SHRI SHANKARACHARYA TECHNICAL CAMUS
BHILAI (C.G.)
(An Autonomous Institution)

SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Computer Science & Engineering	Theory of Computation	CS102501	2	1	-	100	20	30	150	3
2	Computer Science & Engineering	Computer Network	CS102502	2	1	-	100	20	30	150	3
3	Computer Science & Engineering	Introduction to Data Science	CS113503	2	1	-	100	20	30	150	3
4	Computer Science & Engineering	Artificial Intelligence and Machine Learning	CS109504	2	1	-	100	20	30	150	3
5	Computer Science & Engineering	Professional Elective-I	(ReferTable-1)	3	0	-	100	20	30	150	3
6	Computer Science & Engineering	Computer Network Lab	CS102591		-	2	25	-	25	50	1
7	Computer Science & Engineering	Data Science Lab	CS113592		-	2	25	-	25	50	1
8	Computer Science & Engineering	Artificial Intelligence and Machine Learning Lab	CS109593		-	2	25	-	25	50	1
9	Computer Science & Engineering	Minor Project-I	CS102597		-	2	25	-	25	50	1
10	Computer Science & Engineering	Practical Training/Internship (Reports and Seminar)	CS102598		-	2	-	-	25	25	1
11	Computer Science & Engineering	Constitution of India	CS100596		-	-	-	-	25	25	-
Total				**11**	**4**	**10**	**600**	**100**	**300**	**1000**	**20**

L-Lecture
T- Tutorial
P-Practical
CT- Class Test
TA- Teachers Assessment
ESE- End Semester Exam

		July 2022	1.00
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Applicable for AY 2022-23 Onwards

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Table-I (Professional Elective-I)

S.No.	Board of Studies (BOS)	Course(Subject)	Course Code	Credit
1.	Computer Science & Engineering	Computer Graphics and Animation	CS102521	3
2.	Computer Science & Engineering	Cryptography & Network Security	CS102522	3
3.	Computer Science & Engineering	IoT Architecture and Security	CS115523	3
4.	Computer Science & Engineering	Big data Analytics Essentials	CS111524	3
5.	Computer Science & Engineering	Artificial Neural Network	CS109525	3
6.	Computer Science & Engineering	Statistical Foundation for Data Science	CS113526	3
7.	Computer Science & Engineering	Biometrics	CS102527	3
8.	Computer Science & Engineering	Object Oriented Modeling and Design	CS102528	3

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Subject Code CS102501	Theory of Computation	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
Formal languages and automata theory deals with the concepts of automata, formal languages, Grammar, computability and decidability. The reasons to study Formal Languages and Automata Theory are Automata Theory provides a simple, elegant view of the complex machine that we call a computer . More precisely, the objectives are: • To give an overview of the theoretical foundations of computer science from the perspective of formal languages. • To illustrate finite state machines to solve problems in computing. • To explain the hierarchy of problems arising in the computer sciences. • To familiarize Regular grammars, context frees grammar. • To solve various problems of applying normal form techniques, push down automata and • Turing Machines	On successful completion of the course, the student will be able to: **CO1**.Design finite automata to accept a set of strings of a language. **CO2**.Determine whether the given language is regular or not. . **CO3**.Design context free grammars to generate strings of context free language. **CO4**.Design push down automata and the equivalent context free grammars and Design Turing machine. **CO5**.Distinguish between computability and non-computability, Decidability and un-decidability.

UNIT – I:The Theory of Automata **[CO1]**

Introduction to automata theory, Examples of automata machine, Finite automata as a language acceptor and translator, Deterministic finite automata. Non-deterministic finite automata, finite automata with output (Mealy Machine. Moore machine), Finite automata with Epsilon moves, Minimizing number of states of a DFA, My hill Nerode theorem, Properties and limitation of FSM, Application of finite automata. **[8Hrs]**

UNIT – II: Regular Expressions **[CO2]**

Alphabet, String and Languages, Regular expression, Properties of Regular Expression, Finite automata and Regular expressions, Arden's Theorem, Regular Expression to DFA conversion &vice versa. Pumping lemma

for regular sets, Application of pumping lemma, Regular sets and Regular grammar, Closure properties of regular sets. Decision algorithm for regular sets and regular grammar. **[7Hrs]**

UNIT – III: Grammars **[CO3]**

Definition and types of grammar, Chomsky hierarchy of grammar, Relation between types of grammars, Context free grammar, Left most & right most derivation trees, Ambiguity in grammar, Simplification of context free grammar, Chomsky Normal From, Greibach Normal From, properties of context free language, Pumping lemma for context free language, Decision algorithm for context tree language. **[7Hrs]**

