

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**COMPUTER SCIENCE AND ENGINEERING**  
(Effective for the batches admitted in 2019-20)

**II B. Tech – II Semester (Theory – 7, Lab – 5)**

S. No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0512	Object Oriented Programming through Java	3	0	0	3	30	70	100
2	HS	19AHS9903	Communicative English II	2	0	0	2	30	70	100
3	ES	19AES0302	Design Thinking & Product Innovation	2	0	0	2	30	70	100
4	PC	19APC0506	Computer Organization	3	0	0	3	30	70	100
5	PC	19APC0511	Design and Analysis of Algorithms	3	0	0	3	30	70	100
6	PC	19APC0509	Formal Languages and Automata Theory	3	0	0	3	30	70	100
7	MC	19AMC9903	Environmental Studies	2	0	0	0	30	-	30
PRACTICAL										
8	PR	19APR0501	Socially Relevant Project (15 Hrs / Sem)	0	0	0	0.5	50	-	50
9	HS	19AHS9904	Communicative English II Lab	0	0	2	1	30	70	100
10	ES	19AES0303	Design Thinking & Product Innovation Lab	0	0	2	1	30	70	100
11	PC	19APC0504	Computer Organization Lab	0	0	2	1	30	70	100
12	PC	19APC0514	Object Oriented Programming through Java Lab	0	0	4	2	30	70	100
TOTAL							21.5	380	700	1080

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19APC0512</b>	<b>Object Oriented Programming Through Java</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

**UNIT - I**

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

**UNIT - II**

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class. Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages. Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

**UNIT - III**

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes. Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

**UNIT - IV**

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication. The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

**UNIT - V**

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets. GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog. Accessing Databases with JDBC: Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

**Course Outcomes:**

After the completion of the course the student will be able

- To solve real world problems using OOP techniques.
- To apply code reusability through inheritance, packages and interfaces
- To solve problems using java collection framework and I/O classes.
- To develop applications by using parallel streams for better performance.
- To develop applets for web applications.
- To build GUIs and handle events generated by user interactions.
- To use the JDBC API to access database

<b>List of COs</b>	<b>PO no. and keyword</b>	<b>Competency Indicator</b>	<b>Performance Indicator</b>
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
CO3	PO2: Problem analysis	2.3	2.3.1
CO4	PO 3: Design/Development of Solutions	3.4	3.4.3
CO5	PO 4: Conduct investigations of complex problems	4.1	4.1.1
CO6	PO 5: Modern tool usage	5.1	5.1.1
CO7	PO 5: Modern tool usage	5.1	5.1.1

**Text Books:**

1. Herbert Schildt “Java The complete reference”, 9th edition, McGraw Hill Education (India) Pvt. Ltd.
2. Paul Dietel, Harvey Dietel “Java How to Program”, 10th Edition, Pearson Education.

**REFERENCE BOOKS:**

1. T. Budd “Understanding Object-Oriented Programming with Java”, updated edition, Pearson Education.
2. Cay S. Horstmann, “Core Java Volume – 1 Fundamentals”, Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi, “Java Programming for core and advanced learners” University Press
4. Y. Daniel Liang, “Introduction to Java programming”, Pearson Education.
5. P. Radha Krishna, “Object Oriented Programming through Java”, University Press.
6. S. Malhotra, S. Chudhary, “Programming in Java”, 2nd edition, Oxford Univ. Press.
7. R.A. Johnson, “Java Programming and Object-oriented Application Development”, Cengage Learning.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AHS9903	Communicative English II	2	0	0	2

**Course Outcomes**

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

1. Prioritize information from reading texts after selecting relevant and useful points
2. Paraphrase short academic texts using suitable strategies and conventions
3. Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
4. Participate in group discussions using appropriate conventions and language strategies
5. Prepare a CV with a cover letter to seek internship/ job
6. Collaborate with a partner to make presentations and Project Reports

**Unit 1**

**(10 hrs)**

Listening : Listening for presentation strategies and answering questions on the speaker, audience, and key points.

