# ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

## B. Tech. Artificial Intelligence

## Scheme of Examination & Syllabus 2024-25

**SEMESTER III**

| Sr No | Course Category | Course Code | Course Title | Hours per Week | | | Credits | Maximum Marks | | | | No. of Hrs for ESE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | Mid-Sem Examination | Continual Assessment | End Sem Examination | Total | |
| 1. | PCC | **24AS301T** | Discrete Mathematics | **3** | **-** | **-** | **3** | **20** | **20** | **60** | **100** | **3** |
| 2. | PCC | **24AI301T** | Data Structures | **3** | **-** | **-** | **3** | **20** | **20** | **60** | **100** | **3** |
| 3. | PCC | **24AI301P** | Data Structures Laboratory | **-** | **-** | **2** | **1** | **-** | **25** | **25** | **50** | **-** |
| 4. | PCC | **24AI302T** | Fundamentals of Artificial Intelligence | **3** | **-** | **-** | **3** | **20** | **20** | **60** | **100** | **3** |
| 5. | PCC | **24AI302P** | Fundamentals of Artificial Intelligence Laboratory | **-** | **-** | **2** | **1** | **-** | **25** | **25** | **50** | **-** |
| 6. | PCC | **24AI303T** | Database management System | **3** | **-** | **-** | **3** | **20** | **20** | **60** | **100** | **3** |
| 7. | PCC | **24AI303P** | Database Management System Laboratory | **-** | **-** | **2** | **1** | **-** | **25** | **25** | **50** | **-** |
| 8. | ELC | **24ES301T** | Value Education Course | **3** | **-** | **-** | **3** | **20** | **20** | **60** | **100** | **3** |
| 9. | MDM | **24AI331M** | MDM-I (Refer MDM Basket) | **2** | **-** | **-** | **2** | **10** | **10** | **30** | **50** | **1.5** |
| 10. | SEC | **24AI341P** | Career Development III | **-** | **-** | **2** | **1** | **-** | **50** | **-** | **50** | **-** |
| 11. | ELC | **24AI307P** | Micro Project I* | **-** | **-** | **2** | **1** | **-** | **50** | **--** | **50** | **-** |
| | | | **Total** | **17** | **0** | **10** | **22** | **110** | **285** | **405** | **800** | |

*** Field Project or Community engagement project in the major discipline**

| | | | | |
|---|---|---|---|---|
| Chairman - BoS | Dean – Academics | July 2024 | 2.0 | Applicable for 2025-26 |
| | | Date of Release | Version | |

# ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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## B. Tech. Scheme of Examination & Syllabus 2024-25

## ARTIFICIAL INTELLIGENCE

**THIRD SEMESTER**

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MSE | CA | ESE | Total |
| 24AS301T | Discrete Mathematics | 3 | | | 3 | 20 | 20 | 60 | 100 |

| Course Objectives | Course Outcomes |
|---|---|
| The aim of this course is<br>• To understand the concepts of graph theory and related algorithm concepts.<br>• To understand the concepts of algebraic structures, logic, set theory. | **On completion of the course, students will be able to**<br>• Form truth tables, proving results by truth tables.<br>• Observe the various types of sets, functions and relations.<br>• Recognize definition and properties of algebraic structures.<br>• Apply concepts of graph theory, shortest path algorithms, concepts of trees and minimum spanning tree to solve engineering problems.<br>• Apply counting techniques to solve combination problems. |

