D. K.T. E. Society's

Textile and Engineering Institute, Ichalkaranji

(An Autonomous Institute)

Syllabus

for

Third Year B. Tech.

of

Computer Science and Engineering (Artificial Intelligence)

(With effect from 2022-23)

DKTES Textile and Engineering Institute, Ichalkaranji

(An Autonomous Institute)

Teaching and evaluation Scheme for year 2022-23

Third Year B. Tech. (Semester – V) In Computer Science and Engineering (Artificial Intelligence)

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits	Evaluation scheme					
									Theory			Practical		TOTAL
				L	T	P	Contact Hrs/wk		CIE		SEE	CIE	SEE	
									SE-I	SE-II				
1	AIL301	Operating Systems	PCC	3	-	-	3	3	25	25	50	-	-	100
2	AIL302	Machine Learning	PCC	3	-	-	3	3	25	25	50	-	-	100
3	AIL303	Database Engineering	PCC	3	-	-	3	3	25	25	50	-	-	100
4	AILE-I	Elective-I	PEC	3		-	3	3	25	25	50	-	-	100
5	AIL307	Feature Engineering	PCC	3	-	-	3	3	25	25	50	-	-	100
6	AIP308	Java Programming	PCC	2	-	4	6	4	-	-	-	50	50	100
7	AIP309	Database Engineering Lab	PCC	-	-	2	2	1	-	-	-	50	50	100
8	AIP310	Machine Learning Lab	PCC	-	-	2	2	1	-	-	-	50	-	50
9	AID311	Mini Project-I	PST	-		2	2	2	-	-	-	50	-	50
10	AII312	Soft Skill	HSMC	-	-	2	2	-	-	-	-	50	-	GRADE
		Total		**17**	**0**	**12**	**29**	**23**	**125**	**125**	**250**	**200**	**100**	**800**

L- Lecture
T-Tutorial
P-Practical

SE-I: Semester Examination-I
SE-II: Semester Examination-II

CIE – Continuous in Semester Evaluation
SEE- Semester End Examination

AILE-I
AIL304 System Programming
AIL305 Graph Theory
AIL306 Computer Vision

Course Category	HSMC (Hum. & Social Sc., Mgt)	BSC (Basic Sc.)	ESC Engg. Sc.)	PCC (Prof. Core Courses)	PEC (Prof. Elect. Courses)	OEC (Open Elct. Courses)	MC (Mandatory Courses)	PST (Project / Seminar / Ind. Training)
Credits	--	--	--	18	03	--	--	02
Cumulative Sum	03	19	22	42	--	--	--	--

Progressive Total Credits: 86 + 23= 109

DKTES Textile and Engineering Institute, Ichalkaranji

(An Autonomous Institute)

Teaching and evaluation Scheme for year 2022-23

Third Year B. Tech. (Semester – VI) In Computer Science and Engineering (Artificial Intelligence)

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits	Evaluation scheme					
									Theory			Practical		TOTAL
				L	T	P	Contact Hrs/wk		CIE		SEE	CIE	SEE	
									SE-I	SE-II				
1	AIL313	Natural Language Processing	PCC	3	-	-	3	3	25	25	50	-	-	100
2	AIL314	Information Security	PCC	3	-	-	3	3	25	25	50	-	-	100
3	AIL315	Advanced Machine Learning	PCC	3	-	-	3	3	25	25	50	-	-	100
4	AILE-II	Elective-II	PEC	3	-	-	3	3	25	25	50	-	-	100
5	OE	Open Elective	OEC	3	-	-	3	3	25	25	50	-	-	100
6	AIP319	Web Technologies Lab	PCC	2	-	4	6	4	-	-	-	50	50	100
7	AIP320	Natural Language Processing Lab	PCC	-	-	2	2	1	-	-	-	50	-	50
8	AID321	Mini Project-II	PST	-	-	2	2	2	-	-	-	50	50	100
9	AIT322	Industrial Training / Internship	PST	-	-	-	0	1	-	-	-	50	-	50
		Total		**17**	**0**	**8**	**25**	**23**	**125**	**125**	**250**	**200**	**100**	**800**

L- Lecture
T-Tutorial
P-Practical

SE-I: Semester Examination-I
SE-II: Semester Examination-II

CIE – Continuous in Semester Evaluation
SEE- Semester End Examination

OE - Open Elective		
ETLOE1 Fundamentals of Embedded Systems	MELOE2 Mechatronics	TFLOE1 Merchandising

AILE-II
AIL316 Unix Internals
AIL317 Business Intelligence
AIL318 Recommendation System

Course Category	HSMC (Hum. & Social Sc., Mgt)	BSC (Basic Sc.)	ESC Engg. Sc.)	PCC (Prof. Core Courses)	PEC (Prof. Elect. Courses)	OEC (Open Elct. Courses)	MC (Mandatory Courses)	PST (Project / Seminar / Ind. Training)
Credits	--	--	--	14	03	03	--	03
Cumulative Sum	03	19	22	59	04	--	--	02

Progressive Total Credits: 109 + 23 =132

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL301: Operating System

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Demonstrate the structure, functions and services of an operating system
- Apply the knowledge of process management, process synchronization, deadlocks and CPU scheduling algorithms to solve the problems.
- Describe memory organization, memory management techniques and file system concepts.
- Illustrate the concept of I/O systems and their protection.

Course Contents

Unit I	**Introduction to OS and services**	**07 Hours**

Operating System fundamentals, computer system organization, computer system architecture, OS structure, OS operations, process management, memory management, storage management, computing environments, OS services, user and OS interface, system calls, types of system calls, OS structure, system boot.

Unit II	**Process management**	**07 Hours**

Process concept, Process States, Process Control Block, Inter-process communication, process scheduling:- basic concepts, Scheduling Criteria, Scheduling Algorithms, Multiple processor scheduling, Real time CPU scheduling.

Unit III	**Process synchronization and deadlocks**	**06 Hours**

Background, The critical section problem, Peterson's solution, Mutex Locks, Semaphores, Classic problems of synchronization.
System model, deadlock characterization, handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Unit IV	**Memory management**	**07 Hours**

Background, swapping, contiguous memory allocation, segmentation, paging, structure of page table.
Virtual memory background, demand paging, copy-on-write, page replacement, allocation of frames, thrashing.

Unit V	**Storage management**	**06 Hours**

File concept, access methods, and Directory and disk structure, file system mounting, file sharing, protection.

Unit VI	**Input /Output systems**	**06 Hours**

Overview, I/O hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.

