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| **Embedded Systems and IoT Laboratory** |

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| **Course Code** | **18CSL68** | **Credits** | 1.5 |
| **Course type** | LAB | **CIE Marks** | 25 marks |
| **Hours/week: L-T-P** | 0-0-3 | **SEE Marks** | 25 marks |
| **Total Hours:** | 36 | **SEE Duration** | 3 Hours for 50 marks |

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| **Course learning objectives** | |
| 1. | To present the techniques of interfacing LED, LCD, DAC and Sensors with 8051 Microcontroller |
| 2. | To present the techniques of interfacing DHT11, LDR and Relay with Arduino/ Raspberry Pi SBC |
| **Pre-requisites:** Basic Electronics, Computer Organization, Digital Electronics | |
| **List of experiments** | |

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| **Sl. No** | **Title of the Experiment** | **Connection Details** |
|  | Develop an 8051 ‘C’ program to implement MOD-4 (UP/ DOWN) counter on LEDs connected to Port 2. Include **1second** delay between each count. Generate delay using ***for loop***. | Port 2 to CN11 |
|  | Develop an 8051 ‘C’ program to implement MOD-4 (UP/ DOWN) counter on LEDs connected to Port 2. Include **0.5 second** delay between each count. Generate delay using ***for loop.*** | Port 2 to CN11 |
|  | Develop an 8051 ‘C’ program to implement MOD-4 counter on LEDs connected to Port 2 using Hardware delay. Use Timer1 in Mode 1 to generate a delay of ---- ms. | Port 2 to CN11 |
|  | Develop an 8051 ‘C’ program to implement MOD-4 counter on LEDs connected to Port 2 using Hardware delay. Use Timer1 in Mode 2 to generate a delay of ---- ms. | Port 2 to CN11 |
|  | Develop an 8051 ‘C’ program to generate the following waveforms using DAC 0800 interface  i) Square  ii) Triangular | -- |
|  | Develop an 8051 ‘C’ program to generate the following waveforms using DAC 0800 interface  i) Rectangular wave with 70% duty cycle. Assume T=100ms  ii) Positive Ramp | -- |
|  | Develop an 8051 ‘C’ program to generate the following waveforms using DAC interface  i) Square  ii) Negative Ramp | -- |
|  | Develop an 8051 ‘C’ program to interface 2x16 LCD display and to display the following two strings. (Start displaying from 1st position on both lines)   1. KLS GIT 2. ESIoT LAB | Port 2 to CN6 |
|  | Develop an 8051 ‘C’ program to interface 2x16 LCD display and to display the following two strings. (Start displaying from 6th position on both lines)   1. CSE 2. BRANCH | Port 2 to CN6 |
|  | Develop an Embedded ‘C’ program to blink the LEDs connected to Arduino SBC upon pressing the push buttons. | CN9 to CN4 |
|  | Develop an Embedded ‘C’ program to interface the sensor DHT11 to Arduino SBC and display the data acquired from sensors on serial monitor. | RM2 to RM19 |
|  | Develop an Embedded ‘C’ program to control the relay through Arduino UNO. | RM17 to RM9 |
|  | Develop an Embedded ‘C’ program to interface the sensor LDR to Arduino SBC and display the data acquired from sensor on serial monitor. | RM3 to RM20 |
|  | Develop a python program for Raspberry Pi to turn “ON” and “OFF” the buzzer. | RM9 to RM17 |
|  | Develop an Embedded ‘C’ program to interface the sensor DHT11 to Arduino SBC and display the data acquired from sensors on serial monitor. Turn ON the relay when temperature is greater than 22 degree centigrade. | RM2 to RM19  And RM17 to RM9 |