| | |
|---|---|
| **Unit I : Mathematical logic & Set theory:** | **[9Hrs]** |
| Introduction - Statements and notations, Connectives, Conditional statements and tautologies, Validity of argument ,Principle of Mathematical Induction, Basic concepts of set theory, Operations on sets, Power set. | |
| **Unit II : Relation & Function:** | **[9Hrs]** |
| Relation, ordered pairs and n- tuples, Partitions and Cartesian product sets, Properties of binary relation, Equivalence relation and equivalence class, Matrix & Graphical representation of relation, Compatible relation, Composition of relation, Partial ordering, Partial ordered set, Hasse diagram.Types of function, Invertible function, Composition of function, Characteristic function. | |
| **Unit III : Graph theory & Trees:** | **[9Hrs]** |
| Types of graphs definitions, Paths and circuits, Reachability and connectedness, Matrix representation of graphs, Subgraphs and Quotient graphs, Isomorphic digraph, Euler path and Euler circuit, Graph Colouring<br>Trees, Binary tree, Labeled trees, Undirected trees, Weighted graphs, Spanning trees of connected relations, Prim's algorithm, Kruskal's algorithm. | |
| **Unit IV : Combinatorics :** | **[9Hrs]** |
| Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications. | |
| **Unit V : Algebraic Structure & Lattices:** | **[9Hrs]** |
| Binary operations, Semi groups, Monoids, Subsemigroup, Submonoid, Problems on groups, Normal subgroups, Group homomorphism & isomorphism.<br>Ring, Commutative ring, Ring with unity, Ring with zero divisor, Integral domain, field. Properties, Types of lattices, Sub lattices, Complemented and Modular Lattices. | |

**Text Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Discrete Mathematical Structures | Kolman, Busby & Ross | 3rd | PHI |
| 2. | Discrete Mathematical Structures with Applications to Computer Science | Tremblay &Manohar | 2nd | Tata McGraw- Hill. |
| 3. | Discrete mathematics | Swapan kumar Sarkar | 3rd | S. Chand publications |

**Reference Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Discrete Maths for Computer Scientists & Mathematicians | Mott, Kandel, Baker | | Pearson |
| 2. | Discrete Mathematics | Lipschutz | | McGraw Hill Professional, |
| 3. | Elements of Discrete Mathematics | C. L. Liu | | McGraw Hill Education India. |

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|---|---|---|---|---|
| | | July 2025 | 1 | Applicable for 2025-26 |
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## B. Tech. Scheme of Examination & Syllabus 2024-25

## ARTIFICIAL INTELLIGENCE

### THIRD SEMESTER

| `Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MSE | CA | ESE | Total |
| 24AI301T | Data Structures | 3 | | - | 3 | 20 | 20 | 60 | 100 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended to**<br>• Provide a strong foundation in the principles and implementation of fundamental data structures and algorithms for efficient problem-solving..<br>• Develop the ability to analyze algorithm complexity and apply appropriate data structures to design optimized solutions in real-world applications. | **Students will be able to**<br>• Analyze the fundamental concepts of algorithms, asymptotic notations, and basic data structures like arrays.<br>• Apply stacks and queues to solve problems related to expression conversion and evaluation.<br>• Implement various types of linked lists and apply searching and sorting algorithms efficiently.<br>• Demonstrate understanding of tree and graph data structures and implement traversal and pathfinding algorithms.<br>• Apply hashing techniques to manage data efficiently using different collision resolution strategies and implement dictionary operations. |

**Unit I Introduction to Data Structures and Array** **[9Hrs]**

Algorithms , Asymptotic Notation, Introduction to Data Structures, Types of Data Structures, Data Structure Operations, Time and Space Complexity, Introduction to Array, Types of Array, Representation of One-Dimensional Array in Memory, Array Traversal, Insertion and Deletion, Sorting and Searching.

**Unit II Stacks and Queues** **[9Hrs]**

Stacks-Definition, Operations, Applications of stacks – Representation and evaluation of expressions using Infix, Prefix and Postfix, Algorithms for conversions and evaluations of expressions from infix to prefix and postfix using stack.
Queues — Basic Concept, Queue Operations, Queue Implementation, Circular Queues, Priority Queues, Double-Ended Queues.

**Unit III Linked List, Searching and Sorting** **[9Hrs]**

Linked Lists – Basic Concept, Linked List Implementation, Types of Linked Lists, Circular Linked List, Doubly Linked List Selection Sort, Insertion Sort, Bubble Sort, Quick, Sort, Merge Sort.
Linear Search Binary Search, Efficiency of Binary Search.

