SEMESTER – VI

S.No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	20CS6T01	Compiler Design	3	-	-	3.0	30	70	100
2	20CS6T02	Object Oriented Analysis and Design	3	-	-	3.0	30	70	100
3	20CS6T03	Machine Learning	3	-	-	3.0	30	70	100
4		**Professional Elective-II**	3	-	-	3.0	30	70	100
	20CS6E01	Mobile Application Development							
	20CS6E02	Human Computer Interaction							
	20CS6E03	Software Testing Methodologies							
	20CS6E04	Artificial Intelligence Tools and Techniques							
5		**Open Elective - II / Job Oriented Elective-II**	2	-	2	3.0	30	70	100
6	20CS6L01	Machine Learning Lab	-	-	3	1.5	30	70	100
7	20CS6L02	Object Oriented Analysis and Design Lab	-	-	3	1.5	30	70	100
8	20CS6L03	Compiler Design Lab	-	-	3	1.5	30	70	100
9	20CS6S01	Web Design and Development	1	-	2	2	30	70	100
10	20CS6C01	Community Service Project	-	-	-	4	100	-	100
11	20HS6T01	Professional Ethics and Intellectual Property Rights	2	0	0	0	-	-	-
TOTAL			21	0	13	25.5	370	630	1000

VI **SEMESTER**	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**
20CS6T01- COMPILER DESIGN				

COURSE OUTCOMES:

At the end of the course students are able to

1. Apply language processors with its phases and demonstrate about scanning of tokens.(K3)
2. Identify the syntax analysis by using parsing techniques(K2)
3. Discover and perform Semantic analysis using attribute grammar(K2)
4. Compare different memory Management techniques in runtime environment(K2)
5. Ask various optimization techniques for intermediate code forms and code generation.(K2)

UNIT 1:

Overview of language processing: – preprocessors–compiler–assembler–Linkers &loaders, difference between compiler and interpreter- structure of a compiler –phases of a compiler. **Lexical Analysis**: - Role of Lexical Analysis – Input Buffering – Specification of Tokens – Recognition of Token – The Lexical Analyzer Generator Lex.

UNIT 2:

Syntax Analysis: – Role of a parser, Functions of parser, Context Free Grammar.**Top-Down Parsing**: – Recursive Descent Parsing — Non recursive Predictive Parsing- FIRST and FOLLOW – LL(1) Grammar – Error Recovery in Predictive Parsing.

UNIT 3:

Bottom-up Parsing: – Reductions–Handle Pruning - Shift Reduce Parsing - Introductionto simple LR – Why LR Parsers – Model of an LR Parsers — Construction of SLR Tables.

More powerful LR parsers: - Construction of CLR (1) - LALR Parsing tables.

UNIT 4

Runtime Environment: - Storage organization - Stack allocation–Static allocation - Heapmanagement - Parameter passing mechanisms.

Intermediate code: - DAG - Three address code–Quadruples - Triples - Indirect Triples.

UNIT 5

Common Optimization techniques : - Folding, Copy Propagation, Common Sub expression elimination, Frequency reduction, Strength reduction etc.

Machine dependent code optimization: - Peephole optimization–Register allocation -Instruction scheduling - Inter Procedural Optimization - Garbage collection via reference counting.

VI SEMESTER	L	T	P	C
	3	0	-	3
20CS6T02-OBJECT ORIENTED ANALYSIS AND DESIGN				

COURSE OUTCOMES:

At the end of the course students are able to

1. Identify the importance of modeling and object-oriented systems analysis and design. (K2)
2. Develop the basic structural modeling techniques using building blocks of UML. (K3)
3. Apply common modeling techniques for class and object diagrams. (K3)
4. Generalize the basic behavioral and advanced behavioral modeling diagrams. (K2)
5. Illustrate the components and deployment diagrams. (K4)

UNIT I

Introduction to UML: Importance of modeling, principles of modeling, object-oriented modeling, An Overview of the UML, A conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. **Advanced Structural Modeling**: Advanced classes, advanced relationships.

