Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Electrical and Electronics Engineering

BEE027 Microcontroller Based System Design
Seventh Semester,(Odd Semester)

Course (catalog) description

To expose the students to the fundamentals of microcontroller based system design

Compulsory/Elective Course: Elective for EEE students

Credit hours : 3 credits 45 hours

Course Coordinator : Mr.K.Prassd

Instructors : Mr.K.Prassd

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.K.Prassd	Final year EEE	KS 101	**0442229012 5**	HOD.EEE@**bharathuniv.ac. in**	9.00-9.50 AM

Relationship to other courses:

Pre –requisites**:** BEE603- Microprocessor and Microcontroller

Assumed knowledge : To get the knowledge to design control system using microcontroller.

Syllabus Contents
UNIT I   EMBEDDED SYSTEMS   9
Introduction to embedded systems – hardware and software components –types- examples- characteristics –system on chip-challenges in embedded computing system design – embedded system design process.

UNIT II   EMBEDDED SYSTEM INTERFACING   9

Serial and parallel communication devices-wireless devices – timer & counting devices-Watch dog timer – Serial communication using I2C- CAN USB buses –Parallel Communication using ISA- PCI-PCI/X buses-wireless and mobile system protocol.

UNIT III   ARM PROCESSOR-7   9
MSP430 architecture-addressing modes-constant generator and emulsion instructions-instruction set, functions- interrupts low power modes.

UNIT IV   PIC CONTROLLER   9
PIC microcontrollers: History and features –Architecture – memory organization – addressing modes – instruction set – PIC progrmming –I/O port, Data Conversion, RAM & ROM Allocation.

UNITV   INTERFACING – CASE STUDY   9
Interfacing PIC to LCD – Keyboard– parallel and serial ADC, DAC– Stepper motor interfacing.

Text book(s) and/or required materials

1. Sriram. V.Iyer&Pankaj Gupta, "Embedded real time systems Programming", Tata McGraw- Hill, 2007.
2. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ' PIC Microcontroller and Embedded Systems using Assembly and C for PIC18', Pearson Education 2008 .
3. John Iovine, 'PIC Microcontroller Project Book ', McGraw Hill 2000Understand the basics of embedded system

Computer usage:

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	0%
Non major elective	-	100%

Broad area :

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1st week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2nd week	Session 15 to 28	2 Periods

3	Model Test	October 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

This course is to develop a strong foundation in analysis and design of digital electronics. This course introduces combinational and sequential circuit design. It also discussed concepts of memory, programmable logic and digital integrated circuits.	Correlates to program outcome		
	H	**M**	**L**
1. Understand the basics of embedded system		a,c,d,e,f,i,k,l	
2.Understand about Hardware/software co-design aspects and analyse the requirements for interfacing	l	a,c,d,e,f,i,k	
3. Understand concepts of ARM Processor and programming them.	f	a,c,e,i,k,l	
4. Understand concepts of PIC controller and programming them.	i	a,c,e,f,k,l	
5.Analyse and implement various interfacing circuits necessary for various applications	c,e,i,k,l	a,d,f	

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**EMBEDDED SYSTEMS**		
1.	Introduction to embedded systems	NO	
2.	Hardware and software components	NO	
3.	Examples -characteristics	NO	
4.	System on chip	NO	
5.	Challenges in embedded computing system design	NO	T1,T2
6.	Challenges in embedded computing system design	NO	
7.	Embedded system design process	No	
8.	Embedded system design process		
9.	Revision		
UNIT II	**EMBEDDED SYSTEM INTERFACING**		
10.	**Serial communication devices**	NO	
11.	**Parallel communication devices**	NO	
12.	**Wireless devices**	NO	T1,T3
13.	Timer and Counting devices	NO	
14.	Serial communication i2c	NO	
15.	Can usb buses	NO	
16.	Parallel communication using isa	NO	
17.	Wireless system protocol	NO	
18.	Mobile system protocol	NO	
UNIT III	**ARM PROCESSOR-7**		
19.	Msp430 architecture	NO	
20.	Addressing modes	NO	T1,T2, NPTEL NOTES
21.	Constant generator and emulsion instructions	NO	
22.	Instruction set	NO	
23.	Functions	NO	
24.	Interrupts	No	
25.	Low power modes	NO	

26.	Low power modes	No	
27.	Revision	NO	
UNIT IV	**PIC CONTROLLER**		
28.	History and features	NO	T2,T3
29.	Architecture	NO	
30.	Memory organization	NO	
31.	Addressing modes	NO	
32.	Instruction set	NO	
33.	Pic programming	NO	
34.	Data conversion	NO	
35.	Ram and rom allocation	NO	
36.	Revision	No	
UNIT V	**INTERFACING – CASE STUDY**		
37.	**Interfacing pic to lcd**	NO	T2,T3
38.	**keyboard**	NO	
39.	Parallel and serial	NO	
40.	Analog to digital	NO	
41.	Digital to analog	NO.	
42.	Digital to analog	NO	
43.	Stepper motor interfacing	No	
44.	Stepper motor interfacing		
45.	Revision		

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures

- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.

- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: **Dated :**
Mr.K.Prassd

Addendum

ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:

a) An ability to apply knowledge of mathematics, science, and engineering fundamentals.

b) An ability to identify, formulate, and solve engineering problems.

c) An ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

d) An ability to design and conduct experiments, as well as to analyze and interpret data.

e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

f) An ability to apply reasoning informed by the knowledge of contemporary issues.

g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

h) An ability to understand professional and ethical responsibility and apply them in engineering practices.

i) An ability to function on multidisciplinary teams.

j) An ability to communicate effectively with the engineering community and with society at large.

k) An ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.

l) An ability to recognize the need for,and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION
Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE
Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM
Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL
Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS
Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
Mr.K.Prassd	

Course Coordinator   **HOD/EEE**
(Mr.K.Prassd)