**Unit IV Trees and Graphs** **[9Hrs]**

Basic Concept, Binary Tree, Binary Tree Representation, Binary Tree Traversal, Binary Search Tree, Tree Variants.
Graph Basic Concept, Graph Terminology, Graph Implementation, Shortest Path Algorithm, Traversals-Breadth First Search, Depth First Search with algorithms. Definition and Minimum Spanning Tree Algorithms, Dijkstra Algorithms.

**Unit V Hashing** **[9Hrs]**

General Idea, Hash Functions, Collision Resolution Techniques- Chaining, Open Addressing, Chaining without replacement, Chaining with Replacement, Quadratic Probing, Double Hashing.

**Text Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Data Structures using C | E Balagurusamy | 2nd | McGraw Hill Education |
| 2. | Data Structures | Anuradha A. Puntambetkar | 1st | Technical |

**Reference Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Data Structures- A Pseudo code Approach with C | Richard F Gillberg & Behrouz A. Forouzan | 2nd | Cengage Learning, |
| 2. | Data Structures Using C and C++, | Aaron M. Tanenbaum, Yedidyah Langsam and Moshe J. Augenstein, | 2nd | PHI Learning Private Limited, Delhi India. |

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## B. Tech. Scheme of Examination & Syllabus 2024-25

## ARTIFICIAL INTELLIGENCE

**THIRD SEMESTER**

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MSE | CA | ESE | Total |
| 24AI301P | Data Structures Laboratory | - | - | 2 | 1 | - | 25 | 25 | 50 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended to**<br>• develop the ability to design, implement, and analyze basic and advanced data structures (arrays, linked lists, stacks, queues, trees, graphs, and hash tables) for solving computational problems.<br>• enable students to apply appropriate searching, sorting, and hashing techniques. | **Students will be able to**<br>• Implement arrays and apply basic algorithmic techniques including time and space complexity analysis.<br>• Develop programs to implement stacks and queues.<br>• Construct and manipulate different types of linked lists (singly, doubly, circular), and implement efficient searching and sorting algorithms.<br>• Design binary trees, binary search trees, and graph data structures. Apply tree traversal algorithms, graph traversal algorithms.<br>• Implement hashing techniques to efficiently store and retrieve data. |

| Sr. No. | List of Practicals |
|---|---|
| 1 | Write a program to implement insertion, deletion, and traversal operations on a one-dimensional array. |
| 2. | Implement a Stack using arrays or linked lists. Perform push, pop, peek operations and check for underflow/overflow. |
| 3. | Implement Queue, Circular Queue, and Deque using arrays or linked lists. Perform enqueue, dequeue, display operations. |
| 4. | Implement Singly Linked List, Doubly Linked List, and Circular Linked List with insertion, deletion, and display operations. |
| 5. | Implement Bubble Sort, Selection Sort, and Insertion Sort algorithms on an array of integers. Display the sorted array. |
| 6. | Implement a Binary Search Tree (BST) with operations: insertion, deletion, and searching. Perform Inorder, Preorder, and Postorder traversals. |
| 7. | Problem: Implement Breadth-First Search (BFS) and Depth-First Search (DFS) for a graph represented using adjacency matrix or list. |
| 8. | Implement Hash Table with collision handling using Separate Chaining and Open Addressing |
| | Open ended experiments |
| 9. | Develop a Mini Library Management System using Data Structures |
| 10. | Design a Student Record System with Advanced Searching and Sorting |

**Text Books**

| Sr. No. | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Data Structures using C | E Balagurusamy, | 2nd | McGraw Hill Education |

