PEI8J002   EMBEDDED SYSTEMS

University Level: 80%

MODULE – I   10 Hours

Embedded System: Understanding the Basic Concepts:
Introduction to Embedded System: Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, 'Smart' running shoes from Adidas – The Innovative bonding of Life Style with Embedded Technology.
The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.

MODULE – II   12 Hours

Characteristics and Quality Attributes of Embedded System: Characteristics of Embedded System, Quality Attributes of Embedded System.
Embedded Systems – Application and Domain Specific: Washing Machine – Application Specific Embedded System, Automotive – Domain Specific Example for Embedded System.
Hardware Software Co-Design and Program Modeling: Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modeling Language (UML), Hardware Software Trade-offs.

MODULE – III 12 Hours

Design and Development of Embedded Product:
Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.
Embedded Firmware Design and Development: Embedded firmware Design Approaches, Embedded firmware Development Languages, Programming in Embedded 'C'.
Real Time Operating System (RTOS) based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronisation, Device Drivers, How to choose an RTOS.

MODULE – IV 14 Hours

Design and Development of Embedded Systems:
An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (COS-II) RTOS:

VxWorks, MicroC/OS-II (COS-II).

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware & Firmware, Board Power up.

The Embedded System Development Environment: Integrated Development Environment
(IDE), Types of files generated on cross-compilation, Disassembler/Decompiler, Simulators, Emulators & Debugging, Target Hardware Debugging, Boundary Scan.

Product Enclosure Design & Development: Product Enclosure Design Tools, Product Enclosure Development Techniques

Text Book:

1. Shibu K.V., *Introduction to Embedded Systems*, Tata McGraw Hill Education Private Limited, New Delhi, 2009.

Reference Book:

2. *J.K.Peckol, Embedded Systems, A Contemporary Design Tool, Wiley Student edition,*
3. *Peter Marwedel, Embedded System Design,Springer, 2006 http://ls12-www.cs.uni- dortmund.de/~marwedel/kluwer-es-book/*
4. *Wayne Wolf, Computers as Components, Morgan Kaufmann,*
5. *2001 http://www.ee.princeton.edu/~wolf/embedded-book*
6. *Michael Barr, Programming Embedded Systems in C and C++, O'Reilly, 1999.*
7. *David E. Simon, An Embedded Software Primer, Addison Wesley, 1999.*
8. *Jack Ganssle, The Art of Designing Embedded Systems, Newnes, 2000.*
9. *K. Short, Embedded Microprocessor System Design, Prentice Hall, 1998.*
10. *C. Baron, J. Geffroy and G. Motet, Embedded System Applications, Kluwer, 1997.*
11. *Raj Kamal, Embedded Systems – Architecture, Programming and Design,*
12. *Tata McGraw Hill Publishing Company Limited, New Delhi*