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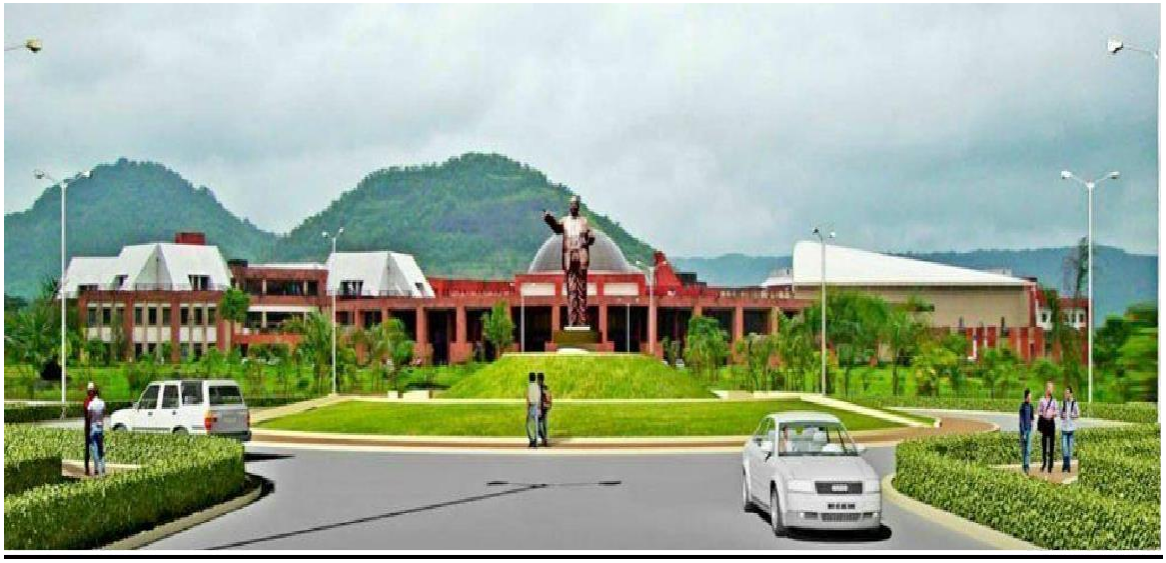
CURRICULUM UNDER GRADUATE PROGRAMME FOR B. TECH

ARTIFICIAL INTELLIGENCE & DATA SCIENCE

WITH EFFECT FROM THE ACADEMIC YEAR
SY: 2021-2022
TY: 2022-2023
B.Tech:2023-24



Course Structure for Second Year

B. Tech in Artificial Intelligence & Data Science

Semester III (Term 3)										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC7	BTBS301	Engineering Mathematics-III	3	1	-	20	20	60	100	4
PCC1	BTAIC302	An Introduction to Artificial Intelligence	3	1	-	20	20	60	100	4
PCC2	BTAIC303	Data Structure and Algorithm using Python	3	1	-	20	20	60	100	4
ESC11	BTAIES304	Computer Architecture & Operating Systems	3	-	-	20	20	60	100	3
ESC12	BTAIES305	Digital Logic & Signal Processing	3	-	-	20	20	60	100	3
LC1	BTAIL306	Artificial Intelligence Lab & Data Structure and Algorithm using Python Lab	-	-	4	60	-	40	100	2
Seminar	BTAIS307	Seminar-I	-	-	4	60	-	40	100	2
Internship	BTES211P	Internship –I (Evaluation)	-	-	-	-	-	-	-	Audit
			15	**3**	**8**	**220**	**100**	**380**	**700**	**22**

BSC = Basic Science Course, ESC = Engineering Science Course, PCC = Professional Core Course PEC = Professional Elective Course, OEC = Open Elective Course, LC = Laboratory Course HSSMC = Humanities and Social Science including Management Courses

Second Year (Semester –III)

Engineering Mathematics-III

BTBS301	Engineering Mathematics-III	BSC7	3L- 1T -0P	4 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial : 1 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. To study the concepts of transformations, used in various field of artificial intelligence and data science.
2. To study partial differential equations to apply it in computer and electronics engineering.
3. To use complex variables.

Course Outcomes:

On completion of the course, students will be able to:

CO1	Understand the concept of LT & ILT.
CO2	Solve problems related to Fourier transform to Deep Learning, Signal & Image processing.
CO3	Understand the concepts of linear algebra and apply Linear Programming, Computer Graphics and Cryptography.
CO4	Understand the concepts of PDE and apply it in data analysis.
CO5	Analyze function of complex variables.

