ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

RAJAMPET, Annamayya District, AP – 516126, INDIA

B.Sc. in Computer Science (Honors),
B.Sc. in Artificial Intelligence & Machine Learning,
B.Sc. in Artificial Intelligence and Data Analytics &
B.Sc. in Programming and Data Science.

B.Sc. – I Year I Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24BMAT11T	Matrices and Calculus	3	0	0	3
2	HSM	24BENG11T	Communicative English	2	1	0	3
3	PC	24BCOM11T	Problem Solving through C Programming	3	0	0	3
4	PC	24BCOM12T	Computer Organization	3	0	0	3
5	HSM	24BUHV11T	Human Values	3	0	0	3
6	HSM	24BENG11L	Communicative English Lab	0	0	4	2
7	PC	24BCOM11L	Problem Solving through C Programming Lab	0	0	4	2
Total				**14**	**1**	**8**	**19**

B.Sc.– I Year II Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24BMAT21T	Probability Theory and Statistics	3	0	0	3
2	PC	24BCOM21T	Introduction to Python Programming	2	1	0	3
3	PC	24BCOM22T	Object Oriented Programming using C++	3	0	0	3
4	PC	24BCOM23T	Data warehousing & Data Mining	3	0	0	3
5	BS	24BENS21T	Environmental Studies	3	0	0	3
6	PC	24BCOM21L	Python Programming Lab	0	0	4	2
7	PC	24BCOM22L	Object Oriented Programming using C++ Laboratory	0	0	4	2
Total				14	**1**	**8**	**19**

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Matrices and Calculus
Category: BS
Course Code: 24BMAT11T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The goal is to familiarize oneself with matrix theory and its applications, gain a solid understanding of partial derivatives and mean value theorems to tackle mathematical problems, and develop proficiency in vector differentiation and integration to address complex challenges effectively.

Course Outcomes:

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

1. understand the methods for solving the system of linear equations
2. utilize matrix algebra techniques for engineering applications.
3. analyze the functions of several variables to optimization techniques.
4. use scalar and vector point functions across a range of technical disciplines.
5. apply vector integral theorems in evaluating double and triple integrals

Unit 1 Matrices 12

Rank of a matrix by echelon form, normal form, solving system of homogeneous and non-homogeneous linear equations, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

Unit 2 Eigen values and Eigen vectors 8

Eigen values and Eigen vectors and their properties, diagonalization of a matrix, Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

Unit 3 Mean Value Theorems & Multivariable calculus 8

Taylor's theorem and Maclaurin's theorem for one variable (without proofs) – Simple problems.
Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, Maxima and Minima of functions of two variables, method of Lagrange multipliers for three variables

Unit 4 Vector Differential Calculus 10

Scalar and vector point functions, vector operator Del, Gradient, Directional derivative, Divergence, Curl, Del applied twice to point functions, vector identities. Applications: Irrotational fields and solenoidal fields.

Unit 5 Vector Integral Calculus 10

Line integral, surface integral and volume integral. Green's theorem in the plane (without proof), verifications of Stroke's theorem (without proof) and Gauss's divergence theorem (without proof).

Prescribed Textbooks:

1. B.S. Grewal. *Higher Engineering Mathematics.* 44th Ed., Khanna Publishers, 2017.
2. J. Stewart. *Calculus: Early Transcendentals.* 7th Ed., Cengage Learning.

Reference Books:

1. G. B. Thomas, Maurice D. Weir and Joel Hass. *Thomas' Calculus*, 14th Ed., Pearson Publishers, 2022.
2. R.K. Jain, S.R.K. Iyengar. *Advanced Engineering Mathematics.* 5th Ed., Narosa Publications.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Communicative English
Category: Humanities
Course Code: 24BENG11T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	0	3

Course Objectives: The primary goal of the Communicative English course is to develop students' listening, reading, speaking, and writing skills, enhancing their comprehension, oral presentation, and reporting abilities. It focuses on improving grammatical structures and vocabulary, equipping students with the proficiency needed for effective communication and preparing them to meet industry standards.

Course Outcomes:

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

1. understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. analyze literary forms, journalistic articles and scientific readings for comprehension and retention
3. demonstrate effective writing and speaking skills
4. apply grammatical knowledge in speech and writing and formulate sentences with accuracy
5. produce coherent and unified paragraphs with adequate support and detail

Unit 1 HUMAN VALUES: The Gift of the Magi (Short Story) 12

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Unit 2 NATURE: The Brook by Alfred Tennyson (Poem) 8

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs.