Text Books:

1. Abraham Silberschatz, Peter B Galvin, Gerg Gagne " Operating System Concepts", 9th Edition.
2. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN-10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8, 8th Edition

References Books:

1. Operating system with case studies in Unix, Netware and Windows NT – Achyut S. Godbole (TMGH).
2. "Operating systems: concepts and design" - Milan Milenkovic (TMGH).
3. "Operating Systems: Internals and Design Principles" by William Stallings

Useful Links: --

1. **https://www.tutorialspoint.com/operating_system/index.asp**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL302: Machine Learning

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Explain machine learning concepts.
- Analyze the Machine learning model.
- Design solution using machine learning techniques.

Course Contents

Unit I	**Introduction to Machine Learning**	**06 Hours**

Definition, Terminology, Types of learning, Machine Learning Problem categories, Machine learning architecture, process, Lifecyle, Performance measures, tools and framework, data visualization.

Unit II	**Regression**	**08 Hours**

Simple regression – hypothesis, cost function, parameter learning with gradient descent, learning rate, Gradient Descent for linear regression, examples, simple regression in matrix form. Multivariate Linear Regression – multiple features, hypothesis functions, Gradient Descent for multiple variables, Feature scaling, polynomial regression

Unit III	**Classification- logistic regression & Neural Network**	**07 Hours**

Definition, logistic regression – hypothesis representation, decision boundary, cost function, gradient descent for logistic regression. multiclass classification, Regularization - Overfitting & Underfitting, cost function, Regularized Linear Regression, Regularized Logistic Regression Neural Networks- Neuron representation and model, Hypothesis for neuron, cost function, solution of a problem using single neuron. Gradient descent for a neuron. Neural network, Multiclass classification with neural network. Learning in neural network-backpropagation algorithm

Unit IV	**Naïve Bayes Classifier, Entropy**	**05 Hours**

Decision trees: definition, terminology, the need, advantages, and limitations. constructing and understanding Decision trees, common problems with Decision trees, Decision tree algorithms, random forest, examples. Conditional probability and Naïve Bayes Classifier Instance-based classifier – K- Nearest Neighbour Classifier

Unit V	**Unsupervised learning**	**07 Hours**

Clustering, K Means clustering, Hierarchical clustering, Association Rule mining

Unit VI	**Recommendation System and Time series analysis**	**05 Hours**

Basic Text Processing with Python, regular expression, Natural Language Processing, Text Classification, Topic modeling Popularity based recommender engines, Content based recommendation engines, Classification based recommendation engine, collaborative filtering Date and Time Handling, Window functions, Correlation, Time Series Forecasting

Text Books:

1. Machine Learning with Python- an approach to applied ML, by Abhishek Vijayvargia, BPB publications
2. Practical Machine Learning by Sunila Gollapudi Packt Publishing Ltd.
3. Machine Learning by Tom M. Mitchell, McGraw Hill Education; First edition

References Books:

1. Machine Learning for dummies John Paul Muller, Willey Publication
2. EthemAlpaydin : Introduction to Machine Learning, PHI 2nd Edition-2013

Useful Links:

1. **http://alierbey.com/useful-links-for-machine-learning/**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL303: Database Engineering

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Explain the fundamentals of database management systems.
- Design database using E-R features.
- Write SQL queries

Course Contents

Unit I	**Introduction to DBMS**	**08 Hours**

Introduction, Traditional file system v/s DBMS, views of data, instance and schema, Data Models – Relational and ER model, Keys, Database design process, Schema diagram, Extended E-R Features- Specialization, Generalization and Aggregation, Database system structure, Database users. Relational algebra, Tuple relational calculus, Domain relational calculus.

Unit II	**Structured Query Language**	**08 Hours**

Introduction to SQL, data types.
DDL Statements – Create, Alter, Drop, Rename, Truncate.
DML Statements- Select, Insert, Update, Delete.
DCL Statements – Commit, Rollback.
Aggregate functions, Group by clause, having clause, order by clause, set operations, Joins, Nested Queries, Views
PL/SQL- Functions, Procedures, Triggers, Cursors

Unit III	**Functional Dependency and Normalization**	**07 Hours**

Integrity constraints – domain constraints, referential integrity, Pitfalls in Relational-Database Design, Functional dependency, types of functional dependency, closure of set of functional dependency, Closure of Attribute Sets, canonical cover.
Normalization – Purpose of normalization, First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF), Fourth Normal Form (4NF), Fifth Normal Form (5NF)

Unit IV	**Data Storage and Indexing**	**05 Hours**

File organization, Organization of records in file, Buffer Management.
Indexing – Ordered indices – primary indices, secondary indices, dense and sparse indices, multilevel indexing, B tree indexing, B+ tree indexing and multiple key access.
Hashing – static hashing – open hashing, closed hashing, dynamic hashing.
Bitmap indices.

Unit V	**Transaction Processing and Concurrency Control**	**07 Hours**

Transaction Processing – Concept, ACID properties, Transaction model, Schedule, Serializability – conflict and view Serializability, Recoverable schedule.
Concurrency Control Mechanisms – Lock based protocols, Multiple Granularity, Timestamp based protocols, Thomas's Write Rule, Validation based protocols

Unit VI	**Deadlock Handling and Data Recovery**	**05 Hours**

Deadlock Handling – Deadlock prevention, deadlock detection and deadlock recovery.
Data Recovery – Failure Classification, Storage, Log based recovery, checkpoints, Recovery Algorithm, Buffer Management, Failure with loss of non- volatile Storage

Text Books:

1. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 6th edition, McGraw- Hill.
2. "Database Systems - A Practical Approach to Design, Implementation and Management", Thomas Connolly, Carolyn Begg, 4th Edition, Addison Wesley.
3. "MySQL Cookbook", Paul DuBois, 3rd edition, O'REILLY.

References Books:

1. "Fundamentals of Database Systems", Ramez, Elmasri, Shamkant B. Navathe, 6th Edition, Addison Wesley.
2. "Database Systems – Design, Implementation and Management", Rob & Coronel, 5th Edition, Thomson Course Technology.

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL304: System Programming

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00Hrs./Week Practicals: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain the phases of compiler.
- Construct parsing tables using various parsing techniques.
- Demonstrate various techniques of code optimization and code generation.
- Describe fundamentals of assemblers, linker and loaders.

Course Contents

Unit I	**Lexical Analysis**	**06 Hours**

Programming Languages & Language Processors, Language Processing Activities. Phases of a compiler, Role of a Lexical analyser, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyser generator.

Unit II	**Syntax Analysis**	**07 Hours**

Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.

