EASWARI ENGINEERING COLLEGE, CHENNAI-600 089
DEPARTMENT OF INFORMATION TECHNOLOGY
LESSON PLAN

SUBJECT CODE   : **IT 2354**

SUBJECT TITLE   : EMBEDDED SYSTEMS

HOURS DISTRIBUTION   **:** (L T P C 3 0 0 3)

COURSE/ BRANCH   : B. TECH / IT

SEMESTER   : VI

ACADEMIC YEAR   : 2014 - 2015

FACULTY NAME   : Mrs. S.LENINISHA and Mrs. G. VALENTEENA

OBJECTIVE OF COURSE   :

   To have a complete understanding of Microcontroller architecture and instruction sets.
   1. To introduce the concepts Embedded software development

   2.   To know how to write programs in an assembly language for a Microcontroller.

   3. To understand the Processor software components.

   4. To have detailed knowledge of instruction sets and programming concepts of Embedded
       Processor.

OUTCOME OF COURSE   :

Upon understanding this course the students will be able to
   1. Understand the basics of an embedded system.
   2. Understand embedded real time systems.
   3. Apply real-time systems design techniques to various software programs
   4. To learn the method of designing a new real time systems.
   5. To Program an embedded system.

PREREQUISTE : Digital Electronics, Microprocessor and Microcontroller, Computer

programming, System Software and Computer Architecture.

Sl.No	Topic	No. of Periods	Reference Books	Page No
	UNIT I EMBEDDED COMPUTING			**9**
	Objective: To explore the basics and challenges of Embedded systems and also to understand the difference between 8051 and ARM processor.			
1	Introduction	1	T1	1-3
2	Challenges of Embedded Systems	1	T1	8-9
3	Embedded system design process	1	T1	10 - 28
4	8051 Microcontroller Architecture	1	R2	23-28
5	8051 Microcontroller instruction sets	1	R2	65-76
6	8051 Microcontroller programming	1	R2	35-53
7	ARM processor Architecture	1	T1	57
8	ARM processor instruction sets	1	T1	57 -64
9	ARM processor Programming	1	T1	64-72
	Outcome: Able to understand the basics of an embedded system, 8051 microcontroller and ARM processor.			
	UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT			**9**
	Objective: To know about Embedded memory input and output devices, about the interrupts and how to write code for embedded systems			
10	Programming Input and Output	1	T1	96-103
11	Memory system mechanisms	1	T1	116-122
12	Memory devices	1	T1	172- 174
13	Memory interfacing	1	T1	175-176.
14	I/O devices	1	T1	169-175.
15	I/O devices interfacing	1	T1	176-177.
16	Interrupts handling	1	T1	96-103
17	Priorities and vectors	1	T1	107- 111
18	Interrupt Overhead	1	T1	111- 114
	Outcome: Able to learn the method of designing a real time systems with knowledge of memory, I/O devices and interrupts.			

UNIT III	PROCESSES AND OPERATING SYSTEMS			9

Objective: To understand the distinguish between Embedded systems processes and its operating system with other processes, different scheduling policies with examples and its performance issues.

19	Multiple tasks	1	T1	308-315
20	Multiple Processes	1	T1	315 - 319
21	Context switching	1	T1	319 - 325
22	Scheduling policies	1	T1	325-333
23	RMS Vs. EDF	1	T1	337-340
24	Interprocess communication mechanisms – SMC	1	T1	340-341
25	Message Passing	1	T1	341-342
26	Signals	1	T1	342-343
27	Performance issues.	1	T1	344-348

Outcome: Able to handle multiple tasks, processes by implementing the concepts of context switching, IPC, Message Passing and signals.

Sl.No	Topic	No. of Periods	Reference Books	Page No
	UNIT IV EMBEDDED SOFTWARE 9			

Objective: To gain knowledge about Embedded Software, know the software development tools and how to write program for embedded processor.

28	Programming embedded systems in C	1		Handouts
29	Programming embedded systems in assembly	1	T2	17-32
30	Meeting real time constraints	1	T2	113-130
31	Examples	1	T2	130-140
32	Multi-state systems	1	T2	189-198
33	Function sequences	1	T2	198-215
34	Embedded software development tools	1		Handouts
35	Debuggers Techniques	1	R1	321-332
36	Emulators Techniques	1	R1	336-338

Outcome: Able to write program for real embedded systems in c and assembly language with real time constraints by using embedded software development tools.

