ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(Effective for the batches admitted in 2020 - 21)

Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P	C			
1	PC	20APC0521	Artificial Intelligence	3	1	0	3	30	70	100
2	PC	20APC0523	Compiler Design	3	0	0	3	30	70	100
3	PC	20APC0528	Cloud Computing	3	0	0	3	30	70	100
4	PE-2	20APE0504 20APE0505 20APE0506	Machine Learning Real Time Operating Systems Blockchain Technology	3	0	0	3	30	70	100
5	OE-2/ JOE (MOOCS-1)		Introduction to robotics Design, Technology and Innovation Introduction to Smart Grid Introduction to Wireless and Cellular Communications Stochastic control and communication Real-Time Digital Signal Processing VLSI Interconnects Developing Soft Skills and Personality Body language: Key to professional Success Psychology of Everyday Educational Leadership Entrepreneurship And IP Strategy Globalization And Culture Consumer Psychology Public Speaking Project Management Training Of Trainers Decision-Making Under Uncertainty Game Theory Organizational Behavior Customer Relationship Management Decision Support System For Managers Stress Management	-	-	-	3	-	-	100
6	PC Lab	20APC0522	Artificial Intelligence Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC0524	Compiler Design Lab	0	0	3	1.5	30	70	100
8	PC Lab	20APC0529	Cloud Computing Lab	0	0	3	1.5	30	70	100
9	SC	20ASA0502	Soft Skills	1	0	2	2	100	0	100
10	MC	20AMC9904	Professional Ethics and Human Values	2	0	0	0	30	0	30
			Total credits				**21.5**	**340**	**490**	**930**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**	0	0	0
Industry Internship (Mandatory) for 6-8 Weeks duration during summer vacation										

AITS TPT - CSE

Course Code	Artificial Intelligence		L	T	P	C
20APC0521			3	1	0	3
Pre-requisite	Mathematics and Programming	Semester	III-II			

Course Objectives:

- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

Course Outcomes :

CO1: Understand the basic concepts of Artificial Intelligence
CO2: Apply searching techniques for solving a problem
CO3: Analyze the concepts of Reinforcement Learning
CO4: Develop Natural Language Interface for Machines
CO5: Understanding the concepts to design a robotics

UNIT - I 9 Hrs

Introduction: What is AI, Foundations of AI, History of AI, The State of Art.
Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT - II 9Hrs

Solving Problems by searching: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, LocalSearch in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

UNIT - III 9 Hrs

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL
Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

UNIT - IV 9 Hrs

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition
Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

UNIT - V 9 Hrs

Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains
Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

Textbooks:

Stuart J. Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system forthe accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Online Learning Resources:

http://peterindia.net/AILinks.html

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2											
CO2	3	3	3	2	3								2	2
CO3	2	2	2	2	2									3
CO4		3	3		3									3
CO5	3	2	1			1		1				1	1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITSPI-CSE

Course Code	COMPILER DESIGN		L	T	P	C
20APC0523			3	0	0	3
Pre-requisite	FLAT and Programming Languages	Semester	III-II			

Course Objectives:

This course is a de facto capstone course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler.

- Realize that computing science theory can be used as the basis for real applications
- Introduce the major concept areas of language translation and compiler design.
- Learn how a compiler works
- Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications
- Know the importance of optimization and learn how to write programs that execute faster

Course Outcomes :

CO1: Understand the basic structure of a compiler
CO2: Use the tools related to compiler design effectively and efficiently
CO3: Generate intermediate code
CO4: Able to explain various data structures used in symbol tables
CO5: Construct optimized code

UNIT - I		9 Hrs

Introduction: Language processors, The Structure of a Compiler, the science of building a complier.
Lexical Analysis: The Role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, The lexical analyzer generator Lex, Design of a Lexical Analyzer generator

UNIT - II		9Hrs

Syntax Analysis: Introduction, Context Free Grammars, Writing a grammar, TOP Down Parsing, Bottom Up Parsing,
Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using ambiguous grammars, Parser Generators

UNIT - III		9 Hrs

Syntax Directed Translation: Syntax Directed Definitions, Evaluation orders for SDD's, Application of SDT, SDT schemes, Implementing L-attribute SDD's.
Intermediate Code Generation: Variants of syntax trees, three address code, Types and declarations, Translations of expressions, Type checking, control flow statements, backpatching, switch statements, intermediate code for procedure.

UNIT - IV		9 Hrs

Run Time Environment : storage organization, Stack allocation of space, Access to non-local data on stack , Heap management
Symbol Table: Introduction, symbol table entries, operations on the symbol table, symbol table organizations, non block structured language, block structured language.

