Embedded Systems

1. **Introduction of Microprocessor & Microcontroller:**
   Introduction of Architecture of Microprocessor & Microcontroller.

2. **Introduction of embedded system, Features of embedded system.**
   Application of embedded system Practical Examples Characteristics Types of Embedded Systems.

3. **Hardware Software Co-design:**
   Challenges in embedded computing design Co-design Process Why co-design Architecture.

4. **Introduction to ATmega/Arduino:**
   Arduino Boards, which Arduino is best? Memory map of Arduino, pin configuration ATmega328 features.

5. **Register map ATmega328:**
   Arduino C functions vs register commands.

6. **Introduction to simulation software/editors:**
   Proteus: know-how TinkerCAD introduction.

7. **Basics Programs with Atmega/Arduino:**
   LED interfacing in proteus and TinkerCAD Controlling LED with a Switch.

8. **Basics Programs with Atmega/Arduino:**
   LED with serial-port LED with switch + serial port.

9. **Advanced Programming: Interfacing 8 LEDs with a single port of ATmega/ Arduino and displaying 10+ different patterns:**
   All on-off First four on-off Odd-Even Left-shift and right-shift Curtain effect: left and right Converge and Diverge.

10. **Advanced Programming: : Seven Segment Display Theory and Practical Use of millis function instead of delay and its advantages:**
    Concept and types of segments Interfacing with Arduino/ATmega Single-Digit, 2-digit and 4-digit Controlling each stripe of seven segment.

11. **Liquid Crystal Display theory and practical:**
    Concept of LCD The internal architecture of LCD with pin configuration Internal registers of LCD Algorithm to send data and commands to LCD from Microcontroller Difference between 4-bit and 8-bit LCD operation.

12. Advanced Programming: Interfacing LCD with Arduino to:

Displaying various patterns and Effects Process of creating custom characters on LCD Hex commands of LCD.

13. Introduction to motors and actuators:

Interfacing different types of motors with Arduino/ATmega.

14. Projects:

Interfacing LDR and displaying the light intensity data on LCD Designing a traffic light controller using LEDs and Seven Segment Interfacing temperature sensor and displaying the readings on LCD Interfacing LEDs, LCD and Motor: all the same time to Arduino/ATmega.