OEI751 INTRODUCTION TO EMBEDDED SYSTEMS

DETAILED SYLLABUS

OBJECTIVES:

- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in Various processor scheduling algorithms.
- To introduce Basics of Real time operating system and example tutorials to discuss on one real-time operating system tool

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor, selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols -RS232 standard – RS422 – RS485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object-oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication-shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, µC/OS-II, RT Linux.

UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT

Case Study of Washing Machine- Automotive Application- Smart card System Application,

OUTCOMES:

- Ability to understand and analyse, linear and digital electronic circuits.

TEXT BOOKS:

1. Rajkamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.

2. Peckol, "Embedded system Design", John Wiley & Sons,2010

3. Lyla B Das," Embedded Systems-An Integrated Approach", Pearson, 2013

REFERENCES:

1. Shibu. K.V, "Introduction to Embedded Systems", Tata Mcgraw Hill,2009.

2. Elicia White," Making Embedded Systems", O' Reilly Series, SPD,2011.

3. Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.

4. Han-Way Huang," Embedded system Design Using C8051", Cengage Learning,2009.

5. Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2007.