UNIT - V		9 Hrs

Code Generation: Issues in the design of a code generator, The Target language, Basic blocks and flow graphs, optimization of basic blocks, a simple code generator, register allocation and assignment, optimal code generation for expressions, dynamic programming code generation.
Code Optimization: Introduction, where and how to optimize, principle source of optimization, function preserving transformations, loop optimizations, global flow analysis, machine dependent optimization

Textbooks:

"Compilers Principles, Techniques and Tools", Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman., Pearson, 2016.
"Compiler Construction", K.V.N Sunitha, Pearson, 2013

Reference Books:

1. Compiler Design", K. Muneeswaran., Oxford University Press, 2012
2. "Engineering A Compiler", Second Edition, Keith D. Cooper & Linda Torczon., MK(Morga Kaufmann) (ELSEVIER)
3. "Compilers Principles and Practice", Parag H. Dave, Himanshu B. Dave.,PEARSON
4. "Compiler Design", SandeepSaxena, Rajkumar Singh Rathore., S.Chand publications
5. "Compiler Design", SantanuChattopadhyay., PHI
6. "Principals of Compiler Design", Nadhni Prasad, Elsevier

Online Learning Resources:

https://www.youtube.com/watch?v=_ck1Lnm28hQ&list=PLbRMhDVUMngcseCW7wXDvtTDemCuH80fP

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	3	3
CO2	2	2	2	2	2								2	2
CO3	3	3	2	2									2	2
CO4	2	2	2	2	2								2	2
CO5	2	2	2	2	2								2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

ACTS TPT CSE

Course Code	CLOUD COMPUTING		L	T	P	C
20APC0528			3	0	0	3
Pre-requisite	Operating systems and Networking	Semester	III-II			

Course Objectives:

- To Understand the concept of cloud computing.
- To understand the concept of Virtualization and familiar with the lead players in cloud.
- To understand the features of cloud and apply different cloud programming model as per need.
- To design of cloud Services and explore the trusted cloud Computing system computing.
- To learn Industry Cloud Platforms.

Course Outcomes :

CO1: Understand the concept of cloud computing
CO2: Ability to understand various service delivery models and Cloud Computing Architecture.
CO3: Analyze the need for virtualization in a cloud environment.
CO4: Demonstrate the map reducing programming model to process the Big Data along with Hadoop tools
CO5: Analyze authentication, confidentiality, privacy issues and disaster management

UNIT - I 9 Hrs

Introduction to Cloud: Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, Characteristics and Benefits, A Closer Look, Cloud Computing Reference Model, Challenges Ahead, Historical Developments, Applications of cloud computing: Healthcare, energy systems, transportation, manufacturing, education, government, mobile communication, application development.

UNIT - II 9Hrs

Cloud Computing Architecture: Introduction, NIST reference architecture, Cloud Reference Model, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance

UNIT - III 9 Hrs

Virtualization: Introduction to Virtualization concept & Hypervisors, Pros and Cons of Virtualization, Virtual Machine (VM), implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Types of Hypervisors, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation.

UNIT - IV 9 Hrs

Programming Model: Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, dataflow of File read & File write, map reduce applications
Cloud Platforms in Industry: Amazon Web Services- Compute Services, Storage Services.

UNIT - V 9 Hrs

Cloud Security & Disaster Recovery: Cloud Security: Risks, privacy and privacy impacts assessments; Multi-tenancy issues, security in VM, OS, virtualization system security issues and vulnerabilities; Virtualization system-specific attacks: Technologies for virtualization-based security enhancement, legal.
Disaster Recovery: Disasters in the Cloud, Disaster Management, Compromise Response Disaster Recovery

Textbooks:

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.
2. George Reese Cloud Application Architectures, First Edition, O" Reilly Media 2009.
3. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing and SOA Convergence in Your Enterprise A Step-by-Step Guide by David S. Linthicum from Pearson 2010.
2. Cloud Computing 2 nd Edition by Dr. Kumar Saurabh from Wiley India 2012.
3. Cloud Computing – web based Applications that change the way you work and collaborate Online – Micheal Miller.Pearson Education.

