

PET7J006 EMBEDDED SYSTEM DESIGN

MODULE – I

(8 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.

The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.

Characteristics and Quality Attributes of Embedded System.

Hardware Software Co-Design and Program Modelling: Fundamental Issues in Hardware Software Co-Design.

MODULE – II

(8 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.

MODULE – III

(8 Hours)

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

(8 Hours)

Design and Development of Embedded Systems:

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.

Embedded Product Development Life Cycle (EDLC): Definition and Objectives of EDLC, Different Phases of EDLC, EDLC Approaches (Modelling the EDLC).

ADDITIONAL MODULE (Terminal Examination-Internal) (8 Hours)

Major Application Areas of Embedded Systems.

Embedded Systems: Application and Domain Specific: Washing Machine: Application Specific Embedded System, Automotive: Domain Specific Example for Embedded System; Computational Models in Embedded Design, Introduction to Unified Modelling Language (UML), Hardware Software Trade-offs; Programming in Embedded 'C'.

An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (μ COS-II) RTOS: VxWorks, MicroC/OS-II (μ COS-II); Boundary Scan;

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

Trends in the Embedded Industry: Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends, Open standards, Frameworks and Alliances, Bottlenecks.

Text Book:

- 1) Introduction to Embedded Systems, Shibu K.V., TMH Private Limited, New Delhi, 2009.

Reference Book:

- 2) An Embedded Software Primer, David E. Simon, Addison Wesley, 1999.
- 3) The Art of Designing Embedded Systems, Jack Ganssle, Newnes, 2000
- 4) Embedded Microprocessor System Design, K. Short, Prentice Hall, 1998.
- 5) Embedded System Applications, C. Baron, J. Geffroy and G. Motet, Kluwer, 1997.
- 6) Embedded Systems – Architecture, Programming and Design, Raj Kamal, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th reprint 2007.
- 7) Embedded system design. Modeling synthesis and verification, Daniel Gajski. BSP BOOKS PVT LTD.