B.Sc Computer Science with Artificial Intelligence
COURSE OUTCOMES (COs)

On completion of the course students will be able to

COURSE COMPONENT	COURSE	COURSEOUTCOME
CORE THEORY –I	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**	**CO1:** Demonstrate fundamental understanding of the history of artificial intelligence(AI) and its foundations. Demonstrate awareness and a fundamental understanding of various applications of AI **CO2:** Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. **CO3:** Convert world knowledge into FOPL formula and construct well-crafted prolog programmes of moderate size Apply truth functional propositional Logic(PL) and first order predicate logic (FOPL) to world knowledge **CO4:** Experience AI development tools such as an Prolog. Demonstrate proficiency developing applications in Prolog. **CO5:** Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications. Explore the current scope, potential, limitations, and implications of intelligent systems.
CORE PRACTICAL-I	**PROLOG LAB**	**CO1:** Understand Formal logic and associated forms of programming. Interpret the logical consequences and validity of formulae using the rules of propositional and predicate logic **CO2:** Convert world knowledge into FOPL formula and construct well-crafted prolog programmes of moderate size. Apply truth functional propositional Logic(PL) and first order predicate logic (FOPL) to world knowledge **CO3:** Describe the basic predicates to manipulate list data structure and sorting algorithms using PROLOG programming **CO4:** Demonstrate Logic Programming Paradigm, Prolog execution models, Prolog's basic and advanced prolog concepts such as LIST, CUT, and Fail using illustrative programming examples. Assess the completeness of Resolution Procedure, Soundness and completeness of Linear Resolution, Unification and Selective Linear Definite Resolution.

CORE THEORY – II	**PROBLEM SOLVING USING PYTHON**	**CO1:** To Understand the principles of Python and acquire skills in programming in python. To develop the emerging applications of relevant field using Python Describe the core syntax and semantics of Python programming language. **CO2:** To Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. **CO3:** Discover the need for working with the strings and functions. **CO4:** Describe the concepts of objects and classes with its features To Able to develop simple turtle graphics programs in Python Understand the usage of Modules and File handling in Python **CO5:** Understand the usage of packages and Dictionaries
CORE PRACTICAL –II	**PYTHON LAB**	**CO1:** To implement the python programming features in practical applications. To write, test, and debug simple Python programs. **CO2:** To implement Python programs with conditionals and loops. Use functions for structuring Python programs.Represent compound data using Python lists, tuples, dictionaries , turtles, Files and modules. **CO3:** Understand the numeric or real life application problems and solve them. Apply a solution clearly and accurately in a program using Python. **CO4:** Apply the best features available in Python to solve the situational problems.
CORE THEORY-III	**JAVA AND DATA STRUCTURE**	**CO1:** To enable the students to learn the basic concepts of Java programming, learn the history and features of Java Students will be able to develop Java Standalone applications and Applets. **CO2:** To use class and objects to create applications with the concepts of Inheritance, Polymorphism, and String Arrays.To describe the concepts of method overloading and overriding with finalize() methods **CO3:** To have an overview of interfaces, packages, process synchronization, multithreading and exceptions, Deadlock situations in Java **CO4:** To familiarize students with basic data structures and their uses in algorithms, Abstract Data types in List **CO5:** Choose the appropriate data structure for Modeling a given problem.(Searching, Representation of Trees and Graphs).Usage of Linear and Non Linear data structures with examples