Speaking: Formal presentations using PPT slides without graphic elements.

Reading: Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style.

Writing: Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases.

Grammar and Vocabulary: Formal/academic words and phrases.

**Unit 2**

**(10 hrs)**

Listening: Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse.

Speaking: Formal presentations using PPT slides with graphic elements.

Reading: Understand formal and informal styles; recognize the difference between facts and opinions.

Writing: Formal letter writing and e-mail writing (enquiry, complaints, seeking permission, seeking internship); structure, conventions and etiquette.

Grammar and Vocabulary: Phrasal prepositions; phrasal verbs.

**Unit 3**

**10(hrs)**

Listening: Identifying views and opinions expressed by different speakers while listening to discussions.

Speaking: Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.

Reading: Identifying claims, evidences, views, opinions and stance/ position.

Writing: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.

Grammar and Vocabulary: Language for different functions such as stating a point, expressing opinion, agreeing/disagreeing, adding information to what someone has stated, and asking for clarification.

**Unit 4:**

**(8 hrs)**

Listening: Understanding inferences; processing of information using specific context clues from the text.

Speaking: Group discussion; reaching consensus in group work (academic context).

Reading: Reading for inferential comprehension.

Writing: Applying for internship/ job - Writing one's CV/Resume and cover letter.

Grammar and Vocabulary: Active and passive voice – use of passive verbs in academic writing.

**Unit 5:**

**(8hrs)**

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

Speaking: Formal team presentations on academic/ general topics using PPT slides.

Reading for Writing: Structure and contents of a Project Report; identifying sections in project reports; understanding the purpose of each section; significance of references.

Grammar and Vocabulary: Reinforcing learning; editing short texts; correcting common errors in grammar and usage.

**\*Course Materials would be compiled and provided to learners and teachers**

**Reference Books**

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2<sup>nd</sup> Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012. Sample Web Resources  
Grammar/Listening/Writing 1-language.com <http://www.5minuteenglish.com/>  
<https://www.englishpractice.com/>

**Grammar/Vocabulary**

English Language Learning Online, <http://www.bbc.co.uk/learningenglish/>, <http://www.better-english.com/>,  
<http://www.nonstopenglish.com/>, <https://www.vocabulary.com/>, BBC Vocabulary Games, Free Rice Vocabulary Game

**Reading**

<https://www.usingenglish.com/comprehension/>, <https://www.englishclub.com/reading/short-stories.htm>,  
<https://www.english-online.at/>

**Listening**

<https://learningenglish.voanews.com/z/3613>, <http://www.englishmedialab.com/listening.html>

**Speaking**

<https://www.talkenglish.com/>, BBC Learning English – Pronunciation tips, Merriam-Webster – Perfect pronunciation Exercises

**All Skills**

<https://www.englishclub.com/>, <http://www.world-english.org/>, <http://learnenglish.britishcouncil.org/>, Online Dictionaries, Cambridge dictionary online, MacMillan dictionary, Oxford learner's dictionaries

**References:**

1. [www.pointblank7.in](http://www.pointblank7.in) > News & Politics > Features dt. 15.05.2019
2. Learning English a Communication Approach by Orient Longman Pvt Ltd. Hyderabad , 2005.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator:
CO1	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1 10.1.2
CO2	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2
CO3	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO4	PO9- Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.	9.2	9.2.1 9.2.2 9.2.3
CO5	PO10-Able to comprehend and write effective reports and design documentation.	10.3	10.3.1 10.3.2
CO6	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2

AITS TPT - CSE

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19AES0302</b>	Design Thinking and Product Innovation	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

Course Objectives:

- To familiarize product design process
- To introduce the basics of design thinking
- To bring awareness on idea generation
- To familiarize the role of design thinking in services design

Unit – I

Introduction to design, characteristics of successful product development, product development process, identification of opportunities, product planning, Innovation in product development.

Unit – II

Design thinking: Introduction, Principles, the process, Innovation in design thinking, benefits of Design thinking, design thinking and innovation, case studies.

