E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

NAGAPATTINAM – 611002

(Affiliated to Anna University, Chennai | Accredited by NAAC with „A++"
Grade|Accredited by NBA T1(B.E. – CSE, CIVIL, ECE, EEE, MECH& B.Tech – IT) |
Approved by AICTE, New Delhi)

MASTER OF COMPUTER APPLICATIONS R - 2024

SECOND YEAR

CURRICULUM AND SYLLABUS FOR THIRD SEMESTER

CourseCode	CourseName	L	T	P	C	CIA	ES	Total	Category
	SEMESTER III								
Theory Course									
2402CA301	Machine Learning	3	-	-	3	40	60	100	PC
2402CA302	Internet of Things	3	-	-	3	40	60	100	PC
	Open elective	3	-	-	3	40	60	100	OE
	Elective – II	3	-	-	3	40	60	100	PE
	Elective – III	3	-	-	3	40	60	100	PE
	Elective – IV	3	-	2	4	50	50	100	PE
Laboratory Course									
2402CA303	Machine Learning Laboratory	-	-	4	2	60	40	100	PC
2402CA304	Internet of Things Laboratory	-	-	4	2	60	40	100	PC
2404CA305	Professional Development Course III	-	-	2	1	100	-	100	EEC
Total		18	0	12	24	470	430	900	

2402CA301	MACHINE LEARNING	L	T	P	C
		3	0	0	3

PREREQUISITE:

Data Analytics

COURSE OBJECTIVES:

1. To gain knowledge on foundations of machine learning and apply suitable dimensionality reduction techniques for an application
2. To select the appropriate model and use feature engineering techniques
3. To gain knowledge on Probability and Bayesian Learning to solve the given problem
4. To design and implement the machine learning techniques for real world problems
5. To analyze, learn and classify complex data without predefined models also

COURSE OUTCOMES:
On the successful completion of the course, students will be able to
   CO1: Understand about Data Preprocessing, Dimensionality reduction
   CO2: Apply proper model for the given problem and use feature engineering techniques
   CO3: Make use of Probability Technique to solve the given problem.
   CO4: Analyze the working model and features of Decision tree
   CO5: Choose and apply appropriate algorithm to learn and classify the data

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2	3	1	1	1	2	3	3
CO2	3	3	3	3	1	1	1	2	3	3
CO3	3	2	2	2	1	1	1	2	2	3
CO4	3	3	3	3	1	1	1	2	3	3
CO5	3	3	3	3	2	1	1	2	3	3

COURSE CONTENTS:

UNITI   INTRODUCTION   9 Hours
Human Learning - Types – Machine Learning - Types - Problems not to be solved - Applications - Languages/Tools– Issues. Preparing to Model: Introduction-Machine Learning Activities-Types of data-Exploring structure of data-Data quality and remediation-Data Pre-processing

**   UNSUPERVISEDLEARNINGANDREINFORCEMENTLEARNING,FEATURE   9 Hours**
MODULE II ENGINEERING

Introduction - Clustering Algorithms -K – Means – Hierarchical Clustering - Cluster Validity - Dimensionality Reduction –Linear Discriminant Analysis-Principal Component Analysis- Reinforcement Learning : Q learning, Rewards and Actions Temporal Difference Learning-Markov Decision Process. Feature Engineering : Feature Transformation-Feature Subset Selection

MODULE III BAYESIANLEARNING   **8 Hours**

Basic Probability Notation- Inference – Independence - Bayes" Rule. Bayesian Learning: Maximum Likelihood and Least Squared error hypothesis –Maximum Likelihood hypotheses for predicting probabilities – Minimum description Length principle – Bayes optimal classifier- Naïve Bayes classifier-Bayesian Belief networks-EM algorithm