UNIT – IV: Push Down Automata And Turing Machine **[CO4]**

Basic definitions, Deterministic push down automata and non-deterministic push down automata, Acceptance of push down automata, Push down automata and context free language, Turing machine model, Representation of Turing Machine, Construction of Turing Machine for simple problem's, Universal Turing machine and other modifications .Church's Hypothesis, , Halting problem of Turing Machine. **[7Hrs]**

UNIT – V: Computability **[CO5]**

Introduction and Basic concepts, Recursive function, Partial recursive function, Initial functions, Composition of functions, Ackerman's function, Recursively Enumerable and Recursive languages, Decidable and decidable problem, Post correspondence problem, Space and time complexity**.** **[7Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Theory of Computer Science (Automata Language & Computation)	K.L.P. Mishra and N. Chandrasekran	PHI
2	Introduction to Automata theory. Language and Computation	John E. Hopcropt & Jeffery D. Ullman	Narosa, Publishing House

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Introduction to Languages and the Theory of Computation	John Martin,	Tata McGraw Hill.
2	Introduction to Formal Languages Automata Theory and Computation	Kamala Krithivasan, Rama R	2nd Edition, Pearson Education.

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS102502	Computer Network	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
To Provide students with 0an enhanced knowledge in Computer Networking. • Understanding concept of local area networks, their topologies, protocols and applications. • Understanding the different protocols, and network architectures. • To make students understand the basic model of data communication and various concepts of networking.	On completion of this course the student will be able to: **CO1:**Describe the basis and structure of an abstract layered Network protocol model. **CO2:** understand the working of network protocols. **CO3:** Students will have deep understanding of various protocols used at Data Link Layer and will be able to analyze the advantages and disadvantages of various available protocols for flow and error control. **CO4:**Students will be able to analyze various Ethernet standards and will be able to choose an appropriate standard according to requirement of LAN. **CO5:** Students will be able to use various network based applications.

UNIT – I : Introduction : **[CO1]**

History of Computer Network, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN, PAN,. Applications, networks architecture requirements, ISO-OSI, TCP/IP, XNS, IPX/SPX. **Physical Layer :** Transmission media, switching and encoding, asynchronous communications; Narrow band, broad band ISDN and ATM. Bandwidth calculation. **[8Hrs]**

UNIT – II : Data link layer : **[CO2]**

Design issues, framing, error detection and correction techniques with numerical, CRC, Elementary Protocol : stop and wait, Sliding Window, Slip, Data link layer in HDLC, ATM. Multiple Access Protocols, Link Layer Addressing, ARP, DHCP, Ethernet devices – Hubs, Bridges, and Switches. **Medium Access sub layer :** ALOHA, MAC addresses, CSMA, CSMA/CD. IEEE 802.XStandardEthernet,wireless LAN. **[8Hrs]**

UNIT – III : Network Layer : **[CO3]**

Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Router, Routing Table, Internet Protocol (IP) – IPv4 and IPv6 , ICMP, Link State Routing , Distance Vector Routing, Hierarchical Routing , RIP, OSPF, BGP, Broadcast and Multicast Routing , MPLS, Mobile IP, IP sec. IPv4 :

Classes, Classless, Subneting, Super netting and its numerical. **[8Hrs]**

UNIT – IV : Transport Layer : **[CO4]**

Transport Layer Services – Multiplexing and Demultiplexing, UDP –Go Back-N and Selective Repeat**. Connection-Oriented Transport**: TCP, Segment Structure, RTT estimation, Flow Control, Connection Management, Congestion Control, TCP Delay Modeling, SSL and TLS. QoS architecture models: IntServvsDiffServ. **[8Hrs]**

UNIT – V : Presentation Layer protocols : **[CO5]**

AFP, ICA, LPP, NCP, NDR, Telnet. **Session Layer protocols**: PAP, PPTP, RPC, SCP. **Application Layer**: Principles of Network Applications , The Web and HTTP, HTTPS, FTP, Electronic Mail, SMTP, IRC, Video Conferencing, MIME, DNS, Socket Programming with TCP and UDP. **Network Security:** Principles of Cryptography, Firewalls, Application Gateway, Attacks and Countermeasures. **[8Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Data Communications and Networking	Behrouz A. Forouzan	Third Edition TMH
2	Computer Networking: A Top-Down Approach Featuring the Internet	James F. Kurose and Keith W. Ross	Pearson Education, Third edition, 2006

