Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

Padmabhooshan Vasantraodada Patil Institute of Technology,
Budhgaon, Sangli (MS) – 416304

(An Autonomous Institute)

Affiliated to

Dr. Babasaheb Ambedkar Technological University,
Lonere, Raigad

(Accredited by NAAC)

Department of Computer Science & Engineering (Artificial Intelligence & Data Science)

Curriculum for Second Year Undergraduate Degree Programme

B. Tech. in Computer Science & Engineering (AIDS)

In accordance with National Education Policy (NEP – 2020)

w. e. f.
Academic Year: 2026-2027

Dr. Vasantraodada Patil Shetkari Shikshan Mandal's
PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, BUDHGAON, SANGLI. 416304
An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

Department of Computer Science and Engineering (Artificial Intelligence and Data Science)

Curriculum Structure and Evaluation Scheme

S. Y. B. Tech Semester III

Computer Science and Engineering (Artificial Intelligence and Data Science)

Academic Year 2026-2027 Onwards

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					TOTAL
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0AIESC201	Applied Mathematics	3	1	0	4	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC202	Foundations of Artificial Intelligence	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC203	Data Structures	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC204	Prompt Engineering	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIMDM205	MDM -I	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIVEC206	Universal Human Values	2	0	0	2	ISE	50	20*	-	-	50
0AIHSSM207	Principles of Management	2	0	0	2	ISE	50	20*	-	-	50
0AIPCC208	Artificial Intelligence Laboratory	0	0	2	1	ISE	-	-	50	20*	50
						ESE	-	-	50	20*	50
0AIPCC209	Data Structures Laboratory	0	0	2	1	ISE	-	-	50	20*	50
						ESE			50	20*	50
0AIPCC210	Python Programming Laboratory	0	0	2	1	ISE	-	-	50	20*	50
TOTAL		**19**	**1**	**6**	**23**	**TOTAL MARKS**					**850**
Total Contact Hours Per Week		**26**									

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Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	4	12	-	3	-	-	-	2	-	2	-	-	-	-	-	23
Cumulative	**16**	**19**	**12**	**-**	**3**	**-**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**63**

Multidisciplinary Minor Bucket offered by CSE (AIDS)

MDM-I (SEM – III)	0AIMDM205	Introduction to Artificial Intelligence

***Passing Criteria: - ISE + MSE + ESE ≥ 40% Marks and ESE has separate passing ≥ 40% Marks.**

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S.Y. B. Tech Semester III

Computer Science and Engineering (Artificial Intelligence and Data Science)

0AIESC201 APPLIED MATHEMATICS

Course Details:

Course Code and Course Title	0AIESC201 – Applied Mathematics			
Semester:	III			
Prerequisites	0BSBS101 - Engineering Mathematics – I 0BSBS120 - Engineering Mathematics – II			
Teaching Scheme: - Lecture/Tutorial/Practical	Lecture	Tutorial	Practical	
	3	1	-	
Credit	04			
Evaluation Scheme	ISE 1	MSE	ISE 2	ESE
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		BL
CO1	**Apply** statistical techniques to analyse and interpret data for solving real-world problems.	3
CO2	**Evaluate** sets, functions, and relations using suitable mathematical operations for computational problem solving.	4
CO3	**Implement** graph and tree concepts using proper algorithms under given problem conditions.	3
CO4	**Solve** algebraic and numerical problems using appropriate methods with acceptable accuracy.	3
CO5	**Utilize** curve fitting, correlation, and regression techniques to develop predictive models for data analytics.	3

Course Content		
Unit No.	Contents	Hrs.
Unit 1	**Frequency Distribution and Measure of Central Tendency:** Frequency Distribution, Continuous frequency Distribution, Graphical Representation of a Frequency Distribution - Histogram, Frequency Polygon, Measure of Central Tendency – Mean, Median and Mode, Range, Quartile, Deviation, Mean Deviation and Standard Deviation	7
Unit 2	**Set Theory and Functions:** Basic notions in set Theory: Sets, Venn Diagrams, Subsets, The Size of a Set, Power Sets, Cartesian Products, Set Operations, Set Identities, Generalized Unions and Intersections, Cardinality of Sets. Functions: Introduction, Subjective, Injective, Bijective, Inverse Functions, Composition of Functions. Relations: Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Equivalence classes and partitions, Partial Ordering, Hasse Diagram, Topological Sort.	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 3	**Graph Theory:** **Graph:** Some Special Simple Graphs, Bipartite Graphs, New Graphs from Old, Shortest Path Problems, Euler and Hamiltonian Paths, Isomorphic Graphs, Planar Graphs, Connectivity, Matching Colouring. **Trees:** Prefix Codes, Huffman Coding, Spanning Trees and Cut Sets, Minimal Spanning Trees, Kruskal 's and Prim 's Algorithms for Minimal Spanning Trees.	6
Unit 4	**Numerical Methods:** Numerical Solution of Polynomial and Transcendental Equations by Bisection Method, Newton-Raphson Method and Regula-Falsi Method, Numerical Integration by Trapezoidal Rule and Simpson 's 1/3rd and 3/8 rules.	7
Unit 5	**Curve Fitting:** Introduction, Least Square Method, Fitting of Straight Line, Fitting of Second-Degree Parabolic Curves and Exponential Curve	6
Unit 6	**Correlation and Regression:** Introduction, Types of Correlation, Karl Pearson's Coefficient of Correlation, Interpretation of the Coefficient of Correlation, Lines of Regression, Fitting of Lines of regression	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt. Ltd.	11th	2025
2	Probability and Statistics for Engineers and Scientists	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye	Pearson Education	9th	2024
3	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers, New Delhi	44th	2023

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Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Numerical Methods for Engineers	Steven C. Chapra, Raymond P. Canale	McGraw-Hill Education	7th	2016
2	Higher Engineering Mathematics	B. V. Ramana	McGraw-Hill Education India	3rd	2015
3	Introduction to Probability	Sheldon M. Ross	Academic Press	11th	2014
4	Advanced Modern Engineering Mathematics	Glyn James, David Burley	Pearson Education	4th	2011
5	Linear Algebra	Serge Lang	Springer	3rd	1987

List of Tutorials:

Tutorial No.	Title
1	Examples on Frequency Distribution and Graphical Representation
2	Examples on Measures of Central Tendency and Dispersion
3	Examples on Set Theory and Set Operations
4	Examples on Functions and Relations
5	Examples on Equivalence Relations and Partial Ordering
6	Examples on Basic Graph Theory Concepts
7	Examples on Euler, Hamiltonian Graphs and Graph Colouring
8	Examples on Trees and Minimum Spanning Trees
9	Examples on Numerical Solution of Equations
10	Examples on Numerical Integration Techniques
11	Examples on Curve Fitting using Least Square Method
12	Examples on Correlation and Regression Analysis

*** Conduct minimum 10 tutorials.**

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0AIPCC202 FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

Course Details:

Course Code and Course Title	0AIPCC202 – Foundations of Artificial Intelligence			
Semester:	III			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	Lecture	Tutorial	Practical	
	3	-	-	
Credit	03			
Evaluation Scheme	ISE 1	MSE	ISE 2	ESE
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		BL
CO1	**Explain** the concepts of agents and environments using real-world examples to understand AI systems.	2
CO2	**Apply** uninformed search techniques on state-space models to solve problems.	3
CO3	**Utilize** heuristic search methods to obtain optimal solutions for problem solving task.	3
CO4	**Apply** propositional and predicate logic to represent knowledge and solve structured problems.	3
CO5	**Solve** constraint satisfaction problems using appropriate techniques for real-world applications.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Artificial Intelligence:** Introduction to Artificial Intelligence, Brief History of AI, Types of AI: ANI, AGI, ASI, Applications of AI -Healthcare, Chatbots, Recommendation systems	6
Unit 2	**Intelligent Agents:** Concept of agents and environments, Nature of environments (deterministic, stochastic, etc.), Types of agents -simple reflex agent, model-based agent, goal-based agent, Examples of agents, Concept of Rationality, Rational agents	7
Unit 3	**Problem Solving & Basic Search:** Problem-solving in AI, State space representation, Uninformed search, Breadth First Search, Depth First Search, Comparison of BFS and DFS, Time & Space Complexity of BFS, DFS, Concept of Depth Limited and Iterative Deepening Search	7
Unit 4	**Heuristic & Optimization Techniques:** Heuristic concept, Best-first search, A* algorithm, Hill Climbing and Local Maxima Problem, Introduction to Optimization: Introduction to Genetic Algorithm, Simulated Annealing, Fitness Function	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 5	**Knowledge Representation:** Need of knowledge representation, Types of Representation: Logical representation, Rule-based systems (IF–THEN rules), Forward and backward reasoning, introduction to expert systems.	6
Unit 6	**Constraint Satisfaction Problems**: Introduction to CSP -Variables, Domains, Constraints, Examples: N-Queens Problem, Map Coloring Problem, Solving CSP: Backtracking approach, Constraint propagation using forward checking, Applications of CSP	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence: A Modern Approach	Stuart Russell, Peter Norvig	Pearson	3rd	2010
2	Artificial Intelligence	Elaine Rich, Kevin Knight	McGraw-Hill	3rd	2009
3	Artificial Intelligence: A New Synthesis	Nils J. Nilsson	Morgan Kaufmann	1st	1998

