

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611 002



B.TECH INFORMATION TECHNOLOGY

Second Year – Third Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1902MA301	Engineering Mathematics – III	3	2	0	4	40	60	100
1902IT301	Data Structures and Algorithms	3	0	0	3	40	60	100
1902IT302	Computer Organization and Architecture	3	0	0	3	40	60	100
1902IT303	Digital Principles and Design	3	0	0	3	40	60	100
1902IT304	Problem solving using Python	3	0	0	3	40	60	100
1902IT305	Biology for IT	3	0	0	3	40	60	100
Laboratory Course								
1902IT351	Data Structures and Algorithms Lab	0	0	2	1	50	50	100
1902IT352	Digital Laboratory	0	0	2	1	50	50	100
1902IT353	Python Programming Lab	0	0	2	1	50	50	100
1904GE351	Life Skills: Soft Skill	0	0	2	1	100	-	100
Audit Course								
1901MCX02	Indian Constitution	2	0	0	-	-	-	-

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1901MA301	ENGINEERING MATHEMATICS – III	L	T	P	C
	(Queuing Model and Network Model)	3	1	0	4
	(Common to CSE & IT)				

UNIT I FOURIER SERIES **12 Hours**
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

UNIT II FOURIER TRANSFORMS **12 Hours**
Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT III QUEUEING MODELS **12 Hours**
Characteristics of Queuing Models – Markovian Queues – (M / M / 1): (FIFO / ∞ / ∞), (M / M / 1): (FIFO / N / ∞), (M / M / C): (FIFO / ∞ / ∞), (M / M / C): (FIFO / N / ∞) models – Little's formulae.

UNIT IV NETWORK MODEL **12 Hours**
Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource analysis in Network Scheduling.

UNIT V TRANSPORTATION AND ASSIGNMENT MODELS **12 Hours**
Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

TOTAL: 60 HOURS

REFERENCES:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Gross.D and Harris C.M, "Fundamentals of Queuing Theory", Wiley Student Edition, 2004.
4. Robertazzi, "Computer Networks and Systems: Queuing Theory and performance Evaluation", Springer, 3rd Edition, 2006
5. Taha H.A. "Operations Research", Pearson education, Asia, 8th Edition, 2007
6. Trivedhi K.S, "Probability and statistics with Reliability, queuing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002
7. Kalavathy S, Operations Research, Second Edition, Vikas Publishing House, 2004.
8. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
9. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

1702IT301	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

UNIT I INTRODUCTION 9 Hours

Data Structures – Programming Strategies – ADT – Algorithms – Problem Solving – Complexity – Asymptotic Notations – Recurrence Relations

UNIT II DATA STRUCTURES 9 Hours

Array – List: Types, Applications, Linked List – Stack: Operations, Applications, Implementations – Queue: Operations, Applications, Implementations – Tree: Types, Implementation, Applications.

UNIT III DIVIDE AND CONQUER & DYNAMIC PROGRAMMING 9 Hours

Divide and Conquer techniques with Algorithm Analysis – Merge Sort – Optimal Binary Search Tree, Huffman Tree – Strassen’s Matrix Multiplications. Dynamic Programming with Algorithm Analysis – Graph – Warshall’s, Floyd’s Algorithms – Binomial Coefficient

UNIT IV GREEDY AND ITERATIVE METHODS 9 Hours

Prim’s Algorithm – Kruskal’s Algorithms – Dijkstra’s Algorithms – The stable Marriage Problem – Algorithm Analysis.

UNIT V ALGORITHM ANALYSIS AND APPLICATIONS 9 Hours

Algorithm Analysis and power – P, NP, NP-Complete Problems – Backtracking – N-Queen Problem, Graph Coloring – Branch and Bound – Decision Tree - Travelling Salesman Problem – Knapsack Problem

TOTAL: 45 HOURS

REFERENCES:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education, 2014
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2012.
3. Reema Thareja, “Data Structures Using C”, Oxford University Press, 2011
4. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 2012
5. Michael T Goodrich, Roberto Tamassia, David Mount, “Data Structures and Algorithms in C++”, 8th Edition, Wiley Publishers, 2014.
6. nptel.ac.in/

1902IT302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

UNIT I STRUCTURE OF COMPUTERS & MACHINE INSTRUCTION 9 Hours

Introduction, Technologies for building Processors and Memory, Performance, The Power Wall, Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsigned numbers, Representing Instructions in the Computer, Logical Operations, Instructions for Making Decisions, Supporting Procedures in Computer Hardware, Communicating with People.

