

B. Tech Computer Science and Engineering (Artificial Intelligence and Machine Learning)
Scheme of Studies/Examination (w.e.f. Session 2022-23)
Semester VI

S. No.	Course No.	Subject	L:T:P	Hours / Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	PC-CS-AIML-302A	Human Computer Interaction	3:0:0	3	3	75	25	0	100	3
2	PC-CS-AIML-304A	Applied Machine Learning	3:0:0	3	3	75	25	0	100	3
3	PC-CS-AIML-306A	Expert Systems	3:0:0	3	3	75	25	0	100	3
4	PC-CS-AIML-308A	Software Testing	3:0:0	3	3	75	25	0	100	3
5	PC-CS-AIML-310A	Computer Vision	3:0:0	3	3	75	25	0	100	3
6	OEC	OEC Elective-I	3:0:0	3	3	75	25	0	100	3
7	PC-CS-AIML-312A	Applied Machine Learning Lab	0:0:2	2	1	0	40	60	100	3
8	PC-CS-AIML-314A	Expert Systems Lab	0:0:2	2	1	0	40	60	100	3
9	PC-CS-AIML-318A	Software Testing Lab	0:0:2	2	1	0	40	60	100	3
		Total		24	21	450	270	180	900	

OEC Elective-I
Soft Skills and Interpersonal Communication: OE-CS- AIML -302
Project Management: OE-CS- AIML -304
Enterprise Resource Planning: OE-CS- AIML -306
Stochastic Processes and Applications: OE-CS- AIML -308

***The students will choose any One Open Elective course out of the given elective list in VI Semester.**

PC CS- - AIML- 302A		Human Computer Interaction					
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	Objective of this course is to learn the foundations of Human Computer Interaction and be familiar with the design technologies for individuals and persons with disabilities and mobile Human Computer interaction.						
Course Outcomes (CO)							
CO1	To develop the foundations of Human Computer Interaction						
CO2	To learn and apply the design technologies for individuals and persons with disabilities						
CO3	To Understand the structure of models and theories of human computer interaction and vision						
CO4	To Design an interactive web interface on the basis of models studied.						

Unit 1

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms.

Unit 2

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules– principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Unit 3

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Unit 4

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Suggested Books:

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, —Human Computer Interaction, 3rd Edition, Pearson Education, 2004 (UNIT I, II & III)
- Brian Fling, —Mobile Design and Development, First Edition, O Reilly Media Inc., 2009
- Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O Reilly, 2009.

Applied Machine Learning							
PC- CS- AIML- 304A							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	Objective of this course is to learn conceptually how Machine Learning algorithms work and interact with data; the emphasis will be on effective methodology for using Machine Learning to solve practical problems.						
Course Outcomes (CO)							
CO1	To develop an understanding of where and how Machine Learning can be used.						
CO2	To learn and apply supervised learning techniques to regression and classification problems						
CO3	To understand and apply the concept of KNN and SVM.						
CO4	To learn and apply unsupervised Machine Learning techniques.						

Unit-1

Introduction-Data representation, domain knowledge for productive use of machine learning, diversity of data: structured/unstructured, machine learning and data mining, basic linear algebra in machine learning techniques, relevant resources for machine learning.

Supervised learning: rationale and basics, learning from observations, bias and variance, why learning works: computational learning theory, occam's razor principle and overfitting avoidance, heuristic search in inductive learning, estimating generalization errors, metrics for assessing regression (numeric prediction) accuracy, metrics for assessing classification (pattern recognition) accuracy, Model selection and validation: Validation for model selection, k-fold cross-validation, Training Validation-Testing split.

Unit-2

Regression: Linear regression, linear regression with least square error criterion, Multiple linear regression, Polynomial regression, Logistic regression, logistic regression for classification tasks, fisher's linear discriminant and thresholding for classification, minimum description length principle, Gradient Descent: Introduction, Stochastic Gradient Descent, Sub gradients, Stochastic Gradient Descent for risk minimization.

Classification: Decision Tree algorithms, Random forests, Decision tree learning, Building a decision tree, combining weak to strong learners via random forest. Regularized loss minimization machine learning and inferential statistical analysis, descriptive statistics in learning techniques, Bayesian reasoning: a probabilistic approach to inference.