Unit - III

Idea generation: Introduction, techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Syntetics, etc., Select ideas from ideation methods, case studies.

Unit - IV

Design Thinking in Information Technology, Design thinking in Business process model, Design thinking for agile software development, virtual collaboration, multi user and multi account interaction, need for communication, TILES toolkit, Cloud implementation.

Unit - V

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

Course Outcomes: Student should be able to

1. Generate and develop different design ideas.
2. Appreciate the innovation and benefits of design thinking.
3. Experience the design thinking process in IT and agile software development.
4. Understand design techniques related to variety of software services

Reference Books:

1. Christoph Meinel and Larry Leifer, "Design Thinking", Springer, 2011
2. Aders Riise Maehlum, "Extending the TILES Toolkit" from Ideation to Prototyping
3. <http://www.algarytm.com/it-executives-guide-to-design-thinking:e-book>.
4. Marc stickdorn and Jacob Schneider, "This is Service Design Thinking", Wiley, 2011
5. Pahl and Vietz, "Engineering Design", Springer, 2007

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO3: Design/development of solutions	3.1	3.1.1
CO: 2	PO 1: Engineering knowledge	1.3	1.3.1
CO: 3	PO 1: Engineering knowledge	1.3	1.3.1
CO: 4	PO3: Design/development of solutions	3.1	3.1.1
CO: 5	PO 1: Engineering knowledge	1.3	1.3.1

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19APC0506</b>	<b>Computer Organization</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

**Unit I:**

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

**Unit II:**

Arithmetic: Addition and Subtraction of Signed Numbers, Design and Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

**Unit III:**

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

**Unit IV:**

Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

**Unit V:**

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose, Interconnection Networks.

**Textbook:**

1. "Computer Organization", Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill Education, 5<sup>th</sup> Edition, 2013.

**Reference Textbooks:**

1. Computer System Architecture, M.Morris Mano, Pearson Education, 3<sup>rd</sup> Edition.
2. Computer Organization and Architecture, Themes and Variations, Alan Clements, CENGAGE Learning.
3. Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill Education.
4. Computer Architecture and Organization, John P.Hayes, McGraw Hill Education.

**Course Outcomes:**

- Ability to use memory and I/O devices effectively
- Able to explore the hardware requirements for cache memory and virtual memory
- Ability to design algorithms to exploit pipelining and multiprocessors

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2: Problem analysis	2.2	2.2.2
CO2	PO2: Problem analysis	2.2	2.2.2
CO3	PO2: Problem analysis	2.3	2.3.2

AITSTPT - CSE

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19APC0511</b>	<b>Design and Analysis of Algorithms</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To know the importance of the complexity of a given algorithm.
- To study various algorithm design techniques.
- To utilize data structures and/or algorithmic design techniques in solving new problems.
- To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.
- To study some techniques for solving hard problems.

**UNIT I**

Introduction: What is an Algorithm, Algorithm specification, Performance analysis  
Divide and Conquer: General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Strassen's matrix multiplication.

**UNIT II**

Greedy Method: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.  
Dynamic programming: General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, the traveling sales person problem.

**UNIT III**

Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS  
Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

**UNIT IV**

Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency Considerations.  
Lower Bound Theory: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

**UNIT V**

NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness, Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

**Text Books:**

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, S. Sartaj Sahni and Rajasekharan, 2nd edition, University Press.2014.
2. "Design and Analysis of Algorithms", Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, Second Edition, 2009.

**Reference Books:**

1. "Introduction to Algorithms", second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. "Introduction to Design and Analysis of Algorithms A strategic approach", R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. "Data structures and Algorithm Analysis in C++", Allen Weiss, Second edition, Pearson education.
4. "Design and Analysis of algorithms", Aho, Ullman and Hopcroft, Pearson education.
5. "Algorithms" – Richard Johnson baugh and Marcus Schaefer, Pearson Education

**Course Outcomes:**

1. Analyze the complexity of the algorithms
2. Use techniques divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
3. Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
4. Able to prove that a certain problem is NP-Complete.