Unit 3 BIOGRAPHY: Elon Musk 8

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations
Vocabulary: Compound words, Collocations

Unit 4 INSPIRATION: The Toys of Peace by Saki 10

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters, Resumes
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary: Words often confused, Jargons

Unit 5 MOTIVATION: The Power of Intrapersonal Communication (An Essay) 10

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts
Reading: Reading comprehension.
Writing: Writing structured essays on specific topics.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Vocabulary: Technical Jargons

Prescribed Textbooks:

1. *Pathfinder: Communicative English for Undergraduate Students.* 1st Ed., Orient Black Swan, 2023 (Units 1,2 & 3)

Reference Books:

1. Dubey, Sham Ji & Co. *English for Engineers.* Vikas Publishers, 2020
2. Bailey, Stephen. *Academic writing: A Handbook for International Students*. Routledge, 2014.
3. Murphy, Raymond. *English Grammar in Use.* 4th Ed., Cambridge University Press, 2019.
4. Lewis, Norman. *Word Power Made Easy- The Complete Handbook for Building Superior Vocabulary.* Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Problem Solving through C Programming
Category: PC
Course Code: 24BCOM11T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understanding the steps in problem solving and formulation of algorithms to problems.
2. Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
3. Develop intuition to enable students to come up with creative approaches to problems.
4. Develop programs using pointers, structures and unions
5. Manipulation of text data using files

Course Outcomes:

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

1. formulate solutions to problems and represent those using
2. choose proper control statements and use arrays for solving problems.
3. decompose a problem into modules and use functions to implement the
4. apply and use allocation of memory for pointers and solve the problems
5. develop the solutions for problems using C programming Language.

Unit 1 Problem Solving and Introduction to C 12

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development Environments. Introduction to programming: Programming languages and generations.

Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively.

Unit 2 Introduction to decision control statements and Arrays 8

Selective, looping and nested statements, jumping statements.

Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations

Unit 3 Strings and Functions 8

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions.

Functions: Types of functions, recursion, scope of variables and storage classes.

Preprocessor Directives: Types of preprocessor directives, examples.

Unit 4 Pointers 10

Pointers: Understanding computer's memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers

Unit 5 Structures and Files 10

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Prescribed Textbooks:

1. B.A. Forouzan, R. F. Gilberg. *C Programming and Data Structures*. Cengage learning, Indian edition.
2. E. Balagurusamy. *C and Data Structures*. Tata McGraw Hill.
3. J. R. Hanly, Ashok N. Kamthane and A. Ananda Rao. *Programming in C and Data Structures*. Pearson Education.

Reference Books:

1. Yashvanth Kanetkar. *LET US C.* 9th Ed., BPB Publication
2. Byron Gottfried. *Schaum's Outline of Programming with C*. McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie. *The C Programming Language*. Prentice Hall of India.
4. A. K. Sharma. *Computer Fundamentals and Programming.* 2nd Ed., University Press, 2018.
5. Pradeep Dey and Manas Ghosh. *Programming in C*. 2nd Ed., Oxford Press, 2017

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Computer Organization
Category: PC
Course Code: 24BCOM12T
Branch/es: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Illuminate the student to understand the basic concepts of digital number systems and their conversions
2. Allow the students to Design and analyze combinational and sequential logic circuits through formulation of logic functions, Boolean algebra minimization
3. Impart the students to understand the internal organization and operations of a computer
4. Enable the students to acquire knowledge about the concepts of processor logic design and memory organization
5. Allow the students to familiarize the concepts related to IO organization.

Course Outcomes:

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

1. identify the basic structure and functional units of a digital computer
2. solve problems based on computer arithmetic
3. design, Analyze and evaluate different digital circuits using Boolean algebra
4. understand instruction structure and analyze the effect of addressing modes on the execution time of a program
5. understand concepts related to Processor, memory organization and select appropriate interfacing standards for I/O devices

Unit 1 Basic Structure of Computers 12

Computer Types, Functional units, Basic operational concepts, Bus structures, Data Representation: Binary Numbers, Fixed Point Representation. Floating – Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.

Unit 2 Digital Logic Circuits 8

Digital Logic Circuits - I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions, Combinational Circuits.

Digital Logic Circuits - II: Flip-Flops, Registers, Shift Registers, Binary counters, Decoders, Multiplexers, Programmable Logic Devices.

Unit 3 Computer Arithmetic and Instruction Set & Addressing 8

Computer Arithmetic: Algorithms for fixed point and floating-point addition, subtraction, multiplication and division operations, Hardware Implementation of arithmetic and logic operations.

