Part 1: Practical Execution - Writing System Code in C (Requirement Suitable for the Personal Development Kit Based on the MSP430x2xx MCU Family):

The software of the system must be based on a Simple FSM architecture (see explanation in section L). The system should execute one of four actions given an external interrupt triggered by pressing one of the four buttons (PB3, PB2, PB1, PB0). These buttons are connected to the four pins P2.3 - P2.0 of the controller, and the LEDs array is connected to PORT1. Initially, the controller is in sleep mode.

(state=1) PB0: On pressing button PB0, an array predefined in the main function of length 9 containing the student's ID number should be displayed on the 8-bit LEDs array, showing the ID digits sequentially with an intermediate delay of 0.5 sec.

Note: Another state cannot "interrupt" this state before the defined operation completes.

(state=2) PB1: On pressing button PB1, a single LED should light up sequentially from right to left with a delay of 0.5 sec between counting values. The duration of the operation will be 7 seconds, storing the LED write value over time, so that on the next execution of the state, the LED will continue to jump from where it stopped.

Note: Another state cannot "interrupt" this state before the defined operation completes.

(state=3) PB2: On pressing button PB2, the system generates a PWM signal at a frequency of 4kHz with a 75% Duty Cycle on pin P2.7, outputting at the highest resolution.

Note: Another state can "interrupt" this state as its operation is infinite (i.e., it never finishes on its own).

(state=idle=0): When in the idle state, the controller turns off the LEDs and goes into sleep mode.