Unit III	**Syntax Directed Translation and Intermediate Code Generation**	**06 Hours**

Syntax directed definitions, construction of syntax tree, S-attributed definitions, L-attributed definitions, Intermediate languages, assignment statements, back patching, procedure calls

Unit IV	**Code Optimization & Code Generation**	**06 Hours**

Sources of optimization, Peephole optimization and basic blocks, loops in flow graphs, Data flow analysis and equations, Issues in design of a code generator and target machine, Basic blocks and flow graphs, Issues of register allocation, code generation from Dags.

Unit V	**Assemblers**	**06 Hours**

Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, Design of single pass assembler for IBM PC 8086/8088.

Unit VI	Linkers & Loaders	06 Hours
Introduction, Relocation & Linking Concepts, Design of a Linker, Self-Relocating Programs, Linking of Overlay Structured Programs, Dynamic Linking, Loaders- Absolute Loaders, Dynamic Linking Loader, Bootstrap Loader, Relocating Loaders.		

Text Books:

1. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D. Ullman (Pearson Education.) 3rd Edition (1 to 4 Unit)
2. Systems Programming- D.M.Dhamdhere, Mc Graw Hill Education (5 and 6 Unit)

References Books:

1. Crafting A Compiler with C - Charles Fischer, Richard LeBlanc (Pearson publication) (For practical use only)
2. System Programming - J. J. Donovan (Mc-Graw Hill)
3. Crafting A Compiler with C - Charles Fischer, Richard LeBlanc (Pearson publication) (For practical use only)

Useful Links:

1. **https://www.javatpoint.com/compiler-tutorial**
2. **https://www.tutorialspoint.com/compiler_design/index.htm**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL305: Graph Theory

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00Hrs./Week Practicals: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain basics of graph concept.
- Describe different applications of graphs.
- Apply different graph techniques to given problem.

Course Contents

Unit I	**Graphs**	**06 Hours**
Introduction, Definition, Example, Three Puzzles, Connectivity, Properties of Tree, Counting Trees, Applications		
Unit II	**Independent Sets and Matchings**	**06 Hours**
Introduction. Vertex-Independent Sets and Vertex Coverings, Edge-Independent Sets, Matchings and Factors, Matchings in Bipartite Graphs, Perfect Matchings and the Tutte Matrix		
Unit III	**Eulerian and Hamiltonian Graphs**	**08 Hours**
Introduction, Eulerian Graphs, Hamiltonian Graphs, Pancyclic Graphs, Hamilton Cycles in Line Graphs, 2-Factorable Graphs.		
Unit IV	**Graph Colorings**	**06 Hours**
Introduction, Vertex Colorings, Critical Graphs: Brooks' Theorem, Other Coloring Parameters .b-Colorings, Homomorphisms and Colorings, Triangle-Free Graphs, Edge Colorings of Graphs, Snarks, Kirkman's Schoolgirl Problem, Chromatic Polynomials		
Unit V	**Planarity**	**08 Hours**
Introduction, Planar and Nonplanar Graphs, Euler Formula and Its Consequences, K5 and K3;3 are Nonplanar Graphs, Dual of a Plane Graph, The Four-Color Theorem and the Heawood Five-Color, Kuratowski's Theorem., Hamiltonian Plane Graphs, Tait Coloring		
Unit VI	**Triangulated Graphs**	**06 Hours**
Introduction, Perfect Graphs, Triangulated Graphs, Interval Graphs, Bipartite Graph B.G/ of a Graph G, Circular Arc Graphs		

Text Books:

1. R. Balkrishnan, K. Rangnathan, "A textbook of Graph Theory", Springer, 2nd Edition

References Books:

1. R. J. Trudeau, " Introduction to Graph Theory", Dover Publications Inc.; 2nd edition

Useful Links:

1. **https://www.britannica.com/topic/graph-theory**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL306: Computer Vision

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00Hrs./Week Practicals: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain image fundamentals
- Explain and analyze image enhancement techniques
- Explain and analyze image restoration and compression techniques
- Explain and analyze Image analysis techniques
- Apply computer vision in characters, fingerprints and faces recognition

Course Contents

Unit I	Digital Image Fundamentals	06 Hours

Digital image Representation – Functional Units of an Image processing system. Visual perception – Image Model _ Image sampling and Quantization – grayscale resolution – pixel relationship – image geometry. Image Transforms – Unitary Transform, Discrete Fourier Transform, Cosine Transform, Sine Transform, Hadamard Transform, Slant and KL Transform.

Unit II	Image Enhancement	06 Hours

Image Enhancement Histogram processing – Spatial operations – Image smoothing- Image Sharpening – Color Image Processing methods- Color Image Models

Unit III	Image Restoration and Compression	06 Hours

Image restoration and compression Degradation Model – Discrete Formulation – Circulant matrices – Constrained and Unconstrained restoration geometric transformations fundamentals – Compression Models – Error Free Compression – Lossy Compression – International Image Compression Standards

Unit IV	Image Analysis and Computer Vision	08 Hours

Spatial feature Extraction – Transform feature –Edge detection-Boundary Representation Region Representation-Moment Representation-Structure-Shape Features-Texture-Scene Matching and Detection-Image Segmentation-Classification techniques MorphologyInterpolation

Unit V	Sensing 3D shape	06 Hours

How the 3rd dimension changes the problem. Stereo 3D description, 3Dmodel, matching, TINA. Direct 3D sensing-structured light, range finders, range image segmentation

Unit VI	Applications of Computer Visions	06 Hours

Introduction, Perfect Graphs, Triangulated Graphs, Interval Graphs, Bipartite Graph B.G/ of a Graph G, Circular Arc Graphs

Text Books:

1. Fundamentals of Digital Image Processing- A.K.Jain (PHI)
2. Image Processing and machine vision-Milan Sonka, Vaclav Hlavae, Roger Boyle Cengage Learning India Pvt Ltd (2008)

References Books:

1. Boyle R & Thomas R, Computer Vision – A First Course, 2nd Edition, McGraw Hill, 1990.

Useful Links:

1. **https://machinelearningmastery.com/what-is-computer-vision/**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIL307: Feature Engineering

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain basics of feature engineering used for representing and generating process.
- Describe features of different types of data with feature selection process.
- Describe feature transformations process for converting high dimensional features to low dimensional features.
- Explain feature learning process from the given input.