MODULE IV PARAMETRICMACHINELEARNING   **9 Hours**

Logistic Regression: Classification and representation – Cost function – Gradient descent – Advanced optimization – Regularization - Solving the problems on over fitting. Perceptron–Neural Networks – Multi – class Classification – Back propagation – Non-linearity with activation functions (Tanh, Sigmoid, Relu, PRelu) - Dropout as regularization-Tensor Flow

MODULE V NONPARAMETRICMACHINELEARNING   **10 Hours**

k-Nearest Neighbors – Decision Trees – Branching – Greedy Algorithm – Multiple Branches – Continuous attributes – Pruning. Random Forests : ensemble learning. Boosting – Adaboost algorithm. Support Vector Machines – Large Margin Intuition–Loss Function – Hinge Loss–SVM Kernels

TOTAL: 45 HOURS

REFERENCES:

1. EthemAlpaydin,"IntroductiontoMachineLearning3e(Adaptive Computationand Machine Learning Series)", Third Edition, MIT Press, 2014
2. TomM.Mitchell,"MachineLearning",IndiaEdition,1stEdition,McGraw-HillEducation Private Limited, 2013
3. Saikat DuttSubramanian Chandramouliand AmitKumar Das,"MachineLearning",1stEdition, Pearson Education, 2019
4. ChristopherM.Bishop,"PatternRecognitionandMachineLearning",RevisedEdition, Springer, 2016
5. AurelienGeron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", 2ndEdition,O"Reilly, 2019
6. StephenMarsland,"MachineLearning–AnAlgorithmicPerspective",SecondEdition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014

2402CA302	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

PREREQUISITE:

Data Analytics

COURSE OBJECTIVES:

1. To understand the concepts of IoT and its working models
2. To know the various IoT protocols
3. To understand about various IoT Physical devices and Endpoints
4. To know the security and privacy issues connected with IoT
5. To apply the concept of Internet of Things in a real world scenario.

COURSE OUTCOMES:

CO1: Define the infrastructure for supporting IoT deployments
CO2: Understand the usage of IoT protocols for communication between various IoT devices
CO3: Design portable IoT using Arduino / Raspberry Pi / equivalent boards
CO4: Understand the basic concepts of security and governance as applied to IoT
CO5: Analyze and illustrate applications of IoT in real time scenarios

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2	3	1	-	-	1	3	2
CO2	3	3	2	3	1	-	1	1	3	2
CO3	3	2	3	3	2	1	-	2	3	2
CO4	2	2	2	2	1	-	3	2	2	1
CO5	2	3	3	2	2	1	1	2	3	3

COURSE CONTENTS:

UNIT I   FUNDAMENTALS OF IOT   **9 Hours**

Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies –Wireless Sensor Networks Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry

UNIT II   IOT PROTOCOLS   **9 Hours**

Protocol Standardization for IoT – Efforts–M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

UNIT III   IOT PHYSICAL DEVICES AND END POINTS   **9 Hours**

Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, and reading input from pins.

UNIT IV   INTERNET OF THINGS PRIVACY, SECURITY AND   **9 Hours**

GOVERNANCE

Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

UNITV   CASESTUDIESANDADVANCEDTOPICS   9 Hours

IOT APPLICATIONS- IoT applications for in dustry : Future Factory Concepts, Brownfield IoT, Smart Objects,SmartApplications.StudyofexistingIoTplatforms/middleware,IoT-A,Hydra etc.

TOTAL: 45 HOURS

REFERENCES:
1. InternetofThings-AHands-onApproach,ArshdeepBahgaandVijayMadisetti, Universities
2. OlivierHersent,DavidBoswarthick,OmarElloumi,"TheInternetofThings–Key applications and Protocols", Wiley, 2012.
3. DavidHanes,GonzaloSalgueiro,PatrickGrossetete,RobBarton,JeromeHenry,"IoTFundamentals,Networkin gTechnologies,Protocols,andUsecasesfortheInternetof Things",CiscoPress,FirstEdition,2017.
4. DieterUckelmann,MarkHarrison,Michahelles,Florian(Eds),"ArchitectingtheInternet ofThings", Springer, 2011
5. RaspberryPiCookbook,SoftwareandHardwareProblemsandsolutions,SimonMonk, O'Reilly (SPD), 2016, ISBN 7989352133895
6. PeterFriess,'InternetofThings–FromResearchandInnovationtoMarketDeployment', River Publishers, 2014