Instruction Set & Addressing: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats, Basic Machine Instructions.

Unit 4 Processor Organization and Memory Organization 10

Processor Organization: Introduction to CPU, Register Transfers, Execution of Instructions, Multiple Bus Organization, Hardwired Control, Micro programmed Control

Memory Organization: Concept of Memory, RAM, ROM memories, memory hierarchy, cache memories, virtual memory, secondary storage, memory management hardware.

Unit 5 Input / Output Organization 10

Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Direct memory access, buses, Interface Circuits, Standard I/O Interfaces.

Prescribed Textbooks:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky. *Computer Organization.* 5th Ed., McGraw Hill.
2. Miles Murdocca, Vincent Heuring. *Computer Architecture and Organization- An Integrated Approach.* 2nd Ed., Wiley India.
3. M. Moris Mano. *Computer System Architecture.* 3rd Ed., Pearson.

Reference Books:

1. William Stallings. *Computer Organization and Architecture*. 6th Ed., Pearson.
2. David A. Paterson and John L. Hennessy. *Computer- organization and Design*. Elsevier.
3. Sivarama Dandamudi. *Fundamentals or Computer Organization and Design*. Springer Int. Edition.
4. M. Morris Mano. *Digital* Design. 3rd Ed., Pearson Education/PHI.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Human Values
Category: Humanities
Course Code: 24BUHV11T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to help students recognize the vital interplay between values and skills, promoting sustained happiness and prosperity. It seeks to foster a holistic perspective on life and profession, encouraging value-based living through a clear understanding of human reality and existence. Additionally, the course emphasizes the ethical implications of such an understanding, fostering trustful behaviour, fulfilling human interactions, and a harmonious relationship with nature.

Course Outcomes:

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

1. comprehend the terms like Natural Acceptance, Happiness and Prosperity
2. analyze one's self, and one's surroundings (family, society, nature)
3. apply human values in enriching human relationships and human society.
4. analyze the need for universal human values and harmonious existence.
5. evaluate themselves as socially and ecologically responsible engineers.

Unit 1 Introduction to Value Education 12

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session1: Sharing about oneself
Lecture 3: Self-Exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations
Tutorial 2: Practice Session2: Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session3: Exploring Natural Acceptance

Unit 2 Harmony in the Human Being 8

Lecture 7: Understanding Human being as the co-existence of the self and the body.
Lecture 8: Distinguishing between the needs of the self and the body
Tutorial 4: Practice Session4: Exploring the difference of needs of self and body.
Lecture 9: The body as an instrument of the self
Lecture 10: Understanding harmony in the self
Tutorial 5: Practice Session5: Exploring sources of imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and health
Tutorial 6: Practice Session 6: Exploring harmony of self with the body

Unit 3 Harmony in the Family and Society 8

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session9: Exploring systems to fulfil human goal

Unit 4 Harmony in the Nature/Existence 10

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, Self-Regulation and Mutual Fulfillment among the Four Orders of Nature
Tutorial 10: Practice Session 10: Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session11: Exploring Co-existence in Existence

Unit 5 Implications of the Holistic Understanding – a Look at Professional Ethics 10

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session 12: Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session13: Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session14: Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance
Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the Difference of Needs of Self and Body
PS5 Exploring Sources of Imagination in the Self
PS6 Exploring Harmony of Self with the Body
Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal
Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence
Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

Prescribed Textbooks:

1. **The Textbook** - R R Gaur, R Asthana, G P Bagaria. *A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. The Teacher's Manual - R R Gaur, R Asthana, G P Bagaria. *Teachers' Manual for A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. A. Nagaraj. *Jeevan Vidya: Ek Parichaya.* Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi. *Human Values.* New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. *The Story of My Experiments with Truth*
5. E. F Schumacher. *Small is Beautiful*

Web Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf
4. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
5. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202325%20Ethics%20v1.pdf
6. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview
7. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Communicative English Lab
Category: Humanities
Course Code: 24BENG11L
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	4	2

Course Objectives:

The main objective of Communicative English Laboratory course is to provide students with a range of self-instructional and learner-friendly methods for enhancing their language skills. This course is designed to train students in fundamental communication abilities and prepare them effectively for job interviews.