Course Contents

Unit I	**Introduction to feature engineering**	**06 Hours**

Motivating example – AI-powered communications, importance of feature engineering, introduction of feature engineering, Evaluation of machine learning algorithms and feature engineering procedures, Feature understanding, Feature improvement – cleaning datasets, Feature selection – removing bad attributes, Feature construction, Feature transformation, Feature learning

Unit II	**Basics of Feature Representation**	**06 Hours**

Scalars, Vectors, and Spaces, Dealing with Counts, Binarization, Quantization or Binning, Log Transformation, Feature Scaling or Normalization, Min-Max Scaling, Standardization (Variance Scaling), ℓ2 Normalization, Interaction Features, Feature Selection

Unit III	**Features of Text and Categorical Data**	**08 Hours**

Bag-of-X: Turning Natural Text into Flat Vectors, Filtering for Cleaner Features, Atoms of Meaning: From Words to n-Grams to Phrases, Tf-Idf : A Simple Twist on Bag-of-Words, Putting It to the Test, Deep Dive, Encoding Categorical Variables, Dealing with Large Categorical Variables

Unit IV	**Feature Selection**	**06 Hours**

Importance of Feature Selection in Machine Learning, Goals of Feature Selection, Classes of Feature Selection Methodologies, Effect of Irrelevant Feature, Overfitting to Predictors and External Validation, Greedy Search Methods- Simple Filters, Recursive Feature Elimination, Stepwise Selection

Unit V	**Feature Transformations**	**08 Hours**

Intuition, Derivation, Linear Projection, Variance and Empirical Variance, Principal Components: First Formulation, Principal Components: Matrix-Vector Formulation, General Solution of the Principal Components, Transforming Features, Implementing PCA, PCA in Action, Whitening and ZCA, Considerations and Limitations of PCA, Use Cases

Unit VI	Feature Learning	06 Hours
Parametric assumptions of data, Non-parametric fallacy, feature learning algorithms, Reconstructing the data, The Bernoulli RBM, Extracting PCA components from MNIST, Extracting RBM components from MNIST, Using RBMs in a machine learning pipeline, Learning text features – word vectorizations, Word embeddings, Application of word embeddings – information Retrieval		

Text Books:

1. Sinan Ozdemir, Divya Susarla, "Feature Engineering Made Easy", Packt Publishing, ISBN 978-1-78728-760-0
2. Alice Zheng & Amanda Casari, "Feature Engineering for Machine Learning: Principles and Techniques for data scientist", Oreilly

References Books:

1. Max Kuhn , Kjell Johnson, "Feature Engineering and Selection: A Practical Approach for Predictive Models" 1st Edition, Chapman & Hall/CRC Data Science Series, ISBN 13-978-1-138-07922-9

Useful Links:

1. https://machinelearningmastery.com/discover-feature-engineering-how-to-engineer-features-and-how-to-get-good-at-it/

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AIP308: Java Programming

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 02 Hrs /Week Tutorials: 00Hrs/Week Practicals: 04 Hrs/Week	04	CIE: 50 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain different concepts of Java.
- Design an object-oriented solution for given problem using Java.
- Implement program using Java.

Course Contents

Unit I	Introduction	07 Hours

Introduction: The Java Buzzwords, The Java Programming Environment JVM, JIT Compiler, Byte Code Concept, HotSpot.

A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays- Jagged Array.

Objects and Classes: Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing

Unit II	Interface, Inheritance and Packages	07 Hours

Interfaces: Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, Default Methods.

Inheritance: Definition, Superclasses, and Subclasses, Overriding and hiding methods, Inheritance Hierarchies, Polymorphism, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, Design Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection.

Packages: Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files.

Unit III	Exceptions, I/O	06 Hours

Exceptions: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions.

I/O: Streams, Text input and output, character streams, Reading and writing binary data in to a file.

Unit IV	Swing, Layout Management and Event Handling	06 Hours

Introduction to the Swing, Swing features, Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern.

Layout Management: Introduction to Layout Management, APIs for Border Layout, panels, Grid Layout, Text Input, Choice Components, Menus, Dialog Boxes,

Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low- Level Events in the AWT, Low-Level Event Types, Introduction to JApplet.

Unit V	Multithreading, Generic Programming	07 Hours

Multithreading: Processes and threads, Runnable interface, thread class, thread object, defining and starting a thread, Interrupting threads, thread states, thread properties, Joins, synchronization.

Generic Programming: Introduction, Definition of a Simple Generic Class, Generic Methods

Unit VI	Collections	06 Hours

Collections: Collection interfaces, Concrete collections, The collections framework.
Introduction to advanced framework in Java: Spring, Hibernate.

Text Books:

1. Core Java- Volume I Fundamentals: Cay Horstmann and Gary Cornell, Pearson, Eight edition
2. Core Java- Volume II Advanced Features: Cay Horstmann and Gary Cornell, Pearson, Eight edition

References Books:

1. JAVA-The Complete Reference: Herbert Schildt, Oracle Press, Mcgraw Hill, Ninth edition
2. JAVA™ HOW TO PROGRAM, By Deitel Paul, Deitel Harvey.10th Edition, Publisher:PHI Learning
3. Core JAVA An Integrated approach: Dr.R.Nageswara Rao, Dreamtech Press.
4. A Programmer's guide to JAVA SCJP Certification: Khaleed Mughal and Rolf W. Rasmussen, Addison Wesley, Third edition

Practical work:

It should consist of minimum 15 experiments based on following topics. The Continuous Internal Evaluation (CIE) is based on regular practical performance and final internal practical oral examination.

List of Experiments:

1. Write a program to find out day of the given date using command line argument.
2. Write a program to implement matrix operations.
3. Write a program to develop class employee with constructor to initialize instance variables. Provide Set method and Get method for instance variables. Also provide a method to raise salary of each employee by 10%.
4. Write a program to demonstrate single inheritance by creating a superclass Room and subclass Bedroom.
5. Write a program to develop class student having instance variable rn and method getno and putno. Create class Test derived from Student having instance variable as part1, part2 and method getmarks and putmarks. Define an Interface Sport having constant variable sportwt and method putwt. Derive Class Result From Test which implements this interface having data members as total. Display the result.
6. Write a program to create an area interface. Develop two different classes that implements these interface and compute area.
7. Write a program to implement mathematical package for arithmetic, statistical and trigonometric operations.
8. Write a program to develop java package for the stack and queue classes.
9. Write a class having two integer data members. Provide facility to add, subtract, multiply and divide these numbers. If addition goes above 1000, it generates TooLongAddition exception. If subtraction is below 0, it generates Negative Answer exception. If multiplication is above 5000, it generates TooLongMultiplication exception.
10. Write a program to remove whitespaces from a text file. Name of the file is given using command line
11. Write a program to accept a file name from user and perform read, write/append operations on it
12. Take Employee information such as name, employee id, department, designation, age, city, phone from user and store it in the file using DataOutputStream and FileOutputStream and Retrive data using DataInputStream and FileInputStream and display the result.
13. Write a program to develop Swing GUI based standard calculator.
14. Write a program to demonstrate key and mouse event.
15. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
16. Write a program for bouncing ball application using multithreading in swing GUI.
17. Write a program to demonstrate collection and generics.