Course Contents:

Unit 1: Laplace Transform **[07 Hours]**

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

Unit 2: Inverse Laplace Transform **[07 Hours]**

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

Unit 3: Fourier Transform **[07 Hours]**

Definitions – integral transforms ; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals ;Complex form of Fourier integrals ; Fourier sine and cosine transforms; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms.

Unit 4: Partial Differential Equations and Their Applications **[09 Hours]**

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ and one dimensional wave equation (i.e. $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$).

Unit 5: Functions of Complex Variables **[08 Hours]**

Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs)

Text Books

1. Linear Algebra, Seymour Lipschutz, Schaums outlines, 4th Edition, McGraw-Hill Publication.

Reference Books

1. Introduction to Linear Algebra, Gilbert Strang, 5th Edition, Wellesley-Cambridge Press.
2. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition, Prentice-Hall of India, 2005.
3. M. Artin, Algebra, Prentice-Hall of India, 2005.

Second Year (Semester –III)

An Introduction to Artificial Intelligence

BTAIC302	An Introduction to Artificial Intelligence	PCC1	3L- 1T - 0P	4 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 1 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. To provide a strong foundation of fundamental basics of Artificial Intelligence.
2. Demonstrate awareness and fundamental understanding of various applications of AI techniques.
3. Apply Artificial Intelligence techniques for problem solving.

Course Outcomes:

On completion of the course, students will be able to:

CO1	Discuss Meaning, Scope and Stages of Artificial Intelligence
CO2	Understand and Implement Problem Space and Search Strategies for Solving problems.
CO3	Discuss the Search Techniques and Knowledge Representation.
CO4	Apply search for solving Constraint Satisfaction Problems and Game-playing.
CO5	Discover the Application of Artificial Intelligence and Analyze Impact of AI on Society

Course Contents:

Unit No 1: Introduction: [7 Hours]

What Is AI? The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art. Introduction: Philosophy of AI, Definitions, AI Future. Stages of AI. (ANI, AGI ASI with examples).

Intelligent Agents: Agents and Environments Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Unit No 2: Search Methods [8 Hours]

State Space Search

Generate and test, simple search, Depth first search (DFS), Breadth First search (BFS), Comparison, Quality of Solution, Depth Bounded DFS, Depth First Iterative Deepening.

Heuristic Search:

Heuristic Functions, Search Techniques: Best-first search, Hill climbing, Local Maxima, Solution Space Search, Variable Neighbourhood Descent, Beam Search, Tabu Search, Peak to peak method.

Unit No 3: Randomized Search: [7 Hours]

Population Based Methods: Escaping Local Optima, Iterated Hill Climbing, Simulated Annealing, Genetic Algorithms, Neural Network, Emergent Systems, Ant Colony Optimization.

Unit No 4: Optimal Path Finding [7 Hours]

Brute Force, Branch & Bound, Refinement Search, Dijkstra Algorithm, Algorithm A*, Admissible A*, Iterative Deepening A*, Recursive Best First Search, Pruning the CLOSED List, Pruning the OPEN List, Conquer Beam Stack Search.

Unit No 5: Constraint Satisfaction [7 Hours]

N Queens, Constraint Propagation, Scene labelling, Higher order consistency, Algorithm backtracking, Look-head strategies, Strategic retreat.

Text Books

1. Deepak Khemani, “A First Course in Artificial Intelligence”, McGraw-Hill Education, 2013.
2. Eugene, Charniak, Drew Mcdermott, "Introduction to artificial intelligence", Addison Wesley, 1985.
3. Elaine Rich, Kevin Knight, Shivashankar B Nair:Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013.
4. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013.

Reference Books

1. Peter Norvig, Artificial Intelligence: A Modern Approach, Third Edition.
2. Herbert A. Simon, "The Sciences of the Artificial ", MIT Press, 3rd Edition (2nd Printing), 1995. 3. Tim Jones, "Artificial Intelligence Application Programming", Dreamtech Publication.
3. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.
4. Prolog Programming for A.I. by Bratko, TMH

Semester –III

Data Structure and Algorithm Using Python

BTAIC303	Data Structure and Algorithm Using Python	PCC2	3L-1T-0P	4 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week Tutorial: 1 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. Introduce the fundamental concept of Python programming to the students
2. Understand various data structures in Python and write algorithms and programs using them
3. Compare alternative implementations of data structures with respect to performance
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Course Outcomes:

On completion of the course, students will be able to:

CO1	Write programs using basic concepts of Python Programming
CO2	Implement algorithms for arrays, linked structures, stacks, queues, trees, and graphs
CO3	Write programs that use arrays, linked structures, stacks, queues, trees, and graphs
CO4	Compare and contrast the benefits of dynamic and static data structures implementation
CO5	Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Course Contents:

Unit 1: Introduction to Programming **[07 Hours]**

Introduction to Programming, Why Programming, What is a Program? Problem Solving, Algorithms and Data Structure

Introduction to Programming, Variables, Data Types, Input-Output Statements, Indentation, Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

Control Flow- if, if-elif-else, for, while break, continue, pass

Collections- String, Lists, Tuples, Dictionaries, Sets, Map

Unit 2: Functions & Object Oriented Programming using Python [07 Hours]

Functions- Built-in and User defined functions, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables, Recursions

Need for OOP, Classes and Objects, OOP Concepts, Constructor, Class Diagram, Encapsulation, Statics, Relationship, Inheritance, and Abstract Classes, Exception Handling

Unit 3: Data Structures in Python [07 Hours]

ADT- Defining the ADT, Using the ADT, Pre conditions and post conditions

Introduction to Data Structures, Types of Data Structures, Arrays- Need for array, Array ADT, Implementing array, 2-D arrays,

Linked Structures- Singly Linked List & Operations with algorithms, Application- Polynomials, Doubly Linked Lists, Circular Linked List

Stacks- Stack ADT, Implementing the stack- using Python List and using a linked list, Stack Applications- Evaluating Postfix expressions

Queues- Queue ADT, Implementing the queue- using Python List and using a linked list, Priority Queue, Applications of Queues

Unit 4: Non-Linear Data Structures in Python [07 Hours]

Binary Trees- Tree Structure, Properties, Implementation, Tree Traversals, Heaps-Definition, Implementation, Heap Sort

Binary Search Trees- Operations and Algorithms (searching, insertion, deletion, min, max),

Hash Tables- Hashing techniques, Hash functions, Applications

Unit 5: Searching & Sorting Algorithms and Analysis [08 Hours]

Search Algorithms- Linear Search Algorithm, Binary Search Algorithm,

Comparison Sort Algorithms- Introduction, Selection Sort, Insertion Sort, Bubble Sort, Merge Sort, Quick Sort

Algorithmic Techniques-Algorithm Technique- Greedy Approach, Dynamic Programming,

Complexity Analysis of Algorithms- Introduction, Analysis of Algorithms, Big-O Notation, Evaluating the Python List.

Text Books / Reference Books

1. Data Structures and Algorithms Using Python, Rance D. Necaise
2. Python for Everybody, Exploring Data Using Python 3, Dr. Charles R. Severance
3. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser.

Semester –III

Computer Architecture and Operation Systems

BTAIES304	**Computer Architecture and Operation Systems**	**ESC11**	**3L-0T-0P**	**3 Credits**

Teaching Scheme	**Examination Scheme**
Lecture: 3 hrs./week	Continuous Assessment : 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. To understand the structure, function and characteristics of computer systems
2. To identify the elements of modern instructions sets and their impact on processor design
3. To understand the services provided by and the design of an operating system.
4. Understand the structure, organization memory management.

Course Outcomes:

On completion of the course, students will be able to:

CO1	Understand the theory and architecture of central processing unit & Analyze some of the design issues in terms of speed, technology, cost, performance
CO2	Use appropriate tools to design verify and test the CPU architecture & Learn the concepts of parallel processing, pipelining and inter processor communication.
CO3	Understand the architecture and functionality of central processing unit & Exemplify in a better way the I/O and memory organization, Memory management systems, Virtual Memory
CO4	Describe and explain the fundamental components of a computer operating system
CO5	Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.

Course Contents:

Unit 1: Introduction, Arithmetic and Instruction Sets [07 Hours]

Introduction: Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function.

Computer Arithmetic: The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

Instruction Sets: Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

Unit 2: Memory Organization and Management [8 Hours]

Memory Organization: Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Continuous Memory Allocation, Fixed and variable partition, Internal and external fragmentation and

compaction, Paging: Principle of operation, Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit 3: Control Unit & Input/ Output Organization: [07 Hours]

Control Unit: Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming.