**Reference Books**

| Sr. No. | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1. | Data Structures, A Pseudo code Approach with C, | Richard F Gillberg & Behrouz A. Forouzan | 2nd | Cengage Learning, |
| 2. | Data Structures Using C and C++, | Aaron M. Tanenbaum, Yedidyah Langsam and Moshe J. Augenstein, | 2nd | PHI |

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## ARTIFICIAL INTELLIGENCE

**THIRD SEMESTER**

| `Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MSE | CA | ESE | Total |
| 24AI302T | Fundamental of Artificial Intelligence | 3 | | - | 3 | 20 | 20 | 60 | 100 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended to**<br>• Gain the basics of one of the most fascinating and fastest growing areas of Computer Science<br>• Formulate artificial intelligence problems corresponding to different applications.<br>• Apply artificial intelligence search strategies/ algorithms to solve the problems.<br>• Learn the applications and existing systems of Artificial Intelligence in different areas. | **Students will be able to**<br>• Learn the fundamentals of Artificial Intelligence domain.<br>• Comprehend the basic AI problem solving strategies.<br>• Analyze the applicability of various searching Techniques.<br>• Distinguish between various search strategies.<br>• Learn the various aspect of knowledge from AI point of view. |

| | |
|---|---|
| **Unit I Introduction** | **[9Hrs]** |
| Definition of AI, history & importance of AI, AI winter, agents, environments, Turing test concept, Task domain of AI, AI Characteristics, AI Problems and its state space search, Introduction to intelligent agents. **AI Problems and its Formulations**: Defining the problems as a state space search and representation, Introduction to Production system, its type, Production system characteristics, Problem solving methods - Tower of Hanoi, Tic-tac-toe, Puzzle, etc, Case study: MYCIN, Dendral | |
| **Unit II Search Strategies** | **[9Hrs]** |
| **Uninformed:** Search strategies, Breadth-first search, Depth-first search, Branch and bound algorithm, Comparing uninformed search techniques. **Informed search strategies:** Indexing and Heuristic functions, Generate-and-test, Hill climbing, best-first search, problem reduction, constraint satisfaction, Mean-ends analysis. Search and optimization (gradient descent) | |
| **Unit III Knowledge Representation** | **[12Hrs]** |
| Knowledge Progression, Types of knowledge, Issues in knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, use of predicate calculus, **Structural Knowledge Representation**: Frames, scripts, predicate logic, semantic network, example of knowledge representation schemes, Truth maintenance system. Transition networks: RTN, ATN. Brief Basic techniques of NLP, application of NLP. | |
| **Unit IV Expert Systems** | **[7Hrs]** |
| Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – DART, XOON, Expert systems shells. | |
| **Unit V Statistical Reasoning** | **[8Hrs]** |
| Probability and Bayes theorem, Certainty factor, Dempster-Shafer theory, Fuzzy logic: crisp sets, application of fuzzy logic. Case study of AI Systems: Google Duplex (or the latest one.) | |

**Text Books**

| Sr. No. | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Artificial Intelligence | Saroj Kaushik | 1st | Cengage Learning India. |
| 2 | A First Course in Artificial Intelligence | Deepak Khemani | 6th | McGraw Hill Education |

**\Reference Books**

| Sr. No. | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Artificial Intelligence | Elaine Rich, Kevin Knight, & Shivashankar B Nair | 3rd | McGraw Hill |
| 2 | Artificial Intelligence: A Practical Approach | Rajiv Chopra | 1st | S Chand & Co Ltd |
| 3 | Artificial Intelligence A modern approach | Stuart Russell, andPeter Norvig | 2nd | Pearson |

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## B. Tech. Scheme of Examination & Syllabus 2024-25

