



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE DESCRIPTOR

Course Title	EMBEDDED PROGRAMMING LABORATORY			
Course Code	BESB09			
Programme	M.Tech (ES)			
Semester	I	ECE		
Course Type	Core			
Regulation	IARE - R18			
	Lectures	Tutorials	Practical	Credits
	-	-	3	2
Course Faculty	Ms. M. Suguna Sri, Assistant Professor			

I. COURSE OVERVIEW:

This course provides knowledge of embedded C programming language. This covers the concepts for reading data from port pins of microcontroller, understanding the interfacing of data I/O devices, serial communication, and port on P89V51RD2 microcontroller. Through laboratory experiments and out-of-class assignments, students are provided learning experiences that enable them to provide in-depth knowledge about embedded processor, its hardware and software, explain programming concepts and embedded programming in C and assembly language and explain real time operating systems, inter-task communication and an embedded software development tool.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	--	I	Microprocessors and Microcontrollers Laboratory	--

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Embedded Programming Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	CHALK & TALK	✓	VIVA	✗	ASSIGNMENTS	✗	MOOCs
✓	LCD / PPT	✗	SEMINARS	✓	MINI PROJECT	✗	VIDEOS
✗	OPEN ENDED EXPERIMENTS						

V. EVALUATION METHODOLOGY:

Continuous internal assessment (CIA):

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, with 20 marks for day to day evaluation and 10 marks for Internal Examination (CIE).

Semester End Examination (SEE):

The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the this courses is contains 12 experiments. The question paper pattern is as follows: Two full questions with 'either' 'or' choice will be drawn from each set. Each set contains 4 questions.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 10 marks for Continuous Internal Examination (CIE), 20 marks for Day to Day Evaluation.

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
	CIE Exam	Technical Seminar and Term Paper	
CIA Marks	10	20	30

Continuous Internal Examination (CIE):

Two CIE exam shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration consisting of two sets.

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Apply advanced level knowledge, techniques, skills and modern tools in the field of Embedded Systems and sub areas IOT, processor technology, and storage technology	3	Lab related Exercises
PO 2	Function on multidisciplinary environments by working cooperatively, creatively and responsibly as a member of a team	2	Lab related Exercises / Mini projects
PO 3	Respond to global policy initiatives and meet the emerging challenges with sustainable technological solutions in the field of electronic product designing	1	Lab related Exercises
PO 4	Demonstrate the importance of embedded technologies and design new innovative products for solving society relevant problems	2	Lab related Exercises
PO 6	Independently carry out research / investigation and development work to solve practical problems	2	Lab related Exercises

3= High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Use embedded C for reading data from port pins
II	Understand the interfacing of data I/O devices with microcontroller.
III	Understand serial communication and port RTOS on microcontroller.

VIII. COURSE OUTCOMES (COs):

CO Code	CO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
BESB09.01	CO 1	Understand the programs for LED blinking and to interface the devices like switch, buzzer and LCD with P89V51RD2.	PO 1, PO 3	2
BESB09.02	CO 2	Implement the programs for interfacing of data I/O devices like seven segment display, keypad and RS232 with P89V51RD2.	PO 1, PO 2	3
BESB09.03	CO 3	Write the programs for interfacing stepper motor and temperature sensor.	PO 4	2
BESB09.04	CO 4	Understand the real time operating systems, inter task communication and analog to digital conversions.	PO 1, PO 3	2
BESB09.05	CO 5	Write the programs for interfacing digital to analog conversion and elevator.	PO 6	2

3= High; 2 = Medium; 1 = Low

IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes (COs)	Program Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3		1				
CO 2	3	2					
CO 3				2			
CO 4	3		1				
CO 5						2	

3= High; 2 = Medium; 1 = Low

X. ASSESSMENT METHODOLOGIES – DIRECT:

CIE Exams	PO 1, PO 3, PO 4	SEE Exams	PO 1, PO 3, PO 4	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2, PO 3, PO 4, PO 6	Student Viva	PO 3, PO 6,	Mini Project	PO 2	Certification	-
Term Paper	-						

XI. ASSESSMENT METHODOLOGIES – INDIRECT:

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XII. SYLLABUS:

S No.	Experiment
1	Program to toggle all the bits of port P1 continuously with 250 ms delay.
2	Program to interface a switch and a buzzer to two different pins of a port such that the buzzer should sound as long as the switch is pressed.
3	Program to interface LCD data pins to port P1 and display a message on it.
4	Program to interface seven segment display.
5	Program to interface keypad. Whenever a key is pressed, it should be displayed on lcd.
6	Program to transmit message from microcontroller to PC serially using RS232. Program to receive a message from PC to microcontroller serially using RS232.
7	Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions.
8	Program to read data from temperature sensor and display the temperature value.
9	Program Port RTOS on to 89V51 Microcontroller and verify. Run 2 to 3 tasks simultaneously on 89V51 SDK. Use LCD interface, LED interface, Serial communication.
10	Program to convert analog signal into digital (ADC).
11	Program to convert digital into analog (DAC).
12	Program to interface Elevator.

XIII. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Lecture No.	Learning Objectives	Topics to be covered
1-3	Over view of Micro controller architecture.	Open the micro controller P89V51RD2 kit box and study the architecture.
4-6	Understand the LED toggling.	Program to toggle all the bits of port P1 continuously with 250 ms delay.
7-9	Understand the concepts of buzzer.	Program to interface a switch and a buzzer to two different pins of a port such that the buzzer should sound as long as the switch is pressed.
10-12	Understand the concept of LCD interfacing.	Program to interface LCD data pins to port P1 and display a message on it.
13-15	Understand seven segment display interface.	Program to interface seven segment display.
16-18	Understand the concept of keypad.	Program to interface keypad. Whenever a key is pressed, it should be displayed on lcd.
19-21	Understand the concept of serial communication.	Program to transmit message from microcontroller to PC serially using RS232. Program to receive a message from PC to microcontroller serially using RS232.
22-24	Understand the working principle of temperature sensor.	Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions.
25-27	Understand the working principle of temperature sensor.	Program to read data from temperature sensor and display the temperature value.
28-30	Understand the concepts of RTOS.	Program Port RTOS on to 89V51 Microcontroller and verify. Run 2 to 3 tasks

		simultaneously on 89V51 SDK. Use LCD interface, LED interface, Serial communication.
31-33	Understand ADC and DAC.	Program to convert analog signal into digital (ADC) and digital into analog (DAC).
34-36	Understand interface of elevator.	Program to interface Elevator.

Prepared by:
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HOD, ECE