Input/ Output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/ O, Direct memory access, I/O channels and processors, External interface. Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol.

Unit 4: Introduction OS & Processes and CPU Scheduling: [07 Hours]

Introduction and Operating system structures: Definition, Types of Operating system, Real Time operating system, System Components- System Services, Systems Calls, System Programs, System structure. Virtual Machines, System Design and Implementation, System Generations.

Processes and CPU Scheduling: Process Concept, Process Scheduling, Operation on process, Cooperating processes. Threads, Inter-process Communication, Scheduling criteria, scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Scheduling Algorithms and performance evaluation.

Unit 5: Process Synchronization & Deadlocks [07 Hours]

Process Synchronization: The critical-section problem, Critical regions, Synchronization Hardware, Semaphores, Classical Problems of synchronization, and Monitors Synchronizations in Solaris.

Deadlocks: Systems Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined approach to deadlock Handling.

Text Books

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
3. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011
4. Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4th Edition, 2015.

Reference Books

1. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.
2. Morris Mano, Computer System Architecture, Pearson Education India, 3rd Edition, 2007.
3. Mostafa Abd-El-Barr, Hesham El-Rewini, Fundamentals of Computer Organization and Architecture, Wiley Publication, 1st Edition, 2004.

Semester –III

Digital Logic & Signal Processing

BTAIES305	Digital Logic & Signal Processing	ESC12	3L-0T-0P	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs./week	Continuous Assessment : 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
2. To classify signals and systems into different categories.
3. To analyze Linear Time Invariant (LTI) systems in time and transform domains.
4. To build basics for understanding of courses such as signal and image processing, computer vision, Machine Learning and Deep Learning.

Course Outcomes:

On completion of the course, students will be able to:

CO1	Use the basic logic gates and various reduction techniques of digital logic circuit in detail
CO2	Understand mathematical description and representation of various signals and systems.
CO3	Develop input output relationship for linear shift invariant system and understand the convolution operator for discrete time system.
CO4	Understand use of different transforms and analyze the discrete time signals and systems.
CO5	Understand the concept of correlation, regression and spectral density.

Course Contents:

Unit 1: Number System and Boolean Algebra [07 Hours]

Digital Signal, Digital logic circuits: AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR.

Boolean algebra and theorems.

Number System: Binary, Octal, Decimal, and Hexadecimal. Binary Arithmetic (addition, subtraction, multiplication, division), 1's & 2's compliment.

Codes: Binary, Gray, BCD, Excess-3, Octal, Hexadecimal code.

Unit 2: Introduction to Signals and Systems [8 Hours]

Signals: Definition of signal and systems, Continuous time and discrete time signal,

Classification of signals as even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power, elementary signals used for testing: exponential, sine,

impulse, step and its properties, ramp, rectangular, triangular, signum, sinc.

Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration (Accumulator for DT), time scaling, time shifting and time folding. Sampling Process.

Systems: Definition, Classification: linear and non-linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible.

Unit 3: Discrete Fourier Transform [07 Hours]

DTFT, Definition, Frequency domain sampling, DFT, Properties of DFT, Convolution: circular convolution, linear convolution, FFT, decimation in time and decimation in frequency using Radix-2 FFT algorithm.

Unit 4: Z transform [07 Hours]

Need for transform, relation between Laplace transform and Z transform, between Fourier transform and Z transform, Properties of ROC and properties of Z transform, Inverse Z transform, Power series method, partial fraction expansion method, Solution of difference equations.

Unit 5: Correlation and Spectral Density [07 Hours]

Introduction of correlation and correlogram, the correlation function: analogy between correlation and convolution, auto-correlation, properties of auto-correlation, Cross-correlation: properties of cross correlation

Introduction of Spectral density, ESD, Properties of ESD, PSD, Properties of PSD.

Text Books

1. Dr. S. L. Nalbalwar, A.M. Kulkarni and S.P. Sheth, “Signals and Systems”, 2nd Edition, Synergy Knowledgeware,2017
2. Nagoor Kanni “Signals and Systems”, 2nd edition, McGrawHill.

Reference Books

1. R. P. Jain, Modern digital electronics. 3rd edition, 12threprint Tata McGraw Hill Publication,2007.
2. Alan V. Oppenheim. Alan S. Willsky and S. Hamid Nawab, “Signals and Systems”,PHI
3. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
4. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, 1997.
5. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
6. ShailaApte, “Signals and Systems-principles and applications”, Cambridge University press,2016.