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIP309: Database Engineering Lab

Lab Scheme: Practical: 02 Hrs. /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Describe the fundamentals of database management systems.
- Design database for the application.
- Analyze database queries for the application
- Implement database queries for the application.

List of Experiments

(It should consist of 10-12 experiments based on the following topics.)

1	Installation and Demonstration of DBMS like MySql
2	Draw E-R Diagram for different applications like – Library Management Systems, College Management Systems, Hospital Management Systems etc.
3	Convert E-R Diagrams into relational tables.
4	Use DDL Statements to Crete, Alter, Drop, Rename, Truncate Tables
5	Use DML Statements to Insert, Select, Update, Delete Data
6	Use of aggregate functions, group by – having clause and order by clause.
7	Use of Joins
8	Use of Set Operations
9	Creation of Indices and Views in SQL
10	Implement PL/SQL procedure and Function
11	Implement PL/SQL Cursor.
12	Implement Triggers in PL/SQL.
13	Find Canonical Cover and Closure for set of functional dependencies.
14	Demonstration of Indexing – Dense index, Sparse index, B+ tree index
15	Demonstration of Hashing – Static hashing, Dynamic hashing
16	Demonstration of Log based recovery.
17	Study of concurrency control mechanisms

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIP310: Machine Learning Lab

Lab Scheme: Practical: 02 Hrs. /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: - Marks

Course Outcomes:

On completion of the course, student will be able to–

- Describe the fundamentals of machine learning.
- Design a model for classification or regression.
- Implement machine learning models.
- Analyze machine learning model

List of Experiments
(It should consist of 10-12 experiments based on the following topics.)

1	Study and installation of python
2	Study and implementation of Simple Linear Regression
3	Write a program to implement Multiple Linear Regression
4	Write a program to implement Logistic Regression.
5	Write a program to implement Multi-class Classification
6	Write a program to implement Neural Network
7	Write a program to implement Backpropagation algorithm of Neural Network
8	Write a program to implement K-means Clustering
9	Write a program to implement association rule mining
10	Write a simple program to identify next point of time series analysis
11	Write a program to build naïve bay's classifier for text data
12	Demonstrate simple recommendation system.

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AID311: Mini Project-I

Lab Scheme: Practical: 02 Hrs. /Week	Credits 02	Evaluation Scheme: CIE: 50 Marks SEE: - Marks

Course Outcomes:

On completion of the course, student will be able to–

- draft and analyze requirements of problem.
- design solution for the problem.
- write code and test the code.
- write report for the project.

Course Content

The mini project should be undertaken preferably by a group of 3-4 students who will jointly work and implement the project. The topic for the project must be based upon societal problem or real-world problem. The project work should be completed in all aspects of analysis, design, implementation and testing (SDLC). The group will select a problem with the approval of the guide and carry out requirements gathering and analysis, requirements specification, design document, coding , test plans & testing and installation reports (if any) for the selected problem statement. Further the group will write report covering the details of project and give presentation. Students also have to maintain a diary of schedule, cost and other managerial activities. All phases of SDLC along with diary should be considered for evaluation of mini project.

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – V)
AII312: Soft Skills

Teaching Scheme:	Credits	Evaluation Scheme:
Practical: 02 Hrs./Week	--	Grade:

Course Outcomes:

On completion of the course, student will be able to–

- Communicate effectively through verbal communication and improve the listening skills.
- Actively participate in group discussion / interviews and prepare & deliver presentations.
- Inculcate the writing skills necessary for communications.
- Work effectively in multi-disciplinary and heterogeneous teams to connect and work with others to achieve a set task.

Course Contents

Unit I	**Communication Skills**

Introduction to Soft Skills, Aspects of Soft Skills, types of communication, barriers of communication, effective communication, Verbal and non-verbal Communication, Inter and Intrapersonal communication, **Speaking Skills** – Importance of speaking effectively, speech process, conversation and oral skills, fluency and self expression, body language, Public Speaking, Group discussion, **Listening Skills:** Virtues of Listening, Barriers and filters, Fundamentals of Good Listening, **Reading Skills:** Comprehension, reading research papers, Communication in a Digital World.

Unit II	**Self Development**

Self-Management, Self-Evaluation, Self-Discipline, Self Awareness, Positive Thinking, Handling failure, identifying one's strengths and weaknesses, SWOT analysis, Career Planning & Goal setting, prioritization, Managing self – emotions, ego, pride, stress; Personality development.

Unit III	**Leadership and Team Building**

Introduction, Leader and Leadership, Leadership Traits, Culture and Leadership Skills: Features of Corporate Culture, Leadership Styles, **Team Building:** Team Development Stages, Types of Teams: Cross-functional Team, Problem-solving Team, Meeting Management, Adaptability & Work Ethics, Types of Conflict and resolutions.

Unit IV	**Language and Writing Skills**

Vocabulary: Word alternatives, Words often Confused - Pairs of Words, Synonyms and Antonyms, **Business Writing:** Format and Style, Note Making, Letter writing, Writing Formal Letters. Technical Report Writing, Memo, Notices/Circulars, Agenda and Minutes of a Meeting, E-Mail, Employment Communication: Job Application, Preparation of CV and Resume writing. **Presentation skills:** Professional Presentation, Nature, planning and preparing the Presentation, Delivering the Presentation.

Unit V	**Ethics, Etiquette and Mannerism**

Professional Etiquette: Etiquette at Meetings, Etiquette at Dining. Public Relations Office(PRO)'s Etiquettes, **Technology Etiquette :** Phone Etiquette, Email Etiquette, Social Media Etiquette, Video Conferencing Etiquette, Interview Etiquette, **Dressing Etiquettes :** for Interview, offices and social functions, Ethical Values: Importance of Work Ethics, Problems in the Absence of Work Ethics.

Text Books:

1. Gajendra Singh Chauhan, Sangeeta Sharma: Soft Skills – An Integrated Approach to Maximize Personality, WILEY INDIA.

References Books:

1. Developing Communication Skills -Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
2. Personality Development and Soft Skills, Barun K. Mitra, Oxford University Press
3. Soft Skills - Enhancing Employability, M. S. Rao I. K. International
4. Communication Skills-Sanjay Kumar and Pushpa Lata , Oxford University Press
5. Creative English for Communication -Krishnaswami, N. and Sriraman, T, Macmillan.
6. Effective Communication & Public Speaking eBook -S.K. Mandal.
7. Effective English Communication- Mohan Krishna, Krishna Mohan Meenakshi Raman, Tata McGraw-Hill Education.

