



## EMBEDDED SYSTEMS (PSIT301) SYLLABUS

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|---|--|--|
| 1 | <p><b>Introduction</b><br/>         What is an Embedded System, Embedded System Vs, General Computing System.</p> <p><b>The Typical Embedded System</b><br/>         Core of Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware.</p> <p><b>Characteristic and quality attributes of Embedded System</b><br/>         Characteristics of an Embedded System, Quality Attributes of Embedded System.</p> <p><b>Embedded product development life cycle</b><br/>         What is EDLC, Why EDLC? Objectives of EDLC, Different Phases of EDLC.</p>  | <p><b>B1</b><br/> <b>Ch</b><br/> <b>1,2,3,15</b></p> |
| 2 | <p><b>Hardware Software Co-design and Program Modelling</b><br/>         Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modelling Language (UML), Hardware Software Trade-offs.</p> <p><b>Embedded Hardware design and development</b><br/>         Analog Electronic Components, Digital Electronic Components, Electronic design Automation (EDA) Tools, The PCB Layout design.</p> <p><b>Embedded Firmware design and development</b><br/>         Embedded Firmware Design Approaches, Embedded Firmware Development Languages</p> <p><b>Real Time Operating System(RTOS)</b><br/>         Operating System Basics, Types of Operating Systems, Device Drivers, How to choose an RTOS</p> | <p><b>B1</b><br/> <b>Ch</b><br/> <b>7,8,9,10</b></p> |
| 3 | <p><b>Memories and Memory Subsystem</b><br/>         Introduction, Classifying Memory, A general Memory Interface, ROM Overview, Static RAM Overview, Dynamic RAM Overview, Chip Organization, A SRAM Design, A DRAM Design, The DRAM Memory Interface, The Memory Map, Memory Subsystem Architecture, Basic Concepts of Caching, Design a cache system, Dynamic Memory Allocation, Testing Memories.</p>  | <p><b>B3</b><br/> <b>Ch 4</b></p>                    |
| 4 | <p><b>Programming Concept and Embedded Programming in C/C++ and Java</b><br/>         Software programming in Assembly Language (ALP) and in High-level Language 'C', C program Elements: Header and Source Files and Pre-processor Directives, Program Elements: Macros and Functions, Program Elements: Types, Data Structures, Modifiers, Statements, Loops and Pointers, Object-Oriented Programming, Embedded Programming in C++, Embedded Programming in Java.</p>   | <p><b>B2</b><br/> <b>Ch 5</b></p>                    |
| 5 | <p><b>Trends in the Embedded Industry</b><br/>         Processor trends in Embedded System, Embedded OS Trends, Development Language Trends, Introduction of PIC Family of Microcontrollers, Introduction of ARM Family of Microcontrollers,<br/>         Introduction of AVR Family of Microcontrollers.</p>  | <p><b>B1</b><br/> <b>Ch 16</b></p>                   |

## Books / References

| Title  | Ch No | Title  |
|--|-------|--|
| 1. Introduction to embedded systems - Shibu K. V                     | 1     | Introduction to embedded Systems                               |
|  | 2     | Typical Embedded System  |
|  | 3     | Characteristics & Quality Attributes of Embedded Sys           |
|  | 15    | Embedded Product Development Life Cycle                        |
|  | 7     | Hardware Software Co-design and Program Modelling              |
|  | 8     | Embedded Hardware design and development                       |
|  | 9     | Embedded Firmware design and development                       |
|  | 10    | Real Time Operating System(RTOS)                               |
|  | 16    | Trends in the Embedded Industry                                |
|  | App-I | Introduction of PIC, AVR & ARM Family of Micro-con             |
| 2. Embedded Systems Architecture, Programming and Design - Raj Kamal | 5     | Programming Concept and Embedded Programming in C/C++ and Java |
| 3. Embedded Systems: A Contemporary Design Tool. - James K. Peckol   | 4     | Memories and Memory Subsystem                                  |

## Practicals (PSIT3P1):

|                   |   |
|-------------------|---|
| 1<br>(Compulsory) | Study of hardware components<br>1. 8051 Microcontroller<br>2. Resistors (color code, types)<br>3. Capacitors<br>4. ADC, DAC<br>5. Operational Amplifiers<br>6. Transistors, Diode, Crystal Oscillator<br>7. Types of Relays<br>8. Sensors<br>9. Actuator<br>10. Types of connectors |
| 2                 | WAP to blink an LED   |
| 3                 | WAP block transfer of data  |
| 4                 | WAP to serial data interface  |
| 5                 | WAP for the keypad and LCD interface  |
| 6                 | Implement mouse driver program using MSDOS interrupt  |
| 7                 | WAP to implement ADC0808 with 8051 microcontroller  |
| 8                 | WAP to simulate elevator functions  |
| 9                 | WAP to interface stepper motor controller   |
| 10                | WAP to simulate traffic signals   |