explore the knowledge on combination of functionalities and services of networking
2	Explain the definition and significance of the Internet of Things.
3	Discuss the architecture, operation and business benefits of an IoT solution.

Module - 1	**No. of Hrs.**
What is The Internet of Things? Overview and Motivations, Examples of Applications, IPV6 Role, Areas of Development and Standardization, Scope of the Present Investigation. Internet of Things Definitions and frameworks-IoT Definitions, IoT Frameworks, Basic Nodal Capabilities. Internet of Things Application Examples-Overview, Smart Metering/Advanced Metering Infrastructure-Health/Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking, OverThe-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications.	8
Module - 2	**No of Hrs.**
Fundamental IoT Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT StandardsOverview and Approaches, IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M, Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Low power WPAN, Zigbee IP(ZIP),IPSO	8
Module - 3	**No of Hrs.**
Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M, Layer 3 Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities, IPv6 Protocol Overview, IPv6 Tunneling, IPsec in IPv6,Header Compression Schemes, Quality of Service in IPv6, Migration Strategies to IPv6	8
Module - 4	**No. of Hrs.**
Case Studies illustrating IoT Design-Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.	8
Module - 5	**No. of Hrs.**
Data Analytics for IoT – Introduction, Apache Hadoop, Using HadoopMapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Realtime Data Analysis, Structural Health Monitoring Case Study.	8

Course Outcomes: At the end of the course, the students will be able to		Blooms Level
CO1	Choose appropriate schemes for the applications of IOT in real time scenarios	L2
CO2	Manage the Internet resources through different protocols used in each layer	L1
CO3	Compare various protocols and algorithms in different layers that facilitate effective communication mechanisms	L3
CO4	Identify how IoT differs from traditional data collection systems	L2

Text Books	
1	Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications Daniel Minoli Wiley 2013
2	Internet of Things: A Hands-on Approach ArshdeepBahga, Vijay Madisetti Universities Press 2015
Reference Text Books	
1	The Internet of Things Michael Miller Pearson 2015 First Edition
2	Designing Connected Products Claire Rowland,Elizabeth Goodman et.al O'Reilly First Edition, 2015

Web links and Video lectures (e-Resources)
https://www.tutorialspoint.com/internet_of_things/index.htm#:~:text=IoT%20(Internet%20of%20Things)%20is,to%20any%20industry%20or%20system. https://www.javatpoint.com/iot-internet-of-things https://www.digimat.in/nptel/courses/video/106105166/L01.html(Video Lectures)

Sl.NO	**Experiments**
1	Transmit a string using UART
2	Point-to-Point communication of two Motes over the radio frequency
3	Multi-point to single point communication of Motes over the radio frequency AN (Sub netting).
4	I2C protocol study
5	Reading Temperature and Relative Humidity value from the sensor
6	Study of Connectivity and Configuration of Raspberry-Pi/Be agle Board circuit with Basic peripherals, LEDs, Understanding GPIO and its use in program.
7	Study of different operating systems for RaspberryPi/Be agle board.Understanding the Process of osinstallation on Raspberry–Pi/Be agle board.
8	Familiarization with the concept of IOT,Arduino/Raspberry Pi and perform necessary Software installation.

4 Credit courses (L:P:SDA 3:2:0):

Component	**Evaluation Criteria**	**Marks Allocation**
CIE - Theory Component (50 Marks)		
Internal Assessment Test 1	Covers 30% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 2	Covers 70% of the syllabus (50 marks, 1.5-hour duration)	50
Internal Assessment Test 3	Covers 100% of the syllabus (50 marks, 1.5-hour duration)	50

a. Total Internal Assessment (**Scaled Down)**	Best of 2 and Average of 2 Test	30
b. Seminar Presentation	Seminar presentation 1 & 2 - Average of 2 Presentation (Each 10 marks)	10
c. Assignment	Assignments 1,2 – Average of 2 assignments (Each 10 marks)	10
Total a+b+c	Sum of Tests + Assignment+ Seminar **(Scaled Down to 25)**	**50**
Minimum passing marks	50% (13/25) of the maximum marks of CIE	