Useful Links:

1. **https://nptel.ac.in/courses/109105110**
2. **https://nptel.ac.in/courses/110105090**
3. **https://nptel.ac.in/courses/109107121**
4. **https://nptel.ac.in/courses/109104107**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL313: Natural Language Processing

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00 Hrs./Week Practicals: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Explain basics of natural language processing
- Describe different classification models used in various natural language tasks
- Explain various word representation techniques.

Course Contents

Unit I	**Introduction to Natural Language Processing**	**06 Hours**
Regular Expressions, Words, Corpora, Text Normalization, Minimum Edit Distance.		
Unit II	**N-Gram Language Models**	**06 Hours**
N-Grams, Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, Huge Language Models and Stupid Backoff, Advanced: Perplexity's Relation to Entropy.		
Unit III	**Naive Bayes and Sentiment Classification**	**08 Hours**
Naive Bayes Classifiers, Training the Naive Bayes Classifier , Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive Bayes as a Language Model, Evaluation: Precision, Recall, F-measure ,Test sets and Cross-validation, Statistical Significance Testing, Avoiding Harms in Classification.		
Unit IV	**Vector Semantics and Embeddings**	**06 Hours**
Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Pointwise Mutual Information (PMI) ,Applications of the tf-idf or PPMI vector models,Word2vec,Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models		
Unit V	**Sequence Labeling for Parts of Speech and Named Entities**	**08 Hours**
English Word Classes, Part-of-Speech Tagging, Named Entities and Named Entity Tagging, HMM Part-of-Speech Tagging, Conditional Random Fields (CRFs), Evaluation of Named Entity Recognition.		

Unit VI	Word Senses and WordNet	06 Hours
Word Senses, Relations Between Senses, WordNet: A Database of Lexical Relations, Word Sense Disambiguation, Alternate WSD algorithms and Tasks, Using Thesauruses to Improve Embeddings, Word Sense Induction.		

Text Books:

1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Third Edition

References Books:

1. Steven Bird, Ewan Klein, and Edward Loper, "Natural Language Processing with Python– Analyzing Text with the Natural Language Toolkit", O'Reilly

Useful Links:

1. **https://www.nltk.org/book/**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL314: Information Security

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs./Week Tutorials: 00Hrs./Week Practicals: 00 Hrs./Week	03	SE-I: 25 Marks SE-II: 25 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Describe basic terminology in cryptography, and classical cryptosystems
- Explain modern cryptosystems
- Explain security policies such as authentication, integrity and confidentiality
- Explain network and Web security protocols.
- Design secure system

Course Contents

Unit I	Overview and Classical Encryption Techniques	06 Hours

Overview: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines

Unit II	Block Ciphers and Advanced Encryption Standard	07 Hours

Block Cipher Principles, The Data Encryption Standard (DES), A DES Example, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles Finite Field Arithmetic, AES Structure, AES Transformation Functions, AES Key Expansion, An AES Example, AES Implementation, Applications of Block Ciphers

Unit III	Public Key Cryptography	06 Hours

Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Recent trends in Public Key Cryptosystems, Applications of Public Key Cryptosystems

Unit IV	Cryptographic Data Integrity Algorithms	06 Hours

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA), General Structure of SHA-512, General Structure of SHA-3

Message Authentication Code: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC, MACs Based on Block Ciphers: DAA and CMAC, Authenticated Encryption: CCM and GCM

Digital Signatures: Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Real life Applications of Hash Functions, MAC, and Digital Signature

Unit V	Key Management and Distribution	06 Hours

Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure, Key management and distribution use cases

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability

Unit VI	Network and Internet Security	06 Hours

Transport-Level Security: Web Security Considerations, Basics of Secure Sockets Layer, Basics of Transport Layer Security, HTTPS

Electronic Mail Security: Pretty Good Privacy, S/MIME, Domain Keys Identified Mail

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload

Text Books:

1. Williams Stallings Cryptography and Network security principles and practices, Pearson Education (LPE), Seventh Edition
2. Cryptography and network security Atul Kahate (TMGH)

References Books:

1. Handbook of Applied Cryptography - Menezes, A. J., P. C. Van Oorschot, and S. A. Vanstone

Useful Links:

1. **https://blog.gigamon.com/2019/06/13/what-is-network-security-14-tools-and-techniques-to-know/**

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL315: Advanced Machine Learning

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Describe different classifier algorithm
- Describe modern optimization techniques
- Explain basics of association rule

Course Contents

Unit I	**Introduction to SVM**	**07 Hours**

Introduction to Support Vector Machine(SVM), Polynomial Support Vector Machines, Types of SVM Hyperplanes and Support Vectors, Working of SVM, Advantages and Disadvantages of SVM, Applications of SVM

Unit II	**SVM Kernel**	**07 Hours**

Dot product, Use of Dot product in SVM, Margin, Hard Margin SVM, Soft margin SVM, SVM Kernels, Types of Kernels, Parameters in Kernelized SVC, Computing the SVM classifier

Unit III	**Probabilistic Models**	**06 Hours**

Uncertainty, Normal distribution and its geometric interpretations, Discriminative learning with maximum likelihood, Probabilistic models with hidden variables, Hidden Markov model, Expectation Maximization methods, Gaussian Mixtures and compression based models

Unit IV	**Naïve Bayes Classifier, Entropy**	**08 Hours**

Naïve Bayes Classifier: Bayes Theorem, Naïve Bayes Classifiers, Multinomial Naïve Bayes, and Gaussian Naïve Bayes.

Entropy: Introduction, Mathematical Formula for Entropy, Decision Tree, Use of Decision Tree in Entropy, Information Gain, Max Entropy Classifier, Cross Entropy

Unit V	**Optimization Techniques**	**07 Hours**

Gradient Descent, Stochastic Gradient Descent (SGD), Mini-Batch Stochastic Gradient Descent (MB — SGD), SGD with Momentum, Nesterov Accelerated Gradient (NAG), Adaptive Gradient (AdaGrad), AdaDelta, Adam, Nadam

Unit VI	**Association Rule**	**06 Hours**

Advanced Analytical Theory and Methods: Association Rules- Overview, a-priori algorithm, evaluation of candidate rules, case study-transactions in grocery store, validation and testing, diagnostics.

