EMBEDDED SYSTEM DESIGN

VI SEMESTER: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEC551	**Elective**	3	-	-	3	30	70	100

Contact Classes: 45	**Tutorial Classes: 0**	**Practical Classes: Nil**	**Total Classes: 45**

OBJECTIVES:

The course should enable the students to:

I. Imbibe knowledge about the basic functions, structure, concepts and applications of Embedded Systems.
II. Understand Real time operating system concepts.
III. Analyze different tools for development of embedded software.
IV. Understand the architecture of advanced processors.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand basic concept of embedded systems.
2. Understand and analyze the applications in various domains of embedded system.
3. Develop embedded system development process and tools.
4. Understand and remember what is microcontroller, and core of the embedded system.
5. Understand the memory interface and assembly language programming process.
6. Understand the counters and timers of 8051 microcontroller.
7. Understand the embedded C programming in Keil IDE, and compiling.
8. Understand different concepts of display and keyboard interfacing using embedded C.
9. Understand different concepts of serial communication using embedded C.
10. Understand the RTOS concepts for firmware development.
11. Develop host and target machines for linking to embedded software.
12. Develop debugging techniques for testing on host machine.
13. Understand the advanced processors such as ARM and SHARC.
14. Understand the bus protocols such as I2C and CAN bus.
15. Design an application based on advanced technological changes.

UNIT-I	**EMBEDDED COMPUTING**	**Classes: 09**

Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, complex systems and microprocessor, classification, major application areas, the embedded system design process, , formalisms for system design, design examples

UNIT-II	**THE 8051 ARCHITECTURE**	**Classes: 09**

Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts. The Assembly Language Programming Process, Instructions of 8051 Programming Tools and Techniques, Simple Programs.

UNIT-III	INTRODUCTION TO EMBEDDED C AND APPLICATIONS	Classes: 09

Embedded systems programming in C , binding and running embedded C program in Keil IDE, dissecting the program, building the hardware.

Basic techniques for reading and writing from I/O port pins, LED interfacing, interfacing with keyboards, displays, D/A and A/D conversions, using embedded C interfacing

UNIT-IV	INTRODUCTION TO REAL – TIME OPERATING SYSTEMS	Classes: 09

Tasks and Task States, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Interrupt Routines in an RTOS Environment. Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine

UNIT-V	INTRODUCTION TO ADVANCED ARCHITECTURES	Classes: 09

ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus.

Text Books:

1. Wayne Wolf, "Principles of Embedded Computing System Design", Elseveir., 2nd Edition 2014,
2. Kenneth J.Ayala, "The 8051 Microcontroller", Thomson, 3rd Edition 2016,.
3. Dr. K V K K Prasad, "Embedded / Real-Time Systems : Concepts, Design And Programming", Black Book , DreamTech Press, ISBN: 9788177224610
4. Embedded systems an integrated approach by lyla b das

Reference Books:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.
7. 8051 Microcontroller and Embedded Systems, by Muhammad Ali Mazadi,Janice Mazidi,Janice Gillispie Mazdi

Web References:

1. https://www.smartzworld.com/notes/embedded-systems-es/
2. http://notes.specworld.in/embedded-systems-es/
3. http://education.uandistar.net/jntu-study-materials
4. http://www.nptelvideos.in/2012/11/embedded-systems.html

E-Text Books:

1. https://www.scribd.com/doc/233633895/Intro-to-Embedded-Systems-by-Shibu-Kv
2. http://www.ee.eng.cmu.ac.th/~demo/think/_DXJSq9r3TvL.pdf
3. https://www.scribd.com/doc/55232437/Embedded-Systems-Raj-Kamal
4. https://docs.google.com/file/d/0B6Cytl4eS_ahUS1LTkVXb1hxa00/edit