Course Objective:

- To develop systematic approach for development of embedded systems using general purpose microcontrollers.

- To study programming of microcontrollers using assembly and embedded C with tools.

    A. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Examination Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
EE-603	Microcontrollers and Their Applications.	4	0	2	6	5	3	70	30	20	30	150

Introduction to Embedded Systems:

Introduction to 8051, Embedded systems, Microprocessor vs. Microcontrollers., Desirable Features of embedded systems, Overview to 8051 family, Introduction to Harvard Architecture, RISC, CISC

Architecture of 8051:
8051 microcontroller hardware: Oscillator and Clock, Role of PC and DPTR, Flags and PSW, CPU registers, Internal RAM and RAM organization, Internal Memory, Special Function Registers, I/O pins, ports and circuits, External memory, Counter and Timers, Serial Transmission, Interrupts

Assembly Language Programming of 8051:

Assembly language programming, Jump Loop and Call Instructions, I/O Port Programming, Addressing Modes, Arithematical and Logical Instructions,
  8051: Programming in C Data types and time delays, I/O Programming in 8051, Logical operations in C, Data conversion programs in C

Peripheral Programming and Interfacing

8051 timer programming, serial port and its programming, interrupt programming, LCD and keyboard interfacing, ADC and DAC interfacing, interfacing to external memory

Applications:

Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- 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, practical's and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Experiments shall be performed in the laboratory related to course contents.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

STUDENTS LEARNING OUTCOME:

On successful completion of the course,

- Students should be able to understand and develop embedded systems.

B. Lesson Planning

SR No.	Lectures (Hours)	Weightage in % in Exam	Topic
1	6	30	Introduction to Embedded Systems: Introduction to 8051, Embedded systems, Microprocessor vs. Microcontrollers., Desirable Features of embedded systems, Overview to 8051 family, Introduction to Harvard Architecture, RISC, CISC
2	12		Architecture of 8051: 8051 microcontroller hardware: Oscillator and Clock, Role of PC and DPTR, Flags and PSW, CPU registers, Internal RAM and RAM organization, Internal Memory, Special Function Registers, I/O pins, ports and circuits, External memory, Counter and Timers, Serial Transmission, Interrupts

3	8	35	Assembly Language Programming of 8051: Assembly language programming, Jump Loop and Call Instructions, I/O Port Programming, Addressing Modes, Arithmetical and Logical Instructions,
4	12		8051: Programming in C Data types and time delays, I/O Programming in 8051, Logical operations in C,Data conversion programs in C
5	12	35	Peripheral Programming and Interfacing 8051 timer programming, serial port and its programming, interrupt programming, LCD and keyboard interfacing, ADC and DAC interfacing, interfacing to external memory
6	10		Applications: Interfacing with relays and optoisolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051

C. Instructional Method & 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. & equal weightage should be given to all topics while teaching and conduction of all examinations.

- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.

- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory 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 an importance of ten 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.

TEXT BOOK:

1. Kenneth J. Ayala, 'The 8051 microcontroller', Cengage Learning, 2004
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 'The 8051 Microcontroller and Embedded Systems' , Second Edition , Pearson Prentice Hall,

REFERENCE BOOKS:
3. 8051 Microcontrollers: MCS51 family and its variants by Satish Shah, Oxford University Press.
4. Programming and Customizing the 8051 Microcontroller by Myke Predko Tata McGraw Hill.