Unit-3

K-Nearest Neighbor (KNN) Algorithm, Naive Bayes, Linear Discriminant Analysis, Latent variables and Expectation-maximization algorithm, Bayesian learning Feature Selection and Generation: Feature selection, Feature transformations, Feature learning.

Learning with support vector machines (SVM)-introduction, linear discriminant functions for binary classification, perceptron algorithm, linear maximal margin classifier for linearly separable data, linear soft margin classifier for overlapping classes, kernel-induced feature spaces, nonlinear classifier, regression by support vector machines, decomposing multiclass classification problem into binary classification tasks, variants of basic SVM techniques

Unit-4

Unsupervised Learning-unsupervised learning, engineering the data, overview of basic clustering methods-means clustering, k-means clustering, expectation-maximization (EM) algorithm and gaussian mixtures clustering, some useful data transformations, Dimensionality reduction: Principal Component Analysis, Random projections, Compressed sensing entropy-based method for attribute discretization, principal components analysis (PCA) for attribute reduction, rough sets-based methods for attribute reduction.

Suggested Books:

M. Gopal, Applied Machine learning, McGraw-Hill Education, 2019

David Forsyth, Applied Machine learning, Springer, 2019

Pascal Bugnion, Patrick R. Nicolas, Alex Kozlov, Scala: Applied Machine Learning, Packt Publishing, 1st Edition, 2017

PC- CS- AIML- 306A	Expert Systems						
Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	In this course the student will learn the methodologies used to transfer the knowledge of a human expert into an intelligent program that can be used to solve real-time problems.						
Course Outcomes (CO)							
CO1	Examining the fundamentals and terminologies of expert system.						
CO2	To explore knowledge of expert system.						
CO3	To facilitate students to implement various knowledge representation techniques for acquisition and validate various structures in expertssystem domain.						
CO4	Signifying AI techniques to solve social, industrial, and environmental problems.						
CO5	Application of professional aspects in multi-disciplinary approach to meet global standards towards design, realizing and manufacturing.						

Unit-I

Introduction to AI programming languages, Blind search strategies, Breadth first – Depth first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game tress, Min-max algorithms, game playing – Alpha beta pruning.

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules based deduction systems.

Unit-II

Introduction to Expert Systems, Difference between expert system and conventional programs, Basic activities of expert system, Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control, Basic aspect of expert system, Acquisition module frames, Knowledge base, Production rules- semantic net, Inference Engine- Backward chaining and forward chaining-Explanatory interface,types of problems handled by expert systems.

Unit-III

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, System-building aids, support facilities, stages in the development of expert systems.

Building an Expert System: Expert system development, Selection of tool, acquiring Knowledge, Building process.

Unit-IV

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain expert, difficulties during development.

Case studies on Expert systems

Suggested Books:

Elain Rich and Kevin Knight, —Artificial Intelligencel, Tata McGraw-Hill, New Delhi, 2009.

Waterman D.A., —A Guide to Expert Systems, Addison Wesley Longman, 1985

Staurt Russel and other Peter Norvig, —Artificial Intelligence – A Modern Approach, Prentice Hall, 1995.

Introduction To Expert Systems, Addison-Wesley; 3rd edition ,1999

Introduction to Expert Systems: The Developments and Implementation of Rule-based Expert Systems, McGraw-Hill Inc, 1990

Patrick Henry Winston, —Artificial Intelligencel, Addison Wesley, 1992, 3rd Ed..

Patterson, Artificial Intelligence & Expert System, Prentice Hall India,1999.

Hayes-Roth, Lenat and Waterman: Building Expert Systems, Addison Wesley, 1983.

Weiss S.M. and Kulikowski C.A., —A Practical Guide to Designing Expert Systems, Rowman & Allanheld, New Jersey, 2011.

PC-CS-AIML-308A	Software Testing						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To provide an understanding of concepts and techniques for testing software and assuring its quality.						
Course Outcomes							
CO 1	Expose the criteria and parameters for the generation of test cases.						
CO 2	Learn the design of test cases and generating test cases.						
CO 3	Be familiar with test management and software testing activities and V&V activities.						
CO 4	Be exposed to the significance of software testing in web and Object orient techniques.						

