BIT 451

EMBEDDED SYSTEMS

UNIT-I

Embedded Computing: Introduction, Complex Systems and Microprocessor, 1be Embedded System Design Process, Formalisms for System Design, Design Examples. The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT-II

Basic Assembly Language Programming Concepts: Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT-III

Applications: Interfacing with Keyboards, Displays, D/A and NO Conversions, Multiple Interrupts, Serial Data Communication. Introduction to Real- Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-IV

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT-V

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Net advanced embedded systems: Bus protocols, 12C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller. 2

Suggested Reading:

1) Wayne Wolt, "Computers and Components", Elsevier.
2) Kenneth J.Ayala, "The 8051 Microcontroller", Third Edition, Thomson.
3) David E. Simon, "An Embedded Software Primer", Pearson Education
4) Raj Kamal, "Embedded Systems", Tata McGraw Hill.
5) Ajay V Deshmllkhi, "Micro Controllers", Tata McGraw Hill.
6) Frank Vahid, Tony Givargis, John Wiley, "Embedded System Design, Wiley Student Edition