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence: Foundations of Computational Agents	David L. Poole, Alan K. Mackworth	Cambridge University Press	2nd	2017
2	Artificial Intelligence	Deepak Khemani	Tata McGraw Hill	1st	2013
3	Artificial Intelligence Structures and Strategies for Complex Problem Solving	George F. Luger	Pearson	6th	2009

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0AIPCC203 DATA STRUCTURES

Course Details:

Course Code and Course Title	**0AIPCC203 – Data Structures**			
Semester:	III			
Prerequisites	0BSES115 Programming for Problem Solving in C			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Describe** data and data structure types with correct classification and examples.	3
CO2	**Demonstrate** linear and non-linear data structures through correct algorithm execution and logical flow.	3
CO3	**Apply** suitable sorting, searching algorithms to solve given problems	3
CO4	**Compare** linear and non-linear data structures with respect to their structure, operations, and applications.	4
CO5	**Implement** hash functions and collision resolution methods for key-value mapping.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Data Structures:** Introduction to Data and Data Structures, Primitive and Non-Primitive Data Structures Abstract Data Type (ADT), Algorithm design and analysis, Time and Space Complexity, Asymptotic Notations	5
Unit 2	**Arrays:** Concept of Sequential Organization, Array representation and operations, Sparse Matrices and their representation, Transpose of sparse matrices **Searching:** Linear/Sequential Searching and Binary Searching **Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge, Sort, Radix Sort **Skip Lists** – Dictionaries, Linear List Representation, Skip List Representation, Operations – Insertion, Deletion and Searching	7
Unit 3	**Linked Lists:** Dynamic Memory Management, Garbage collection, Introduction to Linked Lists, Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List, Operations on Linked Lists, Applications of Linked Lists	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Stacks and Queues:** Stack operations, Implementation of Stack using Arrays and Linked Lists, Recursion and its applications, Stack for expression evaluation and expression conversion Queue operations, Implementation of Queue using Arrays and Linked Lists and applications, Types of Queues and working- Circular Queue, Priority Queue and Deque, Applications of Queues	7
Unit 5	**Trees and Graphs:** Introduction to Trees and Binary Trees, Binary Search Tree (BST) operations, Tree Traversal techniques Heap and Heap Sort Introduction to Graphs, Representation of Graphs using Adjacency Matrix, Warshall's algorithm, Graph Traversal: BFS and DFS, Applications of Trees and Graphs	7
Unit 6	**Hash Tables:** Hash Tables, Direct Address Tables, Hash Tables, Hash Functions, Open Addressing, Perfect Hashing.	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Data structure using C	ISRD group	McGraw Hill	2nd	2017
2	Data structures	Seymour Lipschautz	McGraw Hill	6th	2017
3	Data structure & algorithm analysis in C	Mark Allen Weiss	Pearson Education (LPE)	2nd	2007
4	Data structure using C & C++	Langsam, Rubenstein, Tenenbaum	Pearson	2nd	1996

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Theory and Problems of Data Structures	Seymour Lipschutz	Schaum's Outline Series	2nd	2014
2	Data Structures Using C	Reema Thareja	Oxford University Press	2nd	2014
3	Data Structures through C	G.S. Baluja	Dhanpat Rai & Co. (Pvt) Ltd.	3rd	2009
4	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed	Universities Press	2nd	2007

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0AIPCC204 PROMPT ENGIENEERING

Course Details:

Course Code and Course Title	**0AIPCC204 – Prompt Engineering**			
Semester:	III			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	03			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Explain** clear, concise, and relevant prompts following the standard principles of prompt engineering	2
CO2	**Apply** generative AI techniques for real-world problem-solving.	3
CO3	**Apply** prompt engineering techniques to solve technical and programming tasks.	3
CO4	**Identify** ethical and responsible use of generative AI systems.	3
CO5	**Develop** simple AI-based applications using prompt design, APIs, and frameworks like LangChain.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Generative AI:** Introduction to Artificial Intelligence and Generative AI, Large Language Models (LLMs), Working of Transformer Models, Overview of AI Tools (ChatGPT, Claude, Gemini, Copilot), Applications of Generative AI in Engineering	7
Unit 2	**Fundamentals of Prompt Engineering:** Prompt Engineering Concepts, Prompt Structure and Components, Zero-shot Prompting, One-shot Prompting, Few-shot Prompting, Prompt Formatting and Clarity	7
Unit 3	**Advanced Prompting Techniques:** Chain-of-Thought Prompting, Role Prompting, Instruction Prompting, Step-by-step Reasoning Prompts, Prompt Templates and Reusable Prompts, Iterative Prompt Improvement	7
Unit 4	**Prompt Engineering for Engineering Applications:** Code Generation and Debugging using Prompts, Data Analysis Prompts, Research and Technical Writing Prompts, Image Generation Prompts, AI for Automation and Productivity	6

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 5	**Prompt Engineering with APIs and Tools:** Introduction to AI APIs, Prompt Design for Applications, Using Prompt Frameworks (LangChain basics), Integration with Python / Web apps, Building Simple AI-powered Tools	6
Unit 6	**Ethics, Security and Limitations:** AI Bias and Hallucination, Responsible AI Usage, Data Privacy and Prompt Security, Intellectual Property Issues, Future Trends in Generative AI	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Building AI Applications with OpenAI API	Martin Yanev	Packt Publishing	2nd	2024
2	Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs	James Phoenix & Mike Taylor	O'Reilly Media	1st	2024
3	The Art of Prompt Engineering with OpenAI APIs	Nathan Hunter	Shroff/Hunter	1st	2023
4	Prompt Engineering for Everyone	David Scott Bernstein	The Passionate Programmer	1st	2023

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Generative AI and Prompt Engineering	Rajesh Kumar	BPB Publications	1st	2024
2	The Quick Guide to Prompt Engineering: Generative AI Tips and Tricks for ChatGPT, Bard, DALL·E, and Midjourney	Ian Khan	John Wiley & Sons	1st	2024
3	AI Prompt Engineering for Developers	Andrew Ng	Deep Learning.AI	1st	2023
4	The Art of Prompt Engineering with ChatGPT: A Hands-On Guide	Nathan Hunter	Independently Published	1st	2023

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0AIMDM205MDM INTRODUCTION TO ARTIFICIAL INELLIGENCE

Course Details:

Course Code and Course Title	**0AIMDM205 – MDM (Introduction to Artificial Intelligence)**			
Semester:	III			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Understand** the basic concepts of Artificial Intelligence to build a strong foundation.	2
CO2	**Explain** working of AI system using intelligent agents and environments.	2
CO3	**Apply** search techniques on state-space models for solving basic problems.	3
CO4	**Employ** heuristic search methods to obtain optimal solutions for problem solving task.	3
CO5	**Demonstrate** the application of knowledge representation and constraint satisfaction methods in solving simple real-world problems.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Artificial Intelligence:** Definition and Goals of Artificial Intelligence, Characteristics of Intelligent Systems, Brief History and Evolution of AI, Types of AI, Brief Overview of AI Applications in Healthcare, Agriculture, Smart cities, Manufacturing, Working Idea of Chatbots, Recommendation Systems, Impact of AI on Society and Various Engineering Domains	6
Unit 2	**Intelligent Agents:** Concept of Agents and Environments, Structure of an Intelligent Agent, Types of Environments: Deterministic vs Stochastic, Static vs Dynamic, Fully Observable vs Partially Observable, Types of Agents: Simple Reflex Agents, Model-based Agents, Goal-based Agents, Concept of Rationality and Rational Agents, Real-world Examples of Intelligent Agents	7
Unit 3	**Problem Solving & Basic Search**: Problem-solving Approach in AI, State Space Representation, Uninformed Search Techniques: Breadth First Search (BFS), Depth First Search (DFS), Comparison of BFS and DFS, Basic Idea of Time and Space Complexity, Introduction to Depth Limited Search and Iterative Deepening Search	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Heuristic & Optimization Techniques**: Concept of Heuristic and Heuristic Functions, Best-first search: A* Search Algorithm concept, Hill Climbing Algorithm, Local Maxima Problem **Introduction to Optimization Techniques:** Genetic Algorithm, Simulated Annealing, Concept of fitness function	7
Unit 5	**Knowledge Representation & Reasoning:** Need for Knowledge Representation, Types of Knowledge Representation, Logical Representation (basic idea) Rule-based Systems (IF–THEN rules), Reasoning Techniques: Forward Chaining, Backward Chaining, Introduction to Expert Systems, Applications of Expert Systems	6
Unit 6	**Constraint Satisfaction Problems:** Concept of CSP, Components: Variables Domains, Constraints, Examples: Map Colouring Problem, N-Queens Problem Conceptual Understanding, Introduction to Backtracking	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence: A Modern Approach	Stuart Russell, Peter Norvig	Pearson	3rd	2010
2	Artificial Intelligence	Elaine Rich, Kevin Knight	McGraw-Hill	3rd	2009
3	Artificial Intelligence: A New Synthesis	Nils J. Nilsson	Morgan Kaufmann	1st	1998

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence	Deepak Khemani	Tata McGraw Hill	1st	2013
2	Artificial Intelligence	S. Kaushik	Cengage Learning India	1st	2011
3	Artificial Intelligence Structures and Strategies for Complex Problem Solving	George F. Luger	Pearson	6th	2009

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0AIVEC206 Universal Human Values

Course Details:

Course Code and Course Title	0AIVEC206 – Universal Human Values			
Semester:	III			
Prerequisites	Student Induction Program (SIP)			
Teaching Scheme: - Lecture/Tutorial/Practical	Lecture	Tutorial	Practical	
	2	-	-	
Credit	02			
Evaluation Scheme	ISE 1	MSE	ISE 2	ESE
	25 Marks	--	25 Marks	--

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		BL
CO1	**Develop** the ability to self-explore and verify value-based living through natural acceptance having right understanding and harmonious relationships as foundational to resolving personal, familial, and societal problems sustainably.	2
CO2	**Apply** the understanding of respect as right evaluation to address societal conflicts and contribute to value-based education.	3
CO3	**Recognize** the interconnectedness of natural orders and propose responsible human participation to ensure mutual fulfilment in existence.	3
CO4	**Apply** value-based understanding to their domain expertise to propose sustainable solutions for societal and ecological mutual fulfilment.	3

Course Content		
Unit No.	Contents	Hrs.
Unit 1	**Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations,	6
Unit 2	**Understanding Human being as the Co-existence of the Self and the Body** Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Lecture, Understanding Harmony in the Self, Harmony of the Self with the Body Lecture, Programme to ensure self-regulation and Health	6
Unit 3	**Harmony in the Family – the Basic Unit of Human Interaction** 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in Society, Vision for the Universal Human Order	6

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Understanding Harmony in the Nature** Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.	6
	Total Hrs.	**24**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	A Foundation Course in Human Values and Professional Ethics-Teachers Manual	R. R. Gaur, R Sangal, G P Bagaria	Excel Books	2nd	2022
2	A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R. Sangal, G. P. Bagaria	Excel Books,	2nd	2010
3	Human Values	A. N. Tripathi	New Age International	3rd	2004

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	The Story of Stuff	Annie Leonard	Free Press	1st	2010
2	Slow is Beautiful	Cecile Andrews	New Society	2nd	2009
3	Jeevan Vidya: Ek Parichaya	A. Nagaraj	Jeevan Vidya Prakashan,Amarkantak	1st	1999
4	Small is Beautiful	E. F Schumacher	Harper Collins/Penguin	New	1993
5	The Story of My Experiments with Truth	Mohandas Karamchand Gandhi	Navjivan Publishing House	1st	1948

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Computer Science & Engineering (AIDS) EN 6269

Dr. K. K. Pandyaji
Dean Academics

Dr. S. S. Mohite
Director
(0th Revision)

0AIHSSM207 PRINCIPLES OF MANAGEMENT

Course Details:

Course Code and Course Title	**0AIHSSM207 – Principles of Management**			
Semester:	III			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credit	**02**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25 Marks	--	25 Marks	--

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Develop** analytical and managerial abilities for solving organizational and workplace problems using management concepts and theories.	3
CO2	**Identify** and classify different types of plans such as policies, procedures, rules, programs, budgets, and strategies used in organizations..	3
CO3	**Describe** different types of organizational structures and evaluate their suitability in various business environments.	3
CO4	**Identify** and compare different leadership styles and major leadership theories used in management practices.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Management:** Definition, nature, scope, and importance of management, Functions of management, Levels of management, Managerial roles and skills, Evolution of management thought ,Scientific Management – F.W. Taylor, Administrative Theory – Henri Fayol, Bureaucratic Theory – Max Weber, Human Relations Approach – Elton Mayo ,Management as science, art, and profession.	**7**
Unit 2	**Planning and Decision Making :** Nature and importance of planning. Types of plans, Planning process, Strategic planning, Forecasting techniques, Decision-making process, Types of decisions, Decision-making models, Problem-solving techniques, Management by Objectives (MBO).	**5**
Unit 3	**Organizing and Staffing:** Principles of organization, Organizational structure, Departmentation, Delegation and decentralization, Authority and responsibility, Span of control, Line and staff organization, Staffing process, Recruitment and selection, Training and development, Performance appraisal.	**5**

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Leadership, Motivation, and Communication:** Nature and importance of leadership, Leadership styles and theories, Motivation concepts, Maslow's Need Hierarchy Theory, Herzberg's Two-Factor Theory, McGregor's Theory X and Theory Y, Communication process, Types and barriers of communication, Team dynamics and conflict management, Emotional intelligence.	7
	Total Hrs.	**24**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Essentials of Management	Koontz, H. and Weihrich, H	McGraw Hill	12th	2023
2	Management	Robbins, S.P. and Coulter, M.	Pearson	16th Global	2024
3	Principles of Management	Gupta, C.B.	Sultan Chand & Sons	18th Revised	2023
4	Principles and Practice of Management	Prasad, L.M.	Sultan Chand & Sons	10th	2020
5	Principles of Management	Tripathi, P.C. and Reddy, P.N.	McGraw Hill	6th	2017

Reference Book:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	The Practice of Management	Peter Drucker	Harper Business	Classic/ Reissue	2006
2	Organizational Behaviour	Fred Luthans	McGraw Hill	14th	2021
3	Management	Stoner, Freeman & Gilbert	Pearson / Prentice Hall	6th	2018
4	Organizational Behaviour	Stephen Robbins	Pearson	19th Global	2023

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0AIPCC208 Artificial Intelligence Laboratory

Course Description:

The Artificial Intelligence Laboratory is designed to provide hands-on experience in implementing fundamental AI concepts and techniques. It focuses on problem-solving using search algorithms, knowledge representation, machine learning basics, and intelligent system development. Through practical experiments, students gain the ability to model, analyze, and develop AI-based solutions for real-world applications.

Course Code and Course Title	**0AIPCC208 - Artificial Intelligence Laboratory**			
Semester	III			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25 marks	--	25 marks	50 marks

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** state-space representation and uninformed search techniques to solve basic AI problems.	3
CO2	**Implement** informed search strategies to obtain efficient for problem-solving tasks.	3
CO3	**Apply** constraint satisfaction and knowledge representation techniques to solve structured real-world problems using appropriate AI methods.	3
CO4	**Communicate** effectively in technical and non-technical environments.	3
CO5	**Accept** professional and ethical responsibility of engineering technology profession.	2

Course Contents

Expt. No.	**List of Experiment**
1	Explore Python for AI Development using Jupyter Notebook and essential libraries.
2	Model problem solving using State Space Representation.
3	Design and implement Depth First Search (DFS).
4	Design and implement Breadth First Search (BFS).
5	Demonstrate Greedy Strategy for problem solving.
6	Implement Greedy Best First Search Algorithm.
7	Implement A* Search Algorithm.
8	Develop a solution for the 8-Puzzle Problem.
9	Solve Map Coloring Problem using CSP.