2402CA303   MACHINE LEARNING LABORATORY

L	T	P	C
0	0	4	2

PREREQUISITE:

Data Analytics

COURSE OBJECTIVES:

1. To understand about data cleaning and data preprocessing.
2. To familiarize with the Supervised Learning algorithms and implement the minpractical situations
3. To familiarize with unsupervised Learning algorithms and carry on the implementation part
4. To involve the students to practice ML algorithms and techniques
5. Learn to use algorithms for real time data sets

COURSE OUTCOMES:

CO1:	Apply data pre-processing technique and explore the structure of data to prepare for predictive modeling
CO2:	understand how to select and train a model and measure the performance
CO3:	Apply feature selection techniques in Machine Learning
CO4:	On struct Bayesian Network for appropriate problem
CO5:	Learn about parametric and non-parametric machine Learning algorithms and implement to practical situations

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2	3	1	1	1	2	3	3
CO2	3	3	3	3	1	1	1	2	3	3
CO3	3	3	3	3	1	1	1	2	3	3
CO4	3	3	2	3	1	1	1	2	3	3
CO5	3	3	3	3	2	1	1	2	3	3

LIST OF EXPERIMENTS:

1. Demonstrate how do you structure data in Machine Learning

2. Implement data preprocessing techniques on real time data set
3. Implement Feature subset selection techniques
4. Demonstrate how will you measure the performance of a machine learning model
5. Write a program to implement the naïve Bayesian classifier for a sample training data set. Compute the accuracy of the classifier, considering few test data sets
6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using the standard Heart Disease Data Set
7. Apply EM algorithm to cluster a set of data stored in a.CSV file.
8. Write a program to implement k-Nearest Neighbor algorithm to classify the data set
9. Apply the technique of pruning for a noisy data monk2 data, and derive the decision tree from this data. Analyze the results by comparing the structure of pruned and unpruned tree

10. Apply the technique of pruning for a noisy data monk2 data, and derive the decision tree from this data. Analyze the results by comparing the structure of pruned and unpruned tree
11. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test
12. the same using appropriate data sets
13. Implement Support Vector Classification for linear kernels
14. Implement Logistic Regression to classify problems such as spam detection. Diabetes predictions and so on

TOTAL: 60 HOURS

REFERENCES:

1. Python or any ML tools like R

2402CA304	INTERNET OF THINGS LABORATORY	L	T	P	C
		0	0	4	2

PREREQUISITE:

Basic Programming Knowledge, Computer Architecture

COURSE OBJECTIVES:

1. To design applications to interact with sensors
2. To design and develop IoT application Arduino / Raspberry pi for real world scenario
3. To enable communication between IoT and cloud platforms
4. To develop applications using Django Framework

COURSE OUTCOMES:
On completion of the course, the students will be able to:
- **CO1:** To understand the various IoT protocols
- **CO2:** Test and experiment different sensors for application development
- **CO3:** To develop applications using Arduino/Raspberry Pi/ Equivalent boards
- **CO4:** To develop applications that would read the sensor data and post it in Cloud
- **CO5:** Develop IOT applications with different platforms and frameworks

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	1	2	1	-	1	2	3	1
CO2	2	2	2	3	1	-	1	2	3	2
CO3	3	2	3	3	2	1	1	2	3	2
CO4	3	2	3	3	2	1	1	2	3	3
CO5	3	2	3	3	2	1	1	2	3	3

LIST OF EXPERIMENTS:

