T. K. M. COLLEGE OF ARTS AND SCIENCE KOLLAM

DEPARTMENT OF PHYSICS

CERTIFICATE COURSE ON

MICROCONTROLLERS AND APPLICATIONS

ACADEMIC YEAR 2023-24

COURSE COORDINATOR
Dr. FAIROOS C.
ASSISTANT PROFESSOR

Course on Microcontrollers and Applications

For MSc. Physics Students

Course Duration: 30 Hrs

Course Overview:

This course introduces microcontrollers, their architectures, and programming, focusing on applications in embedded systems. Students will learn hardware and software aspects, interfacing, and real-world applications like automation and control systems.

Course Objectives:

1. Understand the fundamentals of microcontroller architecture and operation.
2. Learn programming techniques for microcontroller applications.
3. Develop practical skills to interface peripherals with microcontrollers.
4. Explore applications of microcontrollers in real-world embedded systems.

Detailed Syllabus:

Module 1: Introduction to Microcontrollers (4 Hours)

- What are Microcontrollers? Difference between Microprocessors and Microcontrollers.
- Overview of Microcontroller Families (8051, AVR, PIC, ARM Cortex, etc.).
- Key Features and Applications.
- Microcontroller Architecture Basics.

Module 2: Microcontroller Architecture (5 Hours)

- Detailed Study of 8051 or AVR Microcontroller Architecture.
    - CPU, Memory (RAM/ROM), and I/O Ports.
    - Timers/Counters.
    - Interrupts and their Importance.
- Clocking and Reset Mechanisms.

Module 3: Programming Microcontrollers (6 Hours)

- Programming Basics:
    - Assembly vs. Embedded C.
    - Development Tools (Keil, MPLAB, Arduino IDE).
- Writing Basic Programs (LED Blinking, Delays).
- Debugging and Simulation using Proteus/Other Tools.

Module 4: Interfacing Peripherals (8 Hours)

- Input Devices:
    - Switches and Keypads.
    - Sensors (Temperature, Light, etc.).
- Output Devices:
    - LEDs, 7-Segment Displays, LCDs.
    - DC Motors and Servo Motors.
- Communication Protocols:
    - UART, SPI, and I2C Basics.

Module 5: Applications and Case Studies (5 Hours)

- Real-World Applications:
  - Home Automation (e.g., Temperature Control).
  - Data Acquisition Systems.
  - Robotics.
  - IoT Applications Using Microcontrollers.
- Case Studies with Arduino or ESP32.

Module 6: Advanced Topics (2 Hours)

- Introduction to Low-Power Microcontrollers.
- Basics of RTOS in Microcontroller Systems.

Teaching Methodology:

- Lectures: 40% (Theory, Concepts, and Principles).
- Hands-On Labs: 50% (Interfacing Experiments, Programming Exercises).
- Interactive Discussions: 10% (Applications, Real-World Problem Solving).

Assessment Plan:

1. Quizzes (15%): Covering theoretical knowledge from each module.
2. Lab Assignments (35%): Programming and interfacing exercises.
3. Mid-Term Exam (20%): Focused on architecture and programming.
4. Final Project (30%): Design and demonstration of a microcontroller-based application.

Course Outcomes:

1. Explain the architecture and functionality of microcontrollers.
2. Write programs for basic and intermediate-level microcontroller applications.
3. Interface and control peripherals effectively.
4. Develop simple embedded systems for practical use.

Reference Textbooks:

1. "The 8051 Microcontroller and Embedded Systems" by Muhammad Ali Mazidi et al.
2. "Programming and Customizing the AVR Microcontroller" by Dhananjay Gadre.
3. "PIC Microcontroller and Embedded Systems" by Muhammad Ali Mazidi et al.
4. "Embedded C Programming and the Microchip PIC" by Richard H. Barnett et al.
5. "Exploring Arduino" by Jeremy Blum.