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Expt. No.	List of Experiment
10	Solve N-Queens Problem using Backtracking.
11	Apply Propositional Logic for Knowledge Representation.
12	Analyze Travelling Salesman Problem (TSP) using Brute Force Approach.
13	Solve Tower of Hanoi Problem using Recursion and analyze its complexity.
14	Implement Heuristic approach for TSP.
15	Mini Project: Develop a Simple AI Application(Group activity)

*** Conduct minimum 10 to 12 experiments.**

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0AIPCC209 Data Structure Laboratory

Course Description:

The **Data Structures Laboratory** is designed to provide hands-on experience in implementing and analysing fundamental data structures and algorithms. This lab complements the theoretical concepts of data structures by enabling students to develop practical skills in designing, coding, and testing efficient solutions to computational problems.

Students will implement various linear and non-linear data structures such as arrays, linked lists, stacks, queues, trees, and graphs, along with algorithms for searching, sorting, and hashing. The laboratory emphasizes problem-solving, algorithmic thinking, and optimization techniques, including time and space complexity considerations. Overall, the laboratory aims to bridge the gap between theory and practice, preparing students to design efficient and scalable solutions in computing applications.

Course Code and Course Title	**0AIPCC209 - Data Structures Laboratory**			
Semester	III			
Prerequisites	0BSES115 Programming for Problem Solving in C			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25	--	25	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Develop** linear and non-linear data structures using appropriate programming techniques.	3
CO2	**Apply** searching, sorting algorithms for problem solving.	3
CO3	**Implement** stack and queue applications using suitable algorithms.	3
CO4	**Demonstrate** collision handling using chaining and probing techniques.	3
CO5	**Communicate** effectively in technical and non-technical environments.	3
CO6	**Accept** professional and ethical responsibility of engineering technology profession.	2

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Course Contents

Expt. No.	List of Experiment
1	Implement Array and Array operations.
2	Represent Sparse Matrices and perform Transpose operations.
3	Implement Linear Search and Binary Search and compare performance.
4	Implement Bubble and Selection Sort algorithms.
5	Implement Insertion, Quick and Merge sort algorithms
6	Implement Single linked list and perform insertion, deletion and traversal in Singly Linked Lists.
7	Implement Doubly linked list and perform insertion and deletion operation on it.
8	Implement stack using Array and Linked List; Perform Push and Pop operations.
9	Implement queue using Array and Linked List; Perform enqueue and dequeue operations
10	Implement Circular Queue and Demonstrate its advantages over linear queue.
11	Solve problems such as Factorial, Fibonacci etc. using recursion.
12	Implement Infix to Postfix conversion and evaluate Postfix Expressions using Stack..
13	Create a Binary Search Tree (BST) and perform insertion, deletion and traversing operations.
14	Represent Graph using Adjacency Matrix/List and perform BFS and DFS.
15	Implement Hash Tables with Collision Resolution Methods (Linear Probing, Chaining).

*** Conduct minimum 10 to 12 experiments.**

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0AIPCC210 PYTHON PROGRAMMING LABORATORY

Course Description:

The Python Programming Laboratory is designed to provide hands-on experience in developing programs using Python for problem-solving and application development. It emphasizes core programming concepts such as data types, control structures, functions, and modules, along with practical exposure to file handling and basic libraries. Through structured experiments, students develop logical thinking and coding skills to build efficient and scalable solutions for real-world applications.

Course Code and Course Title	**0AICEP210 - Python Programming Laboratory**			
Semester	III			
Prerequisites	0BSES115 Programming for Problem Solving in C			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25 marks	--	25 marks	--

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Utilize** Python fundamentals using syntax, variables, data types, operators, and input/output operations for developing basic programs correctly.	2
CO2	**Develop** Python programs using decision-making statements, loops, strings, and collection data types for problem solving with logical accuracy.	3
CO3	**Apply** functions, recursion, modules, file handling, and exception handling to create reliable Python applications efficiently.	3
CO4	**Implement** object-oriented concepts, regular expressions, NumPy and Matplotlib libraries for Python application development and data visualization effectively.	3
CO5	**Communicate** effectively in technical and non-technical environments.	3
CO6	**Accept** professional and ethical responsibility of engineering technology profession.	2

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Course Contents

Expt. No.	List of Experiment
1	**Introduction to Python Programming** Installation, Python IDEs, basic syntax, variables, data types, input/output operations.
2	**Operators and Expressions** Arithmetic, relational, logical, bitwise, assignment, and membership operators.
3	**Decision Making and Control Statements** Programs using if, if-else, nested if, and elif statements.
4	**Looping Statements** Programs using for loop, while loop, nested loops, and pattern generation.
5	**Strings and String Operations** String manipulation, slicing, built-in string functions, and pattern matching.
6	**Lists, Tuples, Sets, and Dictionaries** Creation, manipulation, and applications of Python collection data types.
7	**Functions and Recursion** User-defined functions, lambda functions, recursion, and scope of variables.
8	**Modules and Packages** Creating and importing modules, use of standard Python libraries and packages.
9	**File Handling in Python** Reading, writing, appending, and processing text and CSV files.
10	**Exception Handling** Programs using try, except, finally, custom exceptions, and error handling.
11	**Object-Oriented Programming Concepts** Classes, objects, constructors, inheritance, polymorphism, and encapsulation.
12	**Regular Expressions** Pattern matching and text processing using the re module.
13	**Python for Numerical Computing** Array operations and mathematical computations using NumPy.
14	**Data Visualization using Python** Plotting graphs and charts using Matplotlib.
15	**Mini Project / Case Study Application** Development of a small real-world application integrating Python programming concepts.

*** Conduct minimum 10 to 12 experiments and mini project/case study.**

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Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, BUDHGAON, SANGLI. 416304

An Autonomous Institute, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

Department of Computer Science and Engineering (Artificial Intelligence and Data Science)

Curriculum Structure and Evaluation Scheme

S.Y. B. Tech Semester IV
Computer Science and Engineering (Artificial Intelligence and Data Science)
Academic Year 2026-2027 Onwards

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0AIPCC251	Data Analytics	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC252	Operating Systems	3	1	0	4	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC253	Database Management Systems	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIPCC254	Software Engineering	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIMDM255	MDM -II	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0AIOE256	Open Elective -I	2	0	0	2	ISE	50	20*	-	-	50
0AIAEC257	Soft Skills	0	0	2	1	ISE	-	-	25	10*	25
0AIVEC258	Environmental Studies	2	0	0	2	ISE	50	20*	-	-	50
0AIVSEC259	UI/UX Laboratory	0	0	2	1	ISE	-	-	25	10*	25
0AIPCC260	Data Analytics Laboratory	0	0	2	1	ISE	-	-	50	20*	50
						ESE	-	-	50	20*	50
0AIPCC261	Database Management Systems Laboratory	0	0	2	1	ISE	-	-	50	20*	50
						ESE	-	-	50	20*	50
TOTAL		**19**	**1**	**8**	**24**	**TOTAL MARKS**					**850**
Total Contact Hours Per Week		**28**									

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Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	-	15	-	3	2	1	1	-	-	2	-	-	-	-	-	24
Cumulative	16	19	27	-	6	2	4	4	2	2	4	-	-	-	-	1	87

Multidisciplinary Minor Bucket offered by CSE (AIDS)

MDM-II (SEM – IV)	0AIMDM255	Prompt Engineering

Open Elective-I offered by CSE (AIDS)