Online Learning Resources:

https://www.youtube.com/playlist?list=PLmcndht8X48zKf-jqk9xY5Wg_AhXR8aHb

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1									2	1	
CO2	3	2	1		2								2	1
CO3	2	3	2										2	
CO4	2	1	2	1	2							1	2	2
CO5	2	2				2		2				1	2	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS IBT-CSE

Course Code	MACHINE LEARNING		L	T	P	C
20APE0504			3	0	0	3
Pre-requisite	Data Warehousing and Mining	Semester	III-II			

Course Objectives:

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes :

CO1: Ability to understand what is learning and why it is essential to the design of intelligent machines.
CO2: Ability to design and implement various machine learning algorithms in a wide range of real-world applications.
CO3: Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more
CO4: Ability to demonstrate feature selection and dimensionality reduction
CO5: Ability to solve decision making problems using SVM(Support Vector Machines) and graphical models

UNIT - I 9 Hrs

What is Machine Learning?, Examples of machine learning applications, **supervised Learning:** learning a class from examples, Vapnik- Chervonenkis dimension, probably approximately correct learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of a supervised machine learning algorithm. **Decision Tree Learning:** Introduction, Decisions Tree representation, Appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, issues in decision tree learning, **Artificial Neural Networks:** Introduction, Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithm, Remarks on the BACKPROPAGATION Algorithm, An illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.

UNIT - II 9Hrs

Evaluating Hypotheses: Motivation, Estimating hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, differences in error of two hypothesis, comparing learning algorithms, **Bayesian Learning:** Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and least squared error hypothesis, Maximum Likelihood hypothesis for predicting probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm , Naïve Bayes Classifier , Bayesian Belief Network, EM Algorithm

UNIT - III 9 Hrs

Dimensionality Reduction: Introduction, Subset selection, principle component analysis, feature embedding, factor analysis, singular value decomposition and matrix factorization, multidimensional scaling, linear discriminant analysis, canonical correlation analysis, Isomap, Locally linear embedding, laplacian eigenmaps, **Clustering:** Introduction, Mixture densities, K- Means clustering, Expectations- Maximization algorithm, Mixture of latent variable models, supervised learning after clustering, spectral clustering, Hierarchal clustering, Choosing the number of clusters

UNIT - IV 9 Hrs

Linear Discrimination: Introduction, Generalizing the linear model, geometry of the linear discrimination, pair wise separation, parametric discrimination revisited, gradient descent, logistic discrimination, discrimination by regression, learning to rank, **Multilayer Perceptrons:** Introduction, the perceptron, training a perceptron, learning Boolean functions, multilayer perceptrons, MLP as a universal approximator, Back propagation algorithm, Training procedures, Tuning the network size, Bayesian view of learning, dimensionality reduction, learning time, deep learning

UNIT - V 9 Hrs

Kernel Machines: Introduction, Optimal separating hyperplane, the non separable case: Soft Margin Hyperplane, ν-SVM, kernel Trick, Vectorial kernels, defining kernels, multiple kernel learning, multicast kernel machines, kernel machines for regression, kernel machines for ranking, one-class kernel machines, large margin nearest neighbor classifier, kernel dimensionality reduction, **Graphical models:** Introduction, Canonical cases for conditional independence, generative models, d separation, belief propagation, **undirected Graphs:** Markov Random files, Learning the structure of a graphical model, influence diagrams.

Textbooks:

1. Machine Learning – Tom M. Mitchell - McGraw Hill Education, 2017
2. Introduction to Machine learning, Ethem Alpaydin, PHI, 3rd Edition, 2014.

Reference Books:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis Chapman and Hall/CRC; 2nd edition, 2014
2. Machine Learning For Beginners: A Comprehensive Guide To Understand Machine Learning. How It Works And How Is Correlated To Artificial Intelligence And Deep Learning, Chris Neil, Alicex Ltd, 2020

Online Learning Resources:

https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2							2	3	2
CO2	3	2	2	2	2							2	3	2
CO3	3	2	2	2								2	3	
CO4	2	3	2	2								2	2	
CO5	2	2	2											

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	REAL TIME OPERATING SYSTEMS		L	T	P	C
20APE0505			3	0	0	3
Pre-requisite	Operating Systems	Semester	III-II			

Course Objectives:

To understand how to solve complex problems
- Acquire skills necessary to design and develop embedded applications by means of real-time operating systems
- Understand embedded real-time operating systems

Course Outcomes :

CO1: Characterize real-time systems and describe their functions
CO2: Design and implement a real-time system
CO3: Apply formal methods to the analysis and design of real-time systems
CO4: Apply formal methods for scheduling real-time systems
CO5: Characterize and describe reliability and fault tolerance issues and approaches.

