

Name of the Course: Elective (EL - II): Computer Science - II (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.	study the architecture and functional features of the 8051 microcontrollers , with emphasis on timers, counters, serial communication, and interrupt systems.
	CO 2.	develop programming skills in 8051 assembly language for interfacing external devices and handling real-time events using timers and interrupts.
	CO 3.	study object-oriented programming concepts in Python , including classes, objects, inheritance and also concepts on exception handling and file handling.
	CO 4.	develop students' ability to perform numerical computations and array-based processing using the NumPy library.
	CO 5.	get familiarized with data analysis and visualization techniques using Pandas and Matplotlib for real-world problem solving.
8	Course Outcomes (OC): After successful completion of the course, the student will be able to	
	OC 1.	program and configure 8051 timers, counters, serial ports, and interrupts to implement embedded system applications.
	OC 2.	interface the 8051 Microcontroller with external hardware such as RS-232 devices and develop interrupt-driven embedded programs.
	OC 3.	design and implement Python programs using object-oriented principles , including inheritance. Also, programs based on exception handling and file operations will be performed.
	OC 4.	perform numerical and statistical operations on datasets using NumPy and Pandas data structures.
	OC 5.	visualize and interpret data effectively using Matplotlib to support data-driven decision making.
9	Modules / Units: - There will be One Module / Unit Per Credit	
	Module I / Unit I: Microcontroller (15 Hours)	
	8051 Microcontroller: Timer/Counters, Serial Communication, Interrupts Programming 8051 Timers, Counter Programming, Basics of Serial Communication, 8051 Connection to RS232, 8051 Serial Port Programming in assembly, 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts	
	MMM - Ch 9: 9.1, 9.2, 10.1, 10.2, 10.3, 11.1, 11.2, 11.3	
	Module II / Unit II: (15 Hours)	

	Classes and Objects: class and objects, User defined class, Access convention, Object Initialization, class variables, and methods. Containership and Inheritance: Resuse mechanism, Containership, Inheritance, Features of inheritance, Types of inheritance. Exception Handling: Syntax Errors, Exceptions, How to deal with Exceptions, try an except block, User defined exceptions, else block, finally block File Input /Output: I/O System, File I/O, Read /Write operations, File opening modes, moving within a file, Working with CSV files. NumPy Library: Creation of an array, Array attributes, Array operations, Arithmetic operations, Statistical operations, Indexing and slicing, Array manipulation. Matplotlib: Installation and usage, plotting graphs, Using objects to plot graphs, Multiple plots, Data visualization. Pandas Library: Data structures, Creating series, Properties of Series, Accessing Series data, Series Methods, Creating Data Frame, Properties of Data Frame, Accessing Data Frame Data, Data Frame Methods. Yashavant Kanetkar, Chapter 30											
10	Reference Books: 1. MMM - The 8051 Microcontroller & Embedded Systems by M.A. Mazidi, J.G. Mazidi and R.D.Mckinlay, Second Edition, Pearson 2. Intel's 8031/8051 Data sheet 3. Yashavant Kanetkar, Aditya Kanetkar: Let Us Python, 7th Edition 4. In addition to the reference books internet web-sites & MOOC can be used wherever necessary.											
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 <table border="1"> <tr> <td rowspan="2">Module I / Unit-I 15 Marks</td><td>Q.1 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory</td><td>10 Marks</td></tr> <tr> <td>Q.1 B) Attempt any One (Each carry 05 Marks) (i) Problem /Theory (ii) Problem</td><td>05 Marks</td></tr> <tr> <td rowspan="2">Module II / Unit-II 15 Marks</td><td>Q.2 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory</td><td>10 Marks</td></tr> <tr> <td>Q.2 B) Attempt any One (Each carry 05 Marks) i) Problem ii) Problem</td><td>05 Marks</td></tr> </table>		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 05 Marks) i) Problem ii) Problem	05 Marks
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