OE-I (SEM- IV)	0AIOE256	Prompt Engineering

***Passing Criteria: - ISE + MSE + ESE ≥ 40% Marks and ESE has separate passing ≥ 40% Marks.**

List Open Elective for Semester-IV

Sr. No.	Department offering Open Elective to other Departments	Course Code	Course Title
1	Artificial Intelligence and Data Science	0AIOE256	Prompt Engineering
2	Civil Engineering	0CVOE256	Disaster Management
3	Chemical Engineering	0CHOE256	Biofuels
4	Computer Science and Engineering	0CSOE256	Information Security
5	Electrical and Computer Engineering	0ECEOE256	Sustainable Power Generation
6	Electronics and Computer Science	0ECSOE256	Intellectual Property Rights
7	Electronics and Telecommunication	0ETOE256	Digital Marketing
8	Instrumentation and Control Engineering	0ICOE256	Industrial Economics
9	Mechanical Engineering	0MEOE256	Industrial Safety

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S.Y. B. Tech Semester IV

Computer Science and Engineering (Artificial Intelligence and Data Science)

0AIPCC251 DATA ANALYTICS

Course Details:

Course Code and Course Title	**0AIPCC251 – Data Analytics**			
Semester:	IV			
Prerequisites	0BSBS101 - Engineering Mathematics – I 0BSBS120 - Engineering Mathematics – II 0AIESC201 – Applied Mathematics			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Apply** probability concepts to solve problems using proper theorems.	3
CO2	**Formulate** statistical models using probability distributions, random variables, and descriptive statistics for data interpretation and analysis.	4
CO3	**Apply** sampling techniques and estimation methods to perform statistical analysis of data.	3
CO4	**Perform** statistical inference by constructing confidence intervals and conducting hypothesis testing on real-world data.	3
CO5	**Analyse** non-parametric tests to draw meaningful conclusions from data.	4

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Foundations of Probability & Statistics:** Classical, Empirical, Axiomatic Probability, Addition & Multiplication Theorems, Bayes' Theorem, Sampling, Bias, Population v/s Sample	6
Unit 2	**Random Variables & Descriptive Statistics:** Random Variables (discrete & continuous), PMF & PDF, Expectation & Variance, Measures of Central Tendency & Dispersion, Exploratory Data Analysis (EDA), Box Plot, Histogram, Scatter Plot, Correlation Heatmaps	7
Unit 3	**Probability Distributions & Data Transformation:** Normal Distribution, Binomial Distribution, Poisson Distribution, Relationships between Distributions, Data Transformation (Standardization, Normalization, Log, Box-Cox, Normalization)	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Sampling Techniques & Estimation:** Sampling Techniques (Random, Stratified, Systematic), Sampling Errors and Bias, Sampling Distributions, Standard Error (mean and proportion), Point and Interval Estimation (basic idea), Introduction to Central Limit Theorem and its Applications	6
Unit 5	**Data Science, Statistical Inference:** Role of Statistics in Data Science, Facets of Data, Data Science Process, Data Error Minimization Confidence Intervals, Hypothesis Testing, Type I & Type II Errors, Z-test, T-test, Chi-square Test & Goodness of Fit	7
Unit 6	**ANOVA, Non-Parametric Tests & Data Analytics Concepts:** Analysis of Variance (ANOVA), F-test, Chi-square test, non-parametric tests: Mann-Whitney, Kruskal-Wallis, Contingency Tables, Data Cleaning, Missing Values, Preprocessing	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Statistical Analysis Handbook: A Comprehensive Guide to Statistical Concepts, Methods and Tools	Dr. Michael J de Smith	The Winchelsea Press	1st	2018
2	Probability, Random Variables and Random Signal Principles	Peyttn Z. Peebles	McGraw-Hill Education	4th	2016
3	Fundamentals of Statistics	S. C. Gupta	Himalaya Publishing House	7th	2016
4	Probability, Random Variables and Stochastic Processes	Athanasios Papoulis	Tata McGraw-Hill	4th	2002

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Probability & Statistics For Engineers & Scientists	Ronald Walpole, Raymond Myers; Sharon Myers; Keying Ye	Prentice Hall	9th	2024
2	Fundamentals of Statistics	S. C. Gupta	Himalaya	8th	2024

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Sr. No.	Title	Author	Publisher	Edition	Year of Edition
3	Applied Statistics and Probability for Engineers	Douglas C. Montgomery, George C. Runger	Wiley	6th	2013
4	Probability and Random Processes	G. V. Kumbhojkar	C. Jamnadas and Co.	14th	2010
5	Schaum's Outline of Probability and Statistics	Seymour Lipschutz, John J. Schiller	McGraw-Hill Education	3rd	2010
6	Probability, Statistics with Reliability, Queuing and Computer Science Applications	Kishor S. Trivedi	Wiley India Pvt. Ltd	2nd	2001

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0AIPCC252 OPERATING SYSTEMS

Course Details:

Course Code and Course Title	**0AIPCC252 Operating Systems**			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	1	-	
Credit	**04**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Describe** operating system structure and functions using relevant concepts and components for computing environments.	2
CO2	**Apply** process management techniques with scheduling algorithms and synchronization methods for efficient execution of processes.	3
CO3	**Implement** deadlock handling strategies using resource allocation and recovery mechanisms for maintaining safe system states.	3
CO4	**Apply** paging, segmentation, and virtual memory techniques with memory allocation mechanisms for effective memory utilization.	3
CO5	**Use** file and I/O management methods through file organization and disk scheduling techniques for enhanced system performance.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction and Operating System Structures:** Definition Generations, Types of Operating System, Real-Time Operating Systems **Operating System Components:** System Services, Systems Calls, System Programs, System Structure: Layered, Monolithic, **Kernel-**Types of kernels, Virtual Machines,	5
Unit 2	**Process Management:** **Processes**: Process Concept, Process States, Process State transitions, Process Control Block, Inter-process Communication, Cooperating Processes, Context Switching, Threads – Concept of Multithreads, Benefits of Threads, Types of Threads **Process Scheduling:** Definition, Scheduling objectives, Types of Schedulers, Scheduling Criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only), Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS – SJF – RR, Multiprocessor Scheduling Types, Performance Evaluation of the Scheduling Algorithms	8

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 3	**Process Synchronization:** Race Conditions, Critical Section Problem, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.	7
Unit 4	**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection and Recovery.	5
Unit 5	**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, Segmentation. **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 (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	7
Unit 6	**I/O Management and File Management:** Principles of I/O Hardware: I/O Devices, Device Controllers, Direct Memory Access Principles of I/O Software: Goals of Interrupt Handlers, Device Drivers, Device Independent I/O software, Secondary-Storage Structure: Disk structure, Disk Scheduling Algorithm **File Management:** File Concept, Access Methods, File Types, File Operation, Directory and Disk Structure, File System Structure, File System Implementation, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), Directory Implementation (linear list, hash table), Efficiency and Performance.	7
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Modern Operating System	Andrew S. Tanenbaum	PHI	4th	2015
2	Understanding Operating System	Flynn(Thomson)	Ann McHoes & Ida M	6th	2014
3	Operating System Concepts	Abraham Silberschatz, Peter B. Galvin and Greg Gagne	Wiley	8th	2009
4	Operating Systems-A concept-based approach	Dhanjay M. Dhamdhere	Tata McGraw Hill	3rd	2007

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Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Operating System in Depth: Design and Programming	Thomas W. Doeppner	Wiley	--	2011
2	Operating Systems Concepts	Garry Nutt	Pearson	3rd	2003
3	Systems Programming and Operating Systems	D. M. Dhamdhere	McGraw-Hill	2nd	1996
4	An Introduction to Operating Systems	Harvey M. Deitel	Addison Wesley	2nd	1990

List of Tutorials:

Tutorial No.	Title
1	Introduction to Operating Systems and Types of OS
2	Operating System Structures and Kernel Architecture
3	Process Management and Process State Transitions
4	CPU Scheduling Algorithms: FCFS, SJF, and Round Robin
5	Threads and Multithreading Concepts
6	Process Synchronization and Critical Section Problems
7	Semaphores, Monitors, and Classical Synchronization Problems
8	Deadlocks: Prevention, Avoidance, and Banker's Algorithm
9	Memory Management and Address Translation Techniques
10	Paging, Segmentation, and Virtual Memory Management
11	Page Replacement Algorithms and Performance Analysis
12	I/O Management, Disk Scheduling, and File System Implementation

*** Conduct minimum 10 tutorials.**

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0AIPCC253 DATABASE MANAGEMENT SYSTEMS

Course Details:

Course Code and Course Title	0AIPCC253 – Database Management Systems			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	Lecture	Tutorial	Practical	
	3	-	-	
Credit	03			
Evaluation Scheme	ISE 1	MSE	ISE 2	ESE
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		BL
CO1	**Understand** database concepts, architecture, and types of DBMS.	2
CO2	**Build** ER model for the given problem and apply SQL for data creation and manipulation.	3
CO3	**Demonstrate** use of normalization techniques for reducing redundancy and eliminating anomalies in database schemas.	3
CO4	**Apply** NoSQL database concepts and perform basic operations for searching data.	3
CO5	**Implement** concepts of advanced database models for managing and analysing connected and scalable data systems.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Databases:** Introduction to Data and Databases, Need and Significance of DBMS, Types of DBMS: Relational and Non-Relational, Data Independence, Three-Level Architecture: External, Conceptual, Internal, DBMS System Structure. Client-Server Architecture, Instance and Schema	7
Unit 2	**Relational Database Management System (RDBMS):** Data Models and Types, ER Model and ER-to-Relational Mapping, Structure of Relational Databases, SQL Basics: DDL, DML, DCL, TCL, Constraints and Keys, Introduction to Joins and Nested Queries, Views, Procedures, Trigger	7
Unit 3	**Database Design and Normalization:** Functional Dependencies. Anomalies in Databases, Normalization: 1NF, 2NF, 3NF, BCNF, Lossless Join and Dependency Preservation, Design of Efficient Database Schemas	7
Unit 4	**NoSQL Databases:** Introduction to NoSQL, Limitations of RDBMS, CAP Theorem, Types of NoSQL Databases: Key-Value, Document, Columnar, Graph, Key-Value Databases: Properties and Use Cases, Basic CRUD using Redis	6

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 5	**Columnar and Document Databases:** Columnar Databases: Concepts and Characteristics, Apache Cassandra Architecture and Use Cases, Basic Implementation, Document Databases: Concepts and Structure, MongoDB: CRUD Operations, Data Modelling Basics	6
Unit 6	**Graph and Advanced Databases:** Graph Databases: Graph Models, Traversal, Applications, Data Structures: Edge List, Adjacency Matrix, Neo4j: Basic CRUD Operations, Advanced Databases: Introduction to PostgreSQL, Concepts of Scalable, Reliable, Maintainable Systems, Overview of Modern Data Platforms (brief introduction to distributed databases)	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudarshan	McGraw-Hill Education	7th	2019
2	Fundamentals of Database Systems	Ramez Elmasri, Shamkant B. Navathe	Pearson Education	7th	2016
3	MongoDB The Definitive Guide	Kristina Chodorow, Michael Dirolf	O'Reilly Media	2nd	2013
4	NoSQL Distilled A Brief Guide to the Emerging World of Polyglot Persistence	Pramod J. Sadalage, Martin Fowler	Addison-Wesley Professional	1st	2012
5	Database Management Systems	Raghu Ramakrishnan, Johannes Gehrke	McGraw-Hill Education	3rd	2003

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Database Systems Design Implementation and Management	Carlos Coronel, Steven Morris	Cengage Learning	14th	2019
2	Learning Neo4j	Rik Van Bruggen	Packt Publishing	1st	2014
3	An Introduction to Database Systems	C. J. Date, A. Kannan, S. Swamynathan	Pearson Education	8th	2006

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0AIPCC254 SOFTWARE ENGINEERING

Course Details:

Course Code and Course Title	**0AIPCC254 – Software Engineering**			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Describe** software engineering principles, development challenges, and process models for software projects.	2
CO2	**Apply** appropriate software development models and Agile methodologies for effective project execution and management.	3
CO3	**Explain** software requirements, use cases, and validation techniques used in developing SRS documents.	2
CO4	**Apply** software testing principles to design test cases using various techniques at different testing levels.	2
CO5	**Compare** testing strategies, test management practices, and describe automation tools to ensure software quality and reliability.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Software Engineering** The Software Problem: Software Is Expensive, Late, Costly, and Unreliable, Problem of Change and Rework. Software Engineering Problem: The Problem of Scale, Cost, Schedule, and Quality, The Problem of Consistency. The Software Engineering Approach: Phased Development Process, Project Management and Metrics	7
Unit 2	**Software Process Models** Waterfall model, V model, Evolutionary, Prototyping, Spiral Model, Agile Software Development, Agile Methodologies, Agile Model: Principle Techniques, Extreme Programming (XP): planning, design, coding, XP practices, Scrum: framework, Sprint: product backlog, sprint backlog, burn down charts, case study on Agile Model	6
Unit 3	**Software Requirements, Analysis and Specification** Software requirements, Problem Analysis, Requirement Specification, Functional Specification with Use Cases, Validation, Metrics, Distributed Software Engineering	6

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Introduction to Testing and Testing Strategies** Basics of Software testing: Definition, Error, Fault, Failure, Levels of Testing: Unit Testing, Integration Testing, System Testing, Regression Testing, V life cycle model, Test plans and design of test cases, Testing strategies: Black box testing and White box testing, Non-Functional Testing: Performance Testing (Load testing, Stress Testing, Scalability testing, Stability), Usability Testing, Compatibility Testing	8
Unit 5	**Test Planning and Management** People and Organizational Issues in Testing, Organization Structures for Testing Teams, Testing Services, Test Planning, Test Management, Test Process, Test Reporting	6
Unit 6	**Test Automation** Software Test Automation, Skills Needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation. Automation Testing Tools: Selenium, Cucumber, Zephyr, Silk test etc	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	An Integrated Approach to Software Engineering	Pankaj Jalote	Narosa Publishers	3rd	2011
2	Fundamentals of Software Engineering	Rajib Mall	PHI	3rd	2009
3	Software Testing – Principles and Practices	Srinivasan Desikan and Gopalaswamy Ramesh	Pearson Education	1st	2006
4	Software Testing	Ron Patton	Sams Publishing, Pearson Edu.	2nd	2007

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Software Engineering	Ian Sommerville	Pearson	10th	2016
2	Software Engineering: Practitioner's Approach	Roger S. Pressman	McGrow Hill	7th	2010
3	Foundations of Software Testing _ Fundamental Algorithms and Techniques	Aditya P. Mathur	Pearson Education	1st	2008
4	Practical Software Testing	Ilene Burnstein	Springer	1st	2003

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0AIMDM255 MDM PROMPT ENGIENEERING

Course Details:

Course Code and Course Title	**0AIMDM255 – MDM (Prompt Engineering)**			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	3	-	-	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10 Marks	20 Marks	10 Marks	60 Marks

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Explain** the fundamentals of generative AI and large language models for given AI applications with correct interpretation of key concepts.	2
CO2	**Explain** prompt engineering concepts, prompting techniques, and prompt components for given AI tasks with correct interpretation of their usage.	2
CO3	**Apply** prompt engineering techniques to solve technical and programming tasks.	3
CO4	**Apply** AI tools for engineering applications and AI-powered solutions in given problem scenarios with effective prompt design and tool integration.	3
CO5	**Employ** ethical and secure AI practices for generative AI applications considering bias, privacy, and intellectual property.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Generative AI:** Introduction to Artificial Intelligence and Generative AI, Large Language Models (LLMs), Working of Transformer Models, Overview of AI tools (ChatGPT, Claude, Gemini, Copilot), Applications of Generative AI in Engineering	7
Unit 2	**Fundamentals of Prompt Engineering:** Introduction of Prompt Engineering, Prompt Structure and Components, Zero-shot Prompting, One-shot Prompting, Few-shot Prompting, Prompt Formatting and Clarity	7
Unit 3	**Advanced Prompting Techniques:** Chain-of-Thought prompting, Role Prompting, Instruction Prompting, Step-by-step Reasoning Prompts, Prompt Templates and Reusable Prompts, Iterative Prompt Improvement	7

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**Prompt Engineering for Engineering Applications:** Code Generation and Debugging using Prompts, Data Analysis Prompts, Research and Technical Writing Prompts, Image Generation Prompts, AI for Automation and Productivity	6
Unit 5	**Prompt Engineering with APIs and Tools:** Introduction to AI APIs, Prompt Design for Applications, Using Prompt Frameworks (LangChain basics), Integration with Python / Web apps, Building Simple AI-powered Tools	6
Unit 6	**Ethics, Security and Limitations:** AI Bias and Hallucination, Responsible AI Usage, Data Privacy and Prompt Security, Intellectual Property Issues, Future Trends in Generative AI	6
	Total Hrs.	**39**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Building AI Applications with OpenAI API	Martin Yanev	Packt Publishing	2nd	2024
2	Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs	James Phoenix & Mike Taylor	O'Reilly Media	1st	2024
3	The Art of Prompt Engineering with OpenAI APIs	Nathan Hunter.	Shroff/Hunter	1st	2023
4	Prompt Engineering for Everyone	David Scott Bernstein	The Passionate Programmer	1st	2023