UNIT - I 9 Hrs

Typical Real time Applications: Digital control, High-level control, Signal processing, other Real-time Applications.
Hard versus Soft Real-Time Systems: Jobs and processors, Release time, deadlines and Timing constraints, Hard and soft timing constraints, Hard Real time systems, Soft Real-time Systems.
A Reference Model of Real Time Systems: Processors and resources, Temporal parameters of Real time workload, periodic task model, precedence constraints and data dependency, Functional parameter, Resource Parameters of Jobs and Parameters of Resources, Scheduling Hierarchy.
Commonly used Approaches to real time Scheduling: Clock-Driven Approach, Weighted Round-Robin Approach, Priority driven Approach, Dynamic vs Static Systems, Effective release time and deadlines, Optimality of the EDF and LST algorithms, Nonoptimality of the EDF and LST algorithms, Challenges in validating timing constraints in priority driven System, Off line vs On line scheduling, summary.

UNIT - II 9Hrs

Clock-Driven Scheduling: Notations and Assumptions, static, Timer-Driven scheduler, General Structure of the Cyclic Scheduler, Improving the average response time of Aperiodic Jobs, Scheduling sporadic Jobs, Practical considerations and generalizations, Algorithm for generating Static Schedules, Pros and cons of Clock-driven scheduling, summary.

UNIT - III 9 Hrs

Priority-Driven Scheduling of periodic Tasks : Static Assumption, Fixed-priority vs Dynamic-priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms, A Schedulability test for Fixed-priority tasks with Short Response time, A Schedulability test for Fixed-priority tasks with arbitrary Response time, Sufficient Schedulability conditions for the RM and DM Algorithms, summary.

UNIT - IV 9 Hrs

Scheduling Aperiodic and Sporadic Jobs in Priority Driven Systems: Assumptions and approaches, Diferrable servers, Sporadic Servers, Constant utilization, total bandwidth and weighted fair –Queueing servers, Slack stealing in Dead-line Driven System, Stack stealing in Fixed-priority systems, Scheduling of sporadic jobs, Real-time performance for jobs with soft timing constraints, A two-level scheme for Integrated scheduling.

UNIT - V 9 Hrs

Resources and Resource access control: Assumptions on Resources and their usage, Effects of Resource contention and resource access control, Non Preemptive critical section, Basic Priority inheritance protocol, Basic Priority ceiling protocol, Stack
–based, Priority ceiling protocol, Use of priority ceiling protocol in Dynamic priority systems, pre-emption ceiling protocol, Controlling accesses to Multiple unit Resources, Controlling concurrent accesses to data objects.

Multiprocessor Scheduling, Resource access control, and Synchronization: Model of Multiprocessor and Distributed Systems, Task assignment, Multiprocessor Priority ceiling protocol, Elements of Scheduling Algorithms for End-to-End Periodic Tasks, Schedulability of Fixed-priority End-to-End periodic Tasks, End to End tasks in heterogeneous Systems, Predictability and validation of Dynamic Multiprocessor Systems, Summary.

Textbooks:

1. "Real-Time Systems" by Jane W.S Liu, Pearson Edition, 2006.

Reference Books:

1. Real-Time Systems: Scheduling, Analysis, and Verification, Cheng, A. M. K.: Wiley, 2002.
2. Z.: Scheduling in Real-Time Systems, by Cottet, F., Delacroix, J., Kaiser, C., Mammeri John Wiley & Sons, 2002.
3. Real-Time Systems, C. M., Shin, K. G. McGraw-Hill, Krishna 1997.

Online Learning Resources:

https://www.youtube.com/watch?v=dHsHP9RrXBw&list=PLJ5C_6qdAvBH-JNRIlupFb44miyx9M8JD

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2		3	2										3	3
CO3		2	3										2	2
CO4			3											2
CO5	2													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS-CSE

Course Code	BLOCKCHAIN TECHNOLOGY		L	T	P	C
20APE0506			3	0	0	3
Pre-requisite	Computer Networks and Web Technology	Semester	III-II			

Course Objectives:

The objective of this course is to provide

- To understand the history types of applications of Blockchain
- To acquire knowledge of WEB3J and design Blockchain based application
- To acquire knowledge about consensus algorithms

Course Outcomes :

CO1: Understand the basic concepts of blockchain and its applications
CO2: Make use of the specific mechanics of Ethereum
CO3: Experiment with Smart contracts
CO4: Develop Enterprise applications using Blockchain
CO5: Create customized Blockchain solutions

UNIT - I 9 Hrs

Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges. Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates

UNIT - II 9Hrs

Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle. Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

UNIT - III 9 Hrs

Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet**.**

UNIT - IV 9 Hrs

Smart contracts (continued): Smart contract examples, Smart contract patterns. Decentralized Applications: implementing Dapps, case studies.

