Course Code: BTCS601-18	Course Title : Compiler Design	3L:0T:0P	3Credits

Detailed Contents:

UNIT 1: Unit I Introduction to Compilers:
Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA. [**8 hrs., CO 1]**

Unit II :Syntax Analysis:
Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar, Top-Down Parsing – General Strategies Recursive Descent Parser – Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0) Item Construction of SLR Parsing Table - Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC.
[**8 hrs., CO 2]**

Unit III : Intermediate Code Generation:
Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking. [**8 hrs., CO 3]**

Unit IV: Run-Time Environment and Code Generation:

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.
[**6 hrs., CO 4]**

Unit V: Code Optimization:
Principal Sources of Optimization – Peep-hole optimization – DAG- Optimization of Basic Blocks-Global Data Flow Analysis – Efficient Data Flow Algorithm. [**6 hrs., CO 5]**

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

CO1: Build concepts on lexical analysis.

CO2: Understand strategies of syntax analysis.

CO3: Learn techniques of Intermediate code generation.

CO4: Undestand code design issues and design code generator.

CO5: Design and develop optimized codes.

Suggested Readings/ Books:

1. A.V. Aho, Monica, R.Sethi, J.D.Ullman, “Compilers, Principles, Techniques and Tools”, Second Edition, Pearson Education/Addison Wesley, 2009.

2. Andrew W. Appel, "Modern Compiler Implementation in Java", Second Edition, 2009.
3. J.P. Tremblay and P.G. Sorrenson, "The Theory and Practice of Compiler Writing", McGraw Hill, 1985.

Course Code: BTCS604-18	**Course Title: Compiler Design Lab**	**L:0;T:0; 2P**	**1Credits**

Sr. No.	**No. List of Experiments**
1	Design a lexical analyser for given language and the lexical analyser 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. Simulate the same in C language.
2	Write a C program to identify whether a given line is a comment or not.
3	Write a C program to recognize strings under 'a', 'a*b+', 'abb'.
4	Write a C program to test whether a given identifier is valid or not.
5	Write a C program to simulate lexical analyzer for validating operators.
6	Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
7	Write a C program for implementing the functionalities of predictive parser for the mini language specified in Note 1.
8	a) Write a C program for constructing of LL (1) parsing. b) Write a C program for constructing recursive descent parsing.
9	Write a C program to implement LALR parsing.
10	a) Write a C program to implement operator precedence parsing. b) Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
11	Convert the BNF rules into YACC form and write code to generate abstract syntax tree for the mini language specified in Note 1.
12	Write a C program to generate machine code from abstract syntax tree generated by the parser. The instruction set specified in Note 2 may be considered as the target code.

Course Code:BTCS602-18	**Course Title : Artificial Intelligence**	**3L:0T:0P**	**3Credits**

Detailed Contents:

UNIT 1: Introduction (3 Hours)
Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review
of tree and graph structures, State space representation, Search graph and Search tree.

[8hrs] (CO 1)

UNIT 2: Search Algorithms
Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

[9hrs] (CO 2)

UNIT 3: Probabilistic Reasoning

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

[6hrs] (CO 3)

UNIT 4 Markov Decision process

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs. **[6hrs] (CO 4)**

UNIT 5 Reinforcement Learning

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning**.**

[6hrs] (CO 5)

Course Outcomes:

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

CO1: Build intelligent agents for search and games

CO2: Solve AI problems by learning various algorithms and strategies

CO3: Understand probability as a tool to handle uncertainity

CO4: Learning optimization and inference algorithms for model learning

CO5: Design and develop programs for an reinforcement agent to learn and act in a structured environment

Suggested Readings/ Books:

1.Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall

2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

3. Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.

4. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India,

5. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010

Course Code: BTCS 605-18	**Course Title Artificial Intelligence Lab**	**L:0;T:0;2 P:**	**1 Credits**

Detailed List of Tasks:

1.Write a programme to conduct uninformed and informed search.

2. Write a programme to conduct game search.

3. Write a programme to construct a Bayesian network from given data.

4. Write a programme to infer from the Bayesian network.

5. Write a programme to run value and policy iteration in a grid world.

6. Write a programme to do reinforcement learning in a grid world

Course Code: BTCS 612-18	Course Title: Cloud Computing	3L:0T:0P	3Credits

Detailed Contents:

UNIT1: **Introduction** : Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud, Comparing grid with utility computing, cloud computing and other computing systems, types of workload patterns for the cloud, IT as a service, Applications of cloud computing.

[**8hrs] (CO1)**

UNIT2: Cloud computing concepts: Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology, Hypervisors, Types of hypervisors, Multitenancy, Application programming interfaces (API), Elasticity and scalability. **[9hrs] (CO2)**

UNIT 3: Cloud service models: Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models. **[6hrs] (CO3)**

UNIT 4: Cloud deployment models: Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Community clouds, Migration paths for cloud, Selection criteria for cloud deployment. **[6hrs] (CO4)**

UNIT 5: Security in cloud computing: Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches
Case Studies: Comparison of existing Cloud platforms /Web Services.