IPCC- CIE - Practical Component (25 Marks)	
Average of 10 Experiments - Conduction (10)+ Record (10)+ VIVA (10)	30
Conducted after all lab sessions	20
Sum of Lab conduction & Practical Internal Test	**50**
Minimum 50% in CIE - Practical (13/25) - **Scaled Down to 25**	

SEE - Theory Component (50 Marks)		
Minimum passing marks	40% of the maximum marks of SEE. (**Scaled Down to 50 :** Minimum marks : 20/50 **)**	100
Passing Criteria for CIE +SEE (Theory)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			X	X								
CO2												
CO3				X								
CO4	X											

MOOGAMBIGAI CHARITABLE EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Semester I

Algorithms & AI Lab

Category: PCCL

Stream: Computer Science & Engineering (M.Tech)

(Practical)

Course Code	**P24MTC106**	CIE Marks	50
Teaching Hours/Week(L:T:P:SDA)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives: This course will enable students to:

- Implement and evaluate Algorithm and AI in Python programming language.

Descriptions (if any):

Installation procedure of the required software must be demonstrated, carried out in groups. and documented in the journal.

Sl.NO	Programs List:
1	Implement a simple linear regression algorithm to predict a continuous target variable based on a given dataset.
2	Develop a program to implement a Support Vector Machine for binary classification. Use a sample dataset and visualize the decision boundary.
3	Develop a simple case-based reasoning system that stores instances of past cases. Implement a retrieval method to find the most similar cases and make predictions based on them.
4	Write a program to demonstrate the ID3 decision tree algorithm using an appropriate dataset for classification.
5	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test it with suitable datasets.
6	Implement a KNN algorithm for regression tasks instead of classification. Use a small dataset, and predict continuous values based on the average of the nearest neighbors
7	Create a program that calculates different distance metrics (Euclidean and Manhattan) between two points in a dataset. Allow the user to input two points and display the calculated distances
8	Implement the k-Nearest Neighbor algorithm to classify the Iris dataset, printing both correct and incorrect predictions.
9	Develop a program to implement the non-parametric Locally Weighted Regression algorithm, fitting data points and visualizing results.
10	Implement a Q-learning algorithm to navigate a simple grid environment, defining the reward structure and analyzing agent performance.

Laboratory Outcomes: The student should be able to:

Implement and demonstrate AI algorithms.

Evaluate different algorithms.

PCCL - 1 Credit Course – Laboratory

CIE - Practical Component (50 Marks) + SEE - Practical Component (50 Marks)

CIE - Practical Component (50 Marks)		
Lab Conduction	Average of 10 Experiments - Conduction (10)+ Record (10)+ VIVA (10)	30
Practical Internal Test	Conducted after all lab sessions	20
Total	Sum of Lab conduction & Practical Internal Test	**50**
Passing Criteria	Minimum 50% in CIE - Practical (25/50)	

SEE - Practical Component (100 Marks)

Practical Exam	Write up + Execution + Report + VIVA	100
Passing Criteria	Minimum 50% in SEE - Practical (25/50) (**Scaled Down to 50 :** Minimum marks : 25/50	

Passing Criteria for CIE +SEE (Lab)	The student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Semester I					
Research Methodology and IPR Category: NCMC Stream: Computer Science and Engineering (M.Tech) (Theory)					
Course Code	:	P24MTC107	CIE	:	-
Teaching Hours L:P:SDA	:	Online	SEE	:	-
Total Hours	:	-	Total	:	-
Credits		-	SEE Duration	:	-

P24MTC107 -Research Methodology and IPR- None Credit Mandatory Course (NCMC) if students have not studied this course in their undergraduate program then he /she has to take this course at http://online.vtu.ac.in and to qualify for this course is compulsory before completion of the minimum duration of the program (Two years), however, this course will not be considered for vertical progression.

Web links and Video lectures (e-Resources)
1. https://www.youtube.com/watch?v=A7oioOJ4g0Y&list=PLVf5enqoJ-yVQ2RXUl6mCfLPf3J_JUfoc