Text Books:

1. Kevin Murphy, Machine Learning: a Probabilistic Approach, MIT Press, 1st Edition, 2012, ISBN No.: 978-0262-30616-4
2. C.M. Bishop, Pattern Recognition and Machine learning, Springer, 1st Edition, 2013, ISBN No.: 978- 81-322-0906-5
3. Han, Jiawei Kamber, Micheline Pei and Jian, “Data Mining: Concepts and Techniques”, Elsevier Publishers, ISBN:9780123814791, 9780123814807.

References Books:

1. Peter Flach, Machine Learning: The Art and Science of Algorithms that make sense of data, Cambridge University Press, 1st Edition, 2012, ISBN No.: 978-1-316-50611-0 2.
2. Ethem Alpaydin, Introduction to Machine Learning, PHI, 2nd edition, 2013, 978-0-262-01243-0

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL316: Unix Internals

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Explain structure and working of various subsystems in UNIX Kernel
- Describe algorithms used in various subsystems of UNIX Kernel.
- Analyze algorithms and concepts used in UNIX kernel

Course Contents

Unit I	**Introduction and buffer cache**	**07 Hours**

Introduction: - General Overview of the System - History, System Structure, User Perspective, Operating System Services, Assumption About Hardware, Architecture of UNIX OS, Introduction to system concepts, Kernel Data Structure, System Administration,

Buffer Cache: - Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, advantages and disadvantages of cache.

Unit II	**Internal Representation of Files**	**06 Hours**

Internal Representation of Files:-I-nodes, structure of the regular file, directories, conversion of a pathname to i-node, super block, I-node assignment to a new file, allocation of disk blocks, other file types.

Unit III	**System Calls for file system**	**06 Hours**

System Calls for File System: - Open, Read, write, File and Record Locking, Adjusting the position of FILE I/O- LSEEK, Close, File Creation, Creation of Special File, Change Directory
and Change Root, Change Owner and Change Mode, Stat and fstat, Pipes, Mounting and Un-mounting file systems, Link, Unlink.

Unit IV	**The Structure of process**	**06 Hours**

The Structure of Process: - Process stages and transitions, layout of system memory, the context of a process, Saving context of a process, manipulation of the process address space

Unit V	**Process Control and Scheduling**	**07 Hours**

Process Control: -Process Control: - Process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, the shell, System Boot and the Init process.

Process Scheduling: - Process Scheduling, system call for time, clock

Unit VI	**Memory management and I/O Subsystem**	**07 Hours**

Memory management and I/O Subsystem: -Swapping, Demand passing. Driver interfaces, disk drives, terminal drivers, Streams.

Text Books:

1. The design of Unix Operating System - Maurice J. Bach (PHI)

References Books:

1. Linux System Programming - Robert Love, Publisher - SPD, O' REILLY
2. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL317: Business Intelligence

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	04	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Explain components of BI architecture and working of Business Intelligence systems..
- Explain fact tables and dimension tables, explain dimensional modeling & steps in design of dimensional modeling.
- Explain components of ETL and working of ETL Systems
- Explain BI analytical tools & reporting tools, applications and design of BI analytical tools and reporting tools.

Course Contents

Unit I	**Introducing the Technical Architecture**	**09 Hours**
The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, Security.		
Unit II	**Introducing Dimensional Modeling**	**07 Hours**
Making the Case for Dimensional Modeling, Dimensional Modeling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts.		
Unit III	**Designing the Dimensional Modeling**	**06 Hours**
Modeling Process overview, Getting Organized, Four Step Modeling Process, Design the Dimensional Model.		
Unit IV	**Introducing Extract, Transformation & Load**	**06 Hours**
Round up the requirements, the 34subsystems of ETL, Extracting Data, Cleaning & Conforming data, Delivering Data for Presentation		
Unit V	**Introducing Business Intelligence Applications**	**07 Hours**
Importance of B.I. Applications, Analytical cycle for B.I, Types of B.I. Applications, Navigating Applications via the B.I portal.		
Unit VI	**Designing & Developing B.I Applications**	**07 Hours**
B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance		

Text Books:

1. Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India

References Books:

1. Data Warehousing: Fundamentals for IT Professionals by Paulraj Ponniah; 2nd Edn. Publisher: Wiley, John & Sons, Incorporated
2. Star Schema: The Complete Reference by Christopher Adamson, Mc-Graw Hill Osborne Media
3. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling by Ralph Kimball Corporate Information Factory by W. H. Inmon
4. Data Warehousing in the Real World – Anahory & Murray, Pearson

DKTE Society's Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL318: Recommendation System

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 03 Hrs. /Week	03	SE-I: 25 Marks
Tutorials: 00 Hrs./Week		SE-II: 25 Marks
Practical: 00 Hrs./Week		SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- To explain the basic concepts of recommender systems.
- To explore different types of recommender systems.
- To describe performance evaluation of recommender systems based on various metrics.

Course Contents

Unit I	**Introduction**	**06 Hours**

Introduction: Recommender system functions, Linear Algebra notation: Matrix addition, Multiplication, transposition, and inverses; covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system.

Unit II	**Collaborative Filtering**	**06 Hours**

Collaborative Filtering: User-based nearest neighbor recommendation, Item-based nearest neighbor recommendation, Model based and pre-processing-based approaches, Attacks on collaborative recommender systems.

Unit III	**Content-based recommendation**	**06 Hours**

Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content-based filtering, Item profiles, discovering features of documents, obtaining item features from tags, representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

Unit IV	**Knowledge based recommendation**	**06 Hours**

Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders.

Unit V	**Hybrid approaches**	**06 Hours**

Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.

Unit VI	**Evaluating Recommender System**	**06 Hours**

Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centered metrics

Text Books:

1. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press (2011), 1st ed.
2. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, Springer (2011), 1st ed.

References Books:

1. Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, Springer (2013), 1st ed

Useful Links:

1. https://www.academia.edu/download/59888249/2016_Book_RecommenderSystems20190628-83834-1u64gk9.pdf&hl=en&sa=X&ei=UX-1YuzMAcKN6rQP-9Ca6AM&scisig=AAGBfm2ZhzB27KyM2huiZ8sNZFKz_9k_oQ&oi=scholarr

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIL319: Web Technologies Lab

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 02 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 04 Hrs./Week	04	CIE: 50 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

- Develop a responsive webpage as per the given requirement.
- Write an application to handle XML document.
- Apply client side technologies to perform various computations on client.
- Apply server side technologies to develop web application with database and session handling.

