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|  |  | |  | | | | |
| Hours / Week | : | 4 | |  | Sessional Marks | : | 40 |
| Credits | : | 4 | |  | End Examination Marks | : | 60 |

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| **UNIT - I** |
| **Embedded Computing**: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples. |
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| **UNIT – II** |
| **The 8051 Architecture**: Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts.  Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. |
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| **UNIT – III** |
| Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.  **Applications**: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication. |
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| **UNIT – IV** |
| **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. |
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| **UNIT – V** |
| **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 µC 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. |
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| TEXT BOOKS |
| 1. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elseveir. 2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson. 3. An Embedded Software Primer, David E. Simon, Pearson Education. |
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| REFERENCE BOOKS |
| 1. Embedding system building blocks, Labrosse, via CMP publishers. 2. Embedded Systems, Raj Kamal, TMH. 3. Micro Controllers, Ajay V Deshmukhi, TMH. 4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley. 5. Microcontrollers, Raj kamal, Pearson Education. |