Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: Microcontroller and Interfacing lab		Course Code: 15MC37P
Mode (L:T:P) : 0:2:4	Credits:3	Core/ Elective: Core
Type of Course Tutorials and Practical's		Total Contact Hours: 78
CIE- 25 Marks		SEE- 50 Marks

Prerequisites: Knowledge of 8051 Microcontroller

Course Objectives: Understanding and executing of Microcontroller programs with interfacing of various peripheral devices

Course Outcomes: At the end of the course, the students will be able to

1. Develop and execute assembly language programs for given applications.
2. Interface microcontroller with hardware for given applications.

Course Outcome		Cognitive Level	Linked with PO	Teaching Hours
CO1	Develop and execute assembly language programs for given applications	*A*	1,2,3,4	30
CO2	Interface microcontroller with hardware for given applications	*A*	1,2,3,4	48
		Total sessions		**78**

Legend: R; Remember, U: Understand A: Application

Mapping of Course Outcomes with Program Outcomes

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Microcontroller and Interfacing lab	**3**	**3**	**3**	**3**	-	-	-	-	-	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.
Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Contents

Unit-I

Unit-II

2.0 Interface DAC to generate different waveforms with variable frequency and amplitude using variable pot

3.0 Generate different tones using DAC through Buzzer/speaker

4.0 To interface a seven segment display/LCD and Hex keypad, application may be to read, count and display the key pressed a number of times key pressed

5.0 Write the program to interface stepper motor/DC motor to control direction, steps and speed by accepting keys pressed from keypad

6.0 To interface LCD and keys to display the real time clock with preset facility using programmable RTC chips

7.0 To interface matrix display: display characters, numbers on 25X14 dots display in different size

8.0 To interface LCD and keys to generate moving text display

9.0 To interface infrared: Control the relays with respect to the remote control keys pressed

10.0 To interface infrared: Transmit the date from one system to another using IR keyboard and display or Keyboard and motor can be used to verify

11.0 Interface digital elevator simulator module. Write a program to control eight floors with arrow display for direction and seven segment displays for floor indications

12.0 Traffic light control simulator for a junction connecting at least four roads

Note

1) Write flowcharts/ Algorithms and execute the following 8051 programs using any 8051 kits or simulators

2) Download and execute at least five of the following microcontroller 8051 applications Simulators may be used to design and test the application before implementing them using Flash-chip 8051 core based hardware boards and interfacing modules (use ALP/ Embedded C)

Contents linked with CO and PO

Sl No	Contents	CO	PO
1	Program to illustrate the following addressing modes: Immediate, Register, Direct, Indirect	1	1,2,3,4
2	Program to add two 8 bit Signed and Unsigned numbers separately	1	1,2,3,4
3	Program to add an array of 8bit numbers and store result in internal data RAM	1	1,2,3,4
4	Program to convert two digits packed BCD to unpacked BCD and vice versa	1	1,2,3,4
5	Program to convert two digits packed BCD to ASCII and vice versa	1	1,2,3,4
6	Program to separate positive and negative numbers in a series of N-eight bit numbers	1	1,2,3,4
7	Program to count the number of ones and zeros in two consecucutive internal data memory locations.	1	1,2,3,4
8	Program to find smallest /largest number in an array of numbers stored in external data RAM	1	1,2,3,4
9	Program to generate specified time delay	1	1,2,3,4
10	Program to separate Even and Odd numbers in a series of N-eight bit numbers	1	1,2,3,4
11	Program to search a number in the given array of numbers stored in internal program memory	1	1,2,3,4
12	Program to illustrate multiplication and division	1	1,2,3,4
13	Program to clear all the bytes that have even numbers of ones stored in bit addressable internal data RAM	1	1,2,3,4
14	Interface eight channels ADC to temperature transducer/variable voltage source and display temperature/voltage level signal segment display	2	1,2,3,4
15	Interface DAC to generate different waveforms with variable frequency and amplitude using variable pot.	2	1,2,3,4
16	Generate different tones using DAC through Buzzer/speaker	2	1,2,3,4
17	To interface a seven segment display/LCD and Hex keypad, application may be to read, count and display the key pressed a number of times key pressed	2	1,2,3,4
18	Write the program to interface stepper motor/DC motor to control direction, steps and speed by accepting keys pressed from keypad	2	1,2,3,4
19	To interface LCD and keys to display the real time clock with preset facility using programmable RTC chips	2	1,2,3,4
20	To interface matrix display: display characters, numbers on 25X14 dots display in different size	2	1,2,3,4
21	To interface LCD and keys to generate moving text display	2	1,2,3,4
22	To interface infrared: Control the relays with respect to the remote control keys pressed	2	1,2,3,4
23	To interface infrared: Transmit the date from one system to another using IR keyboard and display or Keyboard and motor can be used to	2	1,2,3,4