1. To study various IoT protocols – 6LowPAN, IPv4/IPv6, Wifi, Bluetooth, MQTT
2. IoT Application Development Using sensors and actuators (temperature sensor, light sensor, infrared sensor)
3. To study Raspberry Pi development board and to implement LED blinking applications
4. To develop an application to send and receive data with Arduino using HTTP request
5. To develop an application that measures the room temperature and posts the temperature value on the cloud platform
6. To develop an application that measures the moisture of soil and post the sensed data over Google Firebase cloud platform
7. To develop an application for measuring the distance using ultrasonic sensor and post distance value on Google Cloud IoT platform
8. Develop a simple application based on sensors
9. Develop IoT applications using Django Framework and Firebase/Bluemix platform
10. Develop a commercial IoT application

TOTAL: 60 HOURS

REFERENCES:

1. InternetofThings-AHands-onApproach,ArshdeepBahgaandVijayMadisetti, Universities

2. OlivierHersent,DavidBoswarthick,OmarElloumi,"TheInternetofThings–Key applications and Protocols", Wiley, 2012.

3. DavidHanes,GonzaloSalgueiro,PatrickGrossetete,RobBarton,JeromeHenry,"IoTFundamentals,Networkin gTechnologies,Protocols,andUsecasesfortheInternetof Things",CiscoPress,FirstEdition,2017.

4. DieterUckelmann,MarkHarrison,Michahelles,Florian(Eds),"ArchitectingtheInternet ofThings", Springer, 2011

5. RaspberryPiCookbook,SoftwareandHardwareProblemsandsolutions,SimonMonk, O'Reilly (SPD), 2016, ISBN 7989352133895

6. PeterFriess,'InternetofThings–FromResearchandInnovationtoMarketDeployment', River Publishers, 2014

2404CA305	**PROFESSIONAL DEVELOPMENT COURSES –III**	L	T	P	C
		0	0	2	1

PREREQUISITE:

Basic Mathematics & English Language Skills

COURSE OBJECTIVES:

1. Develop logical reasoning, decision-making, and data interpretation skills
2. Enhance employability through ethics, project handling, and personal branding
3. Strengthen critical reasoning in judgments, arguments, and cause–effect analysis.
4. Improve professional communication in speaking and writing.

COURSE OUTCOMES:

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

CO1: Learners should be able to understand various charts and interpret data at least once.

CO2: Workout puzzles, ability to arrange things in an orderly fashion

CO3: Learners should be able to find a series of the logic behind a sequence.

CO4: Acquire employability skills and to implement their learning

CO5: Enabling students to analyze critically and to evaluate evidence, construct reasoned, communicate inferences and conclusions.

CO6: Verbal reasoning enables the students to make predictions, inferences and connections. To access complex content through spoken and written words.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	3	2	2	1	1	-	1	3	-
CO2	2	3	2	1	1	0	-	1	3	3
CO3	2	3	3	2	1	-	-	1	3	3
CO4	1	2	2	1	3	2	1	2	3	3
CO5	2	3	3	2	3	1	1	2	3	3
CO6	2	3	2	1	3	-	-	2	3	3

COURSE CONTENTS:

MODULE I	**DECISION MAKING**	**9 Hours**

Logical Deduction, Decision making, Arrangements / Puzzles, Data Interpretations, Data Sufficiency

MODULE II	**SHARPEN EMPLOYABILITY SKILLS**	**9 Hours**

Corporate ethics, Project handling, Emotional Intelligence, Habits & Personality builds character, Resume presentation, Video Resume, Brand yourself, Mock interview

MODULE III	**CRITICAL REASONING**	**9 Hours**

Making Judgments, Statement and Conclusion, Argument, Assumption, Logical Problems and Games, Essential Part, Matching Definition, Artificial Languages, Cause and Effect.