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Computer Networks	Andrew S Tanenbaum	4th Edition. Pearson Education/PHI
2	An Engineering Approach to Computer Networks	S.Keshav	2nd Edition, Pearson Education

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS113503	Introduction to Data Science	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
The objective of the course is aimed to Provide knowledge, insight into methods and tools for Preparation and Visualization of the data generated by modern information systems and also to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.	On successful completion of the course, the student will be able to: **CO1** Basic Concepts of Data Science **CO2** Understanding of reading data and manipulation **CO3** Understand data cleaning , dimensionality reduction **CO4** Understand and analyze data **CO5** Use visualization of data to capture data insight and build model

UNIT I : Introduction **[CO1]**

Introduction to data science, Evolution of Data science, Stages in Data science project, Facets of data, Data Science Project's Lifecycle, Web APIs, Open Data sources, Data APIs, Web Scrapping, Relational Databases access to process/access data **[8 Hrs.]**

UNIT II : Introduction to Programming **[CO2]**

Basic programming in python: list, string, dictionary, array and tuples. Indexing, slicing, iterating and other basic operations. Data Science Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK **Numpy:** creating arrays, arrays manipulation, reshape, dimension, broadcasting, reading and writing array data on files. **Pandas:** Series and Data frames. Reading files(.xlsx,.csv,.txt) in data frame. Row and index objects, function by elements, function by rows and columns, statistical functions, sorting and ranking, correlation and covariance **[7 Hrs.]**

UNIT III: Data cleaning and preprocessing **[CO3]**

Data Collection strategies: web scrapping tools, handling missing values; Data imputation techniques, data transformation techniques: Data Smoothing, Attribution Construction, Data Generalization ,Data

Aggregation, Data Discretization, Data Normalization. Data Reduction techniques: Dimensionality reduction, Numerosity reduction, data cube aggregation, data compression, discretization operation.. **[7 Hrs.]**

UNIT IV Exploratory data analysis **[CO4]**

Exploratory Analysis: Introduction to statistics used in data science, Central tendencies and distributions, Variance Descriptive-Mean, Standard Deviation, Skewness and Kurtosis, statistical summary of categorical and numerical data, data dispersion: range , interquartile range ,variance, standard deviation, coefficient of variation. data distribution: Continuous and Normal distributions.

Frequency table: two-way table with joint, conditional and marginal probability. Pearson correlation.**[7 Hrs]**

UNIT V: Data Visualization and model building **[CO5]**

Introduction, Types of data visualization, A Simple Interactive Chart, Set the Properties of the Plot, matplotlib, Bar chart, scatter chart histogram, pie chart Working with Multiple Figures and Axes, Adding Text, adding a Grid, adding a Legend, Saving the Charts. Seaborn library: Box and Whiskers plot for numerical and categorical variables, grouped plotting. Pairwise plot. Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning. Building a basic model with supervised machine learning algorithm: linear regression, logistic regression, support vector **[7 Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Data Science from Scratch: First Principles with Python	Joel Grus	O'Reilly Media
2	Doing Data Science, Straight Talk From The Frontline	Cathy O' Neil and Rachel Schutt	O'Reilly
3	Mining of Massive Datasets	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman	Cambridge University Press

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Machine Learning	Jeeva Jose	Khanna Publishers
2	Data Sciences	Jain V.K	Khanna Publishers
3	Big Data and Hadoop	Jain V.K	Khanna Publishers
4	Machine Learning	Chopra Rajiv	Khanna Publishers
5	Practical Statistics for Data Scientists	Peter Bruce, Andrew Bruce, Peter Gedeck	O'Reilly

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS109504	Artificial Intelligence and Machine Learning	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
The objective of this course is to familiarize the prospective engineers with different kinds of Learning techniques and get acquainted with the basics of machine learning methods and model validation methods and ways to measure their accuracy.	On successful completion of the course, the student will be able to: **CO1** : Get deep insight of AI and its problem Solving techniques. **CO2**: Represent information or knowledge through various representation techniques. **CO3** : Understand various classification and Regression techniques **CO4** : Understand various clustering methodologies and its evaluation process **CO5** : Validate, understand and analyze the different Machine learning curves and performance evaluation methods

Unit I : Introduction to Artificial Intelligence **[CO1]**

Introduction: Defining Artificial Intelligence and its applications

Problem Solving techniques: Blind Search: Depth First and Breadth Search**,** heuristic search: Best first search, A* search, AO* Search, Constraint satisfaction problem, Min-Max Search, Alpha-Beta Pruning **[7 Hrs]**