Course Outcomes:

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

1. relate and differentiate the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
2. develop effective communication skills through various verbal and non-verbal language learning practices
3. demonstrate professional skills by actively participating role-plays and descriptions
4. build an effective resonate and equip themselves with essential employability skills for professional success
5. enhance public speaking skills and deliver oral presentations with clarity and confidence

List of Topics

1. Phonetics: Vowels & Consonants
2. Just A Minute (JAM)
3. Role Play / Situational Dialogues
4. Oral Presentation/ Poster Presentation
5. Information Transfer
6. Describing people/objects/situations

Suggested Software:

1. Walden Infotech
2. Sky Pronunciation Suite
3. Clarity Pronunciation Power – Part I
4. Learning to Speak English - 4 CDs
5. Loose Your Accent in 28 days, CD Rom, Judy Ravin

Prescribed Textbooks:

1. Meenakshi Raman, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Grant Taylor. *English Conversation Practice.* Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. *Cambridge Academic English* (B2). CUP, 2012.
4. T. Balasubramanyam. *A Textbook of English Phonetics for Indian Students.* 3rd Ed., Trinity Press.

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Problem Solving through C Programming Lab
Category: PC
Course Code: 24ACOM11L
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	4	2

Course Objectives:

1. Setting up programming environment.
2. Develop Programming skills to solve problems.
3. Use of appropriate C programming constructs to implement algorithms.
4. Identification and rectification of coding errors in program
5. Develop applications using modular programming and Manage data using files.

Course Outcomes:

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

1. Identify and setup program development environment
2. Implement the algorithms using C programming language constructs
3. Identify and rectify the syntax errors and debug program for semantic errors
4. Solve problems in a modular approach using functions
5. Implement file operations with simple text data

Unit 1 Data Types, Constants, Input and Output and expressions 12

Exercise 1: Data types, Variables, Constants and Input and Output.
Exercise 2: Operators, Expressions and Type Conversions.

Unit 2 Decision Control Statements and Arrays 8

Exercise 3: Conditional Statements [two way and multipath].
Exercise 4: Loop Control Statements. [for, while and do-While]
Exercise 5: Unconditioned JUMP Statements- break, continue, goto.
Exercise 6: Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7: Multidimensional Arrays

Unit 3 Strings and Functions 8

Exercise 8: String Basics, String Library Functions and Array of Strings.
Exercise 9: Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10: Storage classes- Auto, Register, Static and Extern
Exercise 11: Recursive Functions, Preprocessor commands.
Exercise 12: Array Elements as Function Arguments.

Unit 4 Pointers 10

Exercise 13: Pointers, Dynamic memory allocation and error handling

Unit 5 Structures and Files 10

Exercise 14: Structures
Exercise 15: File handling

Prescribed Textbooks:

1. B.A. Forouzan, R. F. Gilberg. *C Programming and Data Structures.* Cengage learning, Indian edition.
2. E. Balagurusamy. *C and Data Structures.* Tata McGraw Hill.
3. J. R. Hanly, Ashok N. Kamthane and A. Ananda Rao. *Programming in C and Data Structures.* Pearson Education.

Reference Books:

1. Yashvanth Kanetkar. *Let Us C*, 9th Ed., BPB Publication
2. A K Sharma. *Computer Fundamentals and Programming.* 2nd Ed., University Press, 2018.
3. Pradeep Dey and Manas Ghosh. *Programming in C.* Oxford Press, 2017
4. Reema Thareja, *Introduction to C Programming*, 2nd Ed., OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Probability Theory and Statistics
Category: BS
Course Code: 24BMAT21T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The aim is to introduce the fundamental concepts of probability theory and elucidate probability distributions for problem-solving. This includes describing measures of central tendency, explaining hypothesis testing and confidence intervals for large samples, and detailing the steps for hypothesis testing with small samples.

Course Outcomes:

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

1. describe the fundamental concepts of probability and random variables.
2. apply the probability distribution in real life problems
3. calculate the correlation between two variables
4. Apply estimation techniques and conduct hypothesis tests for large samples.
5. Analyze the effectiveness of various hypothesis testing methods for small samples to derive accurate conclusions

Unit 1 Probability and Random Variables 10

Probability - axioms of probability – addition theorem of probability - conditional probability- multiplication theorem of probability (without proof) - Baye's theorem.
Random variables - discrete and continuous - Distribution functions - Mean and Variance.

Unit 2 Probability distributions 6

Probability distributions – Binomial and Poisson distribution - fitting - normal distribution - their properties.

8

Unit 3 Introduction of statistics

Introduction of Statistics – Mean - Median and Mode for ungrouped and grouped data.
Correlation - correlation coefficient – Karl Pearson's coefficient - Spearman's rank correlation.