	UNIT V	EMBEDDED SYSTEM DEVELOPMENT			9

Objective: To learn about design issues in embedded systems and different case studies such as ACVCM, Audio Players, Cameras and Video accelerator.

37	Design issues	1		Handouts
38	Design Techniques	1		Handouts
39	Case studies -ACVCM	1		Handouts
40	Alarm Clock	1	T1	193-200
41	Complete design of example embedded systems.-Cell Phones	1	T1	361-368
42	compact DISC and DVDs	1	T1	449-454
43	Audio Players	1	T1	200-206
44	Digital Still Cameras	1	T1	285-296
45	Video accelerator	1	T1	441-449

Outcome: Can understand the existing embedded systems with few real time case studies and able to design an embedded system for new application.

Beyond The Syllabus					
46	EMBEDDED IN ROBOTICS	1		Handouts
47	HARDWARE AND SOFTWARE ARCHITECTURE OF SET-TOP BOXES	1		Handouts

ASSIGNMENTS

1. Study about recent embedded software systems available in the market

2. Open source software tools available to implement embedded system design

3. Mini project on real time embedded system design for wrist watch

TEXT BOOK

T1: Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Desig

T2: Michael J. Pont, "Embedded C", Pearson Education , 2007

REFERENCES:

R1. Steve Heath, "Embedded System Design", Elsevier, 2005.

R2. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007.

PREPARED BY   **APPROVED BY**

S. Leninisha   **HOD**

Program Educational Outcomes

1. Graduates will be proficient in utilizing the fundamental knowledge of basic sciences and mathematics to the applications relevant to various streams of Engineering and Technology.

2. Graduates will possess core competencies necessary for application of knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.

3. Graduates will be capable of thinking logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and design optimal solutions.

4. Graduates will be able to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.

5. Graduates will gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

6. Graduates will be aware of professional ethics of the software industry and equip themselves with communication skills essential for working in community.

Program Outcomes

(d) Ability to interpret and synthesis data to provide valid conclusions

(e) Ability to function effectively as a team member to achieve a common goal

(f) Ability to understand professional, ethical and social issues and responsibilities

(g) Ability to communicate effectively with a diverse groups

(h) Ability to analyze the local and global impact of Information Technology on society

(i) Ability to recognize and engage in continuing professional development and life long learning

(j) Ability to use current techniques, skills, and tools necessary to accomplish projects related to Information Technology.

(k) Ability to understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development.

(l) Ability to understand engineering and management principles to manage projects in multidisciplinary environment.

UNITS	Course outcome	PEO 1	PE O2	PE O3	PE O4	PE O5	PE O6	PO (a)	PO (b)	PO (c)	PO (d)	PO (e)	PO (f)	PO (g)	PO (h)	PO (i)	PO (j)	PO (k)	PO (l)
EMBEDDED COMPUTING	Able to understand the basics of an embedded system	S	M	M	S	M	W	S	M	W	W	M		M		W	M	M	W
	Architecture and programming in 8051 microcontroller and ARM processor.	S	S	M	W	M		M	M	S	W	M		W	W		S	W	M
MEMORY AND INPUT/ OUTPUT MANAGEM ENT	Able to learn the method of designing real time systems with knowledge of memory, I/O devices and interrupts.	S	M	S	M	W	W	M	S	M	S		M	W	M		S	M	M
PROCESSES AND OPERATING SYSTEMS	Able to handle multiple tasks, processes by implementing the concepts of context switching, IPC, Message Passing and signals.	M	S	W	S	W		M	W	M	M	W		W	M		S	W	M
EMBEDDED SOFTWARE	Able to write program for real embedded systems in c and assembly language with real time constraints by using embedded software development tools.	S	M	W	S	W	W	S	M	S	S	W			W	S	S		
EMBEDDED SYSTEM DEVELOPM ENT	Can understand the existing embedded systems with few real time case studies and able to design an embedded system for new application.	M	M	S	S	M	M	M	S	M	M	W	W		W	W	S	M	S