

<b>B. Sc. III Year</b>		<b>BPH-E604</b>		<b>Semester-VI</b>	
<b>DSE 2</b>		<b>EMBEDDED SYSTEM: INTRODUCTION TO MICROCONTROLLERS</b>			
Total Lectures	Time Allotted for End Semester Examination	Marks Allotted for Continuous Assessment	Marks Allotted for End Semester Examination (ESE)	Maximum Marks (MM)	Total Credits
<b>60</b>	<b>2 Hrs</b>	<b>30</b>	<b>70</b>	<b>100</b>	<b>04</b>

NOTE: The question paper shall consist of TWO sections (Sec.-A, Sec.-B). Sec.-A shall contain 10 short answer type questions of Five mark each and student shall be required to attempt any Five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

**Embedded system introduction:** Introduction to embedded systems and general purpose computer systems, architecture of embedded system, classifications, applications and purpose of embedded systems, challenges and design issues in embedded systems, operational and non-operational quality attributes of embedded systems, elemental description of embedded processors and microcontrollers.

**(6 Lectures)**

**Review of microprocessors:** Organization of Microprocessor based system, 8085 $\mu$ p pin diagram and architecture, concept of data bus and address bus, 8085 programming model, instruction classification, subroutines, stacks and its implementation, delay subroutines, hardware and software interrupts.

**(4 Lectures)**

**8051 microcontroller:** Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

**(12 Lectures)**

**8051 I/O port programming:** Introduction of I/O port programming, pin out diagram of 8051 microcontroller, I/O port pins description and their functions, I/O port programming in 8051, (Using Assembly Language), I/O programming: Bit manipulation.

**(4 Lectures)**

**Programming of 8051:** 8051 addressing modes and accessing memory using various addressing modes, assembly language instructions using each addressing mode, arithmetic & logic instructions, 8051 programming in C:- for time delay and I/O operations and manipulation, for arithmetic & logic operations, for ASCII and BCD conversions.

**(12 Lectures)**

**Timer and counter programming:** Programming 8051 timers, counter programming.

**(3 Lectures)**

**Serial port programming with and without interrupt:** Introduction to 8051 interrupts, programming timer interrupts, programming external hardware interrupts and serial communication interrupt, interrupt priority in the 8051.

**(6 Lectures)**

**Interfacing 8051 microcontroller to peripherals:** Parallel and serial ADC, DAC interfacing, LCD interfacing. **(2 Lectures)**

**Programming Embedded Systems:** Structure of embedded program, infinite loop, compiling, linking and locating, downloading and debugging. **(3 Lectures)**

**Embedded system design and development:** Embedded system development environment, file types generated after cross compilation, disassembler/ decompiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry. **(8 Lectures)**

#### **Reference Books**

- Embedded Systems: Architecture, Programming & Design, R. Kamal, 2008, Tata McGraw Hill
- The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A.Mazidi, J.G. Mazidi, and R.D. McKinlay, 2<sup>nd</sup> Ed., 2007, Pearson Education India.
- Embedded Microcomputer System: Real Time Interfacing, J.W. Valvano, 2000, Brooks/Cole
- Microcontrollers in practice, I.Susnea and M.Mitescu, 2005, Springer.
- Embedded Systems: Design & applications, 1/e S.F. Barrett, 2008, Pearson Education India
- Embedded Microcomputer systems: Real time interfacing, J.W.Valvano 2011,Cengage Learning.