	verify		
24	Interface digital elevator simulator module. Write a program to control eight floors with arrow display for direction and seven segment displays for floor indications	2	1,2,3,4
25	Traffic light control simulator for a junction connecting at least four roads	2	1,2,3,4

Scheme of valuation for SEE

Sl. No.	Performance	Max. Marks
1	Writing and execution of any one specified program from **Unit-I** using simulator	15
2	Download and execute any one specified Application from **Unit-II** a) Block diagram, Flowchart, Brief description b) Download and execution	15+10
3	Viva Voce	10
	TOTAL	**50**

Student Activity

Activity No.	Description of Student Activity
1	Students can make models of Micro controller applications excluded from the curriculum.

Note:

1. Group of max four students should do any one of the above activity or any other similar activity related to the course COs and get it approved from concerned Teacher and HOD.
2. No group should have activity repeated or similar
3. Teacher should ensure activities by group must cover all Cos

4. Teacher should asses every student by using suitable **Rubrics** approved by HOD

Rubrics

Dimension	Exemplary	Accomplished	Developing	Beginning	Roll No. of the Student				
	5/4	3	2	1	1	2	3	4	5
Organization	Information presented in logical, interesting sequence	Information in logical sequence	Difficult to follow presentation--student jumps around	Cannot understand presentation--no sequence of information	Ex: 2				
Subject Knowledge	Demonstrates full knowledge by answering all class questions with explanations and elaborations	At ease with expected answers to questions but does not elaborate	Uncomfortable with information and is able to answer only rudimentary questions	Does not have a grasp of the information. Cannot answer questions about subject	3				
Graphics	Explain and reinforce screen text and presentation	Relate to text and presentation	Occasionally uses graphics that rarely support text and presentation	Uses superfluous graphics or no graphics	4				
Oral Presentation	Maintains eye contact and pronounces all terms precisely. All audience members can hear	Maintains eye contact most of the time and pronounces most words correctly. Most audience members can hear presentation	Occasionally uses eye contact, mostly reading presentation, and incorrectly pronounces terms. Audience members have difficulty hearing	Reads with no eye contact and incorrectly pronounces terms. Speaks too quietly	5				
Total Score=(2+3+4+5)=14/4=3.5=4									

Course Assessment Pattern

Particulars			Max Marks	Evidence	Course outcomes
Direct Assessment	**CIE**	Two tests (Average of Two tests)	10	Blue books	1 &2
		Practical record	10	Practical record	1 &2
		Student Activity	05	Student Activity Sheets	1 &2
	SEE	End of the course	50	Answer scripts at BTE	1 &2
Indirect Assessment	**Student Feedback on course**	Middle of the course		Feedback forms	1 &2
		End of the course		Feedback forms	1 &2

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

List of Equipments

1. Microcontroller Trainer Kits with interfacing facility
2. Interfacing modules.

2.1 ADC (8-bits)
2.2 DAC (8-bits)
2.3 Seven segment display
2.4 LCD
2.5 Hexpad
2.6 Elevator
2.7 Traffic light control
2.8 Stepper motor and DC motor
2.9 Speaker/Buzzer
2.10 Control the relays with respect to the remote control using infrared