<b>List of COs</b>	<b>PO no. and keyword</b>	<b>Competency Indicator</b>	<b>Performance Indicator</b>
CO1	PO 3: Design/Development of Solutions	3.1	3.1.1
CO2	PO 3: Design/Development of Solutions	3.2	3.2.1
CO3	PO 4: Conduct investigations of complex problems	4.1	4.1.2
CO4	PO 4: Conduct investigations of complex problems	4.1	4.1.4



**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0509	Formal Languages and Automata Theory	3	0	0	3

**Course Objective:**

- Understand formal definitions of machine models. Classify machines by their power to recognize languages. Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity Understanding of undecidable problems

**UNIT I**

**Introduction:** Basics of set theory, Relations on sets, Deductive proofs, Reduction to definitions, Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with Epsilon transitions ( $\epsilon$ -NFA or NFA- $\epsilon$ ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

**UNIT II**

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problem's of RLS, Applications of REs and FAs

**UNIT III**

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language..

**UNIT IV**

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

**UNIT V**

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar, Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undecidable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP.

**Text Books:**

1. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu kandar, Pearson.
2. Introduction to Automata Theory, Languages, and Computation, Third Edition, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Pearson.

**Reference Books:**

1. Introduction to Languages and the Theory of Computation, John C Martin, TMH, Third Edition.
2. Theory of Computation, Vivek Kulkarni, OXFORD.
3. Introduction to the Theory of Computation., Michel Sipser, 2nd Edition, Cengage Learning
4. Theory of computer Science Automata, Languages and Computation, K.L.P. Mishra, Chandrasekaran, PHI, Third Edition.
5. Fundamentals of the Theory of Computation, Principles and Practice, Raymond Greenlaw, H. James Hoover, Elsevier, Morgan Kaufmann.
6. Finite Automata and Formal Language A Simple Approach, A.M. Padma Reddy, Pearson

**Course Outcomes:**

- Construct finite state diagrams while solving problems of computer science.
- Design of new grammar and language.
- Find solutions to the problems using PDA.
- Find solutions to the problems using Turing machines.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2: Problem analysis	2.4	2.4.1
CO2	PO 3: Design/Development of Solutions	3.2	3.2.2
CO3	PO 4: Conduct investigations of complex problems	4.1	4.1.1
CO4	PO 4: Conduct investigations of complex problems	4.1	4.1.1

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19AMC9903</b>	Environmental Studies	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Outcomes:**

- CO: 1 Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
- CO: 2 Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self-learning.
- CO: 3 Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- CO: 4 Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
- CO: 5 To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting

**UNIT I**

**Multidisciplinary Nature of Environmental Studies:** Introduction – Multidisciplinary Nature of Environmental Studies – Definition, Scope and Importance – Need for Public Awareness.

**Natural Resources:** Renewable and non-renewable energy resources –Natural resources and associated problems.

**Forest resources:** Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

**Water resources:** Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

**Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

**Energy resources:** Renewable and non-renewable energy resources

**UNIT II**

**Ecosystems:** Concept of an ecosystem. – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**Biodiversity And Its Conservation :** Introduction- Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**UNIT III**

**Environmental Pollution:** Definition, Causes, effects and its control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone, Tsunami and landslides.

**UNIT IV**

**Social Issues and the Environment:** From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people – Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies–Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Public awareness.

**UNIT V**

**Human Population and the Environment:** Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

**Text Books:**

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.
3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd.