UNIT - V 9 Hrs

Mining: Consensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Textbooks:

1. Arshadeep Bahga, Vijay madisetti, “Blockchain Applications A hands-on approach”, VPT 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, “Blockchain Technology”, Universty Press, 2021

Reference Books:

1. Imran Bashir, “Mastering Blockchain” Packt Publishing Ltd, March 2017.
2. Melanie swan, “Blokchain blueprint for a new economy”, O’REILLY

Online Learning Resources:

https://www.youtube.com/watch?v=mzPoUjQC4WU&list=PLHRLZtgrF2jl8yqucJsMFqh5XpRLTgCI4

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	3	3	3	2									
CO3	3	3	3						2				1	
CO4	3	3	3						2	2			1	2
CO5	3	3	3	3									1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS FET - CSE

Course Code	ARTIFICIAL INTELLIGENCE LABORATORY		L	T	P	C
20APC0522			0	0	3	1.5
Pre-requisite	Mathematics and Programming	Semester	III-II			

Course Objectives:

This course is designed to:

- Explore the methods of implementing algorithms using artificial intelligence techniques
- Illustrate search algorithms
- Demonstrate building of intelligent agents

Course Outcomes :

CO1: Implement search algorithms
CO2: Solve Artificial Intelligence Problems
CO3: Develop the solutions using Backtracking
CO4: Design Chatbot
CO5: Implement basic problems by using NLTK(Natural Language Tool Kit)

List of Experiments

1. Write a Program to Implement BFS and DFS.
2. Write a Program to find the solution for travelling sales person problem.
3. Write a program to implement simulated annealing Algorithm.
4. Write a Program to Implement Tic-Tac-Toe game.
5. Write a Program to Implement 8-Puzzle problem.
6. Write a program to implement Towers of Hanoi problem.
7. Write a program to implement A* Algorithm.
8. Write a Program to Implement Water-Jug problem.
9. Write a program to implement Hangman game.
10. Write a program to solve N Queen problem using backtracking.
11. Generate Calendar for the given month and year using a python program.
12. Write a program to implement simple Chatbot.
13. Write a program to remove stop words for a given passage from a text file using NLTK.
14. Write a program to implement stemming for a given sentence using NLTK.
15. Write a program to POS (Parts of Speech) tagging for the give sentence using NLTK.
16. Write a program to implement Lemmatization using NLTK.

Reference Books:

1. Tensorflow: https://www.tensorflow.org/
2. Pytorch: https://pytorch.org/,
3. https://github.com/pytorch
4. Theano: http://deeplearning.net/software/theano/ https://github.com/Theano/Theano
5. https://www.nltk.org/

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3									3		3
CO2	3	3	2	2								3		3
CO3	3	2	3		3	3						3	2	3
CO4	3	2	3		3	3						3		3
CO5	3	3	3	3									3	3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITSPT-CSE

Course Code	COMPILER DESIGN LAB		L	T	P	C
20APC0524			0	0	3	1.5
Pre-requisite	FLAT and Programming Languages	Semester	III-II			

Course Objectives:

- To implement some of the functionality of the compiler
- To do programming using compiler related tools

Course Outcomes :

CO1: Develop compiler tools
CO2: Design simple compiler
CO3: Develop program for solving parser problems
CO4: Design lexical analyzer
CO5: Able to use Lex and YACC tools for developing a scanner and a parser

List of Experiments

1. Design a lexical analyzer for given language and 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. 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.

Note 1:

A simple language written in this language is

```
{int a[3],t1,t2;
T1=2;
A[0]=1;a[1]=2;a[t]=3;
T2=-( a[2]+t1*6)/(a[2]-t1);
If t2>5then
Print(t2)
Else{
Int t3;
T3=99;
T2=25;
Print(-t1+t2*t3);/*this is a comment on 2 lines*/
}endif
}
```

Comments(zero or more characters enclosed between the standard C/JAVA Style comment brackets/*…*/)can be inserted .The language has rudimentary support for1-dimenstional array,the declaration int a[3] declares an array of three elements,referenced as a[0],a[1] and a[2].Note also you should worry about the scopping of names.