## ARTIFICIAL INTELLIGENCE

### THIRD SEMESTER

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CA | ESE | Total |
| 24AI303P | Fundamentals of Artificial Intelligence Lab | - | - | 2 | 1 | 25 | 25 | 50 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended**<br>• To implement the theoretical concepts of Artificial intelligence<br>• To compare the efficiency of various AI search algorithms. | **Students will be able to**<br>• Comprehend and explore Python programming language.<br>• Demonstrate basic AI problem solving strategies.<br>• Implement the applicability of various searching Techniques.<br>• Evaluate and implement various knowledge representation techniques.<br>• Implement real time AI based applications. |

| Sr. No. | List of the Practical's |
|---|---|
| 1 | Implementation of various AI Problems. |
| 2 | Production systems. |
| 3 | Search Strategies |
| 4 | Knowledge representation |
| 5 | Natural language processing |
| 6 | Expert system |
| 7 | Reasoning |
| 8 | Course syllabus based Micro Project. |
| | **Open ended practicals** |
| 9 | Set up a simulated environment where a robot needs to navigate to different locations while avoiding obstacles. Implement the Simulated Annealing algorithm to optimize the robot's path planning considering factors like distance to goal, energy consumption, and obstacle avoidance. |
| 10 | Design a maze-solving task where students implement these algorithms and analyze their effectiveness in Finding the optimal path and the computational resources they consume. |

**Text Books:**

| S. No | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | A Classical Approach to Artificial Intelligence | Munesh Chandra Trivedi | 2nd | Khanna Publishing House Delhi. |
| 2 | Artificial Intelligence | Saroj Kaushik | 1st | Cengage Learning India. |
| 3 | Artificial Intelligence: Foundations for Computational Agents | David Poole and Alan Mackworth | 2nd | Cambridge University Press. |

**Reference Books:**

| S. N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Artificial Intelligence | Elaine Rich, Kevin Knight, & ShivashankarB Nair | 3rd | McGraw Hill |
| 2 | Artificial Intelligence: A Practical Approach | Rajiv Chopra | 1st | S Chand & Co Ltd |
| 3 | A First Course in Artificial Intelligence | Deepak Khemani | 6th | McGraw Education |

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## ARTIFICIAL INTELLIGENCE

### THIRD SEMESTER

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CA | ESE | Total |
| 24AI303T | Database Management System | 3 | - | - | 3 | 40 | 60 | 100 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended to provide**<br>• To train the fundamental concepts of database management system, database modeling and design, SQL system implementation techniques.<br>• To enable students to model ER diagram for any customized applications.<br>• To provide knowledge on distributed databases, concurrency techniques, federated systems and active databases. | **Students will be able to**<br>• Understand the evolution, architecture, and key functionalities of DBMS, differentiating it from traditional file systems.<br>• Apply SQL commands (DDL, DML, DCL, TCL) to define, manipulate, and control data in relational databases.<br>• Construct and analyze ER diagrams to represent real-world scenarios and translate them into relational schemas.<br>• Apply functional dependencies and normalization techniques to optimize relational database schemas.<br>• Develop advanced SQL queries using embedded SQL, procedures, and triggers for real-time applications. |

| | |
|---|---|
| **Unit I Introduction** | **[9Hrs]** |
| History and motivation for database systems; Introduction to database systems :overview, File systems Vs DBMS, various data models, levels of abstraction, structures of DBMS, relational model, components of database systems; DBMS functions; Database Architecture, Data Independence. | |
| **Unit II SQL Data Types** | **[9Hrs]** |
| Data definition language (DDL) - Create , Alter , Drop, Rename, Comment , Data Manipulation Language (DML) - Insert , Update, Delete , Transaction control Language – Commit, Save-point, Rollback , Data Control Language - GRANT, REVOKE, DENY , Constraints – Not null , Unique , Primary Key, Foreign Key, Check , Default, Set Operations, Null values, Aggregate functions | |
| **Unit III Data Models** | **[9Hrs]** |
| Entity Relationship Model, Development of ER Diagrams, Extended Entity Relationship Model ,Relational database design: Database design; multi-valued dependency | |
| **Unit IV Normalization** | **[9Hrs]** |
| Basic Concept of Normalization, need of Normalization, Codd's Relational Database Rules, functional dependency; normal forms; Types of Normalization – 1 NF , 2Nf,3NF, BCNF,4NF, 5NF. | |
| **Unit V Advanced SQL** | **[9Hrs]** |
| Dynamic SQL and Embedded SQL, Functions and Procedures, Triggers. Overview of OODBMS & Distributed DBMS,Introduction to NoSQL Database | |