TOTAL: 27 HOURS

REFERENCES:

1. Arun Sharma, _How to Prepare for Logical Reasoning for CAT,,, 4th edition, McGraw Hills publication, 2017.
2. R S Agarwal, _A modern approach to Logical reasoning,,, revised edition, S.Chand publication, 2017.
3. B.S. Sijwalii and InduSijwali, ―A New Approach to REASONING Verbal & Non-Verbal‖, 2nd edition, Arihnat publication, 2014
4. Objective General English by SP Bakshi.
5. A Modern approach to verbal and non verbal reasoning by R.S. Agarwal.
6. Complete reference campus recruitment book.

2403CA007   **DEVOPS AND MICROSERVICES**   **L   T   P   C**
                                                                     3   0   0   3

PREREQUISITE:

Artificial Intelligence

COURSE OBJECTIVES:

1. To introduce Micro services and Containers
2. To understand the key concepts and principles of DevOps
3. To be familiar with most common DevOps tools
4. To explain the business benefits of DevOps and continuous delivery
5. To recall specific DevOps methodologies and frameworks

COURSE OUTCOMES:
At the end of this course, the students will be able to:
  CO1: Select the Micro services design and apply the principles
  CO2: Apply Micro services in DevOps
  CO3: Understand about DevOps and the common tools used in DevOps
  CO4: Develop and integrate projects using DevOps
  CO5: Deploy and monitor projects using DevOps

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	3	3	1	1	1	2	3	2
CO2	2	3	3	3	2	2	1	2	3	2
CO3	2	2	2	3	2	1	1	2	2	2
CO4	3	3	3	3	2	2	1	2	3	3
CO5	3	2	3	3	2	2	2	2	3	3

COURSE CONTENTS:

 MODULE I   **INTRODUCTIONTOMICROSERVICES**   **9 Hours**
Definition of Microservices – Characteristics - Microservices and Containers – Interacting with Other Services – Monitoring and Securing the Services – Containerized Services – Deploying on Cloud
MODULE II   **MICROSERVICESARCHITECTURE**   **9 Hours**
Monolithic architecture – Microservices architectural style – Benefits – Drawbacks of Microservices architectural style - decomposing monolithic applicationsin to Microservices
 MODULE III   **DEVOPSTOOLS**   **9 Hours**
History of DevOps - DevOps and Software Development Life Cycle – Waterfall Model _Agile Model – DevOps Life Cycle – DevOps Tools: distributed version of control tool Git- Automation testing tools- Selenium – report generation –Test NG – User Acceptance Testing – Jenkins

 MODULE IV   **MICROSERVICESINDEVOPSENVIRONMENT**   **9 Hours**

Evolution of Microservices and DevOps – Benefits of combining DevOps and Microservices-working of DevOps and Microservices in Cloud environment - DevOps Pipeline representation for a NodeJS based Microservices

| **MODULE V** | **VELOCITYANDCONTINUOUSDELIVERY** | **9 Hours** |

Velocity-Delivery Pipeline – teststack – Small / UnitTest–medium/ integration testing–system testing-Job of Development and DevOps – Job of Test and DevOps –Job of Op and Devops - Infrastructure and the job of Ops

TOTAL: 45 HOURS

REFERENCES:
1. NamitTanasseri,RahulRai,MicroserviceswithAzure,1stEdition,PacktPublishing, UK,2017
2. EberhardWolff,Microservices:FlexibleSoftwareArchitecture,1stEdition,Pearson Education,2017
3. JamesAScott,APracticalGuidetoMicroservicesandContainers,MapRData Technologies e – book. https://mapr.com/ebook/microservices-and-
4. JoynerJoseph,DevopsforBeginners,FirstEdition,MihailsKonoplovspublisher,2015.
5. Gene Kim, Kevin Behr, George Spafford, The Phoenix Project, A Novel about IT, DevOps, 5th Edition, IT Revolution Press, 2018
6. MichaelHüttermann,DevOpsforDevelopers,1stEdition,APress,e-book,2012

2403CA013	CYBER SECURITY	L	T	P	C
		3	0	0	3

PREREQUISITE:

Mathematical Foundations of Computer Applications Computer Communication and Networks

COURSE OBJECTIVES:

To learn the principles of cyber security and to identify threats and risks.
To learn how to secure physical assets and develop system security controls.
To understand how to apply security for Business applications and Network Communications.
To learn the technical means to achieve security.
To learn to monitor and audit security measures.