Unit-I

Introduction: Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, Definition of software testing, test cases, test oracles, testing process, limitations of testing.

Unit-II

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

Unit-III

Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing and Slice based testing.

Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

Unit-IV

Overview of SQM: Concepts of Software Quality, quality attributes, software quality models: McCall, Boehm, ISO-9000, CMM.

Misellaneous Topics: Stress testing, Adhoc testing, Buddy testing, Exploratory testing, Agile and extreme testing.

Suggested Books:

Naresh Chauhan, —Software Testing Principles and Practices| Oxford publications, 2012.

William Perry, —Effective Methods for Software Testing|, John Wiley & Sons, New York, 1995.

CemKaner, Jack Falk, Nguyen Quoc, —Testing Computer Software|, Second Edition, Van Nostrand Reinhold, New York, 1993.

Boris Beizer, —Software Testing Techniques|, Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.

Louise Tamres, —Software Testing|, Pearson Education Asia, 2002

Roger S. Pressman, —Software Engineering – A Practitioner’s Approach|, Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.

Boris Beizer, —Black-Box Testing – Techniques for Functional Testing of Software and Systems|, John Wiley & Sons Inc., New York, 1995.

K.K. Aggarwal & Yogesh Singh, —Software Engineering|, New Age International Publishers,

New Delhi, 2003.

Marc Roper, —Software TestingI, McGraw-Hill Book Co., London, 1994.

PC-CS- AIML-310A	Computer Vision						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To provide an understanding of concepts and techniques for computer vision						
Course Outcomes							
CO 1	To develop the foundation of image formation, measurement, and analysis						
CO 2	To developed the practical skills necessary to build computer vision applications						
CO 3	the geometric relationships between 2D images and the 3D world.						
CO 4	To have gained exposure to object and scene recognition and categorization from images						

Unit 1

Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.

Unit 2

Edge detection, Edge detection performance, Hough transform, corner detection, Segmentation, Morphological filtering, Fourier transform.

Unit 3

Feature extraction, shape, histogram, color, spectral, texture, using CVIptools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing.

Unit 4

Pattern Analysis; Clustering: K-Means, K-Medoids, Mixture of Gaussians.

Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised.

Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.

Suggested Books:

Richard Szeliski, —Computer Vision: Algorithms and Applications|

Goodfellow, Bengio, and Courville, —Deep Learning|

Fisher et al., —Dictionary of Computer Vision and Image Processing|

OE-CS-AIML-302	Soft Skills and Interpersonal Communication						
Lecture	Tutorial	Practical	Credits	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hour
Purpose	To Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.						
Course Outcomes (CO)							
CO1	Develop effective communication skills (spoken and written).						
CO2	Develop effective presentation skills.						
CO3	Conduct effective business correspondence and prepare business reports which produce results.						
CO4	Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.						

Unit I

Introduction, Need for Communication, Process of Communication - Written and Verbal Communication, Visual communication, Signs, Signals and Symbols, Silence as a Mode of Communication - Inter-cultural, Intra-cultural, Cross-cultural and International communication - Communications skills, Communication through Questionnaires, Business Letter Writing, Electronic Communication. Barriers to Communication Improving Communication Skills -Preparation of Promotional Material -Non-verbal communication -Body language - Postures and gestures -Value of time -Organizational body language - Importance of Listening -Emotional Intelligence

Unit II

Business Cases and Presentations, Letters within the Organizations, Letters from Top Management, Circulars and Memos - Business Presentations to Customers and other stakeholders, Presenting a Positive Image through Verbal and Non-verbal Cues, Preparing and Delivering the Presentations, Use of Audio-visual Aids - Report Writing

Unit III

Individual Interaction and skills Basic Interaction Skills –Within family, Society Personal and interpersonal intrapersonal skills Types of skills; conceptual, supervisory, technical, managerial and decision making skills. Problem Solving, Lateral Thinking Self Awareness and Self Esteem Group Influence on Interaction Skills Human relations examples through role – play and cases

Unit IV:

Leadership Skills Working individually and in a team Leadership skills 15 Lectures Leadership Lessons through Literature Team work & Team building Interpersonal skills – Conversation, Feedback, Feed forward Interpersonal skills – Delegation, Humor, Trust, Expectations, Values, Status, Compatibility and their role in building team – work Conflict Management – Types of conflicts, how to cope with them Small cases including role – plays will be used as teaching methodology.Negotiation Skills (To be Taught through Role Plays and Cases) Types of Negotiation Negotiation Strategies Selling skills – Selling to customers Selling to Superiors Selling to peer groups, team mates & subordinates Conceptual selling, Strategic selling Selling skills – Body language.

