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| COURSE CODE: 1152EE120 | COURSE TITLE: EMBEDDED SYSTEMS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |
| COURSE CATEGORY: | | | | | |
| Program Elective | | | | | |
| PREAMBLE : | | | | | |
| This Course aims to enable the students to gain a fair knowledge on concepts, characteristics and applications of embedded systems to Electrical Engineering and also it will make the students familiarize with real-time. | | | | | |
| PREREQUISITE COURSES: | | | | | |
| Microprocessor & Microcontroller. | | | | | |
| RELATED COURSES: | | | | | |
| Embedded System Design | | | | | |
| COURSE EDUCATIONAL OBJECTIVES : | | | | | |
| The objectives of the course are to make the students, | | | | | |
| <ul style="list-style-type: none"> • To teach students all aspects of the design and development of an embedded system, including hardware and embedded software development. • To learn and understand the characteristics of embedded systems and its architectures. • Understanding and experience of state of – the - practice industrial embedded systems and intelligent embedded system development. • To understand the operation of real time systems. | | | | | |
| COURSE OUTCOMES : | | | | | |
| Upon the successful completion of the course, students will be able to: | | | | | |
| CO Nos. | Course Outcomes | Knowledge Level (Based on revised Bloom's Taxonomy) | | | |
| CO1 | Explain the definitions, components and requirements of the Embedded System. | K2 | | | |
| CO2 | Describe the processor, architecture and memory organisation of the Embedded System. | K2 | | | |
| CO3 | Develop the interfacing and communication techniques of the Embedded System. | K3 | | | |
| CO4 | Explain the I/O, testing and applications of the Embedded System. | K2 | | | |
| CO5 | Describe the definitions, characteristics and issues of real time systems and Develop the algorithm for real time applications | K2 | | | |

CORRELATION OF COs AND POs

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | | M | M | | M | | | H | L | M | M | L |
| CO2 | M | M | | H | | | | H | L | | | L |
| CO3 | | L | L | H | | | | | | M | | |
| CO4 | | | M | | | | | H | L | H | | |
| CO5 | | M | | H | M | | | H | L | | M | L |

COURSE CONTENT:**UNIT I | INTRODUCTION TO EMBEDDED SYSTEMS | 9**

Introduction to Embedded Systems - definitions and constraints; Structures - Components - Hardware and Processor Requirements - Device and Device drivers - Examples of embedded systems.

UNIT II | EMBEDDED PROCESSORS & MEMORY | 9

Special Purpose Processors - General Purpose Processors - Architectural Issues: ARM, PIC, CISC, RISC, DSP Architectures - Memory - Memory Organization.

UNIT III | EMBEDDED INTERFACING & COMMUNICATION | 9

Memory Interfacing - Bus, Protocols & ISA Bus Interfacing - USB Interfacing - AD/DA interfacing - Parallel Data Communication - Serial Data Communication - Network Communication - Wireless Communication.

UNIT IV | EMBEDDED SYSTEM I/O, TESTING & APPLICATION | 9

Timer – Interrupts – DMA – USB & IrDA - Testing - BIST - Open-loop and Closed Loop Control Systems - Application Examples: Washing Machine, Automotive Systems, Auto-focusing digital camera, Air-conditioner, Elevator Control System, ATM System.

UNIT V | REAL TIME EMBEDDED SYSTEM | 9

Introduction - Definition & characteristics of real-time systems - Issues in real time computing - Structure and performance measures of a real time system - Classical Uniprocessor scheduling algorithms - Uniprocessor scheduling of IRIS tasks - Mode changes - Fault tolerant scheduling.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Raj Kamal, "Embedded Systems", Tata McGraw Hill, 1st Edition, 2004
2. David Simon, "An Embedded Software Primer", Addison Wesley, 2000.
3. RTS: Real-Time Systems, by C.M. Krishna and Kang G. Shin, McGraw-Hill, 1997, ISBN 0-07-057043.
4. Jean J.Labrosse, "Embedded system building blocks", CMP books, 2nd Edition, 1999

REFERENCE BOOKS:

1. R. Mall, Real Time Systems Theory and Practice, Pearson, 2008.
2. T. Noergaard, "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Newness 2005.
3. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.