UNIT II PROCESSING UNIT 9 Hours

MIPS Addressing for 32-Bit Immediate and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Sub word Parallelism, Real Stuff: Streaming SIMD Extensions and Advanced Vector Extensions in x86.

UNIT III PIPELINING 9 Hours

Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, Real Stuff: The ARM Cortex – A8 and Intel Core i7 Pipelines, Going Faster: Instruction –Level Parallelism and Matrix Multiply. An Introduction to Digital Design Using a Hardware Design Language to Describe and Model a Pipeline.

UNIT IV MEMORY 9 Hours

Memory Technologies, the Basics of Caches, Measuring and Improving Cache Performance, dependable memory hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite- State Machine to Control a Simple Cache, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers, Real Stuff: The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies, Going Faster: Cache Blocking and Matrix Multiply.

UNIT V DISK STORAGE 9 Hours

Disk Storage and Dependability-RAID levels-hardware multi threading-clusters- message passing multiprocessors-Multiprocessors network topologies.

TOTAL: 45 Hours

References:

1. David A. Patterson and John L. Hennessey, “Computer organization and design, The Hardware/Software interface”, Morgan Kaufman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th Edition, Tata McGraw Hill, 2013.
3. William Stallings, —Computer Organization and Architecture – Designing for Performance, Sixth Edition, Pearson Education, 2013.
4. V.P. Heuring, H.F. Jordan, —Computer Systems Design and Architecture, Second Edition, Pearson Education, 2015.
5. Behrooz Parhami, —Computer Architecture, Oxford University Press, 2012.
6. <http://nptel.ac.in>

1902IT303	DIGITAL PRINCIPLES AND DESIGN	L	T	P	C
		3	0	0	3

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES **9 Hours**

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC **9 Hours**

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers and Demultiplexers – Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC **9 Hours**

Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC **9 Hours**

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

UNIT V WORKING WITH VERILOG **9 Hours**

Verilog Concepts – Basic concepts – Modules & ports & Functions – useful modeling techniques – Timing and delays – user defined primitives. Modeling Techniques -Advanced Verilog Concepts – Synthesis concepts – Inferring latches and flip-flops – Modeling techniques for efficient circuit design. .

TOTAL: 45 HOURS

REFERENCES:

1. Morris Mano M. and Michael D. Ciletti, “Digital Design”, IV Edition, Pearson Education, 2008.
2. John F. Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007.
3. Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2003.
4. Donald D. Givone, “Digital Principles and Design”, Tata Mcgraw Hill, 2003.
5. Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.
6. <http://nptel.ac.in/>

1902IT304	PROBLEM SOLVING USING PYTHON	L	T	P	C
		3	0	0	3

UNIT I PROBLEM SOLVING AND PYTHON INTRODUCTION 9 Hours

Problem solving techniques: Program development life-cycle – Algorithms – building blocks of algorithms -Flowchart– Pseudo Code-Illustrative problems. Introduction to Python, Python Interpreter and its working, Syntax and Semantics

UNIT II PYTHON BASICS 9 Hours

Data Types, operators, loops, Assignments and Expressions, Control Flow Statements.

UNIT III DATA STRUCTURES AND FUNCTIONS 9 Hours

Lists-Tuples-Dictionaries-Functions and lambda expressions-Iterations and Comprehensions.

UNIT IV FILES,MODULES AND Packages 9 Hours

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages

UNIT V CLASSES OBJECTS And REGULAR EXPRESSIONS 9 Hours

Overview of OOPs terminology-class-inheritance-overloading-Regular Expressions

TOTAL: 45 HOURS

FURTHER READING: Python for Data Science

REFERENCES:

1. Martin. C. Brown, “PYTHON: The Complete Reference”, McGraw Hill,2001.
2. Naomi R. Ceder , The Quick Python Book, Second Edition,2010
3. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
4. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Allen B. Downey ,”Think Python: How to Think Like a Computer Scientist“, 2nd edition,
7. Updatedfor Python 3,Shroff/O‘Reilly Publishers, 2016
(<http://greenteapress.com/wp/thinkpython/>)
8. <http://nptel.ac.in/>

1902IT305

BIOLOGY FOR IT

L	T	P	C
3	0	0	3

UNIT I LIFE (INTRODUCTION TO CELLS)

8 Hours

Biomolecules: Carbohydrates, Proteins, Nucleic Acids, Lipids, Enzymes. Cell structure and composition; The central dogma in molecular biology; Darwinian evolution; Molecular perspective and classification; Phylogenetic trees; Study of inter-and intra-species relationships; Microorganisms and Infectious Diseases.