Suggested Books:

A Practical Guide to Soft Skills Communication, Psychology, and Ethics for Your Professional Life by Richard Almonte, Taylor & Francis.

OE-CS- AIML - 304	Project Management						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To provide an understanding of Software Project Planning and Evaluation techniques.						
Course Outcomes							
CO 1	To Understand Project Management principles while developing software.						
CO 2	To manage software projects and control software deliverables.						
CO 3	To Obtain adequate knowledge about software process models and software effort estimation techniques.						
CO 4	To Learn staff selection process and the issues related to people management.						

UNIT I PROJECT EVALUATION AND PROJECT PLANNING

Importance of Software Project Management – Activities - Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION

Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL

Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

SUGGESTED BOOKS:

Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata

McGraw Hill, New Delhi, 2012.

Robert K. Wysocki —Effective Software Project ManagementI – Wiley Publication, 2011

Walker Royce: —Software Project ManagementI- Addison-Wesley, 1998.

Gopaldaswamy Ramesh, —Managing Global Software ProjectsI – McGraw Hill Education (India),

Fourteenth Reprint 2013.

OE-CS-AIML - 306	Enterprise Resource Planning						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To provide an understanding of concept of ERP and the ERP model;key terms; the transition from MRP to ERP; identify the levels of ERP maturity.						
Course Outcomes							
CO 1	To Develop model for ERP for large projects						
CO 2	To Develop model for E-commerce architecture for any application						
CO 3	To Demonstrate a working knowledge of how data and transactions are integrated in an ERP system to manage the sales order process, production process, and procurement process.						
CO 4	To Evaluate organizational opportunities and challenges in the design system within a business scenario.						

Unit I

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP.

Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM), LAP, Supply chain Management.

Unit II

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.

Unit III

ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.

Unit IV

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study.

SUGGESTED BOOKS

Vinod Kumar Garg and Venkitakrishnan N K, —Enterprise Resource Planning Concepts and Practicel, PHI.

Joseph A Brady, Ellen F Monk, Bret Wagner, —Concepts in Enterprise Resource Planningl, Thompson Course Technology.

Alexis Leon, —ERP Demystifiedl, Tata McGraw Hill

Rahul V. Altekar —Enterprise Resource Planningl, Tata McGraw Hill,

Vinod Kumar Garg and Venkitakrishnan N K, —Enterprise Resource Planning – A Concepts and Practicel, PHI

Mary Summer, —Enterprise Resource Planning— Pearson Education

OE-CS- AIML - 308	Stochastic Processes and Applications						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To provide an Understanding of the concepts of Random Process						
Course Outcomes							
CO 1	To demonstrate clear understanding of random variable and distribution.						
CO 2	To demonstrate operations on single random variable						
CO 3	To demonstrate operations on multiple random variable						
CO 4	To demonstrate random processes with its characteristics.						

Unit – I

THE RANDOM VARIABLE : Introduction, Review of Probability Theory, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

Unit - II

OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

Unit - III

MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions. **OPERATIONS ON MULTIPLE RANDOM VARIABLES**: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit - IV

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, Nth-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Suggested Books

Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.

Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrishna, PHI, 4th Edition, 2002.

Probability Theory and Stochastic Processes – B. Prabhakara Rao, BS Publications

Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.

Schaum's Outline of Probability, Random Variables, and Random Processes.

An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.

Random Process – Ludeman , John Wiley

Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015

PC-CS-AIML-312A	Applied Machine Learning Lab						
Lecture	Tutorial	Practical	Credit	Minor Test	Practical	Total	Time
0	0	2	1	40	60	100	3
Purpose	To apply Machine Learning to complex real-world datasets and observe the findings.						
Course Outcomes (CO)							
CO1	To formulate a machine learning problem and develop a solution.						
CO2	To select an appropriate pattern analysis method for analyzing data.						
CO3	To apply machine learning techniques such as classification and feature selection to practical applications and detect patterns in the data.						
CO4	To develop an ANN network and analyze the data.						
CO5	To implement recent machine learning techniques, train models, conduct experiments, and develop real-world ML-based applications and products						

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate- Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
 3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
 4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
 6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
 7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k- Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
 8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
 9. Implement the non-parametric Locally Weighted Regression algorithm to fit data points. Select appropriate data set for your experiment and draw graphs.
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PC- CS- AIML- 314A	Expert Systems Lab						
Lecture	Tutorial	Practical	Credits	Minor Test	Practical	Total	Time
0	0	2	1	40	60	100	3 Hrs.
Purpose	To implement the concepts of intelligent agents, searching, knowledge and reasoning, planning, learning and expert systems.						
Course Outcomes (CO)							
CO1	To implement about representing knowledge.						
CO2	To study the reasoning and decision making of some real life problems						
CO3	To construct plans and methods for generating knowledge.						
CO4	To study the concepts of expert systems.						

1. Study of Prolog Language.

2 Write simple fact for the statements using PROLOG.

3 Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

4 Write a program to solve the Monkey Banana problem.

5 WAP in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts. 6 WAP to implement factorial, Fibonacci of a given number.

7 Write a program to solve 4-Queen problem.

8 Write a program to solve traveling salesman problem.

9 Write a program to solve water jug problem using LISP

10 Case study of standard AI programs, like, Mycin, and AI Shell.

Software Testing Lab							
PC- CS- AIML- 318A							
Lecture	Tutorial	Practical	Credits	Minor Test	Practical	Total	Time
0	0	2	1	40	60	100	3 Hrs.
Purpose	To implement different techniques for testing software.						
Course Outcomes (CO)							
CO1	To design and implement the test cases..						
CO2	Generating test cases for real life problems.						
CO3	To implement test management and software testing activities and V&V activities.						
CO4	To implement software testing in web and Object orient techniques.						

1. Decision table approach for solving triangle problem. Design and develop a program in a language of your choice to solve the triangle problem defined as follows : Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.
2. (Boundary value analysis program) .Design and develop a program in a language of your choice to solve the triangle problem defined as follows : Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on boundary value analysis, execute the test cases and discuss the result
3. (Equivalence class partitioning program) Design and develop a program in a language of your choice to solve the triangle problem defined as follows : Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on equivalence class partitioning , execute the test cases and discuss the results
4. Dataflow Testing for commission calculation.
5. (Boundary for Commission Problem) Design. develop, code and run the program in nay suitable language to solve the commission problem. Analyze it from the perspective of boundary value, derive test cases, execute these test cases and discuss the test results. Assumption price for lock=45.0, stock=30.0 and barrels=25.0 production limit could sell in a month 70 locks,80 stocks and 90 barrels commission on sales = 10 % <= 1000 and 15 % on 1000 to 1800 and 20 % on above 1800.
6. (Equivalence for Commission Problem) Design. develop, code and run the program in nay suitable language to solve the commission problem. Analyze it from the perspective of boundary value, derive test cases, execute these test cases and discuss the test results. Assumption price for lock=45.0, stock=30.0 and barrels=25.0 production limit could sell in a month 70 locks,80 stocks and 90 barrels commission on sales = 10 % <= 1000 and 15 % on 1000 to 1800 and 20 % on above 1800.
7. (Decision Test Case for Commission Problem) Design. develop, code and run the program in nay suitable language to solve the commission problem. Analyze it from the perspective of boundary value, derive test cases, execute these test cases and discuss the test results. Assumption price for lock=45.0, stock=30.0 and barrels=25.0 production limit could sell in a month 70 locks,80 stocks and 90 barrels commission on sales = 10 % <= 1000 and 15 % on 1000 to 1800 and 20 % on above 1800.

8. (Binary Search - Path Testing) Design, develop a code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases execute these test cases and discuss the test results.
9. (Quick Sort-Path Testing) Design, develop ,code and run the program in any suitable language to implement the quicksort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.
10. (Absolute Letter Grading Path Testing) Design, develop, code and run the program in any suitable language to implement an absolute letter grading procedure, making suitable assumptions. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.
11. Write the test cases for GMAIL.
12. Create and test plan document for any application (e.g. Library Management System)