# Kadi Sarva Vishwavidyalaya

## Faculty of Engineering & Technology

### Third Year Bachelor of Engineering(EE)

With effect from: Academic Year 2019-20

| Subject Code:EE602-N | Subject Title: Microcontrollers and their Applications |
|---|---|
| Pre-requisite | |

**Course Objective:**

- To understand the study of microcontroller 8051 and PIC.
- To study about Embedded through PIC and 8051 microcontroller.
- To develop programming skill through assembly and C language programming.
- Study about how to interface peripherals devices with 8051and PIC.
- Application using PIC and 8051 microcontroller.

| Teaching scheme | | | | Total Credit | Evaluation Scheme | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | Total | | Theory | | IE Marks | CIA Marks | Practical Marks | |
| Hrs | Hrs | Hrs | Hrs | | Hrs | Marks | | | | |
| 03 | 00 | 02 | 05 | 04 | 03 | 70 | 30 | 20 | 30 | 150 |

**Outline of the Course:**

| Sr. No | Title of the Unit | Minimum Hours |
|---|---|---|
| 1 | Introduction to PIC Microcontroller. | 03 |
| 2 | PIC Architecture & Assembly Language Programming | 08 |
| 3 | Branch, Call and Time Delay Loop, PIC I/O Port Programming, Arithmetic, Logic Instructions of PIC Microcontroller. | 10 |
| 4 | 8051 and PIC Programming in 'C' | 08 |
| 5 | Peripheral Programming and Interfacing. | 08 |
| 6 | Applications | 08 |

**Total Hours (Theory): 45**
**Total Hours (Lab): 30**
**Total Hours: 75**

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**Detailed Syllabus**

| Sr. Noo | Topic | Lecture Hours | Weightage(%) |
|---|---|---|---|
| 1 | **Introduction to PIC Microcontroller:** Introduction to PIC controller, RISC Architecture in PIC. | **03** | **07** |
| 2 | **PIC Architecture & Assembly Language Programming** Wreg register, PIC file register, using instructions with the default access bank, PIC status register, PIC data format and directives, introduction to PIC assembly programming, the program counter and program ROM space in the PIC. | **08** | **18** |
| 3 | **Branch, Call and Time Delay Loop, PIC I/O Port Programming, Arithmetic, Logic Instructions of PIC Microcontroller.** Branch instructions and looping, call instructions and stack, PIC18 time delay and instruction pipeline, I/O port programming in PIC18, I/O Bit manipulation Programming, Arithmetic Instructions, Logic and Compare Instructions, Rotate Instructions and Data Serialization. | **10** | **20** |
| 4 | **8051 and PIC Programming in 'C':** Data types and time delays, I/O Programming, Logic And Arithmetic operations in 'C', Data conversion programs in 'C'. | **08** | **20** |
| 5 | **Peripheral Programming and Interfacing.** LCD and keyboard interfacing, ADC and DAC interfacing. | **08** | **15** |
| 6 | **Applications:** Interfacing with relays and Opto-isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051 and PIC Microcontroller with use of C Language. | **08** | **20** |
| | **Total** | **45** | **100** |

**Instructional Method and Pedagogy:**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry a weight age of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

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**Learning Outcome**

- On successful completion of the course, Students should be able to understand and develop Embedded systems.
- Able to understand architecture of different microcontrollers.
- Able to understand different microcontroller and its programming in assembly and C language.
- Able to develop an application based on microcontrollers.

**Text Book**

- The 8051 Microcontroller and Embedded Systems Using Assembly and C, by Muhammad Ali Mazidi, Janice GillispieMazidi and Rolin McKinlay (Second Edition, Pearson Education).

- PIC Microcontroller and Embedded Systems using Assembly and C for PIC18 by Muhammad Ali Mazidi, Rolin McKinlay, Danny Causey (Second Edition, Pearson Education).

- Kenneth J. Ayala, 'The 8051 microcontroller', Cengage Learning, 2004

**Reference Books:**

- 8051 Microcontrollers: MCS51 family and its variants by Satish Shah, Oxford University Press.
- Programming and Customizing the 8051 Microcontroller by MykePredko Tata McGraw Hill.

**List of experiments:**

| Sr. No. | Title |
|---|---|
| 1 | To Study About PIC Microcontroller Trainer Kit. |
| 2 | To Study about programming of PIC Microcontroller and Instruction Syntax. |
| 3 | To study branch and call instructions. |
| 4 | To study arithmetic and logical instructions. |
| 5 | To write a C Program to interface DC motor. |
| 6 | To design and write a program to display "AAAAA" on first line on 16*2 LCD. |
| 7 | To write a C Program to interface stepper motor. |
| 8 | To write a C program interface dc motor using PWM. |
| 9 | To Write a C program to interface matrix keyboard. |
| 10 | To Write a C program to interface LED and LCD. |