CORE PRACTICAL –III	**DATA STRUCTURES USING JAVA LAB**	**CO1:** Implement linear and non-linear data structure operations. **CO2:** Understand the different operations of search trees **CO3:** Implement graph traversal algorithm
CORE THEORY– IV	**RELATIONAL DATABASE MANAGEMENT SYSTEM**	**CO1:** Describe the concepts of database technologies, Model Entity Relationship with E-R Diagrams and the classification of ER model. **CO2:** Be familiar with the relational database theory according to Codd's rules, and be able To write relational algebra expressions and calculus for queries. **CO3:**Designdatabase schema considering normalization and relationships within database And also can summarize the transaction processing mechanisms **CO4:** Be able to write SQL commands for data definition and data manipulation in query Processing. **CO5:** Develop triggers, procedures, user defined functions ,packages and design PLSQL Programs.
CORE PRACTICAL –IV	**PL/SQL LAB**	**CO1:** Implement the DDL, DML Commands and Constraints. **CO2:** Implement queries, sub queries and using aggregate functions to retrieve information from database. **CO3:** Develop PL/SQL block for exception handling, cursors, packages and triggers. **CO4:** Design and develop simple database applications.
CORE THEORY-V	**OPERATING SYSTEMS**	**CO1:** To understand the fundamental concepts and role of Operating System. To learn the Process Management and Scheduling Algorithms **CO2:** To understand the Memory Management policies To gain insight on I/O and File management techniques **CO3:** Understand the structure and functions of Operating System **CO4:** Compare the performance of Scheduling Algorithms **CO5:** Analyze resource management techniques
CORE THEORY-VI	**COMPUTER NETWORKS**	**CO1:** To understand the concept of Computer network **CO2:** To impart knowledge about networking and inter networking devices

		CO3: Analyze different network models **CO4:** Describe, analyze and compare a number of data link, network and transport layer **CO5:** Analysing key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI
CORE THEORY-VII	**COMPUTER VISION**	**CO1:** To introduce students the fundamentals of image formation; To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition; **CO2:** To develop an appreciation for various issues in the design of computer vision and object recognition systems; **CO3:** To provide the student with programming experience from implementing computer vision and object recognition applications **CO4:** Identify basic concepts, terminology, theories, models and methods in the field of computer vision Describe known principles of human visual system **CO5:** Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition Suggest a design of a computer vision system for a specific problem
CORE PRACTICAL –V	**COMPUTER VISION LAB**	**CO1:** Understand What Is A Digital Image and what is Manipulating Image **CO2:** Understand Manipulating Images One Pixel At a Time, Pixel Transformations, geometric Operations **CO3:** Implement Spatial Operations in Image Processing Implement the Image Gradients and Edge Detection Techniques **CO4:** Implement Extraction of desired features Implement object detection
ELECTIVE THEORY-I	**NATURAL LANGUAGE PROCESSING**	**CO1:** To grasp the significance of natural language processing in solving real-world problems To map the appropriate processing technique to a problem and implement the technique **CO2:** To demonstrate required design skills for large collection sets. To appreciate the theoretical formulation of the natural language processing techniques. **CO3:** Describe the fundamental concepts and techniques of natural language processing. **CO4:**Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.

		CO5: Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Analyze large volume text data generated from a range of real-world applications.
ELECTIVE THEORY-I	**MOBILE APPLICATION DEVELOPMENT FOR MACHINE LEARNING**	**CO1:** To understand the Android with Machine Learning **CO2:** To analyze the Anatomy of an Android Application Context, Activities, Services, Intents **CO3:**To envisage outcomes automatically without human interference **CO4:**To learn Machine learning serving mobile application **CO5:** To analyze user behavior patterns and suggest apps which will reduce human interference
ELECTIVE THEORY-I	**INTRODUCTION TO REINFORCEMENT LEARNING**	**CO1:** To understand the statistical learning techniques where an agent explicitly takes actions and interacts with the world. **CO2:** To analyze the basic exploration methods and the exploration/exploitation tradeoff **CO3:**To understand value functions, as a general-purpose tool for optimal decision- making **CO4:**To Know how to implement dynamic programming as an efficient solution approach to an industrial control problem. **CO5:** To determine be able to start using RL for real problems
ELECTIVE PRACTICAL –I	**NATURAL LANGUAGE PROCESSING LAB**	**CO1:** To understand the concepts of morphology, syntax, semantics, discourse & pragmatics of natural language. **CO2:** To analyze the understanding of the relationship between NLP and statistics & machine learning. **CO3:** To familiarize various NLP software libraries and datasets publicly available. **CO4:** To develop systems for various NLP problems namely, spelling correction, morphological analysis, parts-of-speech tagging, parsing and semantic analysis
ELECTIVE PRACTICAL –I	**MOBILE APPLICATION DEVELOPMENT FOR MACHINE**	**CO1:** To develop components and different Layout for mobile application development framework for android **CO2:** To develop Simple GUI application with the Use of Built in components and widgets.