**Text Books:**

| Title | Authors | Edittion | Publisher |
|---|---|---|---|
| An introduction to database systems | C. J. Date | 8th | Addison Wesley |
| Database system implementation | H. Garcia et al., | - | Prentice Hall |

**Reference Book**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Database System Concepts | Abraham Silberschatz,Henry F. | 6th | McGraw Hill (SIE) |
| 2 | Database Systems-Models, Languages, Design and Application Programming | Ramez Elmasri | 6th | Pearson |

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## ARTIFICIAL INTELLIGENCE

### THIRD SEMESTER

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CA | ESE | Total |
| 24AI303P | Database Management System Lab | - | - | 2 | 1 | 25 | 25 | 50 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended** | **Students will be able to·** |
| • To train the fundamental concepts of database management system, database modeling and design, SQL system implementation techniques.<br>• To enable students to model ER diagram for any customized applications.<br>• To provide knowledge on distributed databases, concurrency techniques, federated systems and active databases | • An ability to apply the knowledge of mathematics, science and computing appropriate to the discipline.<br>• Solve issues of information systems using the learned database principles.<br>• Construct database application using current tools and techniques.<br>• Gain overview advance SQL for database application.<br>• Development of SQL based application. |

| Expt. No. | List of Experiments |
|---|---|
| 1 | SQL Query for Database Creation & Deletion |
| 2 | SQL Query for Relation Creation & Deletion |
| 3 | SQL Query for Constraints |
| 4 | SQL Query for DML, DCL & TCL commands |
| 5 | Query for Join & Set Operations, Functions, and Trigger in SQL |
| 6 | PL/SQL Program |
| 7 | Database Connectivity with Frontend |
| 8 | Micro project based on the syllabus. |

**Text Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Database System Concepts | Abraham Silberschatz, Henry F. Korth and S. Sudarshan | 6th Edition | McGraw Hill (SIE) |
| 2 | Database Systems - Models, Languages, Design and Application Programming | Ramez Elmasri and Shamkant Navathe | 6th Edition | Pearson Education |

**Reference Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | An introduction to database systems | C. J. Date | 8th Edition | Addison Wesley |
| 2 | Database system implementation | H. Garcia et al. | | Prentice Hall |

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## ARTIFICIAL INTELLIGENCE

**THIRD SEMESTER**

| Course Code | Course Name | Th | | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | MSE | CA | ESE | Total |
| 24ES301T | Value Education Course | 3 | | - | - | 3 | 20 | 20 | 60 | 100 |

| Course Objectives | Course Outcomes |
|---|---|
| Development of a holistic perspective through self-exploration and development of clarity about harmony between self, family, society and nature. | **At the end of the course, students will be able to:**<br>● Demonstrate awareness about self and their surroundings and its interdependence.<br>● Understand concepts of aspirations and happiness.<br>● Recognize and explain the nine universal values in relationship and their application in visualizing a harmonious society.<br>● Discuss concepts of conservation of nature and harmony and reusability.<br>● Identify the scope of eco-friendly systems for enriching institutions. |

| **Unit I : Introduction** | **[9Hrs]** |
|---|---|
| Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations , Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority , Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario , Method to fulfill the above human aspirations: understanding and living in harmony at various levels. | |
| **Unit II : Understanding Harmony** | **[9Hrs]** |
| Understanding human being as a co-existence of the sentient 'I' and the material 'Body' , Understanding the needs of Self ('I') and 'Body' - happiness and physical facility , Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) ,Understanding the characteristics and activities of 'I' and harmony in 'I' , Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health. | |
| **Unit III : Values in relationships** | **[9Hrs]** |
| Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. | |
| **Unit IV : Co-existing with nature** | **[9Hrs]** |
| Understanding the harmony in Nature , Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Coexistence of mutually interacting units in all-pervasive space ,Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature<br>(film "Home" can be used), pollution, depletion of resources and role of technology etc. | |
| **Unit V : Holistics approach for engineers** | **[9Hrs]** |
| Natural acceptance of human values , Definitiveness of Ethical Human Conduct , Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order , Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. , Case studies of typical holistic technologies, management models and production systems , Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up | |

