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| **SL** | **Topic** | **Description** | **Class** | **Date** | **Time** | **Trainer** |
| 1 | Introduction to Embedded System & Microcontroller | a) Introduction  b) Technology and Architecture details  c) Embedded System Design Flow | 1 | 23 Jan | 3:00-5:00 | Shamim |
| 2 | Electronics Basics | a) AC and DC power, Resistor, Capacitor, Inductor, voltage and current law,  b) Transistor, Op-Amp, Relay, Motor, etc.  c) Designing a simple electronic circuit. | 2 | 30 Jan | 3:00-5:00 | Shamim |
| 3 | Digital Logic and Number System | a) Digital logic gates, Boolean function and MOSFET  b) Adder, Encoder, Decoder, MUX, BCD-to-7 Segment, etc. concepts and IC’s Data sheet.  c) Binary, Decimal, Octal and Hexadecimal number systems and their conversions.  d) Designing a digital combinational circuit using logic gate IC’s. | 3 | 30 Jan | 5:00-7:00 | Shamim |
| 4 | Starting with Microcontroller | Datasheet of microcontroller  Pin configuration of microcontroller  Microcontroller programming using C  Syntax and Libraries, Data type, variable, array, functions, etc.  Setup simulation software, compiler, programmer, Proteus, etc. | 4 | 03 Feb | 6:00-8:00 | Hassan |
| 5 | Power Supply, PCB Design and Soldering | Project 01: Design of 5 Volt DC Power Supply   * Theory, circuit design, PCB design | 5 | 06 Feb | 3:00-  5:00 | Ferdaus |
| Project 02: Design of Variable voltage DC Power Supply   * Theory, circuit design, PCB design * PCB soldering. | 6 | 06 Feb | 5:00-7:00 | Ferdaus |
| 6 | I/O port Programming | Configuring Input pins and Output pins  Project 03: Scroll LED Effect  Project 04: Conditional LED Effect | 7 | 10 Feb | 6:00-8:00 | Hassan |
| 7 | Input and Output device Interfacing | 7-segment display  Project 05: Number & Text display on 7-segment | 8 | 13 Feb | 3:00-  5:00 | Hassan |
| LCD Display  Project 06: Text Display on LCD | 9 | 13 Feb | 5:00-7:00 | Hassan |
| 4x4 Keypad  Project 07: 4x4 Keypad Door Lock design | 10 | 16 Feb | 6:00-8:00 | Hassan |
| 8 | Interrupt | Handling Interrupts and Programming  Project 08: Interrupt Counter Design | 11 | 20 Feb | 3:00-  5:00 | Hassan |
| Project 09: Water Pump Controller Design | 12 | 20 Feb | 5:00-7:00 | Hassan |
| 9 | Analog to Digital Converter (ADC) | Handling ADC in Microcontroller:  ADC configuration and programming | 13 | 24 Feb | 6:00-8:00 | Hassan |
| Project 10: input analog data and convert that to digital using ADC module and then process the digital data and generate the output. | 14 | 27 Feb | 3:00-  5:00 | Hassan |
| Project 11: DC Voltmeter Design | 15 | 27 Feb | 5:00-7:00 | Hassan |
| 10 | Microcontroller Timer | Timer concept and Programming  Project 12: 1 second pulse  Project 13: Data read from Temperature Sensor | 16 | 03 Mar | 6:00-8:00 | Hassan |
| Project 14: Digital Clock | 17 | 06 Mar | 3:00-  5:00 | Hassan |
| 11 | Pulse Width Modulation (PWM) | PWM Concept and Programming  Project 15: Light Intensity Control | 18 | 06 Mar | 5:00-7:00 | Hassan |
| Project 16: Motor Speed Control | 19 | 10 Mar | 6:00-8:00 | Hassan |
| 12 | USART Communication | Project 17: UART Transmitter | 20 | 13 Mar | 3:00-  5:00 | Hassan |
| Project 18: UART Receiver | 21 | 13 Mar | 5:00-7:00 | Hassan |
| 13 | I2C Communication | Project 19: Data Read/Write from EEPROM | 22 | 17 Mar | 6:00-8:00 | Hassan |
| Project 20: Temperature Logger | 23 | 20 Mar | 3:00-  5:00 | Hassan |
| 14 | Review/Make-up  Assigning projects | Review/Make-up Class  Individual project will be assign to each student to be submitted by 28 days. | 24 | 20 Mar | 5:00-7:00 | Hassan |
| 15 | Evaluation Exam | Evaluation Exam of duration 1.5 hour.  Discussion on working process and submission of assigned project.  (Participation in the exam and submit the project is mandatory for getting the course certificate.) | 25 | 24 Mar | 6:00-8:00 | Shamim |

**Course Materials:**

1. Microcontroller Development Kit (Techshop/PiLabs)
2. CAD Tools (Proteus 7.10 Professional, C Compiler, Program loader, etc.)
3. E-books and Tutorials