Unit 4 Estimation and Testing of hypothesis for large samples 10

Estimation - Point estimation - Interval estimation of one mean (small and large) - one Proportion (large).
Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).

Unit 5 Testing of hypothesis for small samples 10

Student t-distribution test for single mean - two means and paired t-test,
Testing of equality of variances (F-test) - χ^2 test for goodness of fit - χ^2 test for independence of attributes.

Prescribed Textbooks:

1. Miller and Freund's. *Probability and Statistics for Engineers.*7th Ed., Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor. *Fundamentals of Mathematical Statistics.* 11th Ed., Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross. *a First Course in Probability.* Pearson Education India, 2002.
2. W. Feller. *An Introduction to Probability Theory and its Applications.* 1st Ed., Wiley, 1968.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Introduction to Python Programming
Category: PC
Course Code: 24BCOM21T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	0	3

Course Objectives:

1. To learn basics of computational problem solving, python programming and basic control structures.
2. To know python programming basic constructs like lists, dictionaries, sets and functions
3. To understand basics of object-oriented programming
4. To understand the performance of the implementations of basic data structures.

Course Outcomes:

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

1. Understand Python basics: literals, variables, operators, and control structures.
2. Develop functions, modules, and process strings; learn object-oriented principles.
3. Apply OOP concepts: inheritance, polymorphism, and handle exceptions effectively.
4. Implement advanced data structures: linked lists, stacks, and queues.
5. Utilize tree structures and algorithms: binary trees, search trees.

Unit 1 12

Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Control structure importance, Boolean expressions, selection control, and iterative control.

Data Structures in python: List structures, lists in python, iterating over lists (sequences) in python, more on python lists, Dictionary, Set

Unit 2 8

Functions: Program routines, more functions. Module Design: Modules, Top-Down design, python modules. String Processing: String Traversal, String-Applicable Sequence Operations. String Methods

Introduction to Object oriented programming: class, three fundamental features of object-oriented programming. What is encapsulation? Defining classes in python.

Data abstraction and through classes, special methods, calling a class method from another class method, garbage collection, class and static methods.

Unit 3 8

Inheritance: Introduction, Inheriting classes in python, types of inheritance, abstract classes and interfaces. Polymorphism: Operator overloading: Introduction, implementing operator overloading, method overriding.

Error and Exception handling: introduction, handling exceptions, multiple except blocks, multiple exceptions in a single block, the else clause, raising exceptions, instantiating exceptions, handling exceptions in invoked functions, built-in and user defined exceptions, the finally block, Assertions in python.

Unit 4 10

Data structures: Introduction to abstract data types, Single Linked List-traversing, searching, prepending, and removing nodes. Stacks-implementing using python list & linked list, Queues-implementing using python list & linked list.

Unit 5 10

Binary Trees: The Tree structure, the binary tree, priority queues-heaps Search trees: The binary search tree, search tree iterators, AVL trees

Prescribed Textbooks:

1. Charles Dierbach. *Introduction to Computer Science Using Python: A Computational Problem-Solving Focus.* Wiley.
2. Rance D. Necaise. *Data Structures and Algorithms using Python.* Wiley Publications.

Reference Books:

1. R. Nageswara Rao. *Core Python Programming.* Dream Tech Press (Wiley India), 2017.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser. *Data Structures and Algorithms in Python*, Wiley Publications
3. Reema Thareja. *Python Programming using problem solving approach.* Oxford University press
4. John Zelle, Franklin, Beedle. *Python Programming: An Introduction to Computer Science.* 3rd Ed.,
5. Allen Downey. *Think Python: How to think like a computer Scientist.* 2nd Ed., O'Reilly Publications
6. Bradley Miller, David L. Ranum, Franklin, Beedle. *Problem solving with algorithms and data structures using python.* independent publishers

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Object Oriented Programming using C++
Category: PC
Course Code: 24BCOM22T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To learn New & Advanced Data Structures
2. To impart the Object-Oriented Concepts in C++
3. To acquire knowledge on Algorithmic Design and Analysis
4. To solve problems Using Different Data Structures and Design Techniques, and Compare their Performance and Tradeoffs
5. To implement pattern matching algorithms and Tree Data Structures in C++

Course Outcomes:

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

1. Able to understand the basic concepts of C++ and its functions
2. Able to understand and apply the Object-Oriented Concepts and performance analysis for algorithms
3. Able to apply and analyze the abstract data types such as Stacks, Queues, and Dictionaries
4. Able to categorize tree data structures such as binary search trees, AVL, Red-black, Splay trees
5. Able to determine pattern matching algorithm efficiencies.

