

Name of the Course: Elective (EL - I): Computer Science - I (2 Credits)

Sr. No.	Heading		Particulars
1	Description the course (Including but Not limited to)	:	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical	:	Major /Minor/Open Electives /Skill Enhancement / Ability Enhancement/Indian Knowledge System
3	Type	:	Theory
4	Credits	:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted	:	30 Hours
6	Marks Allotted	:	50 Marks
7	Course Objectives (CO): The students are expected to:		
	CO 1.	to get the opportunity to study the fundamental concepts of microcontrollers, processor architectures, and embedded system components with emphasis on the 8051 microcontrollers.	
	CO 2.	to develop the ability to understand the 8051's instruction set and write simple assembly language programs for embedded applications.	
	CO 3.	to explore the basics of Python Programming and understand components of Python Program	
	CO 4.	to learn how to use control structures in Python	
	CO 5.	to study the built in data structures in Python	
8	Course Outcomes (OC): After successful completion of the course, the student will be able to:		
	OC 1.	Understand the fundamental concepts, architecture, and memory organization of the 8051 Microcontroller.	
	OC 2.	Develop and analyze basic assembly language programs using the 8051's instruction set and addressing modes.	
	OC 3.	Ability to store, manipulate and access data in Python	
	OC 4.	Ability to work with data structures.	
	OC 5.	Ability to learn how to write functions and pass arguments in Python and understand recursive functions. .	
9	Modules / Units: - There will be One Module / Unit Per Credit		
	Module I / Unit I: 8051 Microcontroller		(15 Hours)
	(i) Introduction to Microcontrollers: Introduction, Microcontrollers and Microprocessors, History of Microcontrollers and Microprocessors, Block diagram of 8051 Microcontroller*, Embedded Versus External Memory Devices, 8-bit & 16-bit Microcontrollers, CISC and RISC Processors, Harvard and Von Neumann Architectures, Commercial Microcontrollers. AVD-Ch: 1 MMM - For * Refer 1.2		
	(ii) 8051 Microcontrollers: Introduction, MCS-Architecture, Registers in MCS-51,8051 Pin Description, 8051 Connections, 8051 Parallel I/O Ports, Memory Organization. AVD-Ch: 2, 3		
	(iii)8051 Instruction Set and Programming: MCS-51 Addressing Modes and Instructions: 8051 Addressing modes, MCS-51 Instruction Set, 8051 Instructions and Simple Programs, Using Stack Pointer AVD-Ch: 4		

	Module II / Unit II: Python Programming (15 Hours) Introduction to Python: What is Python? Reasons for popularity, what sets Python apart, where is Python used? Functional programming model, Procedural programming model, Object Oriented Programming model, Event driven programming model. Getting Started: Python Installation, Python resources, Third party packages. Python Basics: Identifiers and Keywords, Python types, Basic Types, Integer and float ranges, Variable type and Assignment, Arithmetic operators, Precedence and Associativity, Conversions Built in functions, Built in modules, Comments and indentation. Strings and Regular Expressions: What are Strings? Accessing String elements, String properties, Built-in Functions, String methods, String Comparisons, Regular expressions, Regex functionality, Regex Metacharacters, Regex Repetition qualifiers. Regex anchors, Regex grouping Decision Control Instruction: Decision control instruction, Nuances of conditions, Logical operators, Conditional expressions, receiving input, pass statement. Repetition Control Instruction: Repetition control instruction, while loop, for loop, break and continue, else block of a loop. Console Input /Output: Console input, Console output, Formatted printing Lists: What are Lists, Accessing List elements, Looping in Lists, Basic List operations, Using Built-in Functions on Lists, List methods, Sorting and reversing, list varieties. Tuples: What are tuples, accessing tuple elements, looping in tuple, Basic tuple operations, Using Built-in Functions on tuples, tuple methods, tuple varieties. Sets: What are Sets, accessing set elements, Looping in Sets, Basic Set operations, Using Built-in Functions on Sets, set methods, Mathematical Set operations, Updating Set operations, Set varieties. Dictionaries: What are Dictionaries, accessing dictionary elements, looping in dictionaries, Basic dictionary operations, Using Built-in Functions on dictionaries, Dictionary methods, Dictionary varieties. Functions: What are functions, Communication with functions, Types of arguments, unpacking arguments Recursion: Repetitions, Recursive functions, when to use recursion, Recursive factorial function, Problem with unknown loops, types of recursion, Recursion limit, Iteration to recursion YK: Chapter 14
10	Reference Books: 1. AVD: Microcontrollers (Theory and Applications) by Ajay V Deshmukh, The Tata-McGraw-Hill Companies. 2. MMM: The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R. D. Mckinlay, Second Edition, Pearson 3. Intel's 8031/8051 Data sheet 4. YK: Yashavant Kanetkar, Aditya Kanetkar: Let Us Python, 7th Edition Additional Reference Books: 1. The 8051 Microcontroller & Embedded Systems-Dr. Rajiv Kapadia (Jaico Pub. House) 2. 8051 Micro-Controller by K. J. Ayala, Penram International. 3. Programming & customizing the 8051 Microcontroller by Myke Predko, TMH. 4. Paul Gries, et al., Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014 5. Python Programming for Students: Mahesh Bhavne & Sunil Patekar, Shroff Publishers & Distributors Pvt Ltd. First Edition August 2021 6. Starting out with Python, Tony Gaddis, Fourth Edition Pearson 7. Python Programming, Anurag Gupta, G Biswas, 1st Edition McGraw Hill

	8. The Complete Reference: Python Martin C Brown, 1 st Edition		
11	Internal Continuous Assessment: 40% (20 Marks)		External Assessment: (60%) (30 Marks)
12	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)		Evaluation: through Exam at the End of the Semester / Term.
13	Format of Question Paper for Semester End Examination Total Marks: 30 Marks Duration: One Hour		
	Module I / Unit-I 15 Marks	Q.1 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks
		Q.1 B) Attempt any One (Each carry 05 Marks) i) Problem / Theory ii) Problem	05 Marks
	Module II / Unit-II 15 Marks	Q.2 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks
		Q.2 B) Attempt any One (Each carry -5 Marks) i) Problem / Theory ii) Problem	05 Marks