Unit II : Knowledge Representations **[CO2]**

Logic: Predicate Logic, Resolution in predicate logic, Other ways of knowledge representation: Brief Introduction of semantic nets, frame, conceptual dependency, Scripts

Planning: Goal Stack and Partial Order Planning **[7 Hrs]**

Unit III: Machine Learning and Supervised Learning **[CO3]**

Machine Learning Introduction: What Is Machine Learning?, How Do We Define Learning?, Applications of ML, Aspects of developing a Learning system: training data, Concept representation, function approximation, Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning

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Supervised Learning : Source of uncertainty, Entropy and Information Gain, K Nearest Neighbor- Challenges in KNN, Application of KNN, Decision trees – ID3, Classification and Regression Trees, Translating Decision tress into rules, Rule Based Classification, Over fitting, noisy data and pruning, Linear Regression, Logistic Regression, Support Vector Machine (SVM) **[8 Hrs]**

Unit IV : Unsupervised Learning **[CO4]**

Partition Based Clustering, K – Means, K- Medoids, Hierarchical Clustering, Agglomerative, Divisive, Distance Measure, DBSCAN, Density Based Clustering, Evaluation of Clustering methods. **[7 Hrs]**

Unit V: Validations **[CO5]**

Validation Techniques, Need for Cross Validation, K-fold validation, Validation and Test Dataset, Evaluation Measures: SSE, MME, R2, Confusion Matrix – Recall, Precision, Accuracy, F-Measure, Learning Curves : ROC and AUC curve. **[7 Hrs]**

Text Books:

S. No.	Title	Author(s)	Publisher
1	Artificial Intelligence	Elaine Rich and Kevin Knight	Tata McGraw Hill
2	Introduction to Machine Learning with Python	Aurelien Geron	Oreilly
3	Machine Learning for Absolute Beginners: A Plain English Introduction	Oliver Theobald	Scatterplot Press
4	Machine Learning Simplified: A gentle introduction to Supervised Learning	Andrew Wolf	Leanpub

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Introduction to Artificial Intelligence and Expert Systems	Dan W.Patterson	Prentice Hall of India.
2	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (First Edition)	Aurelien Geron	O'Reilly Media
3	Dive into Deep Learning	Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola	E-Books
4	Machine Learning for Humans	Vishal Maini ,Samer Sabri	E-Books

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS102591	Computer Network Lab	L =0	T = 0	P = 2	Credits = 1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 Hours

Course Objectives	Course Outcomes
To Provide students the basic knowledge of Computer Networking, tools used, their purpose and their connectivity based on requirements.	On completion of this course the student will be able to **CO1**. Setup and configure various networking hardware and software. **CO2**. They will also be able to identify the basic faults and can resolve. **CO3**. They can identify and use various cables and connectors with devices. **CO4**. Can setup and manage Servers. **CO5**.They Can write Simple networking programs in various language like Java.

List of experiments

1. Introduction to cables, connectors and topologies.
2. Demonstration of Switch, Hub, Router and their uses and types.
3. Installation of UTP, Co-axial cable, Cross cable, parallel cable.
4. Case Study of Ethernet (10base5,10base2,10 base T)
5. Case Study of various Wireless technologies available.
6. Basic network command and Network configuration commands like ping, netstat, hostname, nslookup, route, arp, tracert, ipconfig, ARP etc.
7. To enable secured / unsecured file sharing, device sharing over network.
8. Installation and working of Remote Desktop and other third party related software's.
9. To setup IP and other values avoiding DHCP.
10. Use of Subnet mask to create two or more different logical network in same lab.
11. Installation and working with IIS Server.
12. Basic Configuration of Home Router/Modem
13. Introduction to Server administration.
14. Basic Chat Program in Java using TCP.
15. Basic Chat Program in Java using UDP.

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Text Books:

S.No.	Title	Authors	Publisher
1	Networking Bible	Barrie Sosinsky	Wiley
2	Network Programmability and Automation	Jason Edelman	O'Reilly
3	Subnetting for Beginners: How to Easily Master Ip	Adam Vardy	Amazon
4	Networking Made Easy: Get Yourself Connected	James Berstein	

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS113592	Data Science Lab	L = 0	T = 0	P = 2	Credits =1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 hours

Course Objectives	Course Outcomes
The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.	On successful completion of the course, the student will be able to: **CO1** Basic Concepts of Data Science **CO2** Demonstrate understanding of the mathematical foundations needed for data science. **CO3** Collect, explore, clean, manage and manipulate data. **CO4** Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. **CO5** Build data science applications using Python based toolkits.