Unit 1 INTRODUCTION TO C++: 12

Introduction, Class Overview: Class, Objects, Class Members, I/O Streams, Access Control, Class Scope, Static Class Members: Static Member Variables, Static Member Functions, Static Object, Functions: Parameter Passing Methods, Inline Functions, The Friend Function, This Pointer, Dynamic Memory Allocation and Deallocation: New Operator, Delete Operator, Exception Handling.

Unit 2 OBJECT ORIENTED CONCEPTS 8

Constructors, Constructor Overloading, Destructors, Function Overloading, Operator Overloading: Plus, Minus, Unary, Inheritance: Base Class Access Control, Types of Inheritance, Reasons for the usage of Inheritance, Polymorphism: Virtual Functions, Pure Virtual Functions, Abstract Classes, Generic Programming with Templates: Function Templates, Class Templates.

Algorithms: Performance Analysis, Space Complexity, Time Complexity: Bubble Sort, Selection Sort.

Unit 3 STACKS, QUEUES AND DICTIONARIES: 8

Stack ADT, Queue ADT, Operations of Stack & Queue ADT

Dictionaries, Linear List Representation, Skip List Representation: Operations, Searching, Insertion, Deletion, Hash Table: Hash Functions, Collisions: Separate Chaining, Open Addressing - Linear Probing, Quadratic Probing, Double Hashingor Rehashing, Extendible Hashing, Comparison of Chaining and Open Addressing.

Unit 4 PRIORITY QUEUES, SEARCH TREES (PART I): 10

Priority Queue ADT, Priority Queue Implementation Using Heaps, External Sorting.

Binary Search Trees ADT, Representation of Binary SearchTree, Operations on Binary Search Trees: Insertion, Deletion and Searching, AVL Trees, Operations of AVL Trees: Insertion, Deletion and Searching.

Unit 5 SEARCH TREES (PART II) AND PATTERN MATCHING 10

Introduction to Red–Black and Splay Trees, B-Trees, Operations on B-Trees: Insertion, Deletion and Searching, Height of B Tree.

Pattern Matching Algorithms, Fixed PatternMatching Algorithms: Brute Force, Boyer–Moore, Knuth-Morris-Pratt Algorithms.

Prescribed Textbooks:

1. Akepogu Ananda Rao, Palagiri Radhika Raju. *Data Structures and Algorithms Using C++.* Pearson Education.
2. Sartaj Sahni. *Data Structures, Algorithms and Applications in C++.* 2nd Ed., Universities Press (India) Pvt. Ltd.
3. Mark Allen Weiss. *Data Structures and Algorithm Analysis in C++.* 2nd Ed, Pearson Education.

Reference Books:

1. Michael T. Goodrich, R. Tamassia and Mount. *Data Structures and Algorithms in C++.* Wiley Student Edition, John Wiley and Sons.
2. Adam Drozdek. *Data Structures and Algorithms in C++.* 3rd Ed., Thomson.
3. A.Y. Langsam and A.M. Tanenbaum. *Data Structures Using C and C++.* Hall of India Pvt. Ltd., 2006.
4. W. Savitch. *Problem Solving with C++*, The OOP. 4th Ed., Pearson Education.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Data Ware Housing & Data Mining
Category: PC
Course Code: 24BCOM23T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Learn the types of data to be mined and apply preprocessing methods on raw data.
2. To design data warehouses and techniques for mining frequent patterns, associations, and correlations.
3. To understand different classification algorithms and estimate the accuracy of algorithms.
4. To inculcate knowledge on different clustering algorithms.
5. To identify the various types of complex data and its applications.

Course Outcomes:

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

1. understand and apply the data preprocessing techniques.
2. design data warehouses and techniques for mining frequent patterns, associations, and correlations.
3. solve different classification problems and estimate the accuracy of classification algorithms.
4. understand and analyze different clustering techniques.
5. create various types of complex data such as spatial, text and multimedia.

Unit 1 INTRODUCTION: 12

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit 2 WARE HOUSING, MINING ASSOCIATION RULES IN LARGE DATABASES: 8

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, From Data Warehousing to Data Mining.

Basic Concepts and a Road Map, Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis.

Unit 3 CLASSIFICATION AND PREDICTION 8

Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier Accuracy

Unit 4 CLUSTER ANALYSIS INTRODUCTION 10

Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods,

Outlier Analysis.

Unit 5 MINING COMPLEX TYPES OF DATA AND DATA MINING APPLICATIONS: 10

Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web, Data Mining Applications.