**Text Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Human Values and Professional Ethics | Gaur, Sangal, Bagaria | 2010 | Excel Books, New Delhi |

**Reference Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Jeevan Vidya: Ek Parichaya | A. Nagaraj | 1999 | Jeevan Vidya Prakashan, Amarkantak |
| 2. | Human Values | A.N. Tripathi | 2004 | New Age Intl. Publishers, New Delhi |
| 3. | The Story of My Experiments with Truth | M.K.Gandhi | 2009 | Fingerprint! Publishers |

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|  |  | July 2025 | 1 | Applicable for 2025-26 |
| Chairman - BoS | Dean – Academics | Date of Release | Version | |

# ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

## B. Tech. Scheme of Examination & Syllabus 2024-25

## ARTIFICIAL INTELLIGENCE

**THIRD SEMESTER**

| Course Code | Course Name | Th | Tu | Pr | Credits | Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | MSE | CA | ESE | Total |
| 24AI331M | Multidisciplinary Minor – I (Responsible AI) | 2 | - | - | 2 | 10 | 10 | 30 | 50 |

| Course Objectives | Course Outcomes |
|---|---|
| **This course is intended**<br>• To introduce the fundamental concepts, history, and applications of Artificial Intelligence (AI).<br>• To familiarize students with various ethical theories and frameworks relevant to decision-making in AI systems.<br>• To explore the design and implementation of ethically responsible AI systems. | **Students will be able to**<br>• Describe AI Concepts, History and Intelligent Agents<br>• Analyze ethical issues in AI to real-world AI problems.<br>• Evaluate and design AI systems with ethical considerations, incorporating principles of responsible AI. |

**Unit I: Introduction to AI** **[10Hrs]**

Introduction to AI, History of AI, Applications of Artificial Intelligence, How Does AI Works, Intelligent agents: Agents and Environments, The Concept of Rationality, The Nature of Environments, Properties of task environments, the Structure of Agents, Agent programs: Simple reflex agents, Model-based reflex agents, Goal-based agents, Utility-based agents, Learning agents.

**Unit II: Ethical Decision-Making** **[10 Hrs]**

Introduction, Ethical Theories, Values, Ethics in Practice, Implementing Ethical Reasoning, Taking Responsibility: Introduction, Responsible Research and Innovation, The ART of AI- Accountability, Responsibility & Transparency, Design for Values.

**Unit III: Ethical AI** **[10 Hrs]**

Ethical Action, Approaches to Ethical Reasoning by AI, Designing Artificial Moral Agents, Implementing Ethical Deliberation, The Levels of Ethical Behaviour, Ethical Status of AI Systems, Introduction, Governance for Responsible AI, Codes of Conduct, Inclusion & Diversity, The AI Narrative, AI and society, Super-intelligence, Responsible AI.

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Responsible Artificial Intelligence | Virginia Dignum | 1st | Springer |
| 2 | AI Ethics | Mark Coeckelbergh | 1st | Addison-Wesley Professional |

**Reference Books**

| S.N | Title | Authors | Edition | Publisher |
|---|---|---|---|---|
| 1 | Responsible AI: Best Practices for Creating Trustworthy AI Systems | Dr. Qinghua Lu ,Dr./Prof. Liming Zhu, Prof. Jon Whittle, Dr. Xiwei Xu | 1st | Addison-Wesley Professional |

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