List of Experiments

1. Write programs to understand the use of Matplotlib for Simple Interactive Chart, Set the Properties of the Plot, matplotlib and NumPy.
2. Write programs to understand the use of Numpy's Structured Arrays, Reading and Writing Array Data on Files.
3. Write programs to understand the use of Matplotlib for Working with Multiple Figures and Axes, Adding Text, Adding a Grid, Adding a Legend, Saving the Charts.
4. Write programs to understand the use of Matplotlib for Working with Line Chart, Histogram, Bar Chart, Pie Charts
5. Write programs to understand the use of Numpy's Shape Manipulation, Array Manipulation, vectorization.
6. Write a program in Python to predict the class of the flower based on available attributes.
7. Write a program in Python to predict if a loan will get approved or not.
8. Write a program in Python to predict the traffic on a new mode of transport.

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9. Write a program in Python to predict the class of user.

10. Write a program in Python to indentify the tweets which are hate tweets and which are not.
11. Write a program in Python to predict the age of the actors.
12. Mini project to predict the time taken to solve a problem given the current status of the user

Text Books:

S.No.	Title	Author(s)	Publisher
1	Python Crash Course: A Hands-On, Project-Based Introduction to Programming	Eric Matthes	William Pollock
2	Data Science from Scratch: First Principles with Python	Joel Grus	O'Reilly Media

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Machine Learning	Jeeva Jose	Khanna Publishers
2	Data Sciences	Jain V.K	Khanna Publishers
3	Fluent Python	Luciano Ramalho	O'Reilly Media
4	Machine Learning	Chopra Rajiv	Khanna Publishers

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Subject Code CS109593	Artificial Intelligence and Machine Learning Lab	L = 0	T = 0	P = 2	Credits =1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 hours

Course Objectives	Course Outcomes
Implementing the various AI searching algorithms. Make use of Data sets in implementing the machine learning algorithms. Implement the machine learning concepts and algorithms in any suitable language of choice.	On successful completion of the course, the student will be able to: **CO1** Understand the implementation procedures for the machine learning algorithms. **CO2** Design python programs for various learning algorithms. **CO3** Apply appropriate data sets to the Machine Learning algorithms. **CO4** Identify and apply machine Learning algorithms to solve real world problems. **CO5** Use and apply various python libraries

List of Experiments

1. Implement A* Search algorithm.
2. Implement AO* Search algorithm.
3. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
4. Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of

clustering. You can add Java/Python ML library classes/API in the program.

8. Write a program to implement the k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs.

Text Books:

S. No.	Title	Author(s)	Publisher
1	Python for Data Analysis	WesMc Kinney	O'Reilly

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Python Data Analytics	Fabio Nelli	Apress

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS102597	Minor Project-I	L = 0	T = 0	P =2	Credits = 1
Evaluation Scheme	ESE	CT	TA	-	ESE Duration
	25	-	25	-	3 Hours

Course Objectives	Course Outcomes
The objectives of this lab are: The objective of this course is toimprove student 's ability to analyze, design and solve complex engineering problems through pedagogies **(Project Based Learning)** that support them in developing these skills. The goal here is not to passively absorb and reiterate information; but rather to actively engage with the content, work through itwith others, relate to it through an analysis, use modern tools and effectively solve problems with the corresponding knowledge gained.	**On successful completion of the course, the studentwill be able to:** **CO1:** Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. **CO2:** Reproduce, improve and refine technical aspects of engineering projects applying appropriate techniques, resources, and modern engineering and IT tools. **CO3:** Work as an individual and as a member or leader in teams in development of technical projects. **CO4:** Follow management principle and value health, safety and ethical practices during project. **CO5:** Communicate and report effectively project related activities and findings.

The Process Followed to Maintain the Quality of Student Projects are: [12 Hrs.]

(a) Allotment of Projects:

(i) Students form their team (max four students) and submit their areas in which they would like to pursue their projects.

(ii) Through meeting and deliberations students are allotted guide depending on their preference and maximum number of groups under a faculty is limited to three.

(b) Identification of projects:

Students are asked to formulate problem statement and state objectives of their project inconsultation with the project guide

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c) Continuous Monitoring

(i) Progress is continuously monitored by guide and instructions are given how to proceed further during their project periods as per time table.

(ii) Students submit weekly progress report to the project in-charge after consultation with their project guide.

(d) Evaluation

(i) In order to evaluate projects two project seminars (assessment) are taken in which student 'steam present their project through presentations and demonstrate their work.

(ii) Students are assessed on the basis of their technical skill implementation, use of modern tools, communication skill, team work, health, safety and ethical practices and relevance of theproject.