COURSE OUTCOMES:
On completion of the course, the student will be able to

CO1: Develop a set of risk and security requirements to ensure that there are no gaps in an organization"s security practices
CO2: Achieve management, operational and technical means for effective cyber security
CO3: Audit and monitor the performance of cyber security controls.
CO4: Spot gaps in the system and devise improvements.
CO5: Identify and report vulnerabilities in the system

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	3	2	2	1	1	3	2	3	2
CO2	3	3	3	3	1	1	3	2	3	3
CO3	3	3	2	3	1	1	3	2	3	3
CO4	3	3	3	2	2	1	2	2	3	3
CO5	3	3	2	3	1	1	3	2	3	3

COURSE CONTENTS:

MODULE I	PLANNING FOR CYBER SECURITY	9 Hours

Best Practices-Standards and a plan of Action-Security Governance Principles, components and Approach- Information Risk Management-Asset Identification-Threat Identification-Vulnerability Identification-Risk Assessment Approaches-Likelihood and Impact Assessment-Risk Determination, Evaluation and Treatment- Security Management Function-Security Policy- Acceptable Use Policy- Security Management Best Practices - Security Models: Bell La Padula model, Biba Integrity Model - Chinese Wall model

MODULE II	SECURITY CONTROLS	9 Hours

People Management-Human Resource Security-Security Awareness and Education-Information Management- Information Classification and handling-Privacy-Documents and Record Management- Physical Asset Management-Office Equipment-IndustrialControlSystems-MobileDeviceSecurity-SystemDevelopment-Incorporating Securityin to SDLC-Disaster management and Incident response planning.

MODULE III	CYBERSE CURITY FOR BUSINESS APPLICATIONS AND NETWORKS	9 Hours

Business Application Management-Corporate Business Application Security-End user Developed Applications-System Access- Authentication Mechanisms-Access Control-System Management- Virtual Servers-Network Storage Systems – Network Management Concepts - Firewall-IP Security -Electronic Communications –Casestudyon OWASP vulnerabilities using OWASP ZAP tool.

MODULE IV	TECHNICAL SECURITY	9 Hours

Supply Chain Management-Cloud Security-Security Architecture-Malware Protection-Intrusion Detection- Digital Rights Management-Cryptographic Techniques-Threat and Incident Management- Vulnerability Management-Security Event Management – Forensic Investigations - Local Environment Management – Business Continuity.

MODULE V	SECURITY ASSESSMENT	9 Hours

Security Monitoring and Improvement – Security Audit - Security Performance - Information Risk Reporting – Information Security Compliance Monitoring –Security Monitoring and Improvement Best Practices

TOTAL: 45 HOURS

REFERENCES:
1. WilliamStallings,"EffectiveCyberSecurity-AguidetousingBestPracticesandStandards", Addison-WesleyProfessional,FirstEdition,2019.
2. AdamShostack,"ThreatModellingDesigningforSecurity",WileyPublications,FirstEdition,2014
3. GregoryJ.TouhillandC.JosephTouhill,"CyberSecurityforExecutives-APracticalGuide", Wiley Publications, First Edition, 2014.
4. RaefMeeuwisse,"CyberSecurityforBeginners",SecondEdition,CyberSimplicityLtd,2017.
5. PatrickEngebretson,"TheBasicsofHackingandPenetrationTesting:EthicalHackingand PenetrationTestingMadeEasy",2nd Edition, Syngress, 2013.
6. CharlesP.Pfleeger,ShariLawrencePfleeger,JonathanMargulies,"SecurityinComputing", Fifth Edition, Prentice Hall, 2015.