Course Contents

Unit I	Web Page Development	07 Hours

HTML Design Patterns: HTML Structure, Terminal Block Elements, Structural Block Elements, Multipurpose Block Elements, Inline Elements, Class and ID Attributes, HTML Whitespaces

CSS Selector and Inheritance: Type, Class and ID Selector, Position and Group Selectors, Attribute Selectors, Pseudo-element Selectors, Pseudo-class Selectors, Subclass Selector, Inheritance, Visual Inheritance

Box Model: Display, Box Model, Inline Box, Inline-Block Box, Block Box, Table Box, Absolute Box, Floated Box.

Unit II	Responsive Web Pages	06 Hours

Responsive Web Designing: Introduction, Viewport, Grid View, Image, Video Media Queries, RWD frameworks

Twitter Bootstrap : Introduction, Grid Basics, Typography, Tables, Images, Jumbotron, Well, Alerts, Button, Button Group, Glyphicons, Borders, Labels, Progress bar, Pagination, Pager, List groups, Panels, Drowpdown, Collapse, Tabs, Navbar, Forms, Inputs, Input sizing, Media Objects, Carousel, Modal, Tooltip, Popover, Scrollspy, Affix, Filters.

Unit III	XML and Parsing	06 Hours

What is XML, XML verses HTML, XML terminology, XML standards, XML syntax checking, The idea of markup, XML Structure, Organizing information in XML, Creating Well-formed XML, XML Namespaces.

DTD- Introduction to DTD, Document Type Declaration, Element Type Declaration, Attribute Declaration, Conditional Section, Limitations of DTD

Introduction to Parser, Parsing approaches, JAXP, JAXP and SAX, JAXP and DOM.

Introduction to XSL, overview, XPATH, XSLT – templates, creating elements and attributes, looping and sorting, conditional processing, defining variables.

Unit IV	JavaScript	06 Hours

Introduction, Core features - Data types and Variables, Operators, Expressions and Statements, Functions & Scope, Objects - Array, Date and Math related Objects, Document Object Model, Event Handling, Browser Object Model, Windows and Documents, Form handling and validations.

Unit V	JQuery	07 Hours

Introducing jQuery, jQuery selector, jQuery HTML, Animation effects, Event handling, DOM, jQuery DOM traversing, DOM manipulation.

Unit VI	Introduction to	07 Hours

Introducing PHP: History, General Language Feature
PHP Basics: Embedding PHP code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, and Control Structures
Functions: Invoking a Function, Creating a Function, Function Libraries
Array: Introduction, Creating an array, outputting an Array, Merging, slicing, splicing and Dissecting Arrays, Other useful Array Functions
Using PHP with MySQL: Installation Prerequisites, Using the MySqli Extension, Interacting with the Database, Executing Database Transactions
Session Handlers: What Is Session Handling, Configuration Directives, Working with Sessions, Practical Session-Handling Examples, Creating Custom Session Handlers
Handling File Uploads: Uploading Files with PHP

Text Books:

1. Pro HTML5 and CSS3 Design Patterns by Michael Bowers, Dionysios Synodinos and Victor Sumner, Apress edition
2. Twitter Bootstrap Development How to by David Cochran, Packt Publication
3. XML and Related Technologies – Atul Kahate , Pearson Education.
4. JavaScript: The Definitive Guide by David Flanagan, O'Reilly Media
5. jQuery in Action by Bear Bibeault, Manning Publication
6. Beginning PHP and MySQL: From Novice to Professional, Fourth Edition - W. Jason Gilmore

References Books:

1. Beginning with HTML5 and CSS3 The Web Evolved by Murphy, Apress
2. Responsive Web Design with HTML5 and CSS3 by Ben Frain, Packt Publication
3. JavaScript: The Complete Reference by Thomas A Powell, Fritz Schneider, Tata McGraw Hill
4. Head First jQuery by Ryan Benedetti, O’reilly Publication
5. Modern PHP by Josh Lockhart, O’reilly Publication

DKTES Textile and Engineering Institute , Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIP320: Natural Language Processing Lab

Lab Scheme: Practical: 02 Hrs. /Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: - Marks

Course Outcomes:

On completion of the course, student will be able to–

- Design the model for different natural language tasks
- Devise the representation of word from the corpus.

List of Experiments

(It should consist of 10-12 experiments based on the following topics.)

1	Demonstration of stemming and lemmatization
2	Demonstrate the tokenization and stop words removal
3	Write a python program to build N-grams from the text.
4	Implement N-gram model to predict the next word in the sentence.
5	Demonstration of stemming and lemmatization
6	Demonstration of parts-of-speech tagging
7	Demonstration of document classification using TF-IDF
8	Demonstration of named entity recognition
9	Demonstration of sentiment analysis
10	Implement Naïve Bays classifier for text classification
11	Implement Word Sense Disambiguation algorithm
12	Learn Word2Vec word embedding from the given corpus and perform various operations on it.

DKTES Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AID321: Mini Project-II

Lab Scheme:	Credits	Evaluation Scheme:
Practical: 02 Hrs. /Week	02	CIE: 50 Marks SEE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- Analyze the problem and prepare SRS and design document.
- Write code.
- Carry out testing.
- Write a report covering details of the project.

Course Content

The Mini project-I group is supposed to choose a specific domain for the mini project-II. Further the group should identify the relevant problem in the selected domain and propose the solution, which can be implemented as a mini-project using suitable technology. The mini-project-II work should be evaluated by a team of teachers appointed by the department/COE. The evaluation and marking should include Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) during which the group should give presentation and demonstration of their work done. Care should be taken to avoid out-sourcing of the work.

Mini project group is expected to select the domain from following, but not limited to-

- Machine Learning
- Image processing
- Artificial Intelligence
- Data Science
- Cloud computing
- Block chain
- Internet (Web) of Things
- Cyber security
- Data mining

DKTE Society's Textile and Engineering Institute, Ichalkaranji
Third Year B. Tech. (Semester – VI)
AIT322: Industrial Training / Internship

Teaching Scheme:	Credits	Evaluation Scheme:
Lectures: 00 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	01	CIE: 50 Marks

Course Outcomes:

On completion of the course, student will be able to–

- To Apply fundamental principles of Computer Science.
- To become specialized in a particular technology domain.
- To become updated with all the latest changes in technological world.
- To communicate efficiently
- To identify, formulate and model problems and find engineering solution based on a systems approach
- To have awareness of the social, cultural, global and environmental responsibility as an engineer

Course Contents

Students have to complete two weeks industrial training program after semester V in Software /hardware Industries, Telecom Sectors, Corporate Offices of their choice with the approval of the Department. At the end of the training student will submit a report as per the prescribed format to the department.

Course Assessment

This course is mandatory credit-based course and the student has to pass the course to be promoted to final year. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. CIE Marks will be awarded out of 50 and appropriate grades assigned as per the rules and regulations.