(iii) At the end of the semesters a report is submitted by the students and student 's projects are finally evaluated by external examiner in end semester practical examination based

Reference Books:

S. No.	Title	Authors	Publisher
1	Basics Of Project Management	IES Master Team	IES Master Publication (1 January 2021)
2	Modern Systems Analysis and Design	Jeffrey A. Hoffer, Joey F. George, Joseph S. Valakati	Pearson Education; Third Edition; 2002.

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Subject Code CS100596	Constitution of India	L = 0	T = 0	P =0	Credits = -
Evaluation Scheme	ESE	CT	TA	-	ESE Duration
	-	-	25	-	-

Course Objectives	Course Outcomes
The objective of this course is to introduce Students to the Constitution of India	**On successful completion of the course, the student will be able to:** **CO1:** Display under standing about the history and philosophy of Indian Constitution. **CO2:** Demonstrate clarity about the premises informing the twin themes of liberty and freedom from civil rights perspective. **CO3:** Display under standing about powers and functions of Indian government. **CO4:** Exhibit understanding about emergency rule **CO5:** Demonstrate understanding about structure and functions of local administration.

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UNIT–I **[CO1]**

Introduction: Historical Perspective of Constitution of India ; Philosophy of Indian Constitution; Meaning of the constitution law and constitutionalism; Salient features and Preamble.

UNIT– II **[CO2]**

Contours of Constitutional Rights and Duties: Fundamental rights; Scheme of the Fundamental Duties and its legal status.

UNIT –III **[CO3]**

Organs of Governance: Parliamentary Form of Government in India; The constitutional powers and status of the President of India; Judiciary- Powers and Functions; Local Self Government –Constitutional Scheme in India.

UNIT–IV **[CO4]**

Emergency Provisions: National Emergency; President Rule; Financial Emergency.

UNIT–V **[CO5]**

Local Administration: Federal structure and distribution of legislative and financial powers between the Union and the States; The Directive Principles of State Policy – Its importance and implementation

Text Books:

S. No.	Title	Author(s)	Publisher
1.	Introduction to the Constitution Of India	Basu D D	Lexis Nexis
2.	Principles of Public Administration	Dr S N Myneni	Allahabad Law Agency

Reference Books:

S. No.	Title	Author(s)	Publisher
1.	Dr. B.R. Ambedkar Framing of Indian Constitution	Busi S N	Ava Publishers
2.	Theory and Practices of Modern Government	M G Gupta	Central Book Depot

Professional Elective-I

Subject Code CS102521	Computer Graphics and Animation	L = 3	T = 0	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes

		July 2022	1.00	Applicable for AY 2022-23 Onwards
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SCHEME OF TEACHING AND EXAMINATION

B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

The objective of this course is to 1. Have an understanding of critical and aesthetic issues in computer graphics and Animation. 2. Introduce students with fundamental concepts and theory of Computer Graphics	On successful completion of the course, the student will be able to: **CO1** Discuss various algorithms for scan conversion, Extract scene with different clipping methods and filling of basic objects **CO2** Use of geometric transformations on graphics objects and their application in composite form also exploring projections **CO3** Render projected objects to naturalize the scene in 2D view and use of illumination models for this. **CO4** Visible surface detection techniques for display of 3D scene on 2D screen. **CO5** Design simple applications using principles of virtual reality.

UNIT – I : Display Algorithms **[CO1]**

Overview of Computer Graphics, Computer Graphics Application, Display Technologies: Raster Refresh (Raster-Scan) Graphics Displays, Random-Scan Display Processor, LCD displays.

Scan conversion: Bresenham's Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm

Clipping Lines algorithms–Cohen-Sutherland, Liang-Barsky and Cyrus-Beck

Filling Alogorithms: Flood Fill and Boundary Fill Algorithm **[8 Hrs]**

UNIT – II: Transformations **[CO2]**

Two-Dimensional Transformations: 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Rotation, Reflection, Scaling, Combined Transformation, The Window-to-Viewport Transformations.

Three-Dimensional Transformations: Three-Dimensional Scaling, Three-Dimensional Shearing, Three- Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations

Affine and Perspective Geometry: Perspective Transformations, Vanishing Points, Orthographic Projections, Axonometric Projections, Oblique Projections **[7Hrs]**

UNIT – III: Viewing and Appearance **[CO3]**

Viewing in 3D: Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid.

