

COURSE CODE	COURSE TITLE	L	T	P	C
1151IT116	Embedded Programming	3	0	0	3

Course Category: Program Core

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**a. Preamble:**

Embedded systems are increasingly complex and have to fulfill a wide range of competing constraints: development cost, unit cost, reliability, security, size, performance, power consumption, flexibility, time to market, maintainability, etc. In order to meet these constraints the right balance between the hardware and software components has to be achieved. In this context, the task of designing such systems is becoming increasingly important and difficult at the same time. The spectacular growth and rapid commercialization of VLSI, DSP & Embedded techniques have forced the research and engineering academic community with a serious challenge: either gain working knowledge or risk obsolescence. For making the students industry ready, it is essential to train the young faculty. Keeping this in view, 5 day refresher course is planned. This course aims at imparting the state of art in Embedded technologies. Participants learn the essential concepts of embedded systems development through a practical hands-on approach utilizing industry design automation (EDA) tools and design kits

**b. Pre-requisites:**

Sl. No	Course Code	Course Name
1	1151IT103	Computer Organization and Digital Design

**c. Related Courses**

Sl.No	Course Code	Course Name
1	1156IT701	Major Project

**D. Course Outcomes:**

CO Nos	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
CO1	Explain embedded system concept	K3
CO2	Describe the embedded operating system	K3
CO3	Illustrate the hardware fundamentals of embedded system	K3
CO4	Demonstrate RTOS	K2
CO5	List the development tools and explain	K3

#### f. Correlation of COs with Program Outcomes

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

H- High; M-Medium; L-Low

#### g. SYLLABUS CONTENT

##### PROGRAMMING EMBEDDED SYSTEMS

Embedded Program – Role of Infinite loop – Compiling, Linking and locating – downloading and debugging – Emulators and simulators processor – External peripherals – Memory testing – Flash Memory.

##### OPERATING SYSTEM

Embedded operating system – Real time characteristics – Selection process – Flashing the LED – serial ports – Zilog 85230 serial controlled code efficiency – Code size – Reducing memory usage – Impact of C++.

##### HARDWARE FUNDAMENTALS

Buses – DMA – interrupts – Built-ins on the microprocessor – Conventions used on schematics – Microprocessor Architectures – Software Architectures – RTOS Architectures – Selecting and Architecture.

##### RTOS

Tasks and Task states – Semaphores – Shared data – Message queues, Mail boxes and pipes – Memory management– Interrupt routines – Encapsulating semaphore and queues – Hard Real-time scheduling – Power saving.

##### EMBEDDED SOFTWARE DEVELOPMENT TOOLS

Host and target machines – Linkers / Locators for Embedded Software – Debugging techniques – Instruction set simulators Laboratory tools – Practical example – Source code.

##### REFERENCE BOOKS

1. David E.Simon, “An Embedded Software Primer”, Perason Education, 2003.
2. Michael Bass, “Programming Embedded Systems in C and C++”, Oreilly, 2003.