Note 2:

Consider the following mini language, a simple procedural high –level language, only operating on integer data, with a syntax looking vaguely like a simple C crossed with pascal. The syntax of the language is defined by the following grammar.

```
<program>::=<block>
<block>::={<variable definition><slist>}
|{<slist>}
<variabledefinition>::=int <vardeflist>
<vardec>::=<identifier>|<identifier>[<constant>]
<slist>::=<statement>|<statement>;<slist>
<statement>::=<assignment>|<ifstament>|<whilestatement>
|<block>|<printstament>|<empty>
<assignment>::=<identifier>=<expression>
|<identifier>[<expression>]=<expression>
<if statement>::=if<bexpression>then<slist>else<slist>endif
|if<bexpression>then<slisi>endif
<whilestatement>::=while<bexpreession>do<slisi>enddo
<printstatement>:;=print(<expression>)
<expression>::=<expression>::=<expression><addingop><term>|<term>|<addingop>
<term>
<bexprssion>::=<expression><relop><expression>
<relop>::=<|<=|==|>=|>|!=
<addingop>::=+|-
```

ATS TPT-CSE

<term>::=<term><multop><factor>|<factor>
<Multop>::=*|/
<factor>::=<constant>|<identifier>|<identifier>[<expression>]
|(<expression>)
<constant>::=<digit>|<digit><constant>
<identifier>::=<identifier><letter or digit>|<letter>
<letter or digit>::=<letter>|<digit>
<letter>:;=a|b|c|d|e|f|g|h|I|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit>::=0|1|2|3|4|5|^|7|8|9
<empty>::=has the obvious meaning

Reference Books:

1. Modern compiler implementation in C, Andrew w.Appel, Revised Edn, Cambridge University Press
2. Principles of Compiler Design. – A.V Aho, J.D Ullman ; Pearson Education.
3. lex&yacc , -John R Levine, Tony Mason, Doug Brown; O'reilly.
4. Compiler Construction,- LOUDEN, Thomson.
5. Engineering a compiler – Cooper& Linda, Elsevier
6. Modern Compiler Design – Dick Grune, Henry E.Bal, Cariel TH Jacobs, Wiley Dreatech

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		3								3	
CO2	3	3	3		3								3	3
CO3	3		3										3	
CO4			3		3								3	3
CO5			2		2								2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TPT-CSE

Course Code	CLOUD COMPUTING LABORATORY		L	T	P	C
20APC0529			0	0	3	1.5
Pre-requisite	Operating systems and Networking	Semester	III-II			

Course Objectives:

The student should be made to:

- Be familiar with developing Applications in cloud.
- Be exposed to tool kits for cloud environment
- Install, configure and deploy applications using various cloud platforms
- Learn to run virtual machines of different configuration.

Course Outcomes :

CO1: Ability to understand various service delivery models of a cloud computing architecture.
CO2: Summarize the Services and Platform of cloud.
CO3: Configure various virtualization tools.
CO4: Explore the future trends of cloud computing.
CO5: Develop Hadoop Applications.

List of Experiments

1. To study in detail about cloud computing.
2. Working of Google Drive to make spreadsheet and notes.
3. Installation and Configuration of Justcloud.
4. Working in Cloud9 to demonstrate different language.
5. Install Google App Engine. Create hello world app and other simple web applications using python/java.
6. Deployment and Configuration options in Google Cloud
7. Install Virtual box/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
8. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
9. Install Hadoop single node setup
10. Develop hadoop application to count no of characters, no of words and each character frequency

Programs on SaaS

11. Create an word document of your class time table and store locally and on the cloud with doc,and pdf format . (use www.zoho.com anddocs.google.com).
12. Create a spread sheet which contains employee salary information and calculate gross and total sal using the formula DA=10% OF BASIC HRA=30% OF BASIC PF=10% OF BASIC IF BASIC<=3000 12% OF BASIC IF BASIC>3000 TAX=10% OF BASIC IF BASIC<=1500 =11% OF BASIC IF BASIC>1500 AND BASIC<=2500 =12% OF BASIC IF BASIC>2500 (use www.zoho.com and docs.google.com) NET_SALARY=BASIC_SALARY+DA+HRA-PF-TAX
13. Prepare a ppt on cloud computing –introduction , models, services ,andarchitecture Ppt should contain explanations, images and at least 20 pages (use www.zoho.com and docs.google.com).
14. Create your resume in a neat format using google and zoho cloud.

Programs on PaaS

15. Write a Google app engine program to generate n even numbers and deploy it to google cloud.
16. Google app engine program multiply two matrices.
17. Write a Google app engine program to display nth largest no from the given list of numbers and deploy it into google cloud.

Reference Books:

1. spoken-tutorial.org
2. Bart Jacob (Editor), —Introduction to Grid Computing, IBM Red Books, Vervante, 2005
3. Ian Foster, Carl Kesselman, —The Grid: Blueprint for a New Computing Infrastructure, 2nd Edition, Morgan Kaufmann

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	2				1									
CO3	2				3									1
CO4	2		2		1							1	1	
CO5	1				1									

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TEL CSE

Course Code	SOFT SKILLS		L	T	P	C
20ASA0502			1	0	2	2
Pre-requisite	Communicative English	Semester	III-II			

Course Objectives:

This course is designed to:

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To enable them to develop employability skills
- To provide knowledge of grammatical structures and vocabulary students and encourage their appropriate use in Speech and writing.