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Generative AI and Prompt Engineering	Rajesh Kumar	BPB Publications	1st	2024
2	Hands-On Large Language Models	Jay Alammar & Maarten Grootendorst	O'Reilly Media	1st	2024
3	The Quick Guide to Prompt Engineering: Generative AI Tips and Tricks for ChatGPT, Bard, DALL·E, and Midjourney	Ian Khan	John Wiley & Sons	1st	2024
4	AI Prompt Engineering for Developers	Andrew Ng	DeepLearning.AI	1st	2023

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0AIOE256 - OE – I PROMPT ENGINEERING

Course Details:

Course Code and Course Title	0AIOE256 – OE – I (Prompt Engineering)			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	Lecture	Tutorial	Practical	
	2	-	-	
Credit	02			
Evaluation Scheme	ISE 1	MSE	ISE 2	ESE
	25 Marks	-	25 Marks	-

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		BL
CO1	**Explain** the fundamentals of generative AI and large language models.	2
CO2	**Design** structured prompts for different AI applications.	3
CO3	**Apply** prompt engineering techniques to solve technical and programming tasks.	3
CO4	**Evaluate** AI responses and improve results using iterative prompting.	3
CO5	**Develop** AI-assisted applications using prompt engineering tools and APIs.	3

Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Generative AI and Prompt Engineering:** Introduction to Artificial Intelligence and Generative AI, Overview of Large Language Models (LLMs) and Transformer Models, Applications of Generative AI in Engineering and Industry, Overview of AI tools: ChatGPT, Claude, Gemini, GitHub Copilot, Fundamentals of Prompt Engineering, Prompt structure, formatting, and clarity, Zero-shot, One-shot, and Few-shot prompting	6
Unit 2	**Advanced Prompting Techniques:** Chain-of-Thought Prompting, Role-based and Instruction-based Prompting, Step-by-step Reasoning Prompts, Prompt Templates and Reusable Prompts, Iterative Prompt, Improvement Techniques, Best Practices for Effective Prompting	6
Unit 3	**Prompt Engineering Applications:** Prompting for Code Generation and Debugging, Data Analysis and Visualization Prompts, Research Assistance and Technical Writing Prompts, Image Generation Prompts and Creative AI Applications, AI for Productivity and Automation, Basics of Integrating Prompts with Python and Web Applications	6

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Course Content		
Unit No.	**Contents**	**Hrs.**
Unit 4	**AI Tools, Ethics, and Future Trends:** Introduction to AI APIs and Prompt-based Applications, Basics of Prompt Frameworks and Workflow Automation, Responsible and Ethical Use of Generative AI, AI Bias, Hallucination, and Limitations of LLMs, Data Privacy, Prompt Security and Intellectual Property Issues, Future Trends and Emerging Applications of Generative AI	6
	Total Hrs.	**24**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Building AI Applications with OpenAI API	Martin Yanev	Packt Publishing	2nd	2024
2	Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs	James Phoenix & Mike Taylor	O'Reilly Media	1st	2024
3	The Art of Prompt Engineering with OpenAI APIs	Nathan Hunter.	Shroff/Hunter	1st	2023
4	Prompt Engineering for Everyone	David Scott Bernstein	The Passionate Programmer	1st	2023

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Generative AI and Prompt Engineering	Rajesh Kumar	BPB Publications	1st	2024
2	Hands-On Large Language Models	Jay Alammar & Maarten Grootendorst	O'Reilly Media	1st	2024
3	The Quick Guide to Prompt Engineering: Generative AI Tips and Tricks for ChatGPT, Bard, DALL·E, and Midjourney	Ian Khan	John Wiley & Sons	1st	2024
4	AI Prompt Engineering for Developers	Andrew Ng	DeepLearning.AI	1st	2023

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0AIAEC257 SOFT SKILLS

Course Description:

In today's data-driven and technology-oriented world, technical expertise alone is not sufficient for professional success. Engineers, especially in the domain of Artificial Intelligence and Data Science, must possess strong communication, interpersonal, and professional skills to effectively collaborate, present ideas, and adapt to dynamic work environments.

This course is designed to bridge the gap between technical knowledge and professional expectations by focusing on essential soft skills such as communication, teamwork, leadership, problem-solving, and workplace etiquette. Through practical activities, role-plays, group discussions, and presentations, students will develop confidence and readiness for academic, professional, and social interactions.

The course emphasizes experiential learning to enhance employability and prepare students for internships, interviews, and future career opportunities.

Course Code and Course Title	0AIAEC257 Soft Skills			
Semester	IV			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	--	25

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Communicate** effectively in verbal and written forms in professional settings.	3
CO2	**Exhibit** teamwork, leadership and interpersonal skills during collaborative activities.	3
CO3	**Participate** confidently in group discussions and deliver effective presentations.	3
CO4	**Apply** professional skills for resume building, interviews, time management and workplace etiquette.	3
CO5	**Accept** professional and ethical responsibility of engineering technology profession.	3

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Course Contents

Expt. No.	List of Experiment
1	Self-Introduction & Ice-Breaking • Students present a structured self-introduction • Focus: confidence, clarity, body language
2	Verbal Communication Skills • Activities on tone, pitch, and articulation • Practice structured speaking
3	Non-Verbal Communication • Body language, gestures, posture, eye contact, Role-play exercises
4	Active Listening Skills • Listening exercises and response-based tasks • Note-taking practice
5	Resume Writing • Drafting a professional resume for AI & DS students • Peer review and improvement
6	Email Writing & Professional Communication • Writing formal emails (job application, queries) • Common mistakes and etiquette
7	Group Discussion (GD) Practice – I • Basic GD techniques and rules • Practice on general topics
8	Group Discussion (GD) Practice – II • Advanced GD with evaluation • Analytical and technical topics
9	Presentation Skills – I • Basics of presentation design (PPT structure) • Deliver short presentations
10	Presentation Skills – II • Advanced delivery techniques • Use of visual aids and storytelling
11	Team Building Activity • Group tasks and problem-solving exercises • Reflection on team roles
12	Leadership Skills Development • Case studies and role-play • Decision-making exercises
13	Time Management & Goal Setting • Prioritization techniques (to-do lists, planners) • Personal goal-setting exercise
14	Interview Skills (Mock Interviews) • HR and technical mock interviews, Feedback and improvement
15	Workplace Etiquette & Professional Ethics • Corporate behaviour, dress code, ethics • Case-based discussion

*** Conduct minimum 10 - 12 experiments.**

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0AIVEC258 ENVIRONMENTAL STUDIES

Course Details:

Course Code and Course Title	**0AIVEC258 – Environmental Studies**			
Semester:	IV			
Prerequisites	--			
Teaching Scheme: - Lecture/Tutorial/Practical	**Lecture**	**Tutorial**	**Practical**	
	2	-	-	
Credit	**02**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25 Marks	-	25 Marks	-

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Explain** the components and importance of Environment, ecosystems and Bio-diversity	2
CO2	**Discuss** the various natural resources and strategies for their management	3
CO3	**Explain** the sources of pollution, effects and control measures	2
CO4	**Apply** the knowledge of EIA, EMS and Audits for the preparation of reports.	3

Course Content

Unit No.	**Contents**	**Hrs.**
Unit 1	**Introduction to Environmental Studies:** Definition, scope and importance, Components of environment, Multidisciplinary nature of environmental studies. Ecosystems- Types, Structure and function, energy flow, food chains and food webs. Biodiversity- Types, Importance and conservation	**6**
Unit 2	**Natural resources and Management:** Natural resources- Forest, Water, Mineral food, Energy and Land. Energy resources- Renewable-Wind, Hydropower, Tidal, Ocean thermal, Solar, Biomass, Biogas, Geothermal and Hydrogen. Non-renewable- Coal Petroleum, Natural gas, Nuclear energy, Sustainable management of resources	**6**
Unit 3	**Environmental pollution and climate change:** Types of pollution- Water, Air, Solid waste, Soil and Noise, Sources, effects and control measures, Global effects of pollution	**6**
Unit 4	**EIA, EMS, Social issues and legislation:** Environmental Impact Assessment (EIA)- Purpose and process. Engineering Management Systems(EMS)-Principles and steps, Introduction to Environmental Audit and Green audit	**6**
	Total Hrs.	**24**

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Ecological and Environmental studies	S. K. Garg	Khanna publishers	1st	2006
2	Essentials of Environmental studies	Kurian Joseph and R. Nagendran	Pearson Education, Singapore	2nd	2004

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Environmental studies	Dr. Suresh K. Dhameja	Katson books	4th	2012
2	Environmental studies	Dr. P. D. Raut	Shivaji University, Kolhapur	4th	2012

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0AIVSEC259 UI/UX LABORATORY

Course Description:

The UI/UX Laboratory is designed to equip students with practical skills in designing intuitive, user-centred digital interfaces. It emphasizes principles of usability, accessibility, visual design, and user research to create effective and engaging user experiences. Through hands-on activities, prototyping, and usability testing, students learn to translate user needs into functional and aesthetically appealing designs aligned with industry practices.