Certificate Course

Offered By Department Of Physics,
TKM College Of Arts & Science Kollam

MICROCONTROLLERS AND APPLICATIONS

Attendance Statement

Course on Microcontrollers and Applications

S2 AND S4 MSc Batches – Academic Year 2023-24

(Class Time- 9.30 am-3.30 pm)

Sl. No.	Name of the student	01-05 Wed	02-05 Thur	03-05 Frid	06-05 Mon	07-05 Tue	08-05 Wed	09-05 Thu
1.	Abhirami M.	**P**	**P**	**P**	**P**	**P**	**P**	**P**
2	Adila J	**P**	**P**	**P**	**P**	**A**	**P**	**P**
3	Adithya	P	P	P	P	P	P	P
4	Ahin	**P**	**A**	**P**	**P**	**P**	**P**	**P**
5	Amalkrishna	**P**	**P**	**P**	**P**	**P**	**P**	**P**
6	Anjali	P	P	P	P	P	P	P
7	Fathima E. M.	**P**	**P**	**P**	**P**	**P**	**P**	**P**
8	Fathima Navas	**P**	**P**	**P**	**P**	**P**	**P**	**P**
9	Fathima Shafi	P	P	P	P	P	P	P
10	Harsha S	**P**	**P**	**A**	**P**	**P**	**P**	**P**
11	Hridya M. S.	**P**	**P**	**P**	**P**	**A**	**P**	**P**
12	Jesni B. Jose	P	P	P	P	P	P	P
13	R. Thansi	**A**	**P**	**P**	**P**	**P**	**P**	**P**
14	Salma A	**P**	**P**	**P**	**P**	**P**	**P**	**P**
15	Sharon V. Suresh	P	P	P	P	P	P	A
16	Ameena Salam	**P**	**P**	**P**	**P**	**P**	**P**	**P**
17	Anupama Anil	**P**	**P**	**P**	**P**	**P**	**P**	**P**
18	Arunima	**P**	**P**	**P**	**P**	**P**	**P**	**P**
19	Ayisha S. S.	**P**	**P**	**P**	**P**	**P**	**P**	**P**
20	Fathima N. S.	P	P	P	P	P	P	P
21	Hanna Haneena	**P**	**P**	**P**	**P**	**P**	**P**	**P**
22	Rifana Hassan S	**P**	**P**	**P**	**P**	**P**	**P**	**P**
23	Salmi S B	P	P	P	P	P	P	P
24	Sidana S	**P**	**P**	**P**	**P**	**P**	**P**	**P**
25	Thankom P Unni	**P**	**P**	**P**	**P**	**P**	**P**	**P**
26	Vandana P Vinod	P	P	P	P	P	P	P

Course Coordinator : **FAIROOS C.**
Assistant Professor

Course on Microcontrollers and Applications

S2 AND S4 MSc Batches – Academic Year 2023-24

Report on Certificate Course

Department of Physics TKM College of Arts & Science conducted 30 Hr. Certificate Course on "**Microcontrollers and Applications**". A total of 26 students of S2 MSc (2023-25) and S4 (2022-24) batches were enrolled in the course. The coordinator for the certificate course program is Dr. Mohammed Salim. The course was offered through Class Lectures & Google classroom. The classes are handled by Dr. Fairoos C., Assistant Professor, and Department of Physics. The classes started on 1st May 2024. Each day contains 6 teaching hours. Both theory as well as practical sessions were arranged. An assessment test containing multiple choice questions was conducted on 9th May for issuing certificates. All the students successfully completed the certificate course.

Grades

90% and above - A Grade
80-89% - B Grade
70-79% - C Grade
60-69 % - D Grade

12 Students secured A grade whereas 9 students secured B Grade and 5 students secured C grade.

Course Instructor : Fairoos C, Assistant Professor, Department of Physics

Program Coordinator : Dr. Mohammed Salim, Assistant Professor,
Department of Physics

Microcontrollers and Applications

S2 AND S4 MSc Batches – Academic Year 2023-24

Grade Sheet

Sl. No.	Candidate Code	Name of the student	Grade
1.	63022142001	Abhirami M.	C
2	63022142002	Adila J	B
3	63022142003	Adithya	B
4	63022142004	Ahin	C
5	63022142005	Amalkrishna	B
6	63022142006	Anjali	A
7	63022142007	Fathima E. M.	A
8	63022142008	Fathima Navas	B
9	63022142009	Fathima Shafi	A
10	63022142010	Harsha S	B
11	63022142011	Hridya M. S.	B
12	63022142012	Jesni B. Jose	A
13	63022142013	R. Thansi	A
14	63022142014	Salma A	C
15	63022142015	Sharon V. Suresh	C
16	63023142001	Ameena Salam	A
17	63023142002	Anupama Anil	A
18	63023142003	Arunima	A
19	63023142004	Ayisha S. S.	A
20	63023142005	Fathima N. S.	B
21	63023142006	Hanna Haneena	A
22	63023142007	Rifana Hassan S	A
23	63023142008	Salmi S B	B
24	63023142009	Sidana S	B
25	63023142010	Thankom P Unni	A
26	63023142011	Vandana P Vinod	A