Course Outcomes :

CO1: Recognize the importance of verbal and non verbal skills
CO2: Develop the interpersonal and intrapersonal skills
CO3: Apply grammatical structures to formulate sentences and correct word forms.
CO4: Create trust among people and develop employability skills
CO5: Identify and apply communication skills effectively for professional

UNIT - I 9 Hrs

Grammar: Articles, Prepositions, Antonyms, Synonyms.

Vocabulary: Basics of Communication (Definition, Types of communication). Importance of body language in corporate culture, Body language (Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage – Tone, pitch, pause & selection of words), Impromptu speeches.

Articles:
Web links: https://learnenglish.britishcouncil.org/grammar/a1-a2-grammar/articles-1
https://www.youtube.com/watch?v=ueEp6U8td1I
Prepositions:
Web links: https://www.grammarbook.com/grammar/probPrep.asp
Antonyms, Synonyms.
Web links: https://www.youtube.com/watch?v=-mLRoxWM8dI
https://www.youtube.com/watch?v=IEOrOPVMxiM
https://www.it.iitb.ac.in/~vijaya/ssrvm/worksheetscd/getWorksheets.com/Language%20Arts/syn_ant.pdf

Basics of Communication (Definition , Types of communication).
Web links: https://wikieducator.org/INTRODUCTION_TO_COMMUNICATION
Importance of body language in Corporate culture
Web links:
https://www.forwardfocusinc.com/consciously-communicate/the-importance-of-body-language-in-the-workplace/

Body language (Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause & selection of words)
Web links: https://open.lib.umn.edu/communication/chapter/4-2-types-of-nonverbal-communication/
https://en.wikipedia.org/wiki/Nonverbal_communication
Impromptu speeches.
Web links: https://www.write-out-loud.com/impromptu-public-speaking-topics.html;
https://faculty.washington.edu/mcgarrit/COM220/online%20readings/sample%20critique.pdf

UNIT - II 9Hrs

Grammar: Tenses, Idioms and Phrases, One word substitutes.
Vocabulary: Public speaking - *Oral presentations*, writing skills – *Short Essay writing and E- mail writing.*

Tenses
Web links: https://www.englisch-hilfen.de/en/grammar/english_tenses.htmj; https://onlymyenglish.com/tenses/;
https://www.englishpage.com/verbpage/verbtenseintro.html;
https://www.englishclub.com/grammar/verb-tenses.htm
Idioms and Phrases:
Web links: https://www.britannica.com/list/7-everyday-english-idioms-and-where-they-come-from
https://eslexpat.com/english-idioms-and-phrases/;
https://onlineteachersuk.com/english-idioms/;
One word substitutes:
Web links: https://www.careerpower.in/one-word-substitution.html;
https://www.hitbullseye.com/Vocab/One-Word-Substitute-List.php;
https://englishan.com/one-word-substitution-set-1/;

Public speaking - *Oral presentations*
Web links:https://egyankosh.ac.in/bitstream/123456789/26773/1/Unit-14.pdf;
https://www.skillsyouneed.com/rhubarb/preparing-oral-presentations.html;
https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-methods-of-delivery/

Writing skills – *Short Essay writing and E-mail writing.*
Web links: https://www.kibin.com/essay-writing-blog/important-essay-writing-skills/
https://www.scribendi.com/academy/articles/academic_essay_writing_skills.en.html ;
https://www.microsoft.com/en-us/microsoft-365/business-insights-ideas/resources/improve-email-writing-skills;

UNIT - III 9 Hrs

Grammar : Direct and Indirect speeches, Active and Passive voice, Drawing inferences (reading comprehensions and listening comprehensions)
Vocabulary: Leadership Skills – Negotiation skills - Team-building – *Debate.* Leadership

AITS EPT - CSE

Skills – Negotiation skills - Team-building

Direct and Indirect speeches:

Web links: https://onlymyenglish.com/direct-and-indirect-speech/
https://learnenglish.britishcouncil.org/grammar/b1-b2-grammar/reported-speech-1-statements
https://www.perfect-english-grammar.com/reported-speech.html