**Reference Books:**

1. Environmental studies by R.Rajagopalan, Oxford University Press.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.
4. Environmental studies by A. Ravi Krishnan, G. Sujatha Sri Krishna Hitech publications.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO: 2	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO: 3	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO: 4	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO: 5	PO1:Apply the knowledge of Basic science	1.2	1.2.1

AITSTPT - CSE

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AMC9904	Communicative English II Lab	0	0	2	1

Course Outcomes:

- CO: 1 Prioritize information from reading texts after selecting relevant and useful points.
- CO: 2 Make formal structured presentations on academic topics using PPT slides with relevant graphical elements.
- CO: 3 Participate in Group discussions using appropriate conventions and language strategies.
- CO: 4 Paraphrase short academic text using suitable strategies and conventions.
- CO: 5 Collaborate with a partner to make presentations and Project

**UNIT I**

Oral Presentation: Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style. Listening for presentation strategies and answering questions- Formal presentations using PPT slides without graphic elements

**UNIT II**

Power point Presentation/Poster Presentation: Understand formal and informal styles; recognize the difference between facts and opinions. Following an argument/ logical flow of thought; answering questions, formal presentations using PPT slides with graphic elements.

**UNIT III**

Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position. Identifying claims, evidences, views, opinions and stance/ position. Identifying views and opinions expressed by different speakers while listening to discussions.

**UNIT IV**

Reading for inferential comprehension. Group discussion; reaching consensus in group work(academic context). Understanding inferences; processing of information using specific context clues from the text.

**UNIT V**

Formal team presentations on academic/ general topics using PPT slides-identifying sections in project reports; understanding the purpose of each section; significance of references.

**Reference Books:**

1. Effective Technical Communication, Rizvi, Tata McGraw-Hill Education 2007.
2. A Practical Course in Effective English Speaking skills, J.K.Gangal, PHI Learning Pvt Ltd, 2012.
3. A Course in Communication Skills, P.Kiranmai Dutt, Geetha Rajeevan, C.L.N.Prakash, 2008.
4. Technical Communication, Meenakshi Raman, Oxford University Press.
5. Professional Communication Skills, Er.A.K.Jain, Pravin S.R.Bhatia, Dr.A.M.Sheikh, S.Chand & Company Ltd, 2001.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1 10.1.2
CO: 2	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2
CO: 3	PO9 Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2.	9.2.1 9.2.2 9.2.3
CO: 4	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	10.3	10.3.1 10.3.2
CO: 5	PO10 Able to comprehend and write effective reports and design documentation.	10.3	10.3.1 10.3.2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19AES0303</b>	<b>Design Thinking and Product Innovation Lab</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

MIT App Inventor is an online platform designed to teach Computational Design thinking concepts through development of mobile applications. Students create applications by dragging and dropping components into a design view and using a visual blocks language to program application behavior.

Course Outcomes:

- (1) Identify objectives of the project
- (2) How they shape the design of the system
- (3) Using MIT to develop the platform
- (4) How they are informed by computational thinking literature.

Key takeaways include use of components as abstractions, alignment of blocks with student mental models, and the benefits of fast, iterative design on learning.

Note: Student can also go for generating his/her own product and upload in digital market.

References:

1. <http://kio4.com/appinventori/index.htm>
2. <https://appinventor.mit.edu/>

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1: Engineering knowledge	1.3	1.3.1
CO: 2	PO2: Problem analysis	2.1	2.1.2
CO: 3	PO5: Modern tool usage	5.1	5.1.1
CO: 4	PO2: Problem analysis	2.2	2.2.2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0504	Computer Organization Lab	0	0	2	1

**Course Objectives:**

1. Understanding the behavior of logic gates ,adders, decoders, multiplexers and flipflops.
2. Understanding the behavior of ALU, RAM,STACK and PROCESSOR from working modules and the modules designed by the student as part of the experiment.

**Exercises in Digital Logic Design:**

- Implement Logic gates using NAND and NOR gates
- Design a Full adder using gates
- Design and implement the 4:1 MUX, 8:1 MUX using gates /ICs.
- Design and Implement a 3 to 8 decoder using gates
- Design a 4 bit comparator using gates/IC
- Design and Implement a 4 bit shift register using Flip flops
- Design and Implement a Decade counter

**Exercises in Micro Processor programming:**

Write assembly language programs for the following using GNU Assembler.

1. Write assembly language programs to evaluate the expressions:

i)  $a = b + c - d * e$

ii)  $z = x * y + w - v + u / k$

- a. Considering 8-bit, 16 bit and 32 bit binary numbers as b, c, d, e.