UNIT III

Class & Object Diagrams: Terms and conceptsofClass Diagram, Terms and conceptsof**Object** Diagram, common modeling techniques for Class & Object Diagrams.

UNIT IV

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, state chart diagrams.

UNIT V

Architectural Modeling: Components, Deployment, Component diagrams and Deployment diagrams.

AGILE PROCESSES

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

VI SEMESTER	L	T	P	C
	3	0	-	3
20CS6T03- MACHINE LEARNING				

COURSE OUTCOMES:

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

1. Observe the concepts and types of models in machine learning(K2)
2. Identify to reduce the dimension of the dataset using machine learning techniques(K2)
3. Apply to implement a classification model for any real scenario(K3)
4. Develop an unsupervised learning application using clustering techniques. (K3)
5. Predict methods of ensemble models by applications of ensemble learning. (K3)

UNIT-I:

INTRODUCTION TO MACHINE LEARNING:

What is machine learning, Problems Machine Learning Can Solve, Framework for developing Machine Learning Models, Examples of Machine Learning Applications - Learning Associations, Classification, Regression, Unsupervised Learning, and Reinforcement Learning

UNIT-II

DIMENSIONALITY REDUCTION*:*

Introduction, Feature Selection-Forward selection, Bidirectional Elimination, Principal Component analysis, L1 and L2 regularization, Linear Discriminant Analysis**,** Basics of t-SNE, Information value and Weight of evidence

UNIT-III:

CLASSIFICATION: What is Classification, General Approach to Classification, Multi-class classification, multi-label classification, Binary Classification, , Logistic Regression, Decision Trees,k-Nearest Neighbor Algorithm, Naive Bayesian Classifier and SVM classifier

MODEL METRICS: ROC Curves, Confusion matrix, Holdout Method, Cross Validation, Bootstrap

UNIT-IV

CLUSTERING: Basic Clustering Methods: Partitional Clustering, Hierarchical Clustering, K-Means Clustering. Expectation-Maximization (EM) Algorithm and Gaussian Mixtures Clustering

INTRODUCTION TO NEURAL NETWORKS: Neural Network Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Back propagation Algorithm, Remarks on Back Propagation Algorithm,

UNIT-V

Ensemble Methods:

Introduction-What is Ensembling methods, Why Ensembling methods,, Applications of Ensemble methods, Boosting, Bagging, Combinational Methods-Benefits of combination, Averaging, Voting

TEXT BOOKS:

1.EthemAlpaydin, "Introduction to Machine Learning", 3rd edition, PHI,2014

2.Tom M. Mitchell,''Machine Learning'',MGH

REFERENCE BOOKS:

1.Zhi-Hua Zhou, "Ensemble Methods: Foundations and Algorithms", CRC Press, 2012

2.Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1st Edition, O'Reilly, 2016

3..Applied Machine Learning, M. Gopal, McGraw Hill Education,2019

VI SEMESTER PPROFESSIONAL ELECTIVE-II	L	T	P	C
	3	-	-	3
20CS6E04 : ARTIFICIAL INTELLIGENCE TOOLS AND TECHNIQUES				

COURSEOUTCOMES:

After undergoing this course, the students will be able to:

1. Observe build intelligent agents for search and games (K2)
2. Construct AI problems through Python/Prolog/etc(K3)
3. Illustrate learning optimization and inference algorithms for model learning(K4)
4. Develop programs for an agent to learn and act in a structured environment.(K3)
5. Apply to enhance the MDP concepts(K3)

UNIT 1:

Introduction: Concept of AI, history, scope, agents, environments, State space representation, Problem Formulations, Constraint satisfaction problem.

UNIT 2:

Search Algorithms: Uninformed search strategies (Breadth FirstSearch and Depth first),Informed search strategies (Best first search, A* search algorithm and Hill climbing), Game Search (Minimax algorithm, alpha-beta pruning).

UNIT 3:

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Inference in Bayesian Network, temporal model, hidden Markov model.