Course Code and Course Title	0AIVSEC259 - UI/UX Laboratory			
Semester	IV			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**		**Practical**
	--	--		2
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	--	25

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Explain** the fundamental concepts and principles of User Interface (UI) and User Experience (UX) design.	2
CO2	**Analyse** user requirements and develop user personas, user journeys, and information architecture for digital applications	4
CO3	**Design** wireframes and prototypes for web or mobile applications using modern UI/UX design tools.	4
CO4	**Evaluate** usability, accessibility, and user satisfaction using usability testing methods.	4
CO5	**Develop** user-centred interface designs that improve interaction, usability, and overall user experience.	3
CO6	**Communicate** effectively in technical and non-technical environments.	3
CO7	**Accept** professional and ethical responsibility of engineering technology profession.	2

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Course Contents

Expt. No.	List of Experiment
1	Study of UI/UX design principles and design guidelines.
2	Study and comparison of popular UI/UX design tools (Figma, Adobe XD, Sketch).
3	Identify user requirements and create user personas for a given application.
4	Design user journey map and information architecture for a mobile or web application.
5	Create low-fidelity wireframes for a simple mobile application.
6	Design website layout using grid systems and visual hierarchy principles.
7	Create high-fidelity UI mock-ups using Figma or Adobe XD.
8	Develop interactive prototypes for a mobile or web application.
9	Implement responsive UI design for different screen sizes.
10	Conduct usability testing and heuristic evaluation of a user interface.
11	Analyse accessibility guidelines (WCAG) and design accessible interfaces.
12	Perform A/B testing for UI design improvements.
13	Redesign an existing application interface to improve usability.
14	Design dashboard UI for data visualization applications.

*** Conduct minimum 10 to 12 experiments.**

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0AIPCC260 DATA ANALYTICS LABORATORY

Course Description:

This laboratory course provides practical exposure to probability, statistics, and data analytics techniques using computational tools. The course enables students to analyse, visualize, and interpret data through statistical methods, probability distributions, hypothesis testing, and preprocessing techniques. It also develops the ability to apply statistical concepts for solving real-world data analytics problems using programming and analytical tools.

Course Code	0AIPCC260			
Course Title	Data Analytics Laboratory			
Semester	IV			
Prerequisites	0BSES115 Programming for Problem Solving in C			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	01			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25	--	25	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** sampling techniques, probability concepts distributions to analyse statistical problems using datasets and simulations.	3
CO2	**Experiment** with data preprocessing, and graphical data using suitable statistical tools and techniques for generating descriptive statistics.	3
CO3	**Conduct** statistical inference and hypothesis testing using parametric and non-parametric methods for data-driven decision making.	4
CO4	**Communicate** effectively in technical and non-technical environments.	3
CO5	**Accept** professional and ethical responsibility of engineering technology profession.	2

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Course Contents

Expt. No.	List of Experiment
1	Study and implementation of basic probability concepts and verification of addition and multiplication theorems using datasets/simulations.
2	Experiment on conditional probability and application of Bayes' Theorem in real-world case studies.
3	Perform sampling techniques (random, stratified, systematic) on a dataset and compare sampling bias and errors.
4	Compute measures of central tendency and dispersion for a given dataset using statistical tools.
5	Perform data cleaning, missing value handling, and outlier detection using statistical techniques.
6	Create and interpret graphical representations such as Histogram, Box Plot, Scatter Plot, and Correlation Heatmaps.
7	Study of discrete and continuous random variables using PMF and PDF.
8	Calculate expectation, variance, and standard deviation for probability distributions.
9	Implementation and comparison of Binomial, Poisson, and Normal probability distributions using datasets/simulations.
10	Perform data preprocessing and transformation using normalization, standardization, logarithmic, and Box-Cox transformations.
11	Study and implementation of Central Limit Theorem using sampling distributions.
12	Perform statistical inference using confidence intervals and hypothesis testing (Z-test and T-test).
13	Conduct Chi-square test and goodness-of-fit analysis on categorical datasets.
14	Perform Analysis of Variance (ANOVA) and F-test for comparing multiple datasets.
15	Implement non-parametric tests (Mann-Whitney and Kruskal-Wallis) and perform data cleaning and missing value handling on real-world datasets.

*** Conduct minimum 10 to 12 experiments.**

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0AIPCC261 DATABASE MANAGEMENT SYSTEMS LABORATORY

Course Description:

The Database Management Systems Laboratory is designed to provide hands-on experience in designing, implementing, and managing both relational and non-relational databases. It emphasizes core concepts such as data modelling, normalization, SQL programming, and NoSQL data handling techniques. Through practical exercises, students learn to develop efficient, scalable, and flexible data solutions suited for structured and unstructured data in modern applications.

Course Code and Course Title	0AIPCC261 - Database Management Systems Laboratory			
Semester	IV			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**		**Practical**
	--	--		2
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	25	--	25	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Develop** relational database schemas and perform SQL operations for data definition, manipulation, and querying.	4
CO2	**Apply** SQL functions, joins, subqueries, and aggregation techniques to retrieve and analyse data from databases.	4
CO3	**Implement** NoSQL databases using MongoDB and Cassandra to perform CRUD, querying, and aggregation operations.	4
CO4	**Communicate** effectively in technical and non-technical environments.	3
CO5	**Accept** professional and ethical responsibility of engineering technology profession.	2

Computer Science & Engineering (AIDS) EN 6269 PVPIT Buldhana

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Director

(0^{th} Revision)

Course Contents

Expt. No.	List of Experiment
1	Draw E-R diagram and convert entities and relationships to relation table for a college database.
2	Perform the following: a) Viewing all databases, b) Creating a Database, c) Viewing all Tables in a Database, d) Creating Tables (With and Without Constraints), e) Inserting/ Updating/Deleting Records in a Table.
3	Perform the following: a) Altering a Table, b) Dropping/ Truncating/Renaming Tables, c) Backing up / restoring a Database.
4	For a given set of relation schemes, create tables and perform the following a) Simple Queries, b) Simple Queries with Aggregate functions, c) Queries with Aggregate functions (group by and having clause).
5	Perform queries with Date functions and String Functions.
6	Perform queries with Math Functions, Join Queries- Inner Join, Outer Join and Subqueries- With IN clause, With EXISTS clause.
7	Perform database transactions using COMMIT, ROLLBACK, and SAVEPOINT commands and study concurrency issues in multi-user environments.
8	Create and execute stored procedures, user-defined functions, and triggers for automating database operations.
9	Introduction to NoSQL Database: Install and explore NoSQL database (e.g., MongoDB), Perform basic CRUD operations
10	Querying in NoSQL: Retrieve data using filters and projection
11	Aggregation Framework: Perform aggregation operations (grouping, sorting, pipeline)
12	Implement a columnar database using Apache Cassandra.
13	Implement a document database with MongoDB.
14	Design and implement any 5-query using MongoDB.
15	Write a case study for various types of NoSQL databases.

*** Conduct minimum 10 to 12 experiments.**

Ms. R. R. Jagtap	Dr. K. K. Pandyaji	Dr. S. S. Mohite
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