Light: Radiometry, Transport, Equation, Photometry
Color: Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance **[7Hrs]**

UNIT – IV: Curves and Surfaces **[CO4]**

Visible-Surface Determination: Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting)

Plane Curves and Surfaces: Curve Representation, Nonparametric Curves, Parametric Curves, Cubic Splines,, Bezier Curves, B-spline Curves, Quadric Surfaces, Bezier Surfaces. **[7Hrs.]**

UNIT – V : Animation **[CO5]**

Computer Animation: Fundamentals of computer animation, Animation Techniques, Principles of Animation, Animation and Flash Overview, Using Layer and Creating Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques, Groups of Objects. **[7Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Computer Graphics	Donald Hearn and M.Pauline Baker	PHI
2	Computer Graphics- A practical Approach,	Rishabh Anand,	Khanna Publishing House
3	Procedural Elements for Computer Graphics	David F. Rogers	T.M.H

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Computer graphics, Multimedia and Animation	Malay. K. Pakhir	PHI
2	Graphics, GUI, Games & Multimedia Projects in C	Pilania & Mahendra	Standard Publ.
3	Fundamentals of 3Dimensional Computer Graphics by, 1999,	Alan Watt	Addision Wesley.
4	Principles of Interactive Computer Graphics	W.M. Newman & R. F. Sproull, Peterson,	TMH.

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS115523	IoT Architecture and Security	L = 3	T = 0	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
The objective of this course is to make students know the IoT ecosystem,to provide an understanding of the technologies and the standards relating to the Internet of Things,to develop skills on IoT technical planning	On successful completion of the course, the student will be able to: **CO1** Basic Concepts of Internet of Things **CO2** To understand the technology and standards relating to IoTs. . **CO3** To understand the critical ecosystem required to mainstream IoTs . **CO4** understand the IOT Applications for value creations. **CO5**. To Acquire skills on developing their own national and enterprise level technical strategies.

UNIT – I : IoT & Web Technology **[CO1]**

The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics . **[6 Hrs]**

UNIT – II: M2M to IoT **[CO2]**

A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, an emerging industrial structure for IoT, the international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations **[6Hrs.]**

UNIT – III: IoT Architecture **[CO3]**

State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **[10 Hrs]**

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UNIT – IV: IoT Applications **[CO4]**

for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth **[10 Hrs.]**

UNIT – V Internet of Things Privacy, Security and Governance **[CO5]**

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, Smart Approach. Data Aggregation for the IoT in Smart Cities, Security . **[6 Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Abusing the Internet of Things	Nitesh Dhanjani	Shroff Publisher/O'Reilly Publisher
2	Internet of Things	RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan	John Wiley and Sons
3	Getting Started with the Internet of Things	Cuno Pfister	Shroff Publisher/Maker Media

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything 1 st Edition	Francis daCosta	Apress Publications
2	Make: Getting Started with the Arduino	Massimo Banzi, Michael Shiloh	Shroff Publisher/Maker Media Publishers.

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS111524	Bigdata Analytics Essentials	L = 3	T = 0	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
Student will get answers of questions like What is Big Data? How do we tackle Big Data? Why are we interested in it? How does Big Data add value to businesses? Etc. Students will also understand how to process big data on platforms that can handle the volume, velocity, variety and veracity of Big Data. Student will get to know why Hadoop is a great Big Data solution and why it's not the only Big Data solution. Student will also find out the truth about what Data Science is and various tools available for Data Science.	After completion of this course, student will be able to **CO1**. Understand fundamentals of Big Data. **CO2**. Understand Architecture and working of platforms like Hadoop and Spark. **CO3**. Apply Data Science methodologies in learning Data Science tools. **CO4**. Understand how data analytics and data science rules current IT industries **CO5**. Create the model for the dataset

UNIT – I : Basics of Big Data **[CO1]**

What is Big Data?, Characteristics of Big Data, What are the V's of Big Data?, The Impact of Big Data, Big Data Examples, Sources of Big Data, Big Data Adoption, The Big Data Platform, Big Data and Data Science, Skills for Data Scientists, the Data Science Process, Eco systems of Big Data. **[8 Hrs]**

UNIT – II: Hadoop Introduction **[CO2]**

What is Hadoop, how Big Data solutions can work on the Cloud, other open source software related to Hadoop, Hadoop components, how HDFS works, data access patterns for which HDFS is designed, how data is stored in an HDFS cluster, Add and remove nodes from a cluster, Verify the health of a cluster Start and stop a clusters components, Modify Hadoop configuration parameters, Setup a rack topology, Describe the Map Reduce philosophy, Explain how Pig and Hive can be used in a Hadoop environment, Describe how Flume and Sqoop can be used to move data into Hadoop, Describe how Oozie is used to schedule and control Hadoop job execution. **[7Hrs]**