	LEARNING - LAB	**CO3:** To create databases to store application data locally **CO4:** To Test and Show the results on emulators or on physical handheld devices
ELECTIVE PRACTICAL –I	**REINFORCEMENT LEARNING - LAB**	**CO1:** To develop the knowledge of basic and advanced reinforcement learning techniques. **CO2:** To develop the Identification of suitable learning tasks to which these learning techniques can be applied. **CO3:** To analyze the some of the current limitations of reinforcement learning techniques. **CO4:** To determine the Formulation of decision problems, set up and run computational experiments, evaluation of results from experiments.
CORE THEORY-VIII	**CLOUD COMPUTING**	**CO1:** To understand the concepts in Cloud Computing and its Security **CO2:** To understand the evolving computer model, cloud computing. **CO3:** To introduce the various levels of services that can be achieved by cloud. **CO4:** To explain and apply levels of services of Cloud **CO5:** To describe the security aspects in the cloud.
CORE THEORY-IX	**INTERNET OF THINGS**	**CO1:** To understand the concepts of Internet of Things and the application of IoT. **CO2:** To determine the Market Perspective of IoT. **CO3:** To Understand the vision of IoT from a global context and use of Devices, Gateways and Data Management in IoT. **CO4:** To design IoT applications in different domain and be able to analyze their performance **CO5:** To implement basic IoT applications on embedded platforms.
CORE THEORY-X	**MACHINE LEARNING**	**CO1:** To understand the To understand basic concepts of machine learning and its applications **CO2:** To determine the different machine learning algorithm techniques to evaluate models generated from data. **CO3:** To discover how to build machine learning algorithms, prepare data, and use different techniques using Python **CO4:** To apply appropriate data sets to the Machine Learning algorithms.

		CO5: To implement the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
CORE PRACTICAL –VI	**MACHINE LEARNING LAB**	**CO1:** To design and evaluate the unsupervised models through python in built functions. **CO2:** To evaluate the machine learning model algorithms by python programming. **CO3:** To design and apply various reinforcement algorithms to solve real time complex problems. **CO4:** To design and develop the code for the recommended system using Natural Language processing.
ELECTIVE THEORY-II	**INFORMATION SECURITY**	**CO1:** To acquire knowledge of cryptography and network security **CO2:** To test and evaluate security in systems and networks **CO3:** To use methods for planning and designing secure systems **CO4:** To apply techniques and tools for secure system deployment and operation **CO5:** To Perform continuous testing, assessment and updating of system security
ELECTIVE THEORY-II	**NETWORK SECURITY**	**CO1:** To Understand security issues related to networking vulnerabilities, firewalls, intrusion detection systems **CO2:** To Identify infrastructure components including devices, topologies, protocols, systems software, management and security **CO3:** To Design and develop solutions for technical issues related to networking and security problems. **CO4:** To apply footprinting, scanning, enumeration and similar techniques to discover network and system vulnerabilities **CO5:** To analyze performance of network security applications, IPSec, Firewall, IDS, Web security, Email security, Malicious software etc.
ELECTIVE THEORY-II	**BLOCK CHAIN TECHNOLOGY**	**CO1:** To understand the concepts of block chain technology **CO2:** To understand the consensus and hyper ledger fabric in block chain technology. **CO3:** To state the basic concepts of block chain **CO4:** To paraphrase the list of consensus and Demonstrate and Interpret working of Hyper ledger Fabric **CO5:** To implement SDK composer tool and explain the Digital identity for government