## **TABLE OF CONTENTS**

Chapter No.		Title	Page No
1	Introduction to Artificial Intelligence and Big Data		
	1.1	What is Artificial Intelligence?	
	1.2	History and Evolution of AI	
	1.3	Overview of Big Data - Concepts and Characteristics (4Vs & 5Vs)	
	1.4	Synergy between AI and Big Data	
	1.5	Applications in Industries and Research	
	1.6	Tools Overview: Python, Jupyter, Anaconda, Hadoop	
	1.7	Ethical Challenges and Social Impact	
2	Prol	olem Solving and Knowledge Representation	29-56
	2.1	Problem-Solving Approaches in AI	
	2.2	Search Strategies: BFS, DFS, A*, Hill Climbing	
	2.3	Constraint Satisfaction Problems (CSP)	
	2.4	Game Playing - Minimax and Alpha-Beta Pruning	
	2.5	Logical Representation: Propositional and Predicate Logic	
	2.6	Rule-Based Systems and Semantic Networks	
	2.7	Ontologies and Knowledge Graphs	
3	Machine Learning Techniques		57-84
	3.1	Types of Learning: Supervised, Unsupervised, Reinforcement	
	3.2	Supervised Learning Algorithms (Decision Trees, SVM, Naïve Bayes)	
	3.3	Unsupervised Learning Algorithms (Clustering, PCA)	
	3.4	Reinforcement Learning Basics and Examples	
	3.5	Model Evaluation: Confusion Matrix, ROC, Precision, Recall	
	3.6	Bias-Variance Tradeoff	
	3.7	Real-World Applications: Spam Filtering, Recommendation Systems	

4	Dee	p Learning and Neural Networks	85-107
	4.1	Introduction to Neural Networks	
	4.2	Multilayer Perceptrons and Backpropagation	
	4.3	Activation Functions (ReLU, Sigmoid, Tanh)	
	4.4	Convolutional Neural Networks (CNNs) for Image Processing	
	4.5	Recurrent Neural Networks (RNNs), LSTM, GRU for Sequential Data	
	4.6	Transfer Learning and Pretrained Models	
	4.7	Deep Learning Frameworks: TensorFlow, Keras, PyTorch	
5	Big 1	Data Architecture and Technologies	108-135
	5.1	Big Data Processing Models: Batch, Stream, Real-time	
	5.2	Hadoop Architecture: HDFS, MapReduce, YARN	
	5.3	Hive, Pig, and HBase for Querying Big Data	
	5.4	Introduction to Spark and Its Core Concepts (RDD, DAG, DF)	
	5.5	Apache Kafka and Spark Streaming	
	5.6	NoSQL Databases: MongoDB, Cassandra	
	5.7	Big Data Use Cases in Retail, Telecom, Healthcare	
6	Data	Ingestion, Preprocessing, and Management	136-164
	6.1	Data Collection and Ingestion Tools (Sqoop, Flume)	
	6.2	Data Cleaning: Handling Missing Values, Outliers, Noise	
	6.3	Data Transformation: Normalization, Encoding	
	6.4	Data Integration and Fusion	
	6.5	Feature Engineering and Selection Techniques	
	6.6	Metadata Management and Data Catalogs	
	6.7	Data Storage Solutions: Distributed File Systems, Cloud Storage	

7	AI a	and Big Data Applications in Industry	165-191
	7.1	AI and Big Data in Finance: Fraud Detection, Algorithmic Trading	
	7.2	Healthcare: Disease Prediction, Patient Monitoring	
	7.3	Manufacturing and Predictive Maintenance	
	7.4	Agriculture: Precision Farming, Crop Monitoring	
	7.5	Smart Cities and IoT: Traffic, Utilities, Environment	
	7.6	Cybersecurity and Threat Intelligence	
	7.7	Case Study Compilation: Real-life End-to-End Projects	
8	Secu	urity, Ethics, and Future of AI & Big Data	192-218
	8.1	Ethical AI: Fairness, Accountability, and Transparency	
	8.2	Data Privacy and Protection (GDPR, HIPAA, etc.)	
	8.3	Security in AI and Big Data Pipelines	
	8.4	Federated Learning and Edge AI	
	8.5	Responsible AI Design Principles	
	8.6	Sustainability and Green AI	
	8.7	Future Trends: Quantum AI, AutoML, AIoT	