UNIT – III: Spark Fundamentals **[CO3]**

What is Spark and what is its purpose?, Components of the Spark unified stack, Resilient Distributed Dataset (RDD), Downloading and installing Spark standalone, Scala and Python overview, Launching and using Spark's Scala and Python shell, Resilient Distributed Dataset and Data Frames, Spark application

programming, Spark libraries, Spark configuration, monitoring and tuning. **[7Hrs]**

UNIT – IV: Data Science Introduction **[CO4]**

Defining Data Science, Role of Data Science people, Data Science in Business, Use Cases for Data Science. **Data Science Tools :** Introducing Skills Network Labs, Introducing Jupyter Notebooks, Introducing Zeppelin Notebooks, Introducing RStudio IDE. **[7Hrs]**

UNIT – V Data Science Methodology **[CO5]**

From Problem to Approach, From Requirements to Collection, From Understanding to Preparation, From Modeling to Evaluation, From Deployment to Feedback. **[7Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Big Data Analytics	Seema Acharya, Subhasini Chellappan	Wiley
2	BIG Data and Analytics	Subhashini Chhellappan	Willey
3	BIG Data and Analytics	Venkat Ankam	PACKT
4	BIG Data and Analytics	Raj Kamal, Preeti Saxena	Mc Graw Hill Education

Reference Books:

S. No.	Title	Author(s)	Publisher
1	HADOOP : The definitive Guide	Tom White	OReilly
2	Learning Spark: Lightning-Fast Big Data Analysis	Holden Karau , Andy Konwinski, Patrick Wendell Matei Zaharia	OReilly

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SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Fifth Semester) Computer Science & Engineering [Artificial Intelligence and Machine Learning]

Subject Code CS109525	Artificial Neural Network	L = 3	T = 0	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
Define what is Neural Network and model a Neuron and Express both Artificial Intelligence and Neural Network . Analyze ANN learning, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning.Implement Simple perception, Perception learning algorithm, Modified Perception learning algorithm, and Adaptive linear combiner, Continuous perception, learning in continuous perception. Analyze the limitation of Single layer Perceptron and Develop MLP with 2 hidden layers, Develop Delta learning rule of the output layer and Multilayer feed forward neural network with continuous perceptions.	On successful completion of the course, the student will be able to: **CO1**: Model Neuron and Neural Network, and to analyze ANN learning, and its applications. **CO2**: Perform learning and training. **CO3**: Know the working of various neural network model. **CO4**: Identify application areas of Neural Network. **CO5** : Model neural network and fuzzy systems.

Unit I :Introduction to Artificial Neural Networks **[CO1]**

Elementary Neurophysiology, Models of a Neuron, Neural Networks viewed as directed graphs, Feedback, from neurons to ANN, Artificial Intelligence and Neural Networks; Network Architectures, Single-layered Feed forward Networks, Multi-layered Feed forward Networks, Recurrent Networks, Topologies. **[7 Hrs]**

Unit II: Learning and Training **[CO2]**

Activation and Synaptic Dynamics, Hebbian, Memory based, Competitive, Error-Correction Learning, Credit Assignment Problem: Supervised and Unsupervised learning, Memory models, Stability and Convergence, Recall and Adaptation.

[7 Hrs]

Unit III :A Survey of Neural Network Models **[CO3]**

Single-layered Perceptron – least mean square algorithm, Multi-layered Perceptrons – Back propagation Algorithm, XOR – Problem, The generalized Delta rule, BPN Applications, Adalines and Madalines – Algorithm and applications. **[7 Hrs]**

Unit IV: Applications **[CO4]**

Talking Network and Phonetic typewriter : Speech Generation and Speech recognition, Neocognitron –

Character Recognition and Handwritten Digit recognition, Pattern Recognition Applications. **[7 Hrs]**

Unit V: Neural Fuzzy Systems **[CO5]**
Introduction to fuzzy set, Operations, Relations, Example of fuzzy logic, Defuzzification, nonlinear regression, Multiclass discrimination, Deep Learning overview and importance over machine Learning **[8 Hrs]**

Text Books:

S. No.	Title	Author(s)	Publisher
1	Artificial Neural Networks	B. Yagna Narayan	PHI
2	Neural Networks Fuzzy Logic & Genetic Algorithms	Rajshekaran & Pai	Prentice Hall

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Neural Networks	James A. Freeman and David M. Strapetuns,	Prentice Hall
2	Neural Network & Fuzzy System	Bart Kosko	PHI.
3	Neural Network Design	Hagan Demuth Deale	Vikas Publication House