UNIT II LIFE PROCESSES (FUNCTIONING OF HUMAN SYSTEMS)

7 Hours

Muscular System; Nervous System; Special Senses; Sensory organs (eye, ear, smell, taste, touch); Cardiovascular System; Respiratory System; Renal System; Immune System; Endocrine System; Cancer and Life style diseases; Stem cells.

UNIT III BIO-INSPIRED ALGORITHMS

10 Hours

Artificial Neural Networks; Swarm intelligence algorithms; Particle Swarm Optimization; Ant colony optimization; Bees colony optimization; Genetic Algorithms.

UNIT IV COMPUTATIONAL MEDICINE

10 Hours

Computational Challenges – Phenotyping, Biomarker discovery, Predictive modeling, Casual modeling, Optimizing and or selecting interventions, Advancements.

UNIT V HEALTH INFORMATICS

10 Hours

Overview of Health Informatics, Electronic Health Records and Data Standards and Exchange, Workflow Analysis and Process Redesign, Usability and Human Factors, Systems Design and Designing for Safety

TOTAL: 45 HOURS

REFERENCES:

1. Biology for Engineers, Rajiv Singal , CBS Publishers and Distributors Pvt Ltd; First Edition edition (4 June 2019).
2. Biology for Engineers, Wiley Editorial, Wiley (2018).
3. Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, Wiley; Third edition (2018).
4. Computational Medicine: Tools and Challenges, Zlatko Trajanoski, Springer; 2012 edition (19 September 2012).
5. Health Informatics - E-Book: An Interprofessional Approach, Ramona Nelson, Nancy Staggers, Elsevier; 2 edition (December 8, 2016).

1902IT351	DATA STRUCTURES AND ALGORITHMS LAB	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS:

MODULE 1:

1. Implement Array ADT
2. Write the program to perform Linked List, Stack and Queue Operations
3. Write the program to implement Tree Traversal operations
4. Write the program to implement sorting operations.
5. Write the program to implement searching operations

MODULE 2:

1. Implement Tower of Hanoi Problem using recursion
2. Implement Fibonacci number generation using recursion
3. Implement minimum spanning tree using Dijkstra's algorithm, Prim's, Kruskal's Algorithms
4. Write program to implement all the functions of a dictionary (ADT) using hashing.
5. Implementation of AVL tree.

CASE STUDY:

Given the sequence of integers 5 9 1 7 4 3 2 0 manually arrange this sequence in ascending order using the three "elementary" sorting methods: insertion sort, bubblesort and selection sort, showing at each step the new configuration of the sequence. How many comparisons and how many element moves were used by each method? Which is the best performing method for sorting this array of integers? Which would be the worst arrangement of this sequence?

Hardware: Standalone desktops 30 Nos

Software: Turbo C++ compiler or equivalent

TOTAL: 30 HOURS

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2014
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2012.
3. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011
4. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 2012
5. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 8th Edition, Wiley Publishers, 2014.
6. nptel.ac.in/

1902IT352

DIGITAL LABORATORY

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS:

1. Verification of basic logic gates
2. Verification of Boolean theorems using basic gates.
3. Design and implementation of code converters using logic gates
 - a. BCD to excess-3 code converter and vice-versa
 - b. Binary to gray code converter and vice-versa
4. Design and implementation of 4 – bit binary adder/subtractor using IC
5. Design and implementation of 16 bit odd/even parity generator/checker using IC
6. Design and implementation of 2 bit magnitude comparator using IC
7. Design and implementation of multiplexer and de-multiplexer using IC
8. Design and implementation of sequential circuits
 - a. Shift –registers
 - b. Synchronous and asynchronous counters
9. Design and implement logic gates, combinational and sequential circuits using Hardware Description Language.
10. Coding combinational/sequential circuits using HDL.
11. Design of a 32-bit carry look-ahead adder with logarithmic depth using Verilog
12. Design of a Wallace tree multiplier using Verilog

REQUIREMENTS:

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

HARDWARE:

1. Digital trainer kits 30
2. Digital ICs required for the experiments in sufficient numbers

SOFTWARE:

1. HDL simulator.

TOTAL: 30 HOURS

REFERENCES

1. Morris Mano M. and Michael D. Ciletti, “Digital Design”, IV Edition, Pearson Education, 2008.
2. John F. Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007
3. Charles H. Roth Jr, “Fundamentals of Logic Design”, Fifth Edition – Jaico Publishing House, Mumbai, 2003.
4. Donald D. Givone, “Digital Principles and Design”, Tata Mcgraw Hill, 2003.
5. Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.
6. <http://nptel.ac.in>

1902IT353

PYTHON PROGRAMMING LAB

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS:

1. Study of key features of the Python language, intro to the Python IDE's
2. Play with Data types, keywords, conditional and control statements, looping, branching
3. Implement Python program concepts using List, Tuple and Dictionaries
4. Implement Functions using Python
5. Perform the following file operations using Python
 - a) Traverse a path and display all the files and subdirectories in each level till the Deepest level for a given path. Also, display the total number of files and subdirectories.
 - b) Read a file content and copy only the contents at odd lines into a new file.
6. Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
7. Perform Sorting and Searching using Python
8. Perform the following file operations using Python
 - a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories.
 - b) Read a file content and copy only the contents at odd lines into a new file
9. Perform exception handling using Python
10. Implement Python programming concepts using classes and objects
11. Using Regular Expressions, develop a Python program to
 - a) Identify a word with a sequence of one upper case letter followed by lowercase letters.
 - b) Find all the patterns of "1(0+)1" in a given string.
 - c) Match a word containing 'z' followed by one or more o's. Prompt the user for input.
12. Working with Python and MySQL to create a database and insert records
13. Devise a Python program to implement the Hangman Game and Pygame

REQUIREMENTS:

Software:

Operating System: Windows /Linux operating system

Tool: Python 3.6 (or above)

IDE: Pycharm, Spyder

TOTAL: 30 HOURS

References

1. Martin. C. Brown, "PYTHON: The Complete Reference", McGraw Hill, 2001.
2. Naomi R. Ceder, The Quick Python Book, Second Edition, 2010
3. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
4. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press, 2013
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist“, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
(<http://greenteapress.com/wp/thinkpython/>)
7. <https://www.learnpython.org/>
8. <https://wiki.python.org/moin/BeginnersGuide/Programmers>
9. <https://www.python.org/about/gettingstarted/>
10. <https://www.javatpoint.com/python-tutorial>
11. <https://www.geeksforgeeks.org/python-programming-language/>

1904GE351	LIFE SKILLS: SOFT SKILLS	L	T	P	C
		0	0	2	1

Unit I INTRODUCTION TO SOFT SKILLS 6 Hours

Soft Skills an Overview - Basics of Communication – Body Language – Positive attitude –Improving Perception and forming values – Communicating with others.

Unit II TEAM VS TRUST 6 Hours

Interpersonal skills – Understanding others – Art of Listening - Group Dynamics – Networking - Individual and group presentations - Group interactions – Improved work Relationship.

Unit III SELLING ONESELF 6 Hours

How to brand oneself – social media – job hunting – Resume writing – Group Discussion – Mock G.D - .Interview skills – Mock Interview

Unit IV CORPORATE ETIQUETTES 6 Hours

What is Etiquette – Key Factors – Greetings – Meeting etiquettes – Telephone etiquettes – email etiquettes – Dining etiquettes – Dressing etiquettes – Rest room etiquettes – Life etiquettes

Unit V LEARNING BY PRACTICE 6 Hours

1. My family. Myself. 2. Meeting people. Making Contacts.3. A city. Getting about town. 4. Our flat. Home life.5Travelling. Going abroad.6. Going through Customs.7. At a hotel.8. Shopping. 9. Eating out.10. Making a phone call.11A modern office.12 Discussing business.

TOTAL 30 Hours

REFERENCES:

- 1 Dr.k.Alex, “soft skills “Third Edition, S.Chand& Publishing Pvt Limited, 2015
2. Arunakoneru, ‘Professional Communication’ Second Edition, Tata McGraw-Hill Education, 2012
3. D.K.Sarma, ‘You & Your Career ‘First Edition Wheeler Publishing & Co Ltd, 2010
4. Shiv Khera ‘You Can Win’ Third Edition Mac Millan Publisher India Pvt Limited, 2011

ASSESSMENT PATTERN:

1. Two assignments will be conducted (25 * 2) - 50 marks
2. Pragmatic Assessment - 50 Marks