2403CA020	GENERATIVEAI FOR SOFTWARE DEVELOPMENT	L	T	P	C
		3	0	2	4

PREREQUISITE:

Artificial Intelligence

COURSE OBJECTIVES:

1. To explore the concepts of AI Fundamentals

2. To introduce the Roles of AI Tools

3. To make understand the usage of Open AIAPIS

4. To explore the Application Area of AI

5. To provide the knowledge of software develop mentusing AI.

COURSE OUTCOMES:
At the end of this course, the students will be able to:
- **CO1:** Explain the basic concepts of Generating AI
- **CO2:** Develop Generative AI with Custom Data set using Botsonic, Chatbase
- **CO3:** Create a website using Gen AI Tools
- **CO4:** Build Chat GPT powered applications
- **CO5:** Develop one chatbot building project from various available projects in domains like Travel, E- Commerce. Education, Legal, etc.

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2	2	1	0	1	2	2	2
CO2	2	2	3	3	1	1	1	2	3	3
CO3	3	2	3	3	2	2	1	2	3	3
CO4	3	3	3	3	2	2	1	2	3	3
CO5	3	3	3	3	3	2	1	2	3	3

COURSE CONTENTS:

MODULE I   INTRODUCTION TO THE PROGRAMAND FUNDAMENTALS   15 Hours
Introduction to Generative AI-Chat GPT: What is a Prompt-Elements of a Prompt- Designing Prompt-Example prompts for various use cases, Generative Texts-Introduction to AI Chat bots-Working of AI Chat bots-Popular AI Chat bots- Chat GPT and its working-useage of Chat GPT- Use cases of Chat GPT for various users
  Lab Components
  1. Applications of generative models using text generation
Explore integrating Chat GPT with a voice interface using text-to-speech
MODULE II   GENERATIVE MODEL SFORTEXT   15 Hours

Generative Texts : Language Models Basics – Building blocks of Language models - Transformer Architecture – Encoder and Decoder – Attention mechanisms - Generation of Text- Generation of Text – Autoencoding – Regression Models – Exploring Chat GPT – Prompt Engineering- Programming LLM

Lab Components

1. Generateares pensive HTML web page based on a shorted scription (e.g., "Acontact form with name, email, and message").
2. Generate SQL queries from English instructions

MODULE III	**OPENAIAPIS**	**15Hours**

Understanding Open AI APIs-Open AI playground – creating API keys - Authentication-making requests- Building Chat GPT powered applications- Open AI APIs- build chat bots- integration with Open AI API keys, Builda website using Gen AI Tools, Generative AI with Custom Data set : Botsonic , Chatbase: Train with custom dataset-Introduction about Gemini AI

Lab Components

1. Installing procedure for chatGPT
2. Create Chatbot using GPT Model

MODULE IV	**APPLICATION SAREA OF AI**	**15 Hours**

From simple perceptron to multi-layer perceptron and its training, Deep learning and its architectures- Introducing deep learning and architectures such as CNN, RNN, GAN and transformers, Transformer and Large Language Model, Training LLM for natural language processing

LabComponents

1. Solving XOR problem using DNN
2. Face recognition using CNN

MODULE V	**SOFTWAREDEVELOPMENTUSINGAI**	**15 Hours**

GenerativeAdversarialNetworks(GAN)forimagegeneration,Completeonechatbotbuildingprojectfrom various available projects in domains like Travel, E-Commerce. Education, Legal, etc

Lab Components

1. .Image augmentation using GANs
2. Machine Translation using Encoder-Decoder model

TOTAL: 75 HOURS

REFERENCES:

1. Generative Deep Learning" by David Foster
2. Demystifying Prompt Engineering: A Practical Guide to AI Prompts by Harish Bhat.
3. Rebooting AI : Building Artifical Intelligence we can trust " by Gary Marcus and Ernest Davis
4. Artifical Intelligence " Aguide for Thinking Humans " by Melanie Mitchell
5. Natural Language Processing in Action" by Delve

2403CA025	DATA VISUALIZATION IN BUSINESS ANALYSIS	L	T	P	C
		3	0	0	3

PREREQUISITE:

Full Stack Web Development Cloud Computing

COURSE OBJECTIVES:

1. To understand the categories of data quality principles.

2. To describe data through visual representation.

3. To provide basic knowledge about how large datasets are represented into visual graphics and easily understand the complex relationships within the data.

4. To design effective visualization techniques for any different problems.

COURSE OUTCOMES:
On completion of the course the student should be able to:
- **CO1:** Describe the principles of visual perception.
- **CO2:** Apply visualization techniques for analyzing one-dimensional, two-dimensional, and three-dimensional data.
- **CO3:** Design visualization techniques by applying appropriate design steps and principles
- **CO4:** Design information dashboards by applying visual design principles and usability practices
- **CO5:** Apply visualization systems based on data and analysis types for various applications

COs Vs POs MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	2	2	2	1	1	1	2	2	2
CO2	3	3	3	3	1	1	1	2	3	3
CO3	3	3	3	3	1	1	1	2	3	3
CO4	3	3	3	3	1	1	1	2	3	3
CO5	3	3	3	3	1	1	1	2	3	3

COURSE CONTENTS:

MODULE I	INTRODUCTION	9 Hours

Visualization – visualization process – role of cognition – Pseudocode conventions – Scatter plot -Data foundation : Types of data - Structure within and between records - Data preprocessing – Human perceptions and information processing

MODULE II	VISUALIZATIONFOUNDATIONS	9 Hours

Semiology of graphical Symbols – Eight Visual Variables – Historical Perspective- Visualization Techniques for spatial data – One-dimensional data- two dimensional data – Three dimensional data- dynamic data – combining techniques- Visualization of Geospatial data – Visualization of Point, line, area data

MODULE III	DESIGNINGEFFECTIVEVISUALIZATION	9 Hours

Steps in Designing Visualization –problemsinDesigningEffectiveVisualization–Comparingandevaluating visualization techniques – Visualization Systems

MODULE IV	INFORMATIONDASHBOARDDESIGN	9 Hours

Characteristics of dashboards –Keygoalsinvisual design process –Dashboarddisplaymedia – Designingdashboards for usability– Meaningful organization – Maintaining consistency – Aesthetics of dashboards –Testingforusability – Case Studies: Sales dashboard, Marketing analysis dashboard

MODULE V	VISUALIZATIONSYSTEMS	9 Hours

Systems based on Data type-systems based on Analysis type – Text analysis and visualization – Modern integrated visualization systems – toolkit-Research directions in visualization – issues of cognition, perception and reasoning – issues of evaluation - issues of Hardware

TOTAL: 45 HOURS

REFERENCES:

1.MatthewO.Ward,GeorgesGrinstein,DanielKeim "Interactive Data Visualization : Foundations, Techniques, and Applications", CRC Press; 2ndedition, 2015

2.StephenFew,"Nowyouseeit:SimpleVisualizationTechniquesforQuantitativeAnalysis",1stEdition,Analytics Press, 2009.

3.StephenFew,"InformationDashboardDesign:TheEffectiveVisualCommunicationofData",1stEdition, O'Reilly,2006.

4.BenFry,"Visualizingdata: Exploringandexplainingdatawiththeprocessingenvironment",1stEdition,O'Reilly,2013.

5.AndyKirk,"DataVisualization:AHandbookforDataDrivenDesign",2ndEdition,SagePublications,India, 2019.

6.ClausO.Wilke,"FundamentalsofDataVisualization",1stEdition,O"ReillyMedia,USA,2019