Active and Passive voice,

Web links: https://www.englishclub.com/grammar/passive-voice.htm
https://www.gingersoftware.com/content/grammar-rules/verbs/passive-voice/
https://nps.edu/web/gwc/revising-passive-voice-into-active-voice

Drawing inferences (reading comprehensions and listening comprehensions)

Web links: https://www.readingrockets.org/strategies/inference
https://www.thoughtco.com/making-inferences-3111201
https://www.comprehensionconnection.net/2019/03/exploring-difference-between-making.html

Vocabulary: Leadership Skills – Negotiation skills - Team-building – *Debate.*

Leadership Skills – Negotiation skills - Team-building

Web links: https://online.hbs.edu/blog/post/negotiation-skills
https://www.bumc.bu.edu/facdev-medicine/files/2014/08/BUSM-Leasership-training.pdf
https://in.indeed.com/career-advice/career-development/negotiation-skills
https://www.thebalancecareers.com/what-is-team-building-1918270

Debate:

Web links: https://noisyclassroom.com/debate-topics/
https://www.collegeessay.org/blog/debate-topics
https://www.edu.gov.mb.ca/k12/cur/socstud/frame_found_sr2/tns/tn-13.pdf

UNIT - IV		9 Hrs

Grammar: Common errors, Rearrangement of sentences.

Vocabulary: Resume writing, Pre-interview preparation , Group discussion.

Common errors, Rearrangement of sentences:

Web links:
https://www.letsstudytogether.co/sentence-arrangement-questions-pdf-for-banking-exams-ibps-sbi-po-and-clerk/
https://www.youtube.com/watch?v=e8nO3zZzkZs

Vocabulary: Resume writing, Pre-interview preparation , Group discussion.

Web links: https://www.youtube.com/watch?v=PfJg-67smf4
https://www.youtube.com/watch?v=-lXjbph22Fk

UNIT - V		9 Hrs

Grammar : Verbal ability tests.

Vocabulary: Mock interviews, Post interview Etiquette.

Verbal ability tests.

Web links: https://prepinsta.com/infosys-english-verbal-questions/
https://www.indiabix.com/online-test/verbal-ability-test/random
https://www.allindiaexams.in/online-test/online-general-english-test/61

Vocabulary: Mock interviews, Post interview Etiquette.

Web links: https://www.youtube.com/watch?v=ZOLCMa2QbdE
https://www.ziprecruiter.com/blog/the-right-way-to-follow-up-after-a-job-interview/
https://www.youtube.com/watch?v=KIoD19uoxt8

Textbooks:

1. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.

Reference Books:

1. Barun K. Mitra, "Personality Development and Soft Skills", OXFORD Higher Education 2018.
2. Alka Wadkar, "Life Skills for Success", Sage publications 2016.
3. Diana Booher, "Communicate with Confidence" Tata mcgraw hill, 1994.
4. B.N. Gosh, "Managing Soft skills for Personality development", Tata mcgraw hill 2012.
5. Michael Swan, "Practical English Usage", Oxford publications.
6. Raymond Murphy, "English Grammar in Use", Cambridge 5th Edition
7. Norman Lewis, "Word Power Made Easy", Penguin Publishers.
8. Advanced Grammar in Use A Self-Study Reference and Practice Book for Advanced Learners of English 3rd Edition , Cambridge

Online Learning Resources:

https://www.youtube.com/watch?v=DUlsNJtg2L8&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1										2				
CO2										2				
CO3										2		2		
CO4										2				
CO5										2		2		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AUTO - RT - CSE

Course Code	Professional Ethics and Human Values		L	T	P	C
20AMC9904			3	0	0	3
Pre-requisite	Universal Human Values	Semester	III-II			

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
- To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

Course Outcomes :

CO1: It ensures students sustained happiness through identifying the essentials of human values and skills.
CO2: The students will understand the importance of Values and Ethics in their personal lives and professional careers.
CO3: The students will learn the rights and responsibilities as an employee, team member and a global citizen.
CO4: Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
CO5: Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life.

UNIT - I 9 Hrs

Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly.

UNIT - II 9Hrs

Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT - III 9 Hrs

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - IV 9 Hrs

Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - V 9 Hrs

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

Textbooks:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Professional Ethics: R. Subramanian, Oxford University Press, 2015. 3.Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

Reference Books:

1.Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.
2.Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
3.Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S PritchaMichael J Rabins, 4e , Cengage learning, 2015.
4.Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

Online Learning Resources:

https://www.youtube.com/watch?v=9LSEBK03CiY&list=PLysZquKdjuWSv87TaE7pByn5TE_e46O2C

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2						
CO2								2						
CO3								3						
CO4								2						
CO5								1						

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS-IPT-CSE