Prescribed Textbooks:

1. Jiawei Han &Micheline Kamber. *Data Mining Concepts and Techniques.* 2nd Ed., 2006.

Reference Books:

1. Margaret H Dunham. *Data Mining Introductory and advanced topics.* Pearson Education.
2. Arun K Pujari. *Data Mining Techniques.* University Press.
3. Sam Anahory & Dennis Murray. *Data Warehousing in the Real World.* Pearson Edn Asia.
4. Paulraj Ponnaiah. *Data Warehousing Fundamentals.* Wiley Student Edition.
5. Ralph Kimball. *The Data Warehouse Life cycle Tool kit.* Wiley Student Edition

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Environmental Studies
Category: BS
Course Code: 24BENS21T
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course aims to raise awareness among students about the environment and the critical need to protect natural resources. It emphasizes the significance of ecosystems and biodiversity, while sensitizing students to the pollution challenges caused by everyday human activities. Additionally, the course equips students with the skills to identify and address social issues related to the environment.

Course Outcomes: At the end of the course, the student will be able to

1. explain how natural resources should be utilized with a focus on sustainability.
2. describe the need to protect ecosystems and biodiversity for future generations.
3. comprehend major pollution problems related to ecosystems.
4. apply quantitative reasoning skills in the proper utilization of goods and services.
5. analyze the interconnectedness of human dependence on Earth's ecosystems.

Unit 1 Multidisciplinary Nature of Environmental Studies 10

Definition, Scope and Importance – Need for Public Awareness. Natural resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation– Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources – Food resources: Impacts of overgrazing, problems with traditional agriculture, effects of modern agriculture – Land Resources: Land degradation, soil erosion Energy resources: Renewable and non-renewable energy resources.

Unit 2 Ecosystems, Biodiversity and its Conservation 10

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, lake ecosystem.

Biodiversity and Its Conservation: Definition – Value of biodiversity. Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Unit 3 Environmental Pollution 8

Definition, Causes, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste management: Causes, effects and control measures of urban and industrial wastes. e-waste: sources and health hazards. Need for e-waste management – recycling.

Unit 4 Social Issues and the Environment 10

Rain water harvesting, Environmental ethics: Issues and possible solutions – global warming, acid rain, ozone layer depletion – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Unit 5 Human Population and the Environment 8

Population explosion – Family Welfare Programmes – Environment and human health – Value Education – HIV/AIDS – Role of information Technology in Environment and human health, Field work – Visit to a local area to document environmental assets

Prescribed Textbooks:

1. Kaushik, Anubha, and C.P. Kaushik. *Perspectives in Environmental Studies*. 6th Ed., New Age International Publishers, 2018.
2. Chawla, Shashi. *A Textbook of Environmental Studies*. McGraw Hill Education, 2017.

Reference Books:

1. Joseph, Benny. *Environmental Studies*. 3rd Ed., McGraw Hill Education, 2017.
2. Dhinakaran, A., and B. Sankaran. *A Textbook of Environmental Studies*. Himalaya Publishing House, 2017.
3. Basu, Mahua, and S. Xavier. *Fundamentals of Environmental Studies*. Cambridge University Press, 2017.
4. Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*. University Press, 2013.
5. Tiwari, Vijay Kumar. *A Textbook of Environmental Studies*. Himalaya Publishing House, 2017.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Python Programming Lab
Category:	PC
Course Code:	24BCOM21L
Branches:	**Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester:	II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	4	2

Course Objectives:

1. To practice basics of python programming and basic control structures.
2. To practice python programming basic constructs like lists, dictionaries, sets and functions
3. To practice module design and usage of exception handling in python programming
4. To practice basics of object-oriented programming and elementary data structures.

Course Outcomes:

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

1. Apply basics of python programming
2. Write programs on the basic object-oriented programming in python language, handling of exceptions
3. Implement linear data structure in python programming
4. Develop and write programs for priority queues
5. Construct and write the implementation of binary search tree

List of Programs

Exercise 1: Install Python ecosystem and execute “Hello World” program.

