1. Introduction to Embedded Systems
   - Participants and Trainer Introduction
   - Applications of Embedded Systems
   - Domains of Embedded System
   - Case study: Embedded Systems v/s standard Computer System
   - Case study: Embedded System
   - Block Diagram: General Embedded System
   - Classification of Processors
   - Micro- Processor v/s Micro-controller
   - Programming of Embedded Systems
   - Product Development Lifecycle : Embedded Systems

2. Introduction to AVR atmega16/atmega32
   - Basic Components of AVR
   - Block Diagram: AVR
   - Other features of AVR
   - Pin Description
   - Examples of Embedded systems
   - Criteria in Choosing a Microcontroller
   - AVR Microcontroller Family
   - AVR Hardware Details
   - External Crystal, Power on Reset Circuitry
   - RAM organization

3. Introduction to Software Development Tools for AVR
   - Introduction to IDE
   - Components of IDE
   - Linker
   - Debugger
   - Atmel studio IDE
   - Introduction to Proteus
   - Using Proteus Simulator

4. Inside atmega16
   - Block Diagram
   - Inside ATmega16
   - ATmega16 Basic Components
   - Important Pins
   - On-Chip Internal RAM
5. **GPIO (General Purpose Input Output)**
   - Exploring the Capabilities of On-Chip Resources Programming for I/O Ports
   - Pin Diagram: ATmega16
   - Registers
   - Pin Description
   - Port Alternate Functions
   - Multiplexing Technique

6. **Port Programming**
   - Playing with the Ports
   - Program 1: Simulated Port Testing Using ATMEL STUDIO
   - Program 2: Sending Out Different Contents to Ports
   - Program 3: Generating Square Wave on the Port
   - Program 4: Configuring the Ports as Input
   - Program 5: Software Delay Loops Combined with I/O Ports
   - Program 6: Alternate Method of Soft. Delay Generation with Port Programming
   - Program 7: Exploring Bit Capabilities of the Microcontroller

7. **LED Interfacing**
   - LED Interfacing
   - Benefits and Application
   - Circuit Description
   - Interfacing Circuit

8. **Switch Interfacing**
   - Switch Interfacing
   - Circuit Description
   - Interfacing Circuit
   - Selecting a Resistor Value

9. **Keypad Matrix Interfacing**
   - Keypad Matrix Interfacing
   - Programming Steps

10. **LED Matrix Interfacing**
    - LED Matrix Interfacing
    - Interfacing Circuit
    - Programming Steps
11. Seven Segment Interfacing
   - Seven Segment Interfacing
   - Programming Steps

12. LCD Interfacing
   - LCD Interfacing
   - Circuit Description
   - LCD Commands
   - Interfacing Circuit

13. Motor Interfacing
   - DC Motor Interfacing
   - Interfacing Circuit
   - Stepper Motor Interfacing
   - Types of Stepper Motors
   - Interfacing Circuit
   - Servo Motor Interfacing
   - Interfacing Circuit

14. Relay Interfacing
   - Relay Interfacing
   - Types of Relays
   - Interfacing Circuit

15. ADC Interfacing
   - 8-bit mode Interfacing
   - 10-bit mode Interfacing

16. Timer 0, Timer1 and Timer2
   - Block Diagram
   - Timer 0 and Timer1
   - Timer Registers
   - Compare /Capture/PWM modes operation

17. Universal Asynchronous Receiver & Transmitter (UART)
   - Block Diagram
   - Universal Asynchronous Receiver & Transmitter (UART)
   - RS232 Protocol
   - Setting the Baud Rate
18. Interrupts

- Block Diagram
- Interrupts in Microcontrollers
- Interrupt Registers
- A Word about Interrupt Latency
- Example program and Initialization Steps

19. Inter-Integrated Circuit (I2C)

- Inter-Integrated Circuit (I2C)
- Master mode
- Slave mode

20. Serial Peripheral Interface (SPI)

- Serial Peripheral Interface (SPI)
- Data Transmission
- SPI Bus Topologies
- Advantages and Disadvantages
- Fundamentals
- Pin description