Semester –III

An Introduction to Artificial Intelligence Lab and Data Structure and Algorithm Using Python Lab

BTAIL306	**Artificial Intelligence Lab and Data Structure and Algorithm Using Python Lab**	**LC1**	**0L-0T-4P**	**2 Credits**

Teaching Scheme	**Examination Scheme**
Practical: 04 hrs./week	Continuous Assessment 1: 30 Marks Continuous Assessment 2: 30 Marks End Semester Examination: 40 Marks

A) Artificial Intelligence Lab

List of Practical/Tutorial

Software Tools: Programming languages, namely Java, Python, C++, Lisp, and Prolog, is highly recommended for students to use when completing their assignments and/or practical's for this course.

1. Study of Java/Python/C++/ Lisp/ PROLOG.
2. Existing AI Application (e.g. Recommendation system, Carpooling, OTT channels etc.)
3. Solve any problem using depth first search.
4. Solve any problem using breadth first search.
5. Solve 8-puzzle problem using best first search.
6. Write a program to solve Tic-Tac-Toe using Min-Max search.
7. Solve traveling salesman problem.
8. Write a program for Alpha–Beta Pruning.
9. Write a program to solve 8 queens problem.
10. Write a program to solve map coloring problem using CSP.

Note:

1. Open Source tools and technology use for programs
2. Lab should be in scope of hands of experience and practice related program must
3. Add case study and Live project experience if any related contents

Software Tools: Programming languages Python and Opens Source tools must and highly recommended for students to use when completing their assignments and/or practical's for this course.

B) Data Structure and Algorithm Using Python Lab

List of Practical

Downloading and installing Python gcd in Python as start of lab for hands on laboratory

1) Write code and understand the concept Variable, Data Type and Data Object in python.
2) Write code and understand the concept List, Tuple, and Array in python.
3) Write code and understand the concept Loop and Function in python.
4) Write code and understand the concept Classes and Objects in python.
5) Write code and understand the concept Constructor and Relationship
6) Write code and understand the concept Inheritance and Exception Handling in python.
7) Write code and understand the concept List in data Structure
8) Write code and understand the concept Queue in data Structure
9) Write code and understand the concept Array in data Structure
10) Write code and understand the concept Graphs, Trees in data Structure
11) Write code and understand the concept Hashing, Hast Tables in data Structure
12) Write code and understand the concept Search Algorithms (Any two)
13) Write code and understand the concept Sorting Algorithms (Any two)
14) Write code and understand the concept Algorithm Technique on Greedy Approach

Note:

1. Open Source tools and technology use for programs
2. Lab should be in scope of hands of experience and practice related program must
3. Add case study and Live project experience if any related contents

Semester –III
Seminar-I

BTAIS307	**SEMINAR- I**	**Seminar**	**0L-0T-4P**	**2 Credits**

Guidelines for Seminar

The students shall study in group of two members (or individual) on some special topic beyond the scope of the syllabus under the subjects of Artificial Intelligence, Data Science, Electronics Engineering and Computer Science Engineering or inter discipline branch from current literature, by referring the current technical journal or reference books, under the guidance of the teacher. The students shall prepare his report and deliver talk on the topic for other students of his class in the presence of his guide and internal examiner. The student is permitted to use audio-visual aids or any other such teaching aids.

Continues Assessment:

The Continues Assessment for this head will consists of the report written in a technical reporting manner and presentation of the talk on the subject and will be assessed by the internal examiner appointed by the HOD of concern department of the institution.

Semester –III
Internship - I

BTES211P	**Field Training / Internship / Industrial Training**	**Internship**	**Audit**

Guidelines for Internships

Guidelines for Field Training / Internship / Industrial Training Industrial Training:

1. To apply for a suitable Industrial Training, submit an application form to respective Organization concerned one semester before the Industrial Training Programmed commences.
2. Student can also apply through online platforms such as Internshala for industrial training.
3. Submit one copy of the offer letter for the Industrial Training to the Head of the department or Faculty coordinator (Industrial Training).
4. To complete the Industrial Training process within the specified time based on the Industrial Training Programme schedule.
5. Assessment within the Industrial Training context aims to evaluate the student's work quality and appropriateness to the field of study with reference to the learning outcomes of the Industrial Training Programme.
6. Evaluation of the students' performance should be done in the next upcoming semester.
7. Those students who fails, they can also complete online certification courses which are available at free of cost on various MOOC platforms.