Exercise 2: Practice

a) Python literals, variables, identifiers and data types
b) Python operators
c) Input and output statements.
d) Control statements

Exercise 3: Practice Python Programs on Numbers

a) Prime Numbers
b) Armstrong Numbers
c) Fibonacci Numbers and Series
d) Sum of squares for the first n natural numbers.
e) Reverse of a number

Exercise 4: Practice python programs on Various types of triangle patterns

Exercise 5: Implement python programs on functions, find factorial and Fibonacci number using recursion

Exercise 6: Practice python programs on lists, sets and dictionaries

Exercise 7: Practice any one python program on module design

Exercise 8: Practice python programs on string processing and exception handling

Exercise 9: Practice Python Programs

a) Write python program to implement encapsulation and abstraction
b) Write a python program to implement class variables and object variables

Exercise 10: Practice Python Programs

a) Write a python program to implement static variables and static methods.
b) Write a python program to implement super ()
c) Write a python program to implement types of inheritance

Exercise 11: Practice python programs

a) Write a python program to implement the method overloading and method overriding.
b) Write a python program to implement the abstract classes and interfaces.

Exercise 12: Implement python programs on

a) Stacks
b) Queues

Exercise 13: Implement Single linked list data structure.

Exercise 14: Implement priority queue data structure.

Exercise 15: Implement binary search tree data structure.

Prescribed Textbooks:

1. Charles Dierbach*, Introduction to Computer Science Using Python: A Computational Problem-Solving Focus*.
2. Rance D. Necaise, *Data Structures and Algorithms using Python*, Wiley Publications.

Reference Books:

1. R. Nageswara Rao. *Core Python Programming.* 2017 Ed., Dream Tech Press (Wiley India).
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser. *Data Structures and Algorithms in Python.* Wiley Publications
3. Reema Thareja. *Python Programming using problem solving approach*, Oxford University press
4. John Zelle, Franklin, Beedle. *Python Programming: An Introduction to Computer Science.* 3rd Ed.
5. Allen Downey. *Think Python: How to think like a computer Scientist.* 2nd Ed., O'Reilly Publications
6. Bradley Miller, David L. Ranum, Franklin, Beedle. *Problem solving with algorithms and data structures using python.* independent publishers

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Object Oriented Programming using C++ Laboratory
Category: PC
Course Code: 24BCOM22L
Branches: **Computer Science (Honors), AIML, AI&DA, Programming & Data Science**
Semester: II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	4	2

Course Objectives:

1. To make the student learn an object-oriented way of solving problems.
2. To make the student write ADTs for all data structures.
3. To make the student learn different algorithm design techniques.

Course Outcomes:

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

1. Able to know about Object oriented programming concepts like Encapsulation, Constructors & Destructor, function overloading
2. Able to construct OOP concepts like Operator overloading, inheritance, and polymorphism
3. Able to use Abstract Data Types for data structures with templates
4. Able to design the different trees and their operations
5. Able to understand the implementation of Pattern Matching Algorithm

Week1:

a) Write a C++ program to implement the access control.
b) Write a C++ program to implement the static member function.
c) Write a C++ program to implement the parameter passing.

Week2:

a) Write a C++ program to implement the friend function.
b) Write a C++ program to implement the inline method.
c) Write a C++ program to implement dynamic memory allocation and deallocation.

Week 3:

a) Write a C++ program to implement the exception handling.
b) Write a C++ program to implement the constructor overloading.
c) Write a C++ program to implement the function overloading.

Week4:

a) Write a C++ program to implement the Operator overloading.
b) Write a C++ program to implement the simple inheritance.
c) Write a C++ program to implement multiple inheritance.

Week5:

a) Write a C++ program to implement the virtual function.
b) Write a C++ program to implement the abstract class.
c) Write a C++ program to implement the class template.

Week6: Write a C++ programs to implement the following using an array.

a) Stack ADT

b) Queue ADT

Week7: Write a C++ programs to implement the following using a singly linked list.

a) Stack ADT

b) Queue ADT

Week8: Write a C++ program to implement all the functions of a dictionary ADT using hashing.

Week9: Write a C++ program to perform the following operations on Binary Trees.

a) Insertion

b) Deletion

c) Searching

Week10: Write C++ programs to perform the traversals for the given binary tree.

a) Preorder

b) inorder

c) postorder

Week11: Write C++ programs for priority queue implementation using Heaps.

a) Min Heap Insertion

b) Min Heap Deletion

c) Max Heap Insertion

d) Max Heap Deletion

Week12: Write a C++ program to perform the following operations on Binary SearchTrees.

a) Insertion

b) Deletion

c) Searching

Week13: Write a C++ program to perform the following operations on B-Trees.

a) Insertion

b) Deletion

c) Searching

(Note: Use Class Templates for the above Data Structure Programs)

Prescribed Textbooks:

1. Adam Drozdek. *Data Structures and Algorithms in C++.* 3rd Ed., Thomson, 2007.
2. D.S. Malik. *Data Structures using C++.* Thomson.