SEMESTER S4

MICROCONTROLLERS AND INTERFACING LAB

Course Code	**PCBML407**	**CIE Marks**	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	**ESE Marks**	50
Credits	2	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	GBEST204 (Programming in C)	**Course Type**	PCL

Course Objectives:

1. Develop simple assembly level programs for 8051 Microcontrollers
2. Demonstrate high level programming proficiency using the various addressing modes and data transfer instructions of the PIC microcontroller.
3. Design simple computational systems using target Microcontrollers
4. Design and implement systems with peripheral control using target Microcontrollers

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Expt. No.	Experiments
1	Familiarization with 8051 based kit, programming
2	8051 - arithmetic operations/ logical operations
3	8051 - Bit manipulation.
4	8051 – Data format conversion
5	8051 - Sorting array.
6	8051 - Finding largest/ smallest elements in an array

7	8051 - Data sequence generation
8	Interfacing 8051 - Stepper motor/DC motor
9	Familiarization of MPLAB IDE and PIC16F series.
10	Design logic functions like Addition, Subtraction, and Multiplication using the microcontroller PIC16F.
11	Interfacing stepper motor with PIC16F.
12	Array sorting and manipulations using the microcontroller PIC16F

Course Assessment Method
(CIE: 50 marks, ESE: 50 marks)

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Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
10	**20**	**20**	**50**

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	**15**	**10**	**10**	**5**	**50**

- ***Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.***
- ***Endorsement by External Examiner:*** *The external examiner shall endorse the record*

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Develop simple assembly level programs for 8051 Microcontrollers	**K1**
CO2	Demonstrate high level programming proficiency using the various addressing modes and data transfer instructions of the PIC microcontroller.	**K3**
CO3	Design simple computational systems using target Microcontrollers	**K3**
CO4	Design and implement systems with peripheral control using target Microcontrollers	**K5**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO- PO Mapping (Mapping of Course Outcomes with Program Outcomes)

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3				3	3		3
CO2	3	3	3	3	3				3	3		3
CO3	3	3	3	3	3				3	3		3
CO4	3	3	3	3	3				3	3		3

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	"The 8051 Microcontroller"	Kenneth J Ayala	Cengage Learning,	Third edition
2	"Design with PIC microcontrollers"	John B. Peatman	Pearson Education	ISBN: 978-81-7758-551-3
3	"Arduino Programming: Step-by-Step Guide to Master Arduino Hardware and Software",	Mark Torvalds	Kindle Edition	2nd edition, ISBN-13: 978-1976097713.

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	The 8051 Microcontroller and Embedded Systems using Assembly and C,	Muhammed Ali Mazidi and Janice GillispieMazidi	Pearson Education	2002
2	PIC micro MCU - An introduction to programming the Microchip PIC in CCS C	Nigel Gardner	Bluebird Electronics	2002 (e book)

Continuous Assessment (25 Marks)

1. **Preparation and Pre-Lab Work (7 Marks)**

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- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. **Conduct of Experiments (7 Marks)**

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

3. **Lab Reports and Record Keeping (6 Marks)**

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. **Viva Voce (5 Marks)**

    - Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks)

1. **Procedure/Preliminary Work/Design/Algorithm (10 Marks)**

    - Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
    - Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
    - Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
    - Creativity and logic in algorithm or experimental design.

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2. **Conduct of Experiment/Execution of Work/Programming (15 Marks)**

    - Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. **Result with Valid Inference/Quality of Output (10 Marks)**

    - Accuracy of Results: Precision and correctness of the obtained results.
    - Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. **Viva Voce (10 Marks)**

    - Ability to explain the experiment, procedure results and answer related questions
    - Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. **Record (5 Marks)**

    - Completeness, clarity, and accuracy of the lab record submitted.