[6hrs] (CO5)

Course Outcomes:

After undergoing this course, the students will be able to:
CO1: Understand the core concepts of the cloud computing paradigm
CO2: Understanding importance of virtualization along with their technologies
CO3: Analyze various cloud computing service and deployment models and apply them to solve problems on the cloud.
CO4: Implementation of various security strategies for different cloud platform

Suggested Readings/ Books:

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, "Cloud Computing: Principles and Paradigms",Wiley 2011
2. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, "Cloud Computing: A practical Approach", McGraw Hill, 2010.
3. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
4. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, "Cloud Computing for dummies", 2009.

Reference Books

1. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing" TMH 2013.
2. George Reese "Cloud Application Architectures", First Edition, O"Reilly Media 2009.
3. Dr. Kumar Saurabh "Cloud Computing" 2nd Edition, Wiley India 2012.

UNIT 4 Classification: Need and Applications of Classification, Logistic Regression, Decision tree, Tree induction algorithm – split algorithm based on information theory, split algorithm based on Gini index; Random forest classification, Naïve Bayes algorithm; K-Nearest Neighbours (K-NN), Support Vector Machine (SVM), Evaluating Classification Models Performance (Sensitivity, Specificity, Precision, Recall, *etc*.). **Clustering**: Need and Applications of Clustering, Partitioned methods, Hierarchical methods, Density-based methods. **[12hrs] (CO 4)**

UNIT 5 Association Rules Learning: Need and Application of Association Rules Learning, Basic concepts of Association Rule Mining, Naïve algorithm, Apriori algorithm. **Artificial Neural Network:** Need and Application of Artificial Neural Network, Neural network representation and working, Activation Functions. **Genetic Algorithms:** Basic concepts, Gene Representation and Fitness Function, Selection, Recombination, Mutation and Elitism. **[14hrs] (CO 5)**

Course Outcomes:

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

CO1: Analyse methods and theories in the field of machine learning

CO2: Analyse and extract features of complex datasets

CO3: Deploy techniques to comment for the Regression

CO4: Comprehend and apply different classification and clustering techniques

CO5: Understand the concept of Neural Networks and Genetic Algorithm

Suggested Readings/ Books:

Text Books:

1. Mitchell M., T., Machine Learning, McGraw Hill (1997) 1stEdition.
2. Alpaydin E., Introduction to Machine Learning, MIT Press (2014) 3rdEdition.
3. Vijayvargia Abhishek, Machine Learning with Python, BPB Publication (2018)

Reference Books:

1. Bishop M., C., Pattern Recognition and Machine Learning, Springer-Verlag (2011) 2ndEdition.
2. Michie D., Spiegelhalter J. D., Taylor C. C., Campbell, J., Machine Learning, Neural and Statistical Classification. Overseas Press (1994).

Course Code: BTCS619-18	**Course Title: machine Learning Lab**	**L:0;T:0;2 P:**	**1Credits**

Detailed List of Tasks:

1. Implement data pre-processing
2. Deploy Simple Linear Regression
3. Simulate Multiple Linear Regression
4. Implement Decision Tree

5. Deploy Random forest classification
6. Simulate Naïve Bayes algorithm
7. Implement K-Nearest Neighbors (K-NN), k-Means
8. Deploy Support Vector Machine, Apriori algorithm
9. Simulate Artificial Neural Network
10. Implement the Genetic Algorithm code

Suggested Tools Python/R/MATLAB

Course Code: BTCS620-18	**Course Title:Mobile Application Development**	**L:3; T:0; P:0**	**3Credits**

Details of course:

Unit-1

Introduction to Android: The Android Developing environment, Android SDK, Introduction to Open Handset Alliance, Development Framework, Application Fundamentals; Device Compatibility, System permissions, Understanding Anatomy of Android Application, Android Development Tools **6 hrs. ,CO 1**

Unit-II

Getting started with Mobility: Mobility Landscape, Mobile Platforms, Mobile apps development, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Setting up the mobile apps development environment with emulator **6 hrs., CO1**

Unit-III

Building block of Mobile apps: App user Interface Designing, Layout, User Interface elements, VUIs and Mobile Apps, Text to Speech Techniques, Designing the Right UI, Activity states and lifecycle, Interaction among activities **6 hrs., CO 2**

Unit-IV

Sprucing up Mobile apps: App functionality beyond user interface- Threads, sync task, Services-states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs Native data handling: on device file I/O, shared preferences, mobile databases such as SQLite, Working with a content provider **8 hrs., CO 3,4**

Unit-V

Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User

Graphics and Multimedia: Performance and Multithreading, Graphics and UI Performance, Android Graphics, Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

8 hrs., CO 4,5

Unit-VI