UNIT 4:

MarkovDecisionprocess:MDPformulation,utilitytheory,utilityfunctions,valueiteration,policyiterationand partially observable MDPs.

UNIT 5:

ReinforcementLearning:Passivereinforcementlearning,directutilityestimation,adaptivedynamicprogramming,temporaldifferencelearning, active reinforcement learning-Q learning.

VI SEMESTER : JOB ORIENTED ELECTIVE - II	L	T	P	C
	3	-	-	3
20CS6J01: AWS CLOUD PRACTITIONER				

COURSEOUTCOMES:

After completing this course, students should be able to

1. Show AWS cloud and identify the Global Infrastructure components of AWS. (K2)
2. Observe when to use Amazon EC2, AWS Lambda and AWS Elastic Beanstalk. (K2)
3. Differentiate Storage Services and demonstrate when to use AWS Database services. (K2)
4. Illustrate the Networking and Content Delivery Services. (K3)
5. Analyze to understand the Cloud economics and security. (K4)

UNIT 1:

CLOUD CONCEPTS OVERVIEW – Introduction to cloud computing, Cloud service models, Cloud computing Deployment models , Advantages of the cloud, Introduction to AWS.
AWS GLOBAL INFRASTRUCTURE OVERVIEW: AWS GLOBAL INFRASTRUCTURE, AWS Services and Service categories

UNIT 2:

COMPUTE – Compute services overview, Amazon EC2, Amazon EC2 pricing models, Benefits, use cases, four pillars of cost optimization, Container services, Introduction to AWS Lambda, Benefits of Lambda, Introduction to AWS Elastic Beanstalk, Benefits.

UNIT 3:

STORAGE: Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (Amazon S3), Amazon Elastic File System (Amazon EFS), Amazon Simple Storage Service Glacier (Amazon S3 Glacier).

DATABASES: Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB, Amazon RedShift, Amazon Aurora.

UNIT 4:

Networking and Content Delivery: Networking Basics, Amazon VPC, VPC Networking, VPC SECURITY, Amazon ROUTE-53, Amazon Cloud Front

UNIT 5:
CLOUD ECONOMICS AND BILLING: Fundamentals of pricing, AURI,PURI,NURI ,Total cost of Ownership (TOC).
AWS CLOUD SECURITY: AWS Shared Responsibility Model, AWS IAM (Identity and Access Management),Elastic Load Balancing (ELB), Amazon CloudWatch.

VI SEMESTER	L	T	P	C
	-	-	3	1.5
20CS6L01 : MACHINE LEARNING LAB				

COURSEOUTCOMES:

At the end of the course, the student will be able to,

1. Observe the implementation procedures for the Machine Learning algorithms.(K2)
2. Develop python programs for various learning algorithms.(K3)
3. Apply appropriate data sets to the Machine Learning algorithms.(K3)
4. Identify and apply Machine Learning algorithms to solve real world problems. (K2)
5. Illustrate various clustering algorithms for various applications.(K2)

LIST OF EXPERIMENTS:

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.Implement Simple Linear Regression

3.Implement Multi Linear Regression

4.Implement Logistic Regression

5.Data preprocessing for classification

6.Confusion matrix for a binary classifier.

7.Implement Support Vector Machines.

8.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.

9.Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.

10.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.

11.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.

12.Implement k-Mean’s algorithm to cluster a set of data stored in a .CSV file.

13. Implement Random Forest models for automatic classification

14. Implement Ensemble Model to perform classification.

VI SEMESTER	L	T	P	C
	-	-	3	1.5
20CS6L02 : OBJECT ORIENTED ANALYSIS & DESIGN LAB				

COURSE OUTCOMES:

At the end of the course students are able to

1. Sketch various UML diagrams.(K3)

2. Show the importance of systems analysis and design in solving computer-based problems.(K2)

3. Develop software architecture for a mini project problem.(K3)

4. Classify dynamic and static aspects of various case studies. (K2)

5. Transform model to code and code to model through Forward engineering. (K2)

Introduction about ARGO UML tool

Do the following List of UML CASE STUDY(S): USING ARGO UML tool

1) Model the UML diagrams of ATM Application.

2) Model the UML diagrams of Library Management System.

3) Model the UML diagrams of Online Book Shop.

4) Model the UML diagrams of Railway Reservation System.

5) Model the UML diagrams of Banking System.

6) Model the UML diagrams of Credit Card Processing.

7)Model the UML diagrams of PAYTM Application.

8) Model the UML diagrams of GOOGLE-PAY Application.

9) Model the UML diagrams of PHONE-PAY Application.

10) Model the UML diagrams of Ticket Vending Machine.

11) Model the UML diagrams of Airport Check-In.

12) Model the UML diagrams of Recruitment Application

NOTE: Must Draw the Use case, Class, Sequence, Activity Diagrams

VI SEMESTER	L	T	P	C
	-	-	3	1.5
20CS6L01: COMPAILER DESIGN LAB				

Course Outcomes:
At the end of the course students are able to

1 . Show Lexical analyzer for given language using C and LEX tools. (K2)
2. Identify to design and convert BNF rules into YACC form to generate various parsers. (K2)
3. Predict and design Predictive parser for the given language . (K2)
4 . Generalize machine code from the intermediate code forms . (K2)
5. Sketch Symbol table and design machine code from the abstract syntax tree . (K3)

Syllabus:
1. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.

2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating stools.

3. Design Predictive parser for the given language.

4. Design LALR bottom-up parser for the given language.

5. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.

6. Write program to generate machine code from the abstract syntax tree generated by the parser.

7. Implementation of Symbol Table.

8. Generation of Code for a given Intermediate Code.

Text Books:
1.Compilers: Principles, Techniques and Tools: 2nd Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ulman; 2nd Edition ,Pearson Education.

2.Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

VI SEMESTER	L	T	P	C
	2	-	-	2
20CS6S01-: WEB DESIGN AND DEVELOPMENT				

COURSE OUTCOMES:

At the end of the course, the student should be able to:

1. Show simple web pages using ReactJS.(K2)
2. Observe to gain an intermediate level of expertise in Spring Boot. (K2)
3. Practice various Servlet Programs and Implement Servlets technology for simple applications(K3)
4. Illustrate various operations on Mongo Database. (K2)
5. Develop Applications using ReactJS, MongoDB and Servlets(K3)

UNIT-I: ReactJS

ReactJS: An Introduction to ReactJS, Installation, Architecture, Creating A React Application, JSX, Components, Styling, Properties(props), Event Management, State Management, Http Client Programming, Form Programming, Routing, Redux, Animation, CLI Commands, Building and Deployment, Example.

UNIT-II Mongo DB

Introduction to Mongo DB: Mongo DB Environment, Create Database, Drop Database, Create Collection, Drop Collection, Read Operations, Write Operations.

UNIT-III: Servlet and JSP

Servlet: Servlet Basics, Need of Server-Side Programming, Servlet Life Cycle, Servlet Hello World Application, Web.xml Structure, Servlet Directives- include(), forward(), sendRedirect(), HttpServletRequest and HttpServletResponse in Servlet, Servlet and JDBC Integration.
JSP: JSP Basics, JSP Scripting Elements(Declaration, Expression, Scriptlet), Directive Elements(page, include, taglib), Action Elements(jsp:forward,jsp:include,jsp:useBean), JSP Implicit Objects.

UNIT-IV: Spring Boot

Spring Boot: An Introduction to Spring Boot, Quick Start, Bootstrapping, Tomcat Deployment, Build System, Code Structure, Spring Beans and Dependency Injection, Runners, Application Properties, Logging, Building Restful Web Services, Exception Handelling, Interceptor.

UNIT-V: Spring Boot(Continue)

Servlet Filter, Tomcat Port Number, File Handling, Service Components, Scheduling, Enabling HTTPS, Database Handling, Securing Web Applications.