

Name of the Course: Elective (ELP - II): Computer Science Practical - 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:	Practical
4	Credits:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a Semester)
5	Hours:	60 Hours
6	Marks Allotted:	50 Marks
7	Course Objective (CO): The students are expected to	
	CO 1.	apply microcontroller concepts to configure TIMER0/1 in different modes and handle external interrupts.
	CO 2.	develop assembly programs to implement timing and interrupt-driven applications.
	CO 3.	write Python programs for file handling, object-oriented design, and exception management.
	CO 4.	utilize NumPy, Pandas, and Matplotlib for array operations, data analysis, and visualization.
	CO5.	integrate microcontroller programming with Python skills to solve computational and real-world problems.
8	Course outcomes (OC): After successful completion of this course, the students will be able to:	
	OC 1.	apply knowledge of embedded systems and Python programming to practical tasks.
	OC 2.	analyze and design solutions for timing, interrupts, file handling, and data processing problems.
	OC 3.	use modern tools and libraries to implement, test, and visualize hardware and software applications.
	OC 4.	communicate and document solutions effectively while working independently or in teams.
	OC 5.	engage in continuous learning to adapt to evolving technologies in microcontrollers and data science.
9	List of Experiments: Microcontrollers - Study of TIMER 0/1 in Mode 0. - Study of TIMER 0/1 in Mode 1. - Study of TIMER 0/1 in Mode 2. - Study of External Interrupts INT0 / INT1. Python Programming Exercises - Write a Python program to read an entire text file. - Write a Python program to append text to a file and display the text. - Write a Python program to read last n lines of a file. - Design a class that store the information of student and display the same - Implement the concept of inheritance using python - Write a program to implement exception handling. - Write a program to create a 3D array of dimensions 4 * 2 * 3. Initialize the array to some value. Find the maximum among each axis.	

8. Write a program to create an array of shape 5 * 4 containing elements 1 to 20. Find the sum of the entire array as well as sums along each row and column.
9. Write a program to create a 50 elements array and fill it with odd numbers starting from 1.
10. Write a program to plot a sine and cosine curve in two different sub plots. Each curve should be drawn using 100 x coordinates between 1 and 5.
11. Practical based on defining Series from NumPy Arrays and other Series, filtering values, evaluating values.
12. Practical based on defining a Data Frame, selecting elements, assigning values, Membership of a value, deleting a column, filtering.
13. Practical based on Data Frame from nested dict. Transportation of Data Frame, Indexing.
14. Practical based on reading and writing data with Pandas, readers and writers, CSV and textual files.
15. Practical based on creating line plots, scatter plots with Matplotlib.
16. Practical based on creating bar charts, histogram with Matplotlib.

Minimum 10 experiments from the list of experiments must be completed and reported in the journal.

General Instructions:

- All the measurements and readings should be written with proper units in SI system only.
- After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination to be eligible to appear in the Semester End Practical Examination
- While evaluating practical, weightage should be given to diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
- Skill of doing the experiment and its concepts should be more important than the accuracy of result.

Instruction Regarding Semester End Practical Examination

- For practical examinations, the learner will be examined in One experiment from the list of experiments.
- Evaluation in viva voce will be based on regular experiments and skill experiments.
- A candidate will be allowed to appear for the Semester End Practical Examination only if the candidate submit a certified journal at the time of practical examination or provide a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of that semester of T.Y.B. Sc. Physics as per the minimum requirement.

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

Scheme of Examination:

Semester End Practical Examination:

- The duration of Each Experiment in Semester End External Practical Examination will be of **Two hours**.

The Semester End External Practical Examination will be for 30 marks as per the marking scheme given below:		
Sr. No.	Activity	Total 30 Marks
1	One Experiments	20 Marks
2	Certified Journal	05 Marks
3	Viva	05 Marks
Internal Practical Examination: - The duration of Internal Practical Examination per experiment will be of Two hours. - The Internal Practical Examination Pattern for 20 marks (During the Semester), will be as per the marking scheme given below:		
Sr. No.	Activity	Total 20 Marks
1	Skill testing related any One Experiment	10 Marks
2	Overall performance	05 Marks
3	Viva-Voce	05 Marks