- b. Considering 2 digit, 4 digit and 8 digit BCD numbers.

Take the input in consecutive memory locations and also Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

2. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

- a. Arrange in ascending and descending order.

3. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

- a. Find max and minimum

- b. Find average

Considering 8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

**REFERENCE BOOKS:**

- Switching theory and logic design –A. Anand Kumar PHI, 2013
- Advanced microprocessor & Peripherals-A. K. Ray and K. M. Bherchandavi, TMH, 2nd edition.
- Switching and Finite Automatic theory-Zvi Kohavi, Niraj K.Jha Cambridge, 3rd edition
- Digital Design –Morris Mano, PHI, 3rd edition
- Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

**Course Outcomes:**

- Represent numbers and perform arithmetic operations.
- Minimize the Boolean expression using Boolean algebra and design it using logic gates
- Analyse and design combinational circuit.
- Design and develop sequential circuits
- Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
CO3	PO2: Problem analysis	2.3	2.3.1
CO4	PO 3: Design/Development of Solutions	3.4	3.4.3
CO5	PO1: Engineering knowledge	1.4	1.4.1

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)**

**B.Tech II Year II Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0514	Object Oriented Programming through Java Lab	0	0	4	2

**Course Objectives**

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

**Week-1**

- a. Installation of Java software, study of any Integrated development environment, Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.
- b. Write a Java program that prints all real solutions to the quadratic equation  $ax^2+bx+c=0$ . Read in a, b, c and use the quadratic formula.
- c. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff.  
If the type of the EB connection is domestic, calculate the amount to be paid as follows:  
First 100 units - Rs. 1 per unit; 101-200 units - Rs. 2.50 per unit; 201 -500 units - Rs. 4 per unit;  
> 501 units - Rs. 6 per unit  
If the type of the EB connection is commercial, calculate the amount to be paid as follows:  
First 100 units - Rs. 2 per unit; 101-200 units - Rs. 4.50 per unit; 201 -500 units - Rs. 6 per unit;  
> 501 units - Rs. 7 per unit
- d. Write a Java program to multiply two given matrices.

**Week-2**

- a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.
- b. Write Java program on dynamic binding, differentiating method overloading and overriding.
- c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using Interfaces.

**Week-3**

- a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
- b. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
- c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using String Tokenizer class.

**Week-4**

- a. Write a Java program to implement user defined exception handling.
- b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

**Week-5**

- a. Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
- b. Write a Java program that creates three threads. First thread displays –Good Morning! every one second, the second thread displays –Hello! every two seconds and the third thread displays –Welcome! every three seconds.

**Week-6**

- a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.
- b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

**Week-7**

- a. Write a java program that displays the number of characters, lines and words in a text file.
- b. Write a java program that reads a file and displays the file on the screen with line number before each line.

**Week-8**

- a. Write a Java program that correctly implements producer consumer problem using the concept of interthread communication.
- b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.
- c. Develop a Java application to perform Addition, Division, Multiplication and subtraction using JOption Pane dialog Box and Text fields.

**Week-9**

- a. Develop a Java application for the blinking eyes and mouth should open while blinking.
- b. Develop a Java application that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with –STOP! or –READY! or !GO! should appear above the buttons in selected color. Initially, there is no message shown.

**Week-10**

- a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.
- b. Develop a Java application by using JTextField to read decimal value and converting a decimal number into binary number then print the binary value in another JTextField.

**Week-11**

a. Develop a Java application that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.

b. Develop a Java application to demonstrate the key event handlers.

**Week-12**

a. Develop a Java application to find the maximum value from the given type of elements using a generic function.

b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result.

c. Develop a Java application for handling mouse events.

**Week-13**

a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

Lab Outcomes:

On successful completion of this laboratory students will be able to:

- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming construct to solve a problem.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.4	1.4.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
CO3	PO1: Engineering knowledge	1.4	1.